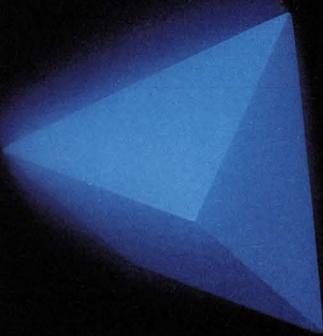


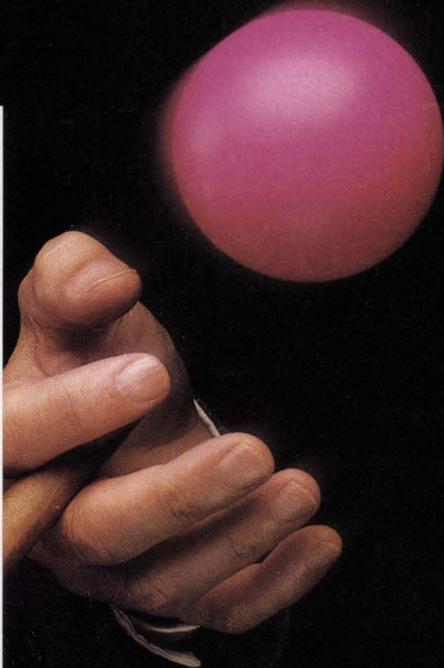
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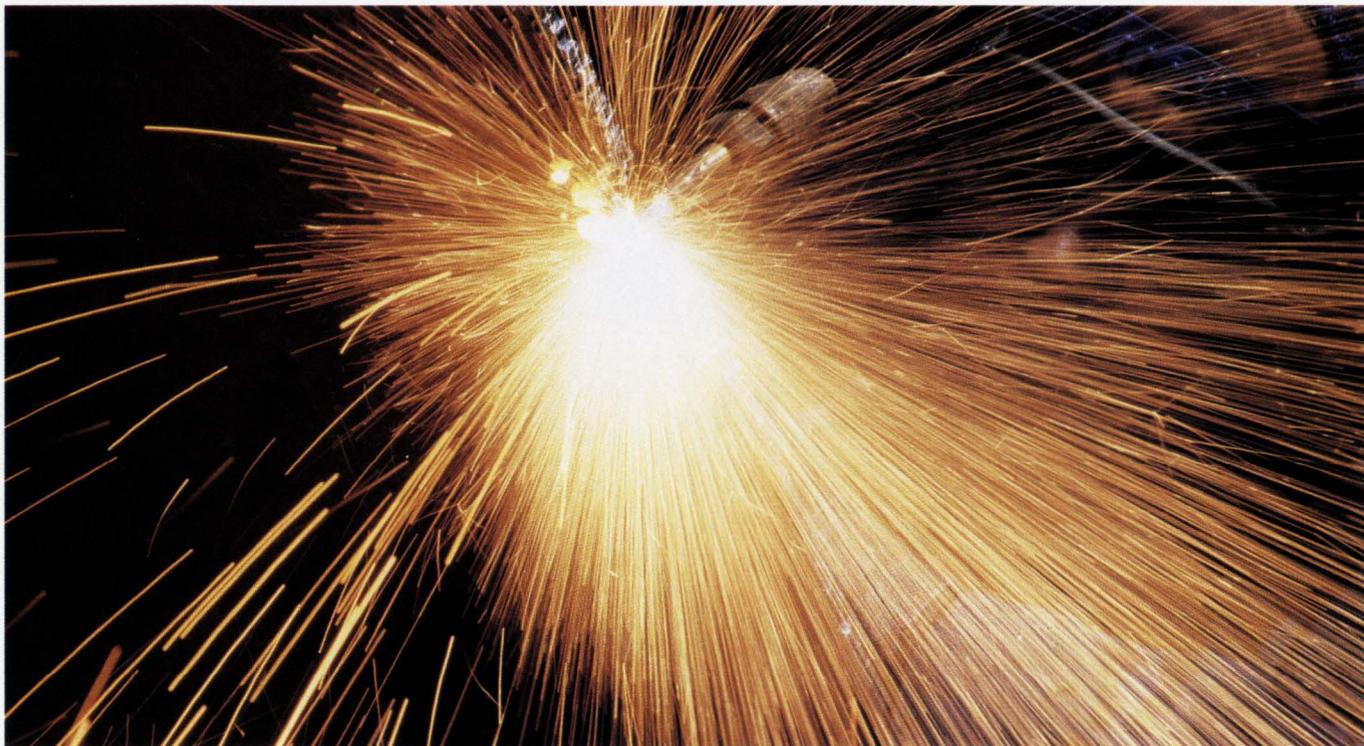
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- VDTs Soup Up To Meet the PC Challenge
- Fatal Flaws in SQL, Part Two

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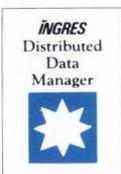
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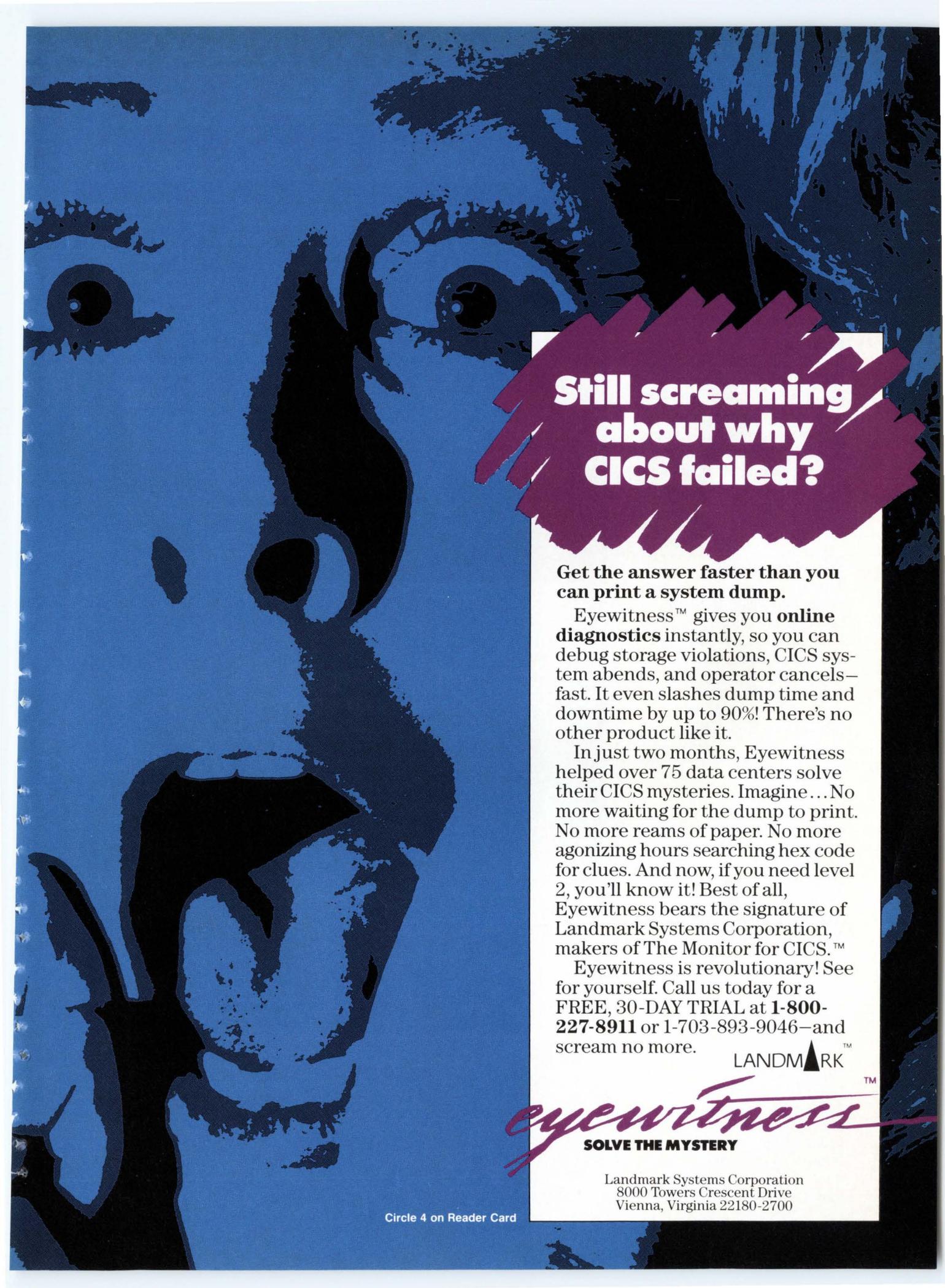
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DATAMAT

NEWS

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The U.S. Navy has a largely decentralized fleet of 200,000 micros. Its job is to determine how to bring the information they're gathering under control while migrating from DOS to OS/2 and Unix, all in the face of DOD's spending freeze. Willie Schatz reports.

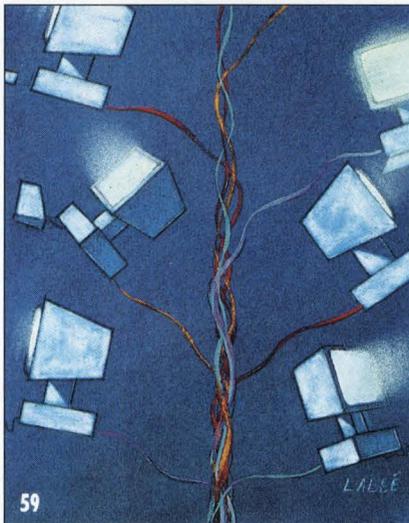
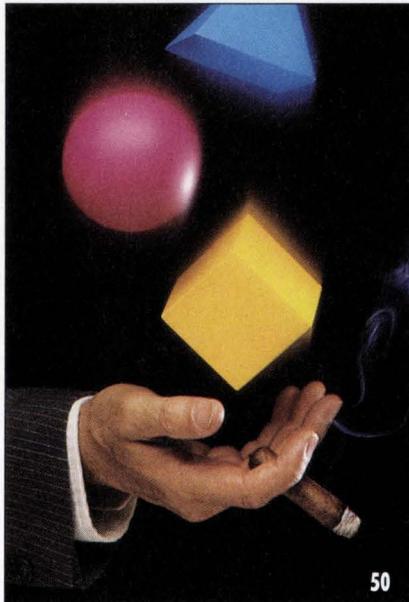
26 **Micro DBMS**

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33 **Supercomputing**

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As the computer industry reaches middle age, it finds the "anything goes" hardware experimentation of its youth becoming a memory. Vendors are conserving resources, but proprietary systems' day is not done. The trick is to find new ways to add value. With:

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BY NORM ALSTER

Financial institutions with a strong yen to spend helped the top 10 IS vendors in Japan grow 33%, or triple the revenue growth of chief IS suppliers in the U.S., in 1987. Minis were an increasingly strong market, but mainframes still top the market, and Fujitsu still leads the field. With financial data on:

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-14 **A European IS Culture For the 1990s**

BY ROGER TOMLIN

The focus of IS in the next decade will be on adding value in strategic applications for the business served. To accomplish this, coordinated management policies concerning IS development must be enacted.

Cover photograph by Walter Wick

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Editorial

Open Systems: On to Square Two

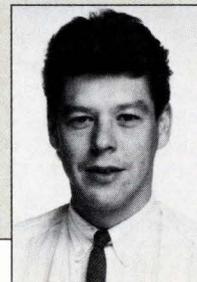
So, is everybody clear about open systems now? What it all means—how vital it is to economic and technological progress for the global IS community, and how much money we'll all save when there's a free information trade between systems? No? Well, that's no surprise.

For a start, there are so many visions of an open future that nobody has a clear view of what open systems really means. A proliferation of standards groups is as bad as a proliferation of different standards. Unless there is a rapid move to unify and coordinate these groups, open systems simply will never happen, and we'll always be stuck at square one.

Second, there is a disturbing 'me too' vogue among IS vendors. They all want to convince customers that they actively support the trend, they all want to make sure they don't get trapped in a proprietary corner, and the large ones in particular want to influence developments. Remember, the movement is over a decade old, particularly in Europe, and what we are seeing now is mostly packaging and vendor power games. Open systems runs the risk of becoming yet another battleground for open warfare among the vendors. Back to square one again, right? Well, almost.

Third, there is a sad lack of perspective. No one wants to wind up locked into open systems. While all the world's corporations will benefit from easier systems integration, they still will want to choose their own technological and business solutions. That's how they differentiate and achieve a competitive edge. In Ralph Emmett Carlyle's "RISC and Unix: Signs of Transitional Times" (p. 38), user Bob Evans puts it succinctly: "What we don't want is some homogenizing effect whereby Unix as the lowest common denominator forces us to sacrifice the value added by proprietary systems."

Let's have open systems—properly coordinated and as free as possible from single-vendor influence. Let's use those standards effectively to cut costs and ease integration—a goal best achieved by including users in the process. But let's not forget that there also must be the freedom for designers and users alike to go their own way, to develop innovative proprietary systems for the jobs they do best. All open systems can ever do is to provide a mature base for easy implementation. Once that happens, we can forget about them. The real challenge now is to develop a mature understanding of the limitations. That's square two.



PAUL TATE
INTERNATIONAL EDITOR

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Senior Editor Linda Runyan

Managing Editor/News & Features David R. Brousell

Senior Writer Ralph E. Carlyle

Deputy News Editor Theresa Barry

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EDITORIAL OFFICES

Headquarters: 249 W. 17 St., New York, NY 10011, (212) 645-0067; telex 127703; fax (212) 242-6987. **New England:** 199 Wells Ave., Newton, MA 02159, (617) 964-3730; **Washington, D.C.:** 4451 Albemarle St. NW, Washington, DC 20016, (202) 966-7100; **Central:** 9330 LBJ Freeway, Suite 1060, Dallas, TX 75243, (214) 644-3683; **Western:** 12233 W. Olympic, Los Angeles, CA 90064, (213) 826-5818; 582 Market St., Suite 1007, San Francisco, CA 94104, (415) 981-2595; 3031 Tisch Way, Suite 100, San Jose, CA 95128-2593, (408) 243-8838. **Internationals:** 27 Paul St., London EC2A 4JU, England, (44-1) 628-7030, telex 914911; CPO Box 665, Tokyo, Japan, (81-3) 201-2335, fax 2135053.

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Letters

So Fully Packed

I have been particularly interested by Marsha J. Fisher's article "Digital Paper Promises Cost, Storage Gains for Optical Media" (May 15, p. 32).

I discovered ICI Electronics "digital paper" product at CeBIT '88, in Hannover, West Germany. At the AIIM Show in Chicago the following month, during the ICI press conference, I asked the chief scientist from Creo a question that had been bugging me since Hannover. A standard (200 ISO) silver-halide color negative film contains 18 million pixels on a frame area of 24mm x 36mm (864mm²); the 24mm x 36mm area is the standard frame on a 35mm film, the most commonly used variety. (Color slide film, such as Kodachrome, has a much higher resolution, some 40 million pixels on the same 24mm x 36mm area.)

The ICI optical tape has a higher data storage density per square millimeter, and—in theory—is the first "electronic imaging" to have a better resolution power than conventional (silver halide) materials. I say "in theory" because, to my knowledge, as of today there is no hardware (CCDs) capable of recording so many pixels.

The Creo's chief scientist confirmed my calculation. Your readers might find this interesting.

JACQUES KAUFFMANN

President

IMAC International Inc.

Wilmette, Ill.

Guidance

Thank you for publishing the letter from GUIDE's President and Secretary (Apr. 15, p. 4). However, I notice that the address of GUIDE headquarters is given as New York. Unless the U.S. is engaged in a process of reverse colonization of the Old World, this is an error. The GUIDE headquarters is located in Ebikon, Lucerne, Switzerland.

GEORGE ANDERSON

Publications Manager

GUIDE

Wiltshire, U.K.

Congratulations

I congratulate Brad Schultz on what I felt to be a fine overview of the VM operating system (see "VM: The Crossroads of Operating Systems," July 15, p. 79). I have corroborating figures of my own to verify the extent of the "VM boom"—my book *VM/CMS Handbook* is selling in numbers normally associated with books on pcs

like *How To Use Your Commodore 64* and *101 Uses for a Dead Apple*.

Dare I try for a plug? The 400-page book overviews all of VM and is available by calling 1-800-428-SAMS.

HOWARD FOSDICK

President

Midwest DB2 Users Group

Villa Park, Ill.

Kudos

Kudos to the authors of "Designing Usability in Systems" (May 15, p. 68). We really enjoyed reading one of the best articles we have seen about this exciting process. You correctly state that so called "high-tech" tools are not always needed to create more usable systems. However, the usability lab is the best tool ever devised for evaluating a product's "usability" or "friendliness."

DAVE JOHNSON

ED POINSETT

Usability Services International Inc.

Atlanta

Corrections

In the "Company Profiles" section of the DATAMATION 100 (June 15, p. 116) General Electric's telephone number was given incorrectly.

General Electric's correct telephone number is (203) 373-2211.

We apologize for the error.

For "The European 25" (see "Smashing the \$50B Barrier," Aug. 1, international edition, p. 48-1), Groupe Bull inadvertently supplied incorrect revenue figures for its European business. The company's 1987 European IS revenue converts into \$2,818,400,000. The company's ranking based on this revision is No. 5. Groupe Bull's European IS revenue accounts for 93.7% of its total IS revenue. The company's U.S. IS revenue accounts for 1% of its total IS revenue.

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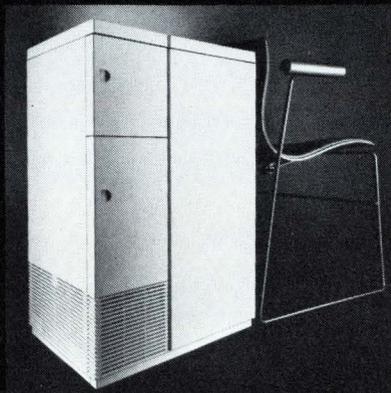
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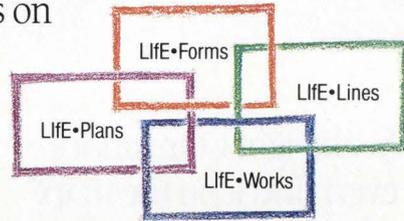
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Look Ahead

USER PREFERS TERADATA MACHINE

HAYWARD, CALIF. -- IBM may be touting the latest, souped-up version of DB2 with referential integrity, but not all users are impressed. After conducting an exhaustive, 28-part benchmark test on DB2 and other DBMSs, Mervyn's, the \$3.2 billion clothing retailer, has decided to standardize on the Data Base Computer from Teradata Corp., Los Angeles. The issue, says a Mervyn's IS official, was performance and cost. Mervyn's tried DB2 running on a 3081 mainframe with MVS/XA and found performance was good only as long as the number of users was kept down. As soon as the load was increased, however, performance suffered significantly. In addition, Mervyn's figured the DB2 solution--including mainframe purchase, systems software licensing, and support--was two-and-a-half times as expensive as the Teradata system. The large Teradata system will be used to support the substantial inventory and financial information applications at Mervyn's, a subsidiary of Dayton-Hudson.

IS SHOP HOPES TO MARKET ITS PRODUCTS

DALLAS -- It seems that yet another large user organization is seriously thinking about turning outside to other companies for IS customers and revenue (see "IS Shops Form Alliances as Development Costs Rise," p. 19). Large manufacturing concern FMC Corp. is weighing the pros and cons of going outside. Although the company isn't ready to say what types of products or services it would offer, manager for product services development John Lozier says, "We think we have some experience and products that are special and could be marketed."

COMPATIBLE UNIX OFFERINGS FROM HB

MASSY, FRANCE -- At last, the Honeywell Bull group is starting to get its Unix act together. In the second half of 1989, the French computer group Bull and Honeywell Bull in the U.S. will offer compatible Unix product lines after years of going their separate ways. These new products are now under development by Honeywell Bull Italia in a joint venture called X-3S located at Bull's site here. So far, Bull's Unix products have come from sources outside the group, such as Ridge Computers, Santa Clara. Honeywell Bull Italia, meanwhile, has been developing and producing all Unix products for Honeywell Bull Inc. Lucio Pinto, former director of the systems division of Honeywell Bull Italia, has been appointed head of the new venture.

AMEX PLACES RFP FOR EX- PERT SYSTEM

NEW YORK -- Now that the famous expert systems-supported credit verification system is up and running at American Express, the big financial services concern

Look Ahead

is planning a much bigger follow-on application. Amex has plans to apply expert systems to its entire call-in customer services operation. An RFP has gone out to potential vendors. They expect the value of the project to be between \$30 million and \$50 million. The project involves the purchase of some 3,000 workstations, plus the integration of the expert systems software.

PROTECTING THE ENVIRON- MENT WITH IS

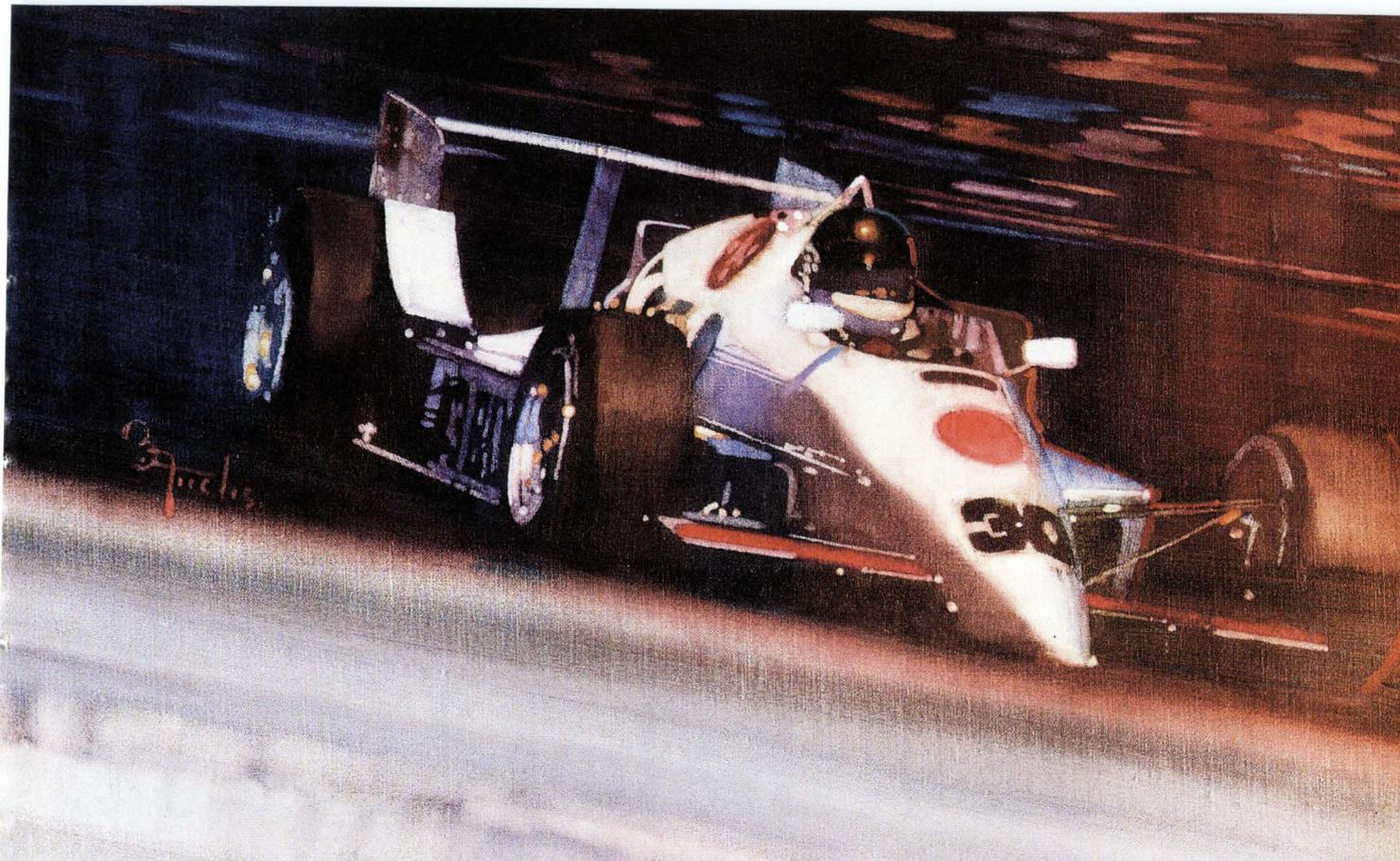
BONN, WEST GERMANY -- Against a background of numerous environmental disasters in central Europe, the West German government is gearing up an environmental research program to develop environmental control systems based on information technologies. Research centers are springing up across the country. Developing environmental protection control systems is becoming a key area of opportunity for the IS business in West Germany. Environmental protection is already a fast-growing industry--\$12 billion last year in West Germany alone--and will be second only to electronics as the industry of the future, say West German business analysts.

EASTERN FIRM HAS PC-BASED CIM SYSTEM

SINGAPORE -- A small Singapore company is developing a working model of CIM based only on pcs. Roger Au, general manager of CIM Systems Singapore, believes this is one of the world's first such models. His company's R&D team has already hooked up 65 IBM-compatible pcs, ranging from ATs to 386s, through Ethernet, to manage office, management, engineering, and process automation at the facilities of the North American Philips subsidiary, SMT Circuit Assembly Pte Ltd., in Singapore. Au hopes to complete the whole system by mid-1989. Once it has proved its mettle, he wants to market CIM Systems' expertise in the U.S.

RUMORS AND RAW RANDOM DATA

It looks like HP is making a push into the lucrative banking and savings and loan market currently dominated by IBM. The first step has been signing up Dallas-based Tek-One Ltd. as a var for its 3000 series computers. Tek-One, headed by Shellie R. Shonk, a former Electronic Data Systems Corp. executive, is a supplier of in-house data processing systems software for banks and savings and loans. Shonk says the HP machines have been selling well to the S&L market. . . . Expect Zenith Corp. to unveil a "super network server" in the near future, according to some users who have seen presentations of the company's new product. The system is described as a cross between a pc and a mini-computer.



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News in Perspective

STRATEGY

IS Shops Form Alliances As Development Costs Rise

Unusual partnerships are being formed to defray the cost of new technologies and to recoup investments in existing systems; profits, however, are still elusive.

BY JEFF MOAD AND
GARY McWILLIAMS

When a systems audit last year at Kidder Peabody Inc. declared the firm's trading systems out-of-date and its data largely unusable, the new IS management faced a tough choice. Kidder, which has just been acquired by General Electric, could either spend six years and upwards of \$100 million developing new systems, or it could acquire technology and systems from Wall Street rival, First Boston Corp.

In an unusual move, Kidder chose the latter course. It purchased First Boston's technology and agreed to co-develop a version for retail trading. "We are going to do this for a fraction of what it would cost to do it ourselves, and in half the time," explains vp of information systems, Robert J. McKinney. "That was a huge factor."

A New Willingness To Deal

With multimillion dollar price tags now common in major systems development, IS organizations are re-evaluating how they develop or acquire their most crucial systems. Increasingly, they are open to trading them, and technology, with others—even competitors—to defray the staggering costs. Many more seek to recoup investments by licensing their software directly or by creating subsidiaries to market systems and expertise.

Sharing, proponents say, is an ideal way to replace systems, which, while difficult or

costly to develop, consist of routine or well-understood operations.

"We can't afford to keep doing what we've been doing: everyone building essentially the same systems," maintains Joseph P. Castellano, managing director for information systems at Drexel Burnham Lambert Inc. "The biggest challenge we all face is reducing costs. Sharing the development, buying packages built by others—vendors or competitors—is one way to do it."

The \$60 million cost of a global trading system was all the motivation First Boston needed to consider reselling its technology, according to Eugene F. Bedell, vp of information services. "When everyone agreed this system had to be built, one of the first questions was 'How do we pay for it?'" Bedell recalls.

Having taken the plunge with Kidder, First Boston now is exploring several ways of selling the fruits of its development. The software tools used to develop the trading system are being tested at companies outside the brokerage industry. Their experiences will help First Boston assess the feasibility

of putting the tools on the open market.

Traditional Businesses Suffered

For San Francisco-based construction and engineering firm Bechtel Group Inc., and

Falling demand for nuclear power plant construction forced Bechtel to look inward for ways to boost falling revenues; IS was one area that offered opportunities.

Similarly, Caterpillar's \$2.5 billion sales drop in the early 1980s "was a catalyst" in its decision to consider IS as a revenue source, says William B. Heming, a manager in the company's venture capital operation. "We had a lot of resources in the computer area that weren't being fully used," he says.

Spinning off IS isn't an entirely new idea. The practice of turning underutilized data centers into profit centers dates to the early 1960s. What has changed, say IS execs and consultants, is the acceptance of dealing with others in the same business in order to shoulder heavy development costs and leverage high-demand technical skills.

"Faced with [some] intangible advantage or cold, hard cash to recoup part of their investment, a lot of companies would take the latter," says Thomas H. Davenport, director of research at IS consultants Index Group Inc., Cambridge, Mass. The economics of building

major systems is relaxing old taboos about dealing with competitors. When it comes to sharing technology, "senior management is open to it," declares Drexel's Castellano.

First Boston's sale of technology to Kidder, for instance, precludes only those



FIRST BOSTON'S BEDELL: Recouping costs was the goal.

Peoria, Ill.-based Caterpillar Inc., a large equipment manufacturing company, it was not the recouping of monies in particular systems, but reversals in their traditional businesses that led each to form IS subsidiaries this year (see "Bechtel and Caterpillar Put IS To Work . . . for Others").

Bechtel and Caterpillar Put IS To Work . . . for Others

From the Alaskan tundra to the oil-rich Middle East, Bechtel Group Inc., the huge engineering firm, and Caterpillar Inc., the heavy equipment giant, are synonymous with construction. This year, both firms turned their building skills to information systems, forming divisions to market systems development, conversion, and consulting services. For each, the decision arose from wrenching changes in their core businesses.

Until 1982, when its revenues peaked at \$11 billion, the biggest problem for San Francisco-based Bechtel and its IS group was managing its rapid growth. The privately held firm had seen its total head count swell in the previous five years to over 44,000 employees—about 1,400 of whom belonged to the company's information systems operation.

Then things began going wrong. Demand for new nuclear power plants—Bechtel's specialty—began to dry up. Suddenly, the company wasn't growing. New business was off, and heads began to roll.

By 1987, total employment at Bechtel had been cut by over 60% to 17,500 and revenue had dropped to \$4.5 billion. The population of its IS operation was halved to 700.

Revenues for Peoria, Ill.-based Caterpillar Inc. reached a \$9.1 billion peak in 1981, only to plummet a year later to \$6.5 billion. That led to three years of losses, and prompted formation of a venture capital group to evaluate new market and service opportunities. Out of its deliberations, the Caterpillar Information Services (CIS) division was created

in January of this year.

Each firm's move toward IS ventures for new revenues goes beyond financial circumstances. Both maintain large and historically strong IS organizations.

The conversion experience provided a means of immediately cashing in on internal skills. CIS employs about 100 people and draws on the company's 1,000-strong dp organization for major project work. Revenues are not separately disclosed.

"We have tended to go after government bids in applications development, conversions, and other areas, such as distribution systems, where we have the expertise," says Bert A. Walker, CIS president. "Caterpillar is known for its spare parts distribution around the world. People tend to think of that when they hear the name."

Bechtel dabbled in selling IS products and services for a couple of years before formalizing its effort. It began selling excess capacity on its Sperry and IBM mainframes to companies that were converting from one to the other, or looking for temporary capacity. It expanded the sales to include space on its satellite-based long-haul network and disaster recovery services.

Then, in 1985, Bechtel was awarded a contract by the Securities and Exchange Commission to manage all the documents filed by public companies with the SEC. Bechtel, which used its experience in managing the millions of documents involved in the nuclear energy regulation process to win the job, agreed to manage the SEC documents for five years in exchange for the rights to

sell access to those public documents on the open market.

"Eventually, the outside IS businesses we were doing on an ad hoc basis grew until we had about 200 people associated with them," says information technology vp and manager Bill Howard. "Finally, management said, 'We need to find a way to manage these businesses to get the most out of them,'" he says. "We think we've got some unique technology, plenty of experience, and that we can turn this into a successful business."

According to Howard, Bechtel Information Technology's goal, in addition to continuing to meet the company's internal IS needs, is to build the outside IS business into one of Bechtel's major lines of business, on a par with the company's key construction businesses.

Other elements include an IS products and services division; the recently formed Bechtel Software Inc., which brings applications such as project management and computer modeling software to market; and Technology Applications Inc., a Jacksonville, Fla., engineering services supplier acquired by Bechtel in May.

In July, Bechtel also announced plans to open a Dublin, Ireland, center to develop software for Bechtel and for commercial sale in Europe and the U.S.

"What we're doing makes a lot of sense because we're applying to these markets the same techniques and products we've been using internally for years," says Howard. "We just never got around to it before because we were always too busy growing."

portions of the trading system that deal with internal accounting and with decisions on when to enter or leave a securities market. Minus the analytical and accounting portions, the global trading system "will help Kidder Peabody do business more efficiently, but won't help them take any business away from us," argues First Boston's Bedell. "There is nothing proprietary in the functions we're doing . . . [They have] all been done for decades."

Castellano agrees. "No one wants to lose control of their systems, but lots of people think many of these do not represent a proprietary edge. Let's face it, egos aside, most firms in our business are competing without any proprietary edge at all."

Decision Is Made Upstairs

Others considering sales of internal development see systems as only one part of the competitive equation. "If in using our product another company is smarter than we are, then they were probably smarter to begin with," reasons Gordon Sollars, Merrill Lynch & Co.'s vp of New York office and distributed systems. Merrill Lynch may license a staff-developed graphical SQL interface package to at least one New York City bank, and has discussed selling the package to Microsoft Corp., Redmond, Wash., and Gupta Technologies Inc., Menlo Park, Calif. Would Merrill license it to a competitor? "That decision would have to be made upstairs," says Sollars.

"Strategic advantage today is part of the corporate culture and an organization's ability to effectively deploy its systems," says Tom Johnson, executive director of Nolan Norton Institute, the research and education arm of Lexington, Mass.-based consulting firm Nolan, Norton & Co.

Just how far companies are willing to share systems with competitors depends on the company. Index Group's survey of executive attitudes toward sharing technology found that most are reluctant to sell technology closely tied to their core business, says research director Davenport, but those that have already entered open waters express strong backing for the view that competitive advantage involves more than systems technology. And, in many cases, that advantage may be more myth than reality.

Cooperation In Trust Banking

"When it comes to trust [banking], it's a given you need these systems," says Dennis Krzywicki, vp of trust systems at PNC Financial Corp., Pittsburgh. "The competitive edge is what you wrap around it."

PNC Financial, which owns Provident Bank in Philadelphia, cooperated on a trust system development with three other banks, including Philadelphia rival Fidelity Bank. That both compete for customers using the same trust system is not important, agrees John McMurrough, vp of trust systems at Fidelity Bank. "Within the next decade," he thinks, "there will be maybe a half dozen trust systems used by everyone in the country."

In the bank's view, alliances present an opportunity to gain from others' experience. For instance, the trust system that PNC Financial and Fidelity Bank jointly developed incorporates the development and business experience of all four partners. "The basic premise before us was to share the cost and come up with a trust system that would meet our current and future needs," says Fidelity's McMurrough. Banks that have since purchased the package are automatically part of a steering committee

that decides future enhancements, he says.

Forest products giant Weyerhaeuser Corp., Tacoma, Wash., has run an IS services venture for three years. During that time, the company has refused to sell IS services for competitive reasons only once, according to J. George Pikas, director of sales and marketing for Weyerhaeuser Information Systems (WIS).

"Lots of companies are realizing that they're kidding themselves to think they are getting much real advantage from their IS products," Pikas says. "They might as well try to make some money off them."

Still, the issue of competitiveness remains a touchy one for IS that is trying to serve two masters. Frequently, WIS will hear another Weyerhaeuser business unit complain that its products or services may be giving a competitor a break. When that happens, says Pikas, WIS and the business unit head straight to upper management for a review.

When Bechtel Group recently formed its own IS venture, it also entertained questions about selling IS to competitors. Information and Technology vp Bill Howard says the debate was part of creating Bechtel Information Technology out of what had been a growing IS cottage industry.

"With most of the software, it's really as much a matter of how you used it as of anything else," says Howard. "We think we know how to use it, and obviously we will have access to it earlier."

Insight into new technologies such as expert systems is a part of Bechtel's experi-

ence. Part of its Information Technology subsidiary, the Artificial Intelligence Institute, trains users in Palo Alto-based Neuron Data Inc.'s Nexpert expert system tool.

Similarly, Caterpillar Information Services division, which teaches programming in addition to doing contract work, refers talented students to the company's IS organization. Because the operation can accept Caterpillar Inc. employees for temporary assignments, skills picked up outside the company are transferred to the parent, says Caterpillar's Heming.

Caterpillar earned its spurs by handling some 30 DOS/VSE-to-MVS operating system conversions for equipment dealers. Those conversion skills helped land the firm a contract at L.F. Rothschild Unterberg Towbin Inc., New York, among others. With about 100 full-time employees and access to the about 1,000 internal IS staff, the Caterpillar division provides

medical claims processing, contract programming, and conversion and training services.

A Word of Caution

Yet, for all the enthusiasm behind companies turning to IS ventures to boost revenues, there is plenty of caution. Caterpillar Information Services and WIS operate near break-even or in the red, according to executives.

Others, such as Hartford Insurance Co., have found attempts to sell IS expertise a money-losing experience and have abandoned the venture (see "High Costs, Lack of Standards Is Slowing Pace of CASE," Aug. 15, 1987, p. 23).

Bert Walker, president of Caterpillar Information

Services division, says the division confines itself to working as a subcontractor to larger systems integrators. "In this business, the key is marketing. Companies like ours jump in and find 70% to 80% of the critical factor to success is the ability to market, where they have little capability and no expertise."

As a result, Caterpillar focuses its efforts on Big Eight consultancies, where it has enjoyed early success, and on government systems integrators. "Anyone who thinks what they're building for their own use is marketable at a commercial level has a surprise coming to them. It doesn't work that way," asserts Walker.

Weyerhaeuser's experience illustrates the challenge for those hoping to turn IS skills quickly into a profitable business. Three years after the company created Weyerhaeuser Information Services to sell professional development and consulting services, the operation remains unprofitable. With revenues of about \$45 million today, WIS's annual revenues are what the company had hoped it would achieve from its first year.

"Many of those projections were too ambitious," concludes WIS director of sales and marketing Pikas. Where three years ago the goal was to balance sales between internal IS projects and outside activities, WIS remains heavily dependent on its sibling divisions for work. "It's going to take longer to grow the outside business, maybe two to three times as long," he says. Still, the company remains optimistic it can succeed. The hard lessons of its early years have not gone unheeded.

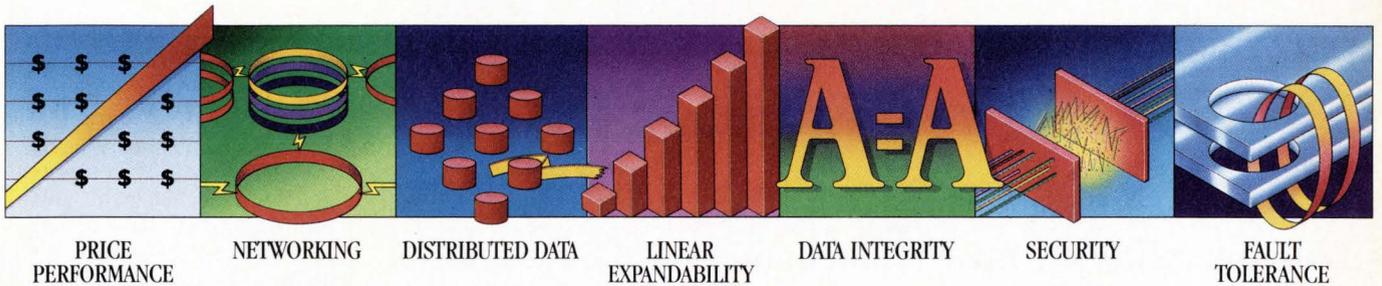
"What many users really want is the services," according to Pikas. "If we had remained dependent on software sales, we would have sunk a long time ago." ■

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MICROCOMPUTERS

The U.S. Navy Grapples To Control Its Large Pool of Micros

With over 200,000 micros and hundreds of thousands of civilian and military personnel, the Navy has its work cut out for it in trying to bring them all under control.

BY WILLIE SCHATZ

You think the Department of Defense spending freeze hurt only the guys who make their living off DOD? Well, it didn't exactly help the people who work for DOD, either, as they

a scheduled production basis.

Like their private sector counterparts, the NARDACs have been known to take no prisoners when competing for contracts. "Our role is to support our customers through activities like train-

Younis, manager of business development for Oracle Corp., Bethesda, Md., said at Navy Micro. "I think they're going to have to go more and more to DBMSs," says Younis.

How is the government going to get DBMS? With 320,000 civilians and about 700,000 military personnel, plus 600 ships, the Navy is hardly a paragon of centralization. Its approximately 200,000 micros are put to every imaginable use, from simple word processing to complicated communications. The micros also are becoming more and more tied up in LANS. Individual users are very much doing their own thing. But they're also having a hard time determining what to do with all the information they're gathering.

Where Do Users Need Help?

The NARDACs aren't exactly having the time of their lives figuring out how to get a handle on both their users and their information. "Where do users need help?" Lieutenant Commander Sharron Crowder, manager of NARDAC Washington's information center, asked her Navy Micro audience. "Everywhere."

The Washington information center has 45 people supporting 3,500 end users. "Electronic mail, spreadsheets, word processing, database management, you name it," Crowder said. "They've got to be able to know where to go with all this information. They've got to be educated on how to use it. And the Navy has to figure out how to control it."

"Control implies technical complexity," Oracle's Younis says. "Control is also a measure of how hard it is to get my data. Since the government doesn't have money to improve its services, it's going to have to use its data to do that." That process won't be easy. Bridging the gap between DOS and its successors will be tough with the current budget constraints.

"The freeze [which is history on Sept. 30] has made it very difficult to know how much to spend on R&D," Pochodowicz says. "We can't keep up with the current technology."

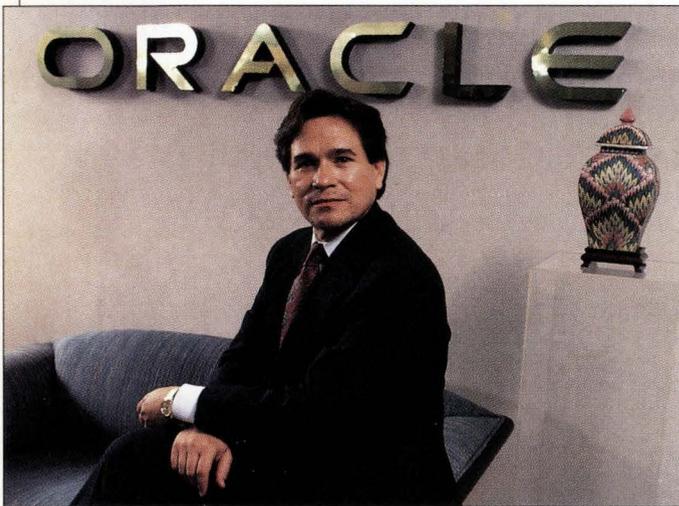
Naval IS Budget To Sink?

Furthermore, the House Appropriations Committee (House Report 100-681) recommends slashing the Navy's IS budget for fiscal year '89, which begins Oct. 1, by \$141.8 million. Precisely \$100 million of that cut would occur because the rest of the Navy is too busy doing NAVDAC's job.

NAVDAC was born about 10 years ago as the Navy's response to Congress's persistent criticism of its IS operations. Its mission was to attempt to gain a modicum of control over the Navy's vast, worldwide computer collection. NAVDAC hasn't done badly, but it would do much better if the rest of the Navy cooperated.

"NAVDAC doesn't have enough teeth to make the rest of the Navy use it," contends one NAVDAC manager.

That may no longer be possible. As the basis for trimming the first \$100 million of the Navy's annual \$1 billion IS budget, H.R. 100-681 cites an Appropriations Committee Surveys and Investigations (S&I) review last May of the management of the Navy's program. The report found that NAVDAC's IS centers had considerable unused and excess capacity,



ORACLE'S YOUNIS: Government's info needs are greater than ever.

begin the migration to the OS/2 and Unix universes from the Zenith 248 DOS world.

"We've had to stop using contractors as a supplement to our work force," says John Pochodowicz, assistant technical director for information systems development at the Navy Regional Data Automation Center (NARDAC), San Diego. The seven NARDACs in the U.S. are under the jurisdiction of the Naval Data Automation Command (NAVDAC). NARDACs are the military equivalent of a service bureau, with offers ranging from one-time technical consulting to total responsibility for processing applications on

ing," Pochodowicz said at the recent Navy Micro '88 conference in San Diego. "But there's been a curtailment of training. We've got two labs with 16 micros, and we're not filling them up. The freeze has left us with less funds available for development."

Resource Development Problem

So what else is new? Just another round of trying to do more with less. The performance expectations certainly haven't lessened. The government is always taking it to the limit.

"The government needs more information than at any time in its history," Toby

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MICRO DBMS

dBase IV Delay Riles Users, Developers

Although release of Ashton-Tate's DBMS is imminent, delays have caused some to jump ship.

BY ROBERT FRANCIS

For the many microcomputer managers who deal with database management software, the waiting period for the latest version of Ashton-Tate's market-leading dBase has proven especially frustrating. When initial versions of

found anything we can't handle." The company expects to have corporate beta test site programs of dBase IV out by the first week in September and to be shipping the product either by, or shortly before, the target date of Sept. 30. Some users, however, are re-evaluating not just dBase but



TOUCHE ROSS'S CONNOLLEY: Planning to stick with dBase IV.

dBase IV were unveiled in February, it appeared that many of the improvements the Torrance, Calif.-based company had promised in 1987 would be coming true. A new, easier-to-use interface and a faster sorting capability were two items users had been hoping for, and dBase IV seemed poised to deliver.

But then the shipping date for dBase IV slipped several times. An Ashton-Tate spokesman tells DATAMATION, "We met all our performance functions, but there were still some bugs in the program. We are now very deep into the package working these out and we haven't

their entire database management systems strategy. During the wait for dBase IV, competitors have popped up as well, offering DBMS programs that have drawn users away from dBase.

Some of these users have moved to competing third-party DBMS programs that already incorporate the promises of dBase IV, such as FoxBase from Fox Software Inc. (Perrysburg, Ohio), Quicksilver from WordTech Systems Inc. (Orinda, Calif.), and Clipper from Nantucket Corp. (Los Angeles).

These so-called dBase workalikes cannot produce a 100% dBase IV-compatible

while other Navy organizations were duplicating NAVDAC.

NAVDAC had the dual pleasure of escaping unscathed from the S&I report's terrible swift sword and being the only Navy IS branch to receive kind words from the S&I. The committee specifically said the reduction was not to be applied to the NAVDAC, "but to the rest of the organizations in the Navy, which feel they have the luxury of creating their own dedicated and standalone systems."

"The proposed funding solution is a political one," says a House staffer. "We want to change the Navy's attitude about NAVDAC. We want them to use NAVDAC unless there's a damn good reason not to."

"The Navy doesn't quite agree with this, of course."

Neither does the Senate, which has recommended no funding reduction for the Navy's IS. If the traditional House-Senate formula holds when both bodies get together this month for a conference to reconcile their defense appropriations bills, they'll meet somewhere in the middle.

Everyone Wants a 386

And just what is the Navy's IS business? At the moment, it's change. The current contract for Zenith 248s, of which there are more than 100,000 in the Navy, expires next February. The warranty for those boxes is up in October. That means DOS is out and OS/2 is in, right? Not necessarily.

"I'm not sure there's going to be a whole lot of new stuff bought," Lieutenant Commander Crowder says. "Everyone's into having a 386 machine on their desk. They'd also love to have a high-powered graphics box, even though most of them won't need it. But those machines have status now."

"The 386 contract will

be in place by next summer," continues Crowder. "But there's an advantage to staying with Zenith 248s. It has allowed us to standardize. To learn the 386 you need more concurrent programming, and that programming is too complicated for end users to handle alone."

Then an information center may be right on. An information center helps end users determine what they need within the context of an entire organization's needs. Crowder contends that an information center gets users out of the habit of picking up a current pc or micro publication and saying they want the latest toy before knowing what it is or how it will affect the organization.

"We'll have to train current users on the 386 machine—whatever it is—so we have a bridge to the new technology," Crowder says. "Then we'll train all those users who never had a [Zenith] 248. We'll start over with users except for those who have a technology base."

PS/2-OS/2 Aren't Big Hits

The bridge to the new technology may not be the world's longest span, though. The PS/2-OS/2 combination isn't exactly knocking them dead.

"I don't know if the Navy's next micro deal is going to be PS/2 or OS/2 at all," says a Washington NARDAC source. "They're leaning toward Unix at my place. OS/2 and PS/2 aren't generating much interest. People are showing more interest in Unix, Mac, and other operating systems."

"The Navy has institutional interest in Unix. More and more micros have to interface with Unix, and the Navy's no exception. More and more users could care less about the operating systems. They just want the application done." ■

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program until Ashton-Tate's version is released, but users say these programs are easier to use than dBase, even though the programs use dBase's language.

Jumping the dBase Ship

Meanwhile, third-party dBase add-on makers have been taking a beating waiting for dBase IV. According to Pat Adams, a New York dBase consultant and a founder of the International dBase Users Group (IDBUG), the delay of dBase IV has seriously hurt the third-party add-on market and has sent many third-party developers into the hands of competitors.

"The third-party developers have been devastated by the wait for dBase IV," says Adams. "Every time a new version of dBase is an-

nounced, the third-party developers run into trouble." Referring to the effect of the delay on third parties, an Ashton-Tate spokesman responds that "we've worked very closely with third-party developers to give them enough information to change the way they do their business so they can use the new product." He says Ashton-Tate has been working with third parties since last December.

But the delay between dBase III and dBase IV has been longer than between previous versions, Adams says, making it more difficult for third-party vendors to make sales. Users typically put off plans to buy more dBase products until the latest version of dBase arrives. Because the availability of

third-party enhancements is considered one of dBase's strongest points, the loss is critical for Ashton-Tate as well as for users.

One third-party developer who decided to jump the Ashton-Tate ship even before the current delay is Michael Thomas, owner of Kansas Data, Evanston, Ill. Kansas Data worked with dBase, writing applications for it for several years, but decided last year to go with FoxBase because it was easier to program than dBase.

According to Jim Hoisington, Dallas-based computer consultant and president-elect of the North Texas PC Users Group, many companies are reevaluating their pc database needs and studying how they will fit into a company's overall system. "I don't think a rapid change will take place, but, over time, you will see it happen," he says.

The move to distributed databases is going to be the prime factor in choosing a database at Boise Cascade Office Products, Itasca, Ill. According to Ann Stoddard, senior information center consultant there, the company is using dBase in some cases, but in general they use Must Software's mainframe-to-micro PC Nomad. Ashton-Tate officials say they plan to compete in the pc database market from standalone applications all the way to micro-to-mainframe connections.

In spite of the conflict surrounding dBase, it does have its loyal fans: dBase holds about 60% of the installed base of microcomputer DBMS programs, says San Jose-based research firm, Dataquest Inc. Liz Connolley, microcomputer analyst at Touche Ross & Co., Chicago, recently saw dBase IV and plans on staying with it. "It looked real different and we're looking forward to using it. I think it will be easier to use and still be a very strong

program, like the earlier versions of dBase," she says. Connolley has seen two demonstrations of dBase IV at various presentations Ashton-Tate has given prior to the introduction of the product.

Ashton-Tate's premier product has met with success overseas as well. Says IDBUG's Adams, "It's the largest selling program in France. It's the one program I've found that's pretty much universal. When I was in China, it was incredible; everywhere I went—the Academy of Science, the universities, businesses—they were doing stuff with dBase that we wouldn't have thought of. They had converted it to run on mainframes, and micros with mainframes."

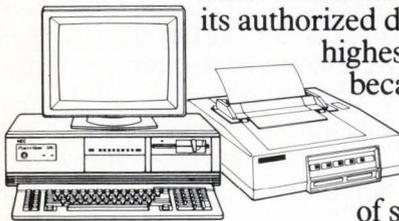
Need Backwards-Compatibility

Although dBase still has its adherents, Hoisington says that "there's an inherent limitation to how easy dBase can be to use." Hoisington saw a demonstration of the product at one of the pc user group's meetings.

That limitation is primarily linked to the fact that dBase IV must be backwards-compatible with earlier versions of dBase. This gives Ashton-Tate little room to radically remake its product. Ashton-Tate's dBase uses a programmer-like procedural interface, while most of its competitors use a nonprocedural language with pull-down menus. Defenders of dBase counter this criticism by saying that dBase, despite being more difficult to learn initially, is more powerful and can accomplish more difficult tasks as users become more familiar with it.

Kansas Data's Thomas, who does consulting and custom programming for other companies, says, "It [dBase IV] looks like it's going to have a partial SQL implementation, which is an enormous,

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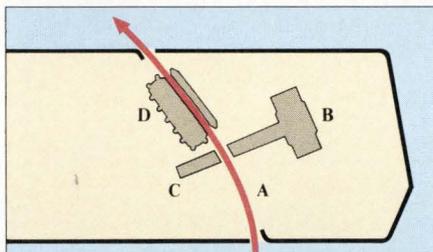
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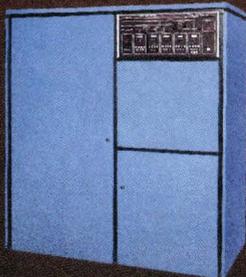
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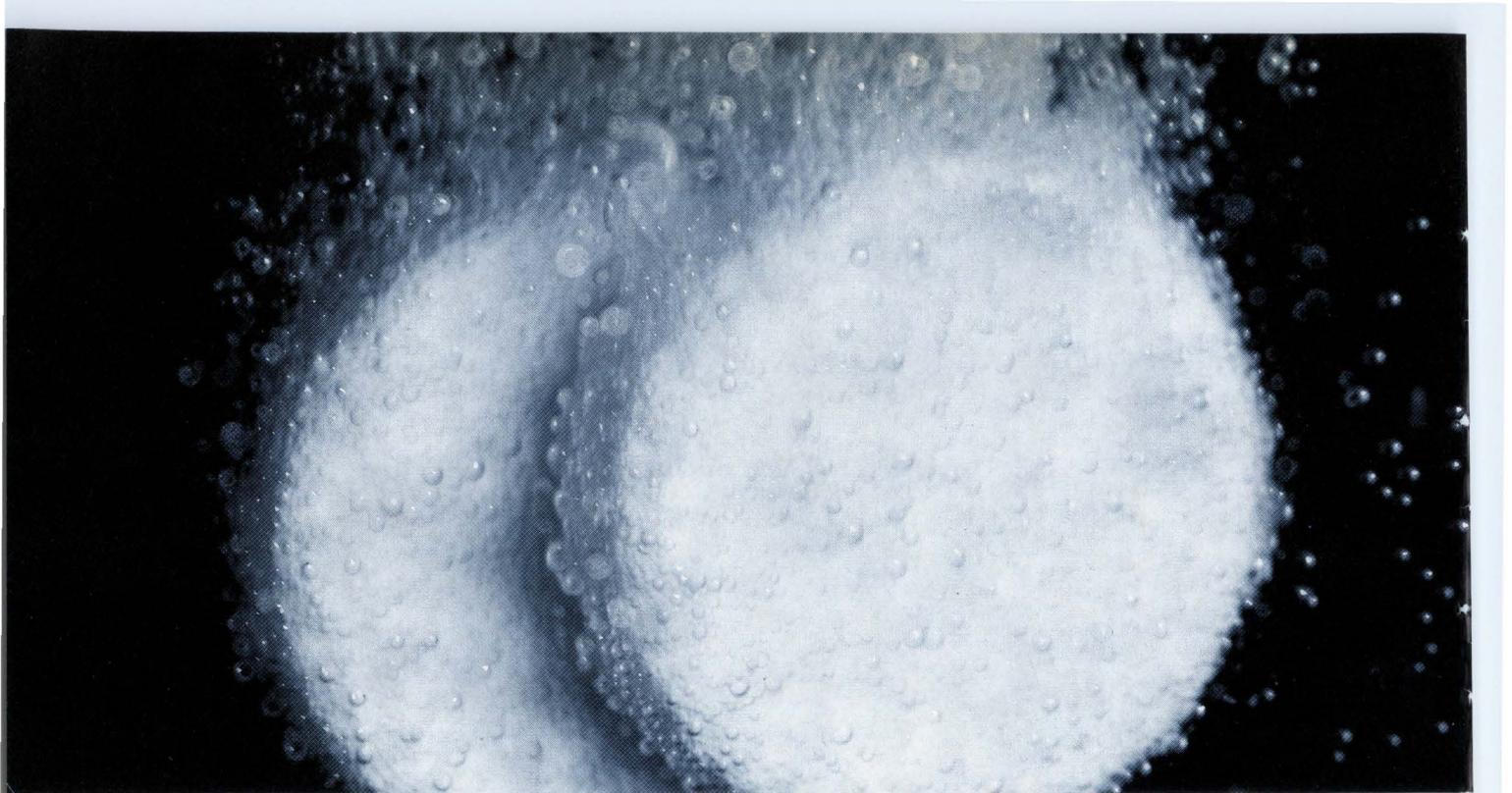
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SUPERCOMPUTING

Users Welcome New NSF Network with Glee and Caution

The long-awaited upgrade to the supercomputer net offers improved levels of speed and reliability, but its capacity may be depleted in less than a year.

BY WILLIE SCHATZ AND MARY JO FOLEY

The researchers and academics who use the services of NSFNET, or the National Science Foundation network, which links NSF's five national supercomputer centers with eight regional network hubs, are a pretty easy lot to please. In July, the contracting team of Merit Inc. (a Michigan-based nonprofit corporation), IBM, and MCI put in place the backbone of the long-awaited \$14 million upgrade to the network. Instantaneously, users began singing the praises of the new network's improved levels of speed and reliability.

While these researchers may be giddy, they are not naive. The interfaces between the network's backbone and mid-level sites are still not trouble-free, and, despite the introduction of centralized management software and techniques, the old problems of troubleshooting and fault resolution across multiple, independently managed sites and resources continue to plague NSFNET and its users.

Most important, many researchers say they expect the network to again run into serious congestion problems

within a year as more computers tie into NSFNET. This would occur despite the 30-times jump in speed now available.

"People were very disenchanted when the old network overloaded," notes Edward Krol, assistant director

site's network service improves depends on the speed of the slowest machine to which its systems are connected, as pointed out by members of the NSF Network Service Center, located at BBN Laboratories Inc., Cambridge, Mass. Even with the

new network, a typical 1MB transfer may require anywhere between five minutes and an hour at busy times of the day, the Service Center reports.

Although the new network's color graphics and raster image capabilities are light years ahead of the black-and-white images of its predecessor, relatively slow data transmission rates leave real-time graphics—a service that many supercomputer users demand—impossible without sophisticated data compression techniques.

(The 45Mbps data transmission rates needed to make real-time a reality won't be available until the '90s.)

In terms of speed, things probably will get worse before they get better. William Wulf, NSF's assistant director for Computer and Information Science and Engineering, is talking about interconnecting "several thousand" total sites, namely "all universities and research

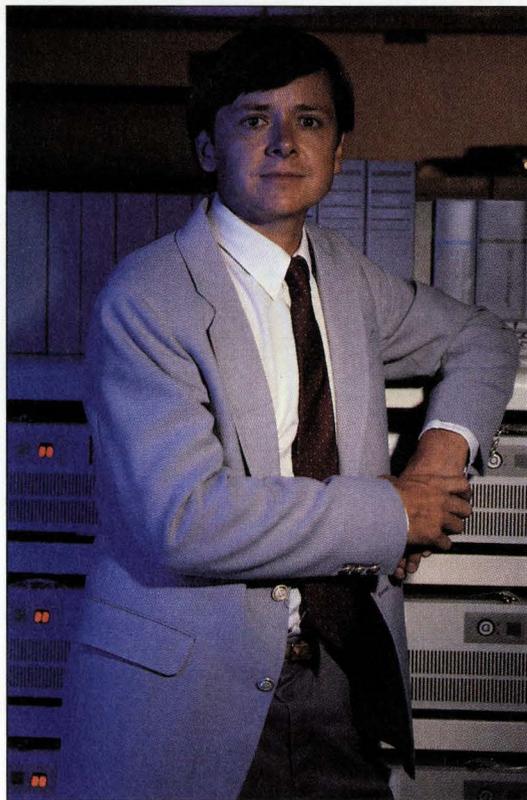
chugging program. It should have a nice report writer, a better applications generator, but, as far as I'm concerned, Ashton-Tate is [trying] to be all things to all people." Thomas has moved to Fox-Base to develop his products because they were easier to program and were much easier for his customers to use.

In the future, Thomas expects to see some real innovations in DBMS products coming from Lotus Development Corp., Cambridge, Mass., and from Microsoft Corp., Redmond, Wash.

The new products from Lotus and Microsoft—expected some time in 1989—won't have the backwards-compatibility problem. They can be built on SQL technology and won't have to work with previous versions of dBase. Lotus's product will tie into the company's vastly popular 1-2-3 product. So far, Microsoft's DBMS is only a rumor, though a company spokesman says that, in light of its announced plans to compete in every major applications software arena, you can "draw your own conclusions." Its rumored product is expected to use BASIC for applications development.

Meanwhile, IBM's OS/2 Extended Edition will include its own data manager, a single-user DBMS using SQL patterned after DB2. Also in the fray is Oracle Corp., Belmont, Calif., currently the number two micro-based DBMS vendor with its Professional Oracle.

Oracle has come up with a product clearly designed to tempt users from dBase. Oracle will market SQL versions of WordTech Systems Inc.'s dBase clone and its Quicksilver dBase compiler. These products, which Oracle plans to have out by the fall, will allow existing dBase applications and files to run with Oracle databases, company officials say. ■



CORNELL'S BRIM: Seeing higher throughput already.

for network services for the University of Illinois at Champaign/Urbana. "We don't know what's going to happen when the new one is loaded down, but, even with higher overload capacity, it will be overloaded within a year."

The degree to which any

labs in the U.S.," via the network.

A National Networked Lab

Ultimately, NSFNET will result in the creation of "a national networked laboratory," which will be vital to the U.S.'s "national security and competitiveness," Wulf predicts. For now, most users look forward to short-term—and, most likely, short-lived—productivity gains.

"The capacity of the old network was used up completely in September 1987," explains Scott Brim, manager of network systems for the

er throughput and reliability.

Bob Sugar, professor of physics at the University of California at Santa Barbara, agrees. "The previous network was really inadequate," he says. "The bandwidth was far too low for what users needed. The new network greatly improves the system and allows for the balancing of dataloads. It also makes it easier to use the supercomputer centers."

"With the previous network," states Julian Kately, director of the computer center for Colorado State University, in Fort Collins, "peaks

reasonable bandwidth. The new backbone is just the first step."

Formerly a Haphazard Design

These old network capacity and transmission limitations were due, in large part, to the haphazard design and management of the old NSFNET (see "The Changing NSFNET Backbone").

The backbone of the network consisted of six hubs, located all around the U.S., running Sun Microsystems' Unix systems as switches, or "fuzzballs." The hubs were linked by 56Kbps lines sup-

The new NSFNET consists of 13 hubs, each running Berkeley Systems Development 4.3 Unix on IBM RT PCs and PS/2s. These nodes are connected by 448Kbps digital-microwave and fiber-optic circuitry provided by MCI Communications Corp. (MCI is in the process of upgrading the network to 1.5Mbps T1 circuits.)

MCI also is responsible for maintaining the network during the five-year duration of the contract. IBM, which was charged with designing and developing the overall architecture, the switching and

routing system, and the network management system, is providing NSFNET users with its NetView network management software, and with GRAND, its electronic communications system, in addition to the network computer hardware.

The Merit Computer Network—a consortium of eight Michigan state universities funded by Merit Inc.—is acting as the day-to-day administrative and management center for NSFNET. At its Ann Arbor,

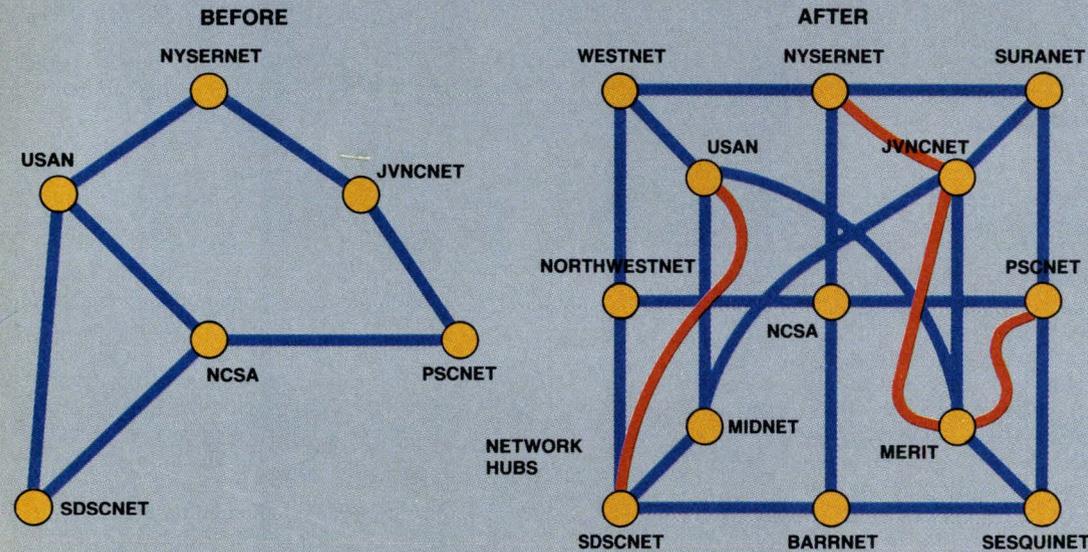
Mich., headquarters, the Merit Computer Network will house two IBM 4381 mainframes.

"I managed the old network in total," says University of Illinois' Krol. "Now, the pressure's off me. There's more exposure for Merit to make it work. They're supposed to do it right. So far, they seem to be."

"No matter what happens," Cornell's Brim says, "the new network won't be [as] terrible [as] the old one." ■

The Changing NSFNET Backbone

On the left is the interim NSFNET backbone; on the right is phase one of the NSFNET backbone, as of July 1988.



Source: NSF Network News, June 1988, Number 4.

Theory Center at Cornell University, Ithaca, N.Y. Cornell was instrumental in engineering two last-ditch attempts to squeeze more power from the old NSFNET.

"Best" Congestion Control

One of these efforts was the in-house development of what Brim calls "the best congestion control and avoidance software in existence." But the best just wasn't good enough. On the other hand, he says, with the new backbone, he's already seen much high-

and valleys were a real problem. People would lose connections because the network was so bad. The new network supposedly has the ability to cope much better with congestion. With the new NSFNET," he says, "it should be easier to identify the peaks earlier and fix them before they happen."

"The new NSFNET does not solve all the problems," Sugar cautions. "We have got to get individual university campuses connected to the supercomputer centers on a

plied by AT&T.

Network Managed at Random

As the National Science Foundation was—and still is—more of a policy-making and funding body than a technology-based one, network management was handled randomly by scientists at various nodes. "It wasn't a real elegant solution," a Merit Inc. spokesperson acknowledges, "but it was a way of transferring data developed by different people using different hardware and software."

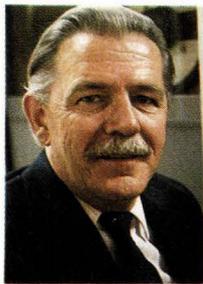
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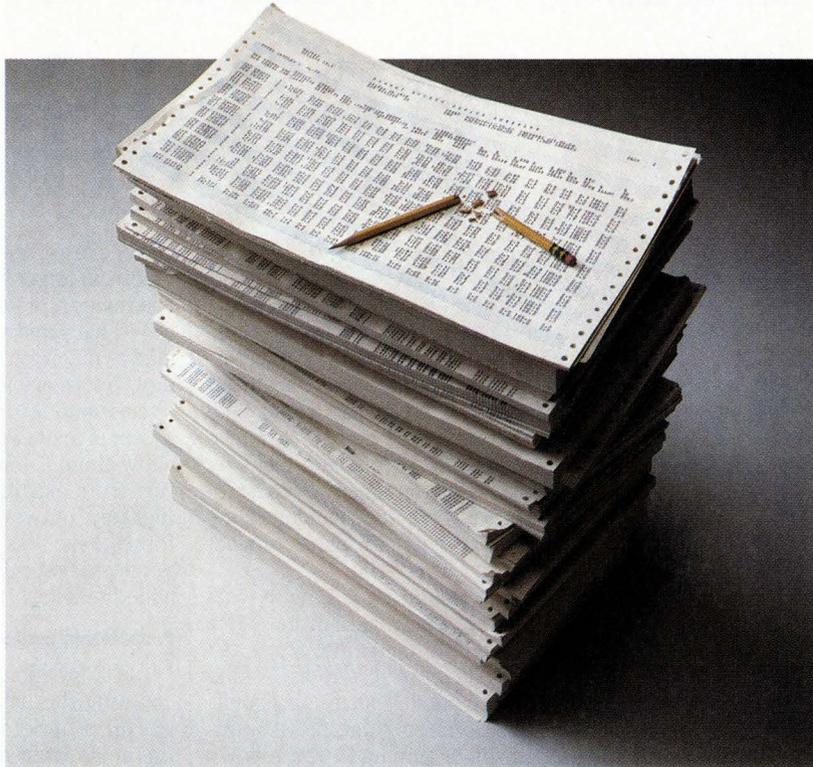
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The Performance People

RISC and Unix: Transitional

Technological developments and user demand for standards are creating a sea of change in IS. Established vendors are having to find new ways to add value in a world of open systems, and users are wrestling with ways to preserve proprietary systems' advantages while achieving connectivity among dissimilar platforms. Recent announcements of RISC and Unix systems have sped the maturation of the industry.

BY RALPH EMMETT CARLYLE

The explosion of computing power that has been unleashed so far this year is, ironically, the product of a rapidly maturing industry. The awesome display of MIPS muscle flexing, which could take computer manufacturers and their customers to 100MIPS commodity chips by 1991, has come about chiefly because of one architectural type and one operating system, namely, reduced instruction set computers (RISC) and Unix.

After an adolescent fling with what one computer pioneer, Gordon Bell, leader of Digital Equipment Corp.'s VAX development team, refers to as "vanity architectures" and "anything goes" hardware experimentation, the 40-year-old industry is beginning to settle down and conserve its resources. Established vendors, especially in the minicomputer

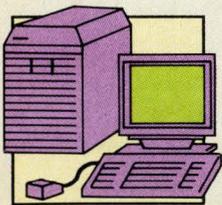
class, are developing fewer new architectures, fewer new operating systems, and fewer new computing styles.

This rapid maturation has been fueled as much by customers as by technology. Users are insisting on standards in everything—from chips to operating systems to network interfaces—that will allow them to cut costs, get a fatter return from existing systems, and build integrated networks. Emerging industry forces, such as independent software vendors, systems integrators, and value-added resellers, are similarly motivated.

Proprietary Systems Aren't Going Away

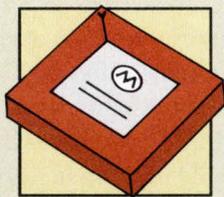
Oddly enough, most users are not counting the days to the time they can get off proprietary systems. Despite all the noise from Motorola, MIPS Computer, Sun, and other RISC/Unix suppliers, most major organizations are clinging

The Furious Pace of Open Systems Developments



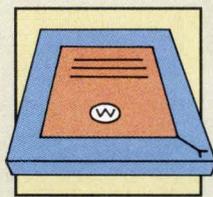
MARCH 1

Apollo announces its Series 10000 personal supercomputer. It is the first machine to make use of Apollo's PRISM multiprocessor RISC architecture. The company says the 10000 is capable of up to 100MIPS, or 100 times the capability of a VAX 11/780. This cpu MIPS payload will cost about \$120,000, Apollo claims.



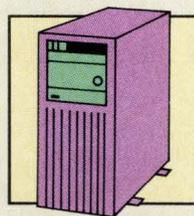
APRIL 18

Motorola introduces the 88000 microprocessor, a RISC-based chip that the company claims will bring supermini, even mainframe, performance to the desktop. CMOS versions are expected to deliver 15MIPS to 17MIPS (close to the level of DEC's top-of-the-line VAX uni-processor) and 50MIPS in parallel processing configurations.



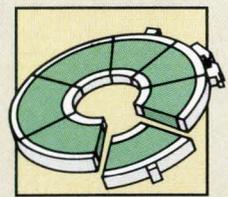
APRIL 19

Data General describes a 100MIPS ECL version of the 88000 it is building with Motorola. It will be offered to the industry in 1991. Sources at DG reveal that the company is already developing a commercial Unix-based system that features eight of the 100MIPS devices (acting as co-processors), to be aimed squarely at IBM's base.



MAY 9

MIPS Computer claims price/performance leadership with a 12MIPS RISC-based system, the M/120, selling at \$2,500 per MIPS.



MAY 17

The Open Software Foundation is formed by seven international computer vendors, including arch-enemies IBM and Digital Equipment Corp. OSF is conceived as an independent and autonomous body that will build a standard operating system from recommendations submitted by vendors and international standards groups. First products are expected in two years.

the Signs of Times

dearly to the proprietary systems on which their applications investments lie. "We're not going to throw out 25 years' [and billions of dollars'] worth of IBM code for Unix, or anything else," says Trevor Nicholas, director of information systems resources at Barclays Bank. The London-based bank is one of IBM's top 20 customers worldwide. It also operates a \$300 million VAX-based network.

Enthusiasm for the AS/400

Some ISVs (independent software vendors), SIs (systems integrators), and VARs even demonstrate abiding respect for closed systems. Witness their enthusiasm for the most ballyhooed product of the year—IBM's AS/400, a proprietary midrange system that drew more headlines than all the Unix introductions combined (see "A Proprietary Machine In a Standards World").

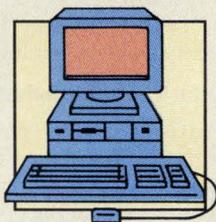
What are users to make of all these events? Should they expect the flurry of aggressively priced RISC products to hasten a general collapse in hardware prices? How are users to act when they have mixed emotions about proprietary systems versus their open systems successors? Should they be shopping for new systems vendors, sticking with their vendors, or leaping into the hands of systems integrators? And what applications should they build on open systems?

The answers don't come easy. The best that users can do is to attempt to understand where the industry is coming from, where it's headed, why it's going in that direction, and what roles suppliers and users themselves will play in its destiny.

Several factors anchor users to proprietary technology. First of all, the largest installed base of computer customers, IBM sites, is more conservative and less technically oriented than any other. Second, users remain loyal to those systems vendors that brought

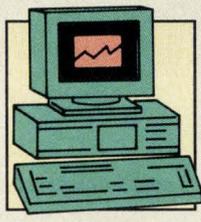
them into the 20th century. Third, the expense of converting from IBM's VM or DEC's VMS to Unix is high. Fourth, as Bob Evans, vp, MIS, at El Paso Gas points out: "Somewhere down the line, people seem to have forgotten the fact that proprietary technology adds value." George DiNardo, executive vice president, MIS, for Mellon Bank, Pittsburgh, argues that in some environments, notably high-volume OLTP crunching, proprietary systems get the job done "better and

Behind the News



JUNE 2

IBM expands PS/2 family with seven new machines, notably the Model 70-A21/386 with Intel's fastest (25MHz) 32-bit microprocessor. The system is priced at \$11,295.



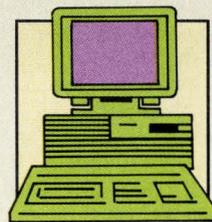
JUNE 20

Compaq extends its line of pcs based on Intel 386 (CISC architecture) chips with Deskpro 386/25 and Deskpro 386. The company claims that the Model 25 (priced starting at \$10,299) outperforms many minis and engineering workstations. It also underscores the Model 25's ability to run DOS, Windows 386, Unix/Xenix, and OS/2 applications.



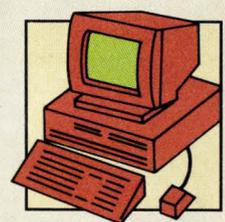
JULY 5

MIPS Computer reasserts its claim to price/performance leadership, offering 20MIPS for around \$100,000 in its new RISC-based M/2000 system.



JULY 12

Apollo touts supremacy at the low end of the workstation marketplace with two new Motorola 68030-based models. One, the 3500, offers 4MIPS for under \$8,000; the other, the 4500, weighs in at 7MIPS for \$19,000.



JULY 19

IBM announces the first upgrade to its RISC-based personal computer, the RT PC, in 20 months. Three new models, priced between \$23,220 and \$32,165, are announced that, typically, offer 25% more throughput to customers.

Signs of Transitional Times

cheaper than anything else"—especially mainframes.

A recent survey of 50 leading U.S. companies by Wall Street firm, First Boston Corp., offers another reason why the longevity of mainframes and mini-computers, which Bell calls "code museums," is assured for a while. Portability, the vanguard of the open systems movement, ranks dead last among 16 user needs measured by the investment firm. Multivendor networking tops the list, with other connectivity needs such as systems integration running close behind. What the commercial sector really wants, concludes First Boston analyst Steve Milunovich, is "Unix layered with extra code to act as the glue between previously antisocial systems."

Value Is Added by Proprietary Systems

El Paso's Evans says the real driving force behind the standards movement, the "ideal" that corporations want to achieve, is to use proprietary systems for whatever they do well. In other

words, says Evans, "IBM for batch, Tandem for OLTP, DEC for timesharing," and open interfaces for improved connectivity. "What we don't want is some homogenizing effect whereby Unix as the lowest common denominator forces us to sacrifice the value added by proprietary systems."

If, as First Boston's Milunovich claims, Unix is more an "evolution than a revolution" in the commercial sector—his survey showed that only 15% of respondents consider Unix strategic at this point—the same can't be said of the rest of user world. Unix and other standards are already a major force in government, education, and, increasingly, in manufacturing. Overseas, where European suppliers have rallied around the Unix standard to hold U.S. vendors at bay, the movement is even stronger.

(That's not to say there are no mainstream examples of U.S. commercial customers investing heavily in Unix. Computing pioneer American Airlines has joined with three other giants of the

travel and leisure business—Marriott, Hilton, and Budget Rent-a-Car—to create a network that allows a single customer transaction to book a flight or hotel room, or to rent a car. The first phase of this CONFIRM network is being built around Unix and a multiprocessor OLTP architecture supplied by Sequent, Beaverton, Ore.)

Paying for Open Systems Development

U.S. commercial users are also being indirectly affected by the standards movement, according to El Paso's Evans. "The U.S. government's insistence that its suppliers offer Unix or nothing is beginning to affect my business," he says. Evans, who has one of the largest Wang installations in the world, says his supplier naturally wants to bid on large federal procurements and must retrofit its technology with open standards to do so. As Wang customers, he says, "we end up having to pay for the development of that open systems technology whether we want to or not. It's passed on to us in the form of increased product costs or less efficient proprietary technology."

In an effort to achieve open interfaces with all speed, the industry may indeed be penalizing proprietary technology, says John Torreele, operations director for one top systems integrator, Computer Sciences Corp., El Segundo, Calif., who is a strong proponent of such interfaces. "Most bids emerging from the federal arena are of the IDIQ [indefinite delivery, indefinite quantity] kind, but at fixed price," says Torreele. "The edge goes to those with open systems."

Standards Redraw the Map of the Industry

The standards movement could soon exert a more direct pressure on the commercial sector, warns Barclays Bank's Nicholas. His fear is that the products of deregulation, such as "pseudo" banks, insurers, etc., will use the new open platforms to take away the handful of really big customers that support the whole Barclays banking structure—the "cherries" on the tree, as Nicholas calls them. He worries that open systems will allow pseudo-competitors to develop equivalent or superior IS capabilities at much lower costs, some of which could be passed along to big customers. "To compete in the years ahead, we may have to put more of our new applications on Unix workstations, if, and when, that operating system achieves functional parity with our own," Nicholas says.

Standards seem to be redrawing the map of the industry. More than anything,

A Proprietary Machine In a Standards World

It's pure IBM: at a time when the industry is obsessed with open systems, the company is extolling—successfully—the virtues of its new proprietary midrange line of systems, the AS/400.

IBM seems to have tapped into something that businesspeople have always known and computer companies tend to forget: the importance of return on investment. "You can pay only \$8,000 for a PC or Unix workstation and see little return. Cost can be meaningless if, by comparison, somebody else has spent \$50,000 for a bundled IBM machine and got a \$200,000 return," says Tom Moser, chairman and ceo of Prosoft Inc., Canton, Ohio, one of a growing number of IBM vars, or "business partners," who can't wait to get his hands on the first AS/400s. The AS/400 is the latest, and according to many analysts, the best, incarnation of IBM's closed System/3X architecture.

IBM's notion of selling a closed machine, often with MIPS that cost 15 times more than on Unix systems aimed at the same industries, seems preposterous at best. (IBM vars put the price at \$270,000 for 4MIPS.) Yet, as Moser points out, he "never loses" in competitive bids with a System/36 and doesn't expect to lose with an AS/400. "We're always more expensive, but we win anyway," he says of bids in his specialty industries of distribution and manufacturing. "The machine is so damn easy to use. IBM understands the psychology of the small business to perfection," says Moser.

Unix and the PC operating systems, in contrast, require quite lengthy learning curves, experts point out. "They are like stick shifts compared to the automatic transmission of an AS/400," says Moser.

While it's true that IBM's customers will lock themselves into their var and to IBM when they purchase an AS/400—and hence possibly pay \$3,000 for a peripheral that costs \$800 to an open systems customer—they do so gleefully. There are some 250,000 System/3X customers across the globe, according to IBM. "So you're locking yourself into a Chevy rather than a '55 Jaguar you can't get parts for," quips Moser.

The strategy has great appeal for many MIS executives who want to cross over into the business side of the house and bypass the complexities of technical management.

It's an odd fact, but all the industry will accept right now, it seems, are two extremes: the fully open system or the fully closed one.

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standards promise to be the "great leveler." Davids can emerge to take on Goliaths. Or "outs" can become "ins," as Edson de Castro, president and ceo of Data General, put it in a recent DATAMATION interview. De Castro admits to being one of the "outs" that would soon be back "in."

Not only will the balance of power shift between corporations, a process already occurring through constant asset juggling, it will also shift between vendors, ISVs, SIS, and vars, say observers.

The demand for connectivity is forcing vendors into unprecedented levels of cooperation and into (often uneasy) alliances. A new elite of systems integrators and resellers, third parties conversant with the customer and his or her business problem, has been created to fill the void. "These people have the real power," says John Imlay, chairman and ceo of the Atlanta-based mainframe software company, MSA, and a member of DATAMATION's advisory board, alluding to firms such as Computer Sciences Corp., Arthur Andersen, and IBM itself. "The whole software industry, MSA included, is reorganizing into vertical niches [industry-specific segments] to play a subcontracting role in the megadeals they are putting together."

The Shifting Balance of Power

Nearly one sixth of the \$33.6 billion worth of hardware sold last year in the U.S. was supplied to customers by third parties, according to International Data Corp., a market research firm in Framingham, Mass. "And this number understates the true importance of vars," says IDC analyst, Steve Bosley, "because many of the processors supplied directly by vendors were offered with third-party software and support. In fact, third-party software drives the whole industry dynamic today."

Standards are also shifting the balance of power between countries. Anetta Kunft, marketing manager for the Netherlands' biggest var, Baan Info Systems, points out that U.S. vendors (IBM and DEC especially) have created the dominant proprietary architectures. That dominance, in turn, has forced the rest of the world into alliances and the quest for alternative open standards. "As a result," she explains, "we have less trouble adapting to the changes, and can use standards offensively, not defensively, as is the case with those protecting huge installed bases."

Baan, which essentially serves two industries, construction and manufactur-

ing, has reached \$23 million in sales and is growing 60% a year by pursuing a vendor-in-dependent strategy.

Proprietary Mini Bases Stop Growing

U.S. firms with smaller proprietary bases, especially the New England mini makers, are seriously threatened by the open movement. "Their bases are too small to attract the interest of ISVs," says Stuart Levinsky, marketing manager for one of Canada's biggest vars, Jonas & Erickson, Toronto. One reason, for example, for Data General's ambitious shift into open systems and communications systems is that, by internal estimates, only about 3% of the world's applications will run on DG's proprietary MV hardware by 1991.



PEOPLE SEEM TO HAVE FOR- GOTTEN THAT PROPRIETARY TECHNOLOGY ADDS VALUE.

"Our proprietary base," says de Castro, "has virtually stopped growing." So have the proprietary minicomputer bases of the other leading vendors, DEC excepted, as recent DATAMATION/Cowen & Co. surveys have shown (see "Midrange Shootout," Nov. 15, 1987, p. 60). The mini makers have to find ways to pry open the larger bases of IBM and DEC and comfortable vertical niches if they want to grow. As one analyst, George Colony at Forrester Research, Cambridge, Mass., puts it: "If you're getting only 8% return on an investment, you have to wonder whether you wouldn't be better off just leaving your money in the bank, or whether you should be in some other business—maybe real estate or publishing."

Economic Benefits of Openness

According to de Castro, the most immediate effect of standards is on the cost and pricing structure of the industry. "Those proprietary vendors that adapt quickly can greatly improve their cost structure," he says, offering an example from his own sphere of influence.

"Because we've committed to commodity RISC chips, we've been able to shut down our semiconductor group and sell off our Singapore-based manufacturing operation. Other major cuts in overhead are possible," de Castro says, declining to elaborate for the time being.

Users can also benefit from standards as a result of reduced development costs. Corporations can cut their programming and operations costs—typically 50% or so of their IS operations budget—since they can choose the system that performs their work most cost-effectively.

Anthony Rodino Dandolo, MIS director for Fininvest Servizi, Milan, notes a paradox of the open standards movement: companies can now develop new applications on closed architectures with less fear. "You always know there is an alternative in the open systems environment that an IBM or DEC must maintain compatibility with. It's a good feeling," Dandolo says.

Open standards also save ISVs and vars huge sums. Jit Saxena, president and ceo of Applix, Westboro, Mass., has begun to make inroads into the commercial arena with his office automation suite, Alis. "I committed to Unix in 1984," he says, "because I didn't see any great future for proprietary systems. But back then, there weren't any standard windowing products, network file systems, and networking interfaces, so we had to write our own." Saxena estimates that Alis cost 10 times more to develop than it would in today's more standardized environment.

Vars Want Independence From Vendors

Jonas & Erickson's Levinsky asserts that vars want to put all their money into solving business problems and supporting the customer, not into their systems vendor's pocket. "We don't want to find out that our proprietary hardware has suddenly become nonstrategic or very expensive. We don't want to be dependent on vendors at all," he says of his company's decision to adopt Unix in the mid-'80s.

Jonas & Erickson uses four main vendors: Hewlett-Packard, IBM, DEC, and Prime. Jonas & Erickson achieved \$33 million in sales last year. It expects \$45 million in sales this year, and \$100 million in 1990. "With vars increasingly adopting Unix and open systems, it's easier for vars to become 'supervars' through acquisition," Levinsky says.

The great levelers though they may be, standards are unlikely to pose a major

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threat to the pricing structure of established vendors. A sizable number of customers, especially in the commercial arena both here and overseas, have no immediate interest in Unix. IS organizations that try to plan ahead, however, should be aware that some sectors of the supplier spectrum will be more prone to pricing turbulence than others.

Data General's de Castro believes that Unix, RISC, and workstations could soon have grave implications for the builders of ECL- (emitter-coupled logic) based superminis, which include DEC and his own company. In five years, main-frame builders using the same expensive bipolar logic could be affected. It's worth noting that CMOS implementations of

RISC chips delivering up to 17MIPS (50MIPS in parallel processing configurations) will be available from Motorola in about a year. DEC recently killed one 10MIPS to 14MIPS ECL-based supermini project ("Argonaut"), which resulted in 300 development staff being stranded. Insiders cite spiraling costs as a major factor; DEC declines to comment on its development activities.

Michael Mahon, System Architecture manager for HP's Information Architecture Group, agrees with de Castro: "ECL technology is very expensive. Only those building CMOS-based minis for the lower end of the market will be able to preserve their margins over the short term."

DEC Goes Outside for RISC Chips

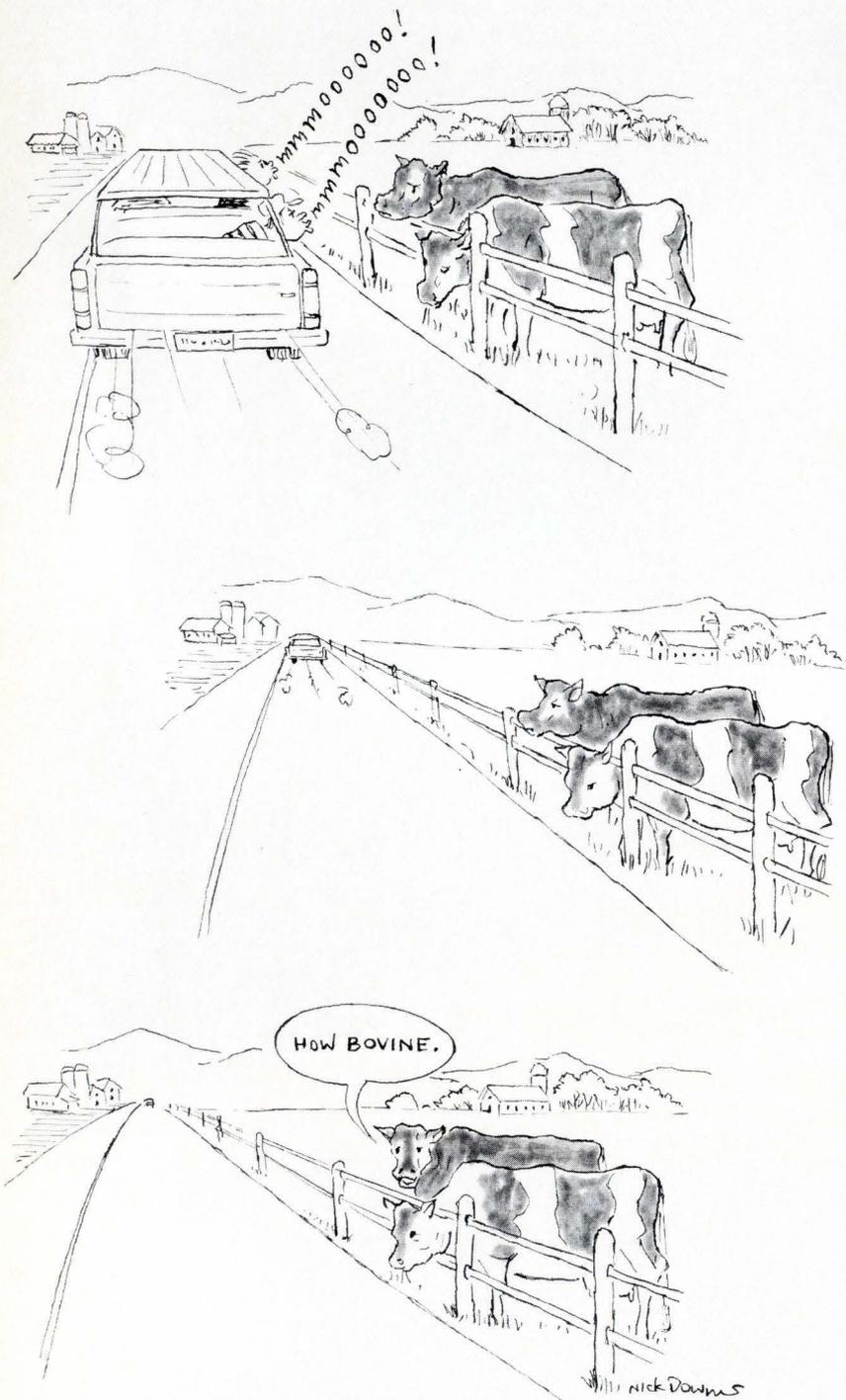
DEC, for example, recently decided to go outside for RISC chip technology, reportedly to MIPS Computer Systems Inc., Sunnyvale, Calif. "The costs of developing proprietary RISC technology at the workstation level are prohibitive. We know," Mahon says, reminding us that HP was the first mini maker to embrace RISC. "DEC hasn't even been able to make any margin on its VAX Station 2000 engineering workstation. The new economics of open systems has hurt even DEC at the low end of its business."

DEC's Bill Strecker, vp, Product Strategy and Architecture, wouldn't be drawn into an argument about DEC's margins, but alluded to the MIPS Computer rumor by saying, "We've always had the good sense to buy something on the outside if we can't make it cheaply enough on the inside."

Both de Castro and Mahon, along with a growing number of experts, stress that popping a few cheap RISC chips into Unix-based systems isn't what poses the real threat to DEC or any other established vendor. "It's the proliferation of consumer-like applications around Unix that make the difference," says de Castro. "People didn't buy pcs for the cheap hardware, though that didn't hurt. They bought them for 1-2-3 and the like."

Don't expect to see a bloodbath soon, though. Customers have decided that standards are what they want, but seem to accept that large companies such as IBM and DEC will have their own way of doing things.

With standards as the great leveler, maybe every organization or group, irrespective of size, will play a part in the creation of new applications. "Through standards," says de Castro, "we're all starting over." ■



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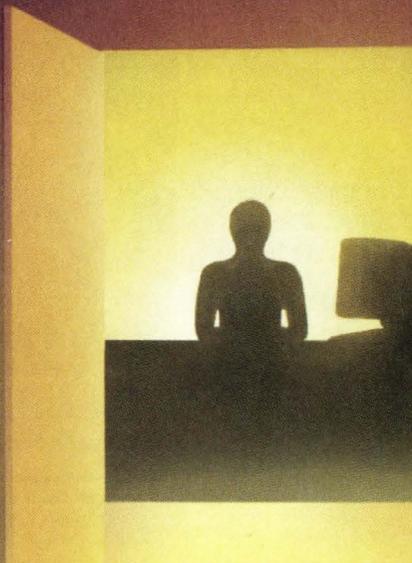
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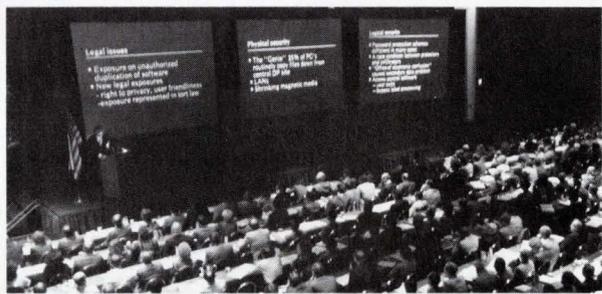
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WORKSHOP PROGRAM

1. Short and Long-Term Planning for Information Security
2. Establishing Workable Information Security Policies
3. Building an Effective Data Security Function
4. Security Review of Communication Networks
5. Architectural Comparison of CA-ACF2, RACF, & CA-Top Secret: Pt. I
6. Planning & Implementing a Security Awareness Program
7. Multi-Level Security in a Commercial Environment
8. Computer Viruses, Part I—What They Are & How They Work
9. An Overview of Risk Management Tools
10. Introduction to Disaster Recovery Planning
11. Career Planning for Information Security Officers
12. Establishing & Managing the Security of Microcomputers
13. Data Security: Who "Owns" the Responsibility?
14. Security Considerations of Inter-Company Networking
15. Architectural Comparison of CA-ACF2, RACF, & CA-Top Secret: Pt. II
16. The Missing Link: Information Classification
17. Correlating Security "Incidents" to Deficient Organizational Policies
18. Computer Viruses, Part II—Protecting Your Systems
19. Controlling the Systems Programmer
20. Contingency Planning: What About Your People?
21. Management's Obligations: The Executive's Checklist for Information Protection
22. Outstanding Security Programs: Making Them Happen
23. Controlling Security Risks of Personal Computers
24. Network Security: A Primer
25. Computer Fraud: Effective Prosecution
26. Security Awareness for Government & Defense Contractors
27. An Introduction to VAX/VMS Security
28. Halon 1301: Can We Live With It?
29. Security Penetration Evaluation Methodology
30. Disaster Recovery Planning, Economy Style
31. Everything You Wanted to Know about Using Consultants
32. Achieving Support for Security: A New Communications Model
33. PC Products Evaluation: Part I
34. Security Implications of IBM's New ESA Environment
35. CA-Top Secret: For the Advanced Practitioner
36. Securing the MVS Environment
37. DECnet Security
38. Computer Viruses: The Law & Your Legal Liability
39. What the DSO & Auditor Should Know about Developing Secure Applications
40. Choosing & Negotiating with a Recovery Services Vendor
41. DP Risk Management Keyed to the "Business Purpose"
42. Security of Local Area Networks
43. PC Products Evaluation, Part II—Physical Security
44. Transborder Data Communications Security
45. RACF: For the Advanced Practitioner
46. Security & Control of VM Systems Software
47. VAXcluster Security Issues
48. The "Computer Security Act of 1987": Implications for Government & Private Standards
49. Controlling the Hacker Threat
50. Legal Aspects of Recovery Planning for Financial Institutions
51. Automating the Data Security Administration Function
52. Data Systems Crisis Management
53. Achieving Success: A 5-Step Program
54. PC-to-Mainframe Security
55. CA-ACF2: For the Advanced Practitioner
56. DB2 Version 2: Security Update
57. Case Histories of Recent Computer Break-ins
58. The Impact of Legal & Legislative Trends on Security Management
59. Auditing & Testing for Security Compliance
60. Organization-Wide Business Resumption Planning



OPTIONAL SEMINARS

You can attend one or two of the optional full-day seminars offered Sunday and Thursday, November 13th and 17th.

1. Introduction to Computer Security
2. Applying Computer Security to Meet Organizational Objectives
3. How to Become a More Effective Data Security Officer
4. A Blueprint for Establishing Security Policies, Standards, & Guidelines
5. How to Conduct an Information Security Review
6. Introduction to Data Communications Security
7. Information Security in a DoD Environment
8. "Criminal Code"—Risks and Countermeasures
9. Network Security in a Digital Environment
10. Developing a Structured Approach to Disaster Recovery Planning
11. Creating an Information Security Awareness Program
12. Computer Crime Investigation: A Practical Approach

ABOUT COMPUTER SECURITY INSTITUTE

CSI, established in 1974, is a full-service membership organization dedicated to helping its more than 3,000 members safeguard their information assets. Services include the bimonthly newsletter *Computer Security*; the annual *Computer Security Buyers Guide*; a Hot Line telephone referral service; and reduced rates on CSI conferences, seminars, and publications. CSI also sponsors the summer IBM/DEC Users Computer Security Conference. CSI publishes the semiannual *Computer Security Journal* and the 500+ page *Computer Security Handbook*. CSI offers in-house training courses as well as a full program of regional public seminars throughout the U.S. and Canada.

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Dynamic SQL Call Being Executed

```
INSERT INTO TDQM.TABLE821  
(PAGE NO,TOTAL) VALUES (000,1)
```

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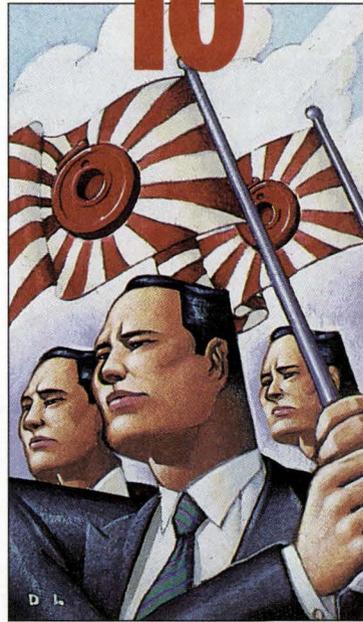
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Circle 29 on Reader Card

THE
JAPAN

10

*Market Close-up*

In 1986, IS vendors in Japan learned that a strong yen makes exporting tough. In 1987, they found that a strong yen also reflects and contributes to a wealthy, powerful Japan. With yen-rich financial institutions paying much of the user freight, the top 10 IS vendors in Japan grew 33% (triple the revenue growth of chief IS suppliers in the U.S.) during calendar year 1987.

Fujitsu Ltd. led the field again last year. Its overall IS revenue growth was 31.3% in dollars (12.7% in yen). In Japan, it sold nearly \$7.2 billion worth of systems and software—that's 82% of its total worldwide IS sales of \$8.7 billion.

Even though the growth chalked up by NEC Corp. lagged behind that of its four closest rivals, NEC managed to hold off Hitachi Ltd. and a resurgent IBM Japan Ltd. to retain second place. NEC's Japanese IS sales were \$6.7 billion, some

YEN DRIVES GROWTH

Japan's currency-rich banks, utilities, and insurance companies spent big on IS. Minis roared, but mainframes grabbed the lion's share.

The DATAMATION Japan 10

1987 RANK	1986 RANK	COMPANY	OWNERSHIP	1987 JAPAN IS REV (\$ MIL)	% CHG (\$ U.S.)	% CHG (YEN)	1987 TOTAL IS REV (\$ MIL)
1	1	Fujitsu Ltd.	Japan	\$7,166.8	31.3	12.7	\$8,740.0
2	2	NEC Corp.	Japan	6,748.6	31.7	13.0	8,230.5
3	4	Hitachi Ltd.	Japan	5,144.4	35.1	16.0	6,273.7
4	3	IBM Japan Ltd.	U.S.	5,140.6	34.5	15.4	50,485.7
5	5	Toshiba Corp.	Japan	2,684.3	35.6	16.3	3,441.3
6	6	Matsushita Elec. Indust. Co.	Japan	2,207.9	35.2	16.0	2,628.5
7	8	Mitsubishi Elec. Corp.	Japan	1,389.3	26.0	8.1	1,673.9
8	9	Nippon Univac Kaisha Ltd.	Japan/U.S.	1,294.6	31.3	12.7	1,294.6
9	7	Nippon Telegraph & Telephone Corp.	Japan	1,128.5	24.6	7.0	1,128.5
10	10	Oki Elec. Indust. Co. Ltd.	Japan	921.2	37.8	18.2	1,137.3

four fifths of its IS performance worldwide.

Following a dismal 1986, with declines in both profits and revenues, IBM Japan parlayed strong export and software sales into a 34.5% revenue expansion in dollars (15.4% in yen).

Last year's best growth, however, was in currency-proof exports such as laser printers and facsimile machines. Although Canon Inc.'s high 70% export ratio kept it from breaking into the ranks of the Japanese Top 10, it exhibited stellar increases, with worldwide IS sales climbing 68% to \$1.7 billion.

Why a Strong Currency Helps Industry

The surge in Japan's IS industry comes both in spite of—and as a result of—the stronger yen. To some extent, the industry comeback is also a tribute to Japanese resourcefulness. With a strong yen making domestic manufacturing more expensive and exports less competitive, the Japanese moved swiftly and decisively to neutralize these disadvantages by importing more components, moving production offshore, gobbling up devalued foreign assets, and doggedly attacking internal inefficiencies.

In a larger sense, 1987's impressive performance reflects the inherent advantages of a strong currency. After all, the yen is strong because Japan is strong. The currency has appreciated 16% against the U.S. dollar from 1986 to 1987 because it is hard to come by. With huge trade surpluses against major trading partners, the Japanese have been able to stockpile yen as other countries bleed their currencies to pay for Japanese imports. The result is that anyone who owns yen has seen his or her assets appreciate along with the currency.

A case in point is Japan's banks. Be-

cause their yen-dominated assets have ballooned in value, seven Japanese banks now rank among the world's 10 richest. With this windfall, Japan's banks have expanded aggressively both at home and abroad.

To manage their ever more complex operations, Japanese banks have implemented so-called third generation on-line systems that integrate functions such as currency trading, international funds transfer, account management, and securities trading. Takehito Inoue, general manager of NEC's electronic data processing product planning division, says the financial industry was NEC's most active customer sector in 1987. IBM Japan, Hitachi, and Nippon Univac Kaisha Ltd. also say that purchases by banks, insurance firms, and other financial institutions contributed substantially to their 1987 performances.

The yen's strength helped IS vendors in other ways. Japanese manufacturers, intent on achieving productivity gains to offset higher production costs, increased their capital spending on information systems.

Spending on office computers was especially strong, because Japanese firms reckon there is great productivity leverage in automating offices. Only 1% of Japanese office workers use computers, according to Peter Wolff, vp and associate director of Far East research for Prudential-Bache Securities in Tokyo. The potential for expansion in this area is substantial.

Industries that are dependent on natural resources found that fewer yen bought more raw materials. Japanese utilities, beneficiaries of lighter energy bills, have been dramatically expanding their IS, says Reto Braun, president of the Asia Pacific division of Unisys Corp.

Finally, the appreciation of the yen puts a bulge in the consumer's wallet, and, with the government's encouragement, the Japanese consumer has been uncharacteristically profligate. Japanese gross national product grew by 4.9% (year ending March 31, 1988), up from the stunted 2.6% of 1986.

Mainframes Still Kings of the Jungle

Mainframes still top the list of Japanese IS expenditures. They account for roughly two thirds of all processor sales, according to the Japanese Ministry of International Trade and Industry (MITI). In 1987, mainframes rang up ¥1.2 trillion (\$8.3 billion) in sales, up 19.1% from 1986. "Mainframe growth has slowed in the rest of the world. But not in Japan," Unisys's Braun notes.

Pcs, by contrast, play a far smaller and less vigorous role. Their sales, hurt by a plunge in exports to the U.S., grew by just 2.3% of a total of ¥380 billion (\$2.63 billion). More promising were sales of "office systems," which are generally synonymous with minicomputers. Although they are still not a major market factor, minicomputers are being used more widely as departmental processors in Japanese offices and, according to MITI data, their sales rose by 21.3% to a total of ¥183.9 billion (\$1.27 billion).

Fierce price-cutting in both hard and floppy disks curtailed growth in storage equipment. Although unit volumes increased by a robust 24%, unit prices declined by 13.1%, yielding an overall gain of 8.4% in the value of storage equipment production. Printer prices were much steadier, allowing an 18% advance in the value of production. Display equipment sales flicked along at a dull 2.3% rate of growth.

The abiding strength of mainframes

% CHG (\$ U.S.)	1987 TOT REV (\$ MIL)	JAPAN IS REV AS % OF TOT REV	IS REV AS % OF TOT REV	NET INCOME (\$ MIL)	1987 TOTAL EMPLS	FISCAL YEAR END
32.9	\$13,103.2	82	66.7	171.0	89,293	March
30.1	18,236.8	82	45.1	208.0	101,227	March
32.7	33,070.6	82	19.0	734.5	161,325	March
5.9	54,217.0	10	93.1	5,258.0	389,384	Dec.
32.1	23,829.0	78	14.4	293.6	124,000	March
33.3	31,906.1	84	8.2	1,010.7	132,851	Nov.
24.4	14,947.2	83	11.2	131.4	70,935	March
31.3	1,294.6	100	100.0	20.1	4,410	March
24.7	1,128.5	100	3.0	1,332.2	298,000	March
29.1	1,137.3	81	35.6	31.4	18,328	March

and relative unimportance of pcs reflect a broader reality of the Japanese IS market. It is, in many ways, a time-delayed snapshot of the U.S. market five or six years ago. Many of the same forces that have recently reshaped the U.S. computer industry are now at work in Japan, but in a more nascent state.

Pcs are just emerging. Minicomputers are coming on strong, offloading mainframe applications. There is an increased recognition of software as the key to competitive differentiation. Other trends that have begun to work their way through the Japanese market include heightened demand for systems integration, keen interest in Unix as an emerging standard, and the quickening pace of office automation.

All of the major IS vendors in Japan have made some attempt to align themselves with these trends. Hitachi has been increasing the number of engineers in software development, observes George Hersh, vp of equity research at Daiwa Securities America. IBM Japan is expanding its systems integration business. Mitsubishi Bank, for example, selected IBM Japan as the systems integrator for its ambitious third-generation computer network.

For its part, NEC is building a desktop-to-mainframe Unix capability and recognizes "a great need for software improvements," according to Inoue. The corporation sees a need for greater ease-of-use and for dramatic improvements in applications development and overall programmer productivity.

Even though NEC rates No. 2 among the Japan 10, it will have to do something to recover momentum. While its 31.7% dollar-revenue growth is nothing to sneer at, it is less than the next four companies on the Top 10 list: No. 3 Hitachi's

dollar-revenue growth is 35.1%; No. 4 IBM Japan's is 34.5%; No. 5 Toshiba Corp.'s is 35.6%; and No. 6 Matsushita Electric Industrial Co.'s is 35.2%. NEC complains that exports were hurt by the strong yen. Its peripherals business also fell prey to pricing pressures, managing only slight improvement.

Wallets Sealed 'Til Christmas

Moreover, the company, traditionally strong in the middle of the mainframe market, suffered as customers awaited the December 1987 introduction of its new System 3300 processor. The other end of its product line also floundered as NEC-compatible pc makers flooded the Japanese market with low-priced models. The fact that NEC is the only leading Japanese mainframe vendor to eschew the copycat strategy of IBM-compatibility did not dissuade Seiko Epson, for example, from coming to market with clones of NEC's popular 9801 line of pcs.

Archival Fujitsu, meanwhile, saw its own copycat strategy upheld in last

year's controversial ruling by a specially appointed two-man panel approved by the American Arbitration Association. The panel, retained by IBM and Fujitsu for binding arbitration of IBM's claim that Fujitsu's mainframe software illegally borrows from its own, surprised most analysts by ruling that Fujitsu will purchase a paid-up license for over 900 IBM programs. The amount and terms of payment have not yet been announced. Although IBM and Fujitsu are not allowed to comment on the decision, the sound of gnashing teeth in Armonk is nonetheless audible even in Tokyo.

Fujitsu, on the other hand, is quite pleased. In the words of Pru-Bache's Wolff, Fujitsu's mainframe business "came on like gangbusters" after the ruling. Relieved Fujitsu customers concluded that there was no longer reason to question Fujitsu's ability to maintain IBM compatibility, and loosened their purse strings. So, with the help of a strong finishing kick, Fujitsu's mainframe sales grew by 15% in the company's fiscal year (ended March 31, 1988). One note of caution, however: recent intellectual property decisions in the U.S. have attached unprecedented value to patents and copyrights. Some industry insiders believe the AAA panel cannot ignore these precedents in its decision on compensation. Fujitsu, they contend, may yet be slapped with a bill that approaches, or even exceeds, \$1 billion.

Meanwhile, Fujitsu can savor the new life in its mainframe business, along with other aspects of its performance in 1987. It benefited from the small boom in office automation in two ways. First, its microcomputer sales, even though a relatively insignificant part of the business, climbed by 17% in its fiscal year. Second, and more important, Fujitsu sold nearly

Leading Japanese-Owned Computer Companies

COMPANY	WORLDWIDE IS REV (\$ MIL)	% CHG (\$ U.S.)	% CHG (YEN)
1 Fujitsu Ltd.	\$8,740.0	32.9	14.1
2 NEC Corp.	8,230.5	30.1	11.7
3 Hitachi Ltd.	6,273.7	32.7	13.9
4 Toshiba Corp.	3,441.4	32.1	13.4
5 Matsushita Elec. Indust. Co.	2,628.5	33.3	14.4
6 Mitsubishi Elec. Corp.	1,673.9	24.4	6.8
7 Canon Inc.	1,673.4	68.3	44.5
8 Nippon Univac Kaisha Ltd.	1,294.6	31.3	12.7
9 Ricoh Co. Ltd.	1,275.7	36.6	17.2
10 Seiko Epson Corp.	1,198.4	15.7	-0.7

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The MX 300 is the new SINIX^{®*} multistation computer designed with teamwork in mind. It is capable of supporting up to 12 workstations which makes it the natural choice for departments and branch offices of large companies and the ideal solution to a variety of tasks in medium-size businesses.

The MX 300 is truly impressive – both inside and out. Its elegant slimline tower looks so good it seems a shame to hide it under a desk.

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For all this it is stunningly simple to use, offering windows, mouse control and graphics at eight workstations. The MX 300 can be tailored to suit your individual requirements in terms of the number of screens and printers, the size of main memory and the capacity of the hard disk. If ever your needs grow the MX 300 can grow with them.

And let's not forget all the other SINIX computers with their new levels of performance, such as the new X20 single-station system with its super high-speed processor, and the flagship model, the MX 500, which can now support 64 workstations – twice as many as before.

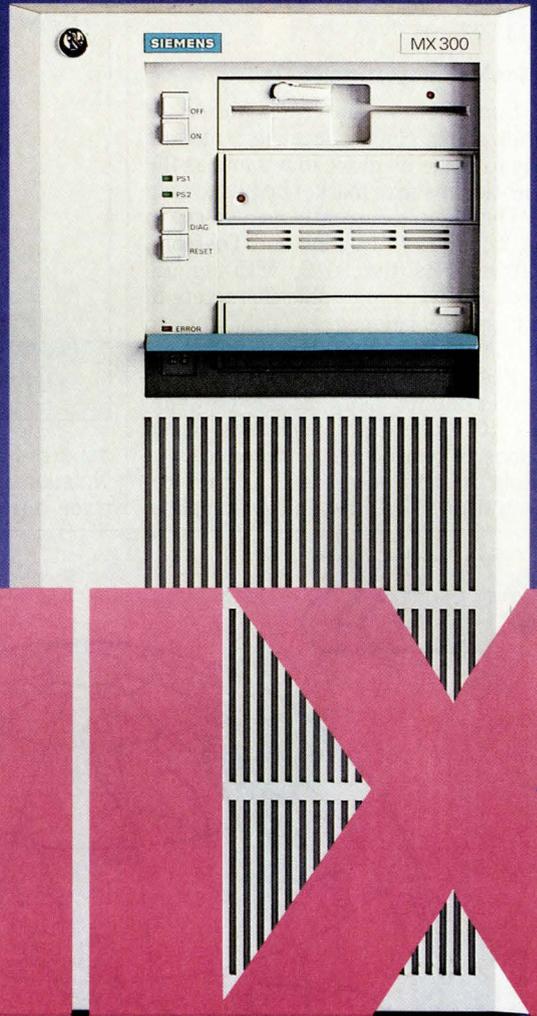
Find out more from Europe's No. 1 in UNIX computers: Siemens AG, Infoservice 134/Z388 P.O.B. 23 48, D-8510 Fürth, Federal Republic of Germany.

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SINKX

50,000 of its "small business" computers, chiefly minis.

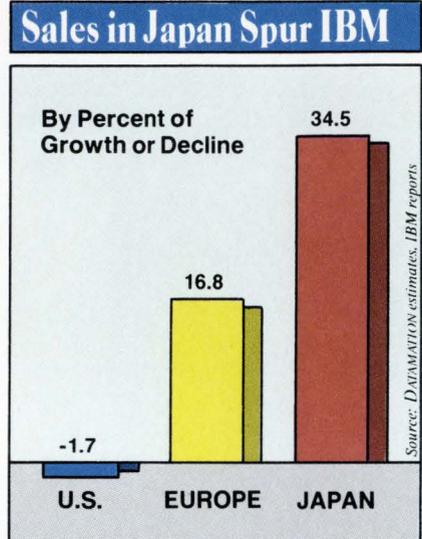
The ruling did little to slow IBM Japan in 1987. After a disappointing 1986, in which the company's sales dropped 2% in yen, the giant rode flourishing software sales to double-digit growth performance in 1987. Big Blue's IS sales in Japan rose to ¥743.4 billion (\$5.14 billion).

IBM Pushes Integration, PS/2s

Some believe that IBM is poised for further gains, chiefly because it may be ready to make its move in pcs just as the domestic Japanese market begins to take off. While IBM is currently an also-ran in pcs (trailing NEC, Fujitsu, and Toshiba), Wolff expects the PS/2, with its improved *kanji* (pictographic characters of the Japanese language) capabilities, to gain market share for IBM.

Pcs were a sore spot for most Japanese IS vendors last year. Seven of Japan's 10 leading pc vendors suffered declines in worldwide pc revenues, according to San Jose-based market research firm, Dataquest Inc. Matsushita,

Mitsubishi, Sharp, and others suffered from the appreciation of the yen and from the U.S. imposition of a 100% tariff on pc



imports—retribution for Japan's alleged violations of the bilateral semiconductor trade agreement. Only NEC (strong at

home), Epson, and Toshiba managed to grow in pc revenues last year, according to Dataquest.

Toshiba's success last year is especially instructive. Like Fujitsu, it is a company that appears to have escaped the worst-feared consequences of its actions. With its worldwide IS sales growing 32.1% to \$3.4 billion in 1987, Toshiba thrived despite its sale of vital submarine technology to the USSR. The company's success is perhaps the best evidence to date of how the U.S. computer industry and industrial policy are hostages to Japan's sovereignty in semiconductor memories. With DRAM-dependent U.S. customers bearing a forgive-and-forget message to Washington, Toshiba has thus far escaped serious sanctions.

Laptops Leave Toshiba Sitting Pretty

Toshiba has moved swiftly to transfer production of its hot-selling laptops to the U.S., thereby sidestepping the punitive tariffs. Yuji Wakayama, a Toshiba spokesman in Tokyo, says the company currently produces 10,000 laptops a month in the U.S., and adds that U.S.

Chart by Catherine Francis



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In addition our compact M380/C now has an improved capacity of 63 MB. All the new M380 line has the Olivetti OVC VGA-compatible graphic subsystem. In the 80286 sector, Olivetti introduces the M290. This PC has



revolutionary plug-in CPU board architecture, offering unprecedented flexibility in upgrading or adaptation to specific applications. The M290 is optimised to run in MS OS/2 in addition to MS-DOS and XENIX/V environments. The new M15 PLUS is a fully portable computer. It is available in two configurations: dual floppy disk or a single floppy and a 20 MB HDU. It has a 512 KB memory and an easy-to-read backlit Liquid Crystal Display. Olivetti promised you the choice of freedom. This is yet another way in which we're keeping that promise.

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How Facit B-line m more attractive,

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EASY SWITCHING FROM HIGH PRINT QUALITY TO FAST DRAFT PRINTING

If you still associate matrix printers with dull "computer-style" text, it's time to change your view. The Facit B-line printers feature professional Near Letter Quality printing that will really flatter your word-processing. The B3450 even offers Letter Quality which makes printouts virtually indistinguishable from those of daisy-wheel and laser printers. You can also easily customize your texts for special applications by selecting from a wide range of versatile fonts in several pitches.



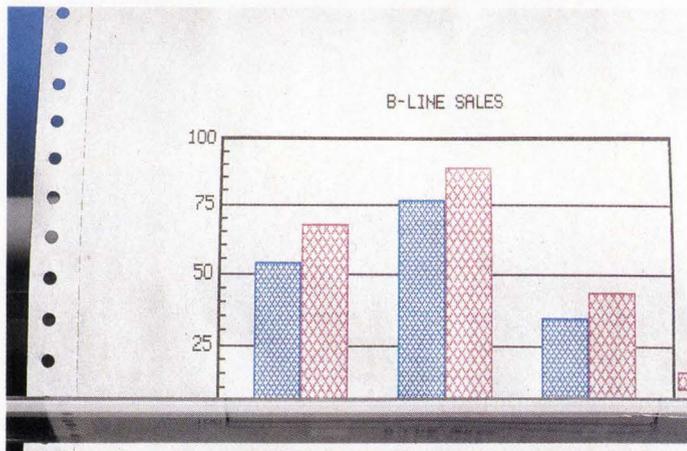
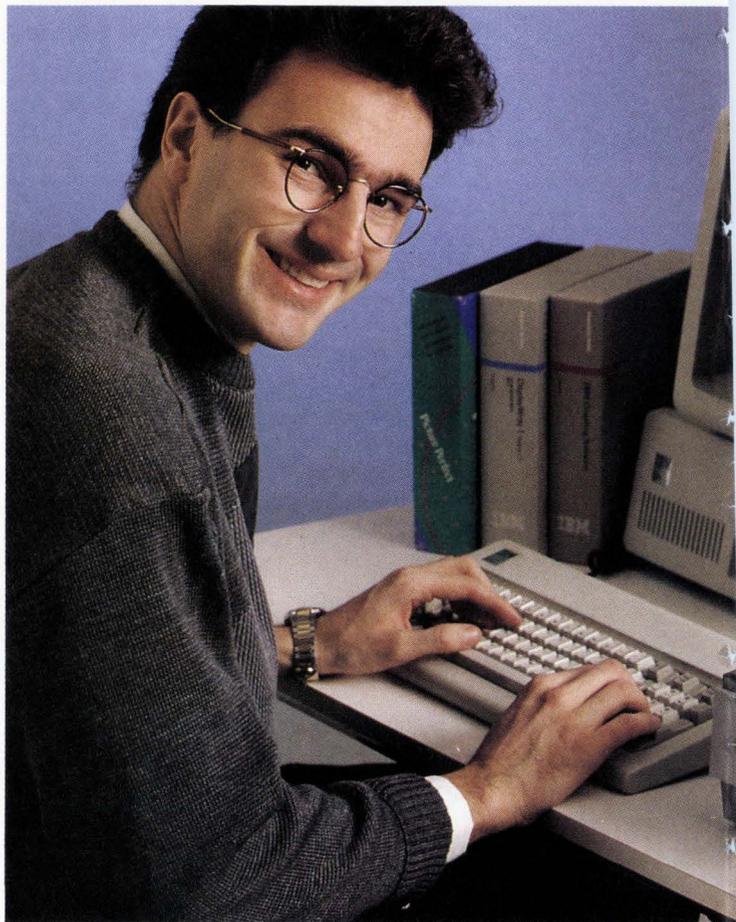
The B-line control panel offers instant selection of print quality, font pitch, low-noise printing, etc. Set-up parameters are also controlled from the panel, thereby making the printers very easy to install.

By flicking a switch on the front panel of the B-line printers, you can quickly change from high quality print to draft quality for lists and other applications when you're in a hurry. And because the Facit B-line printers are designed for high throughput, they maintain their high printspeed even during long printouts.

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The B-line printers permit you to load the paper in several different ways to suit various applications. This facilitates:

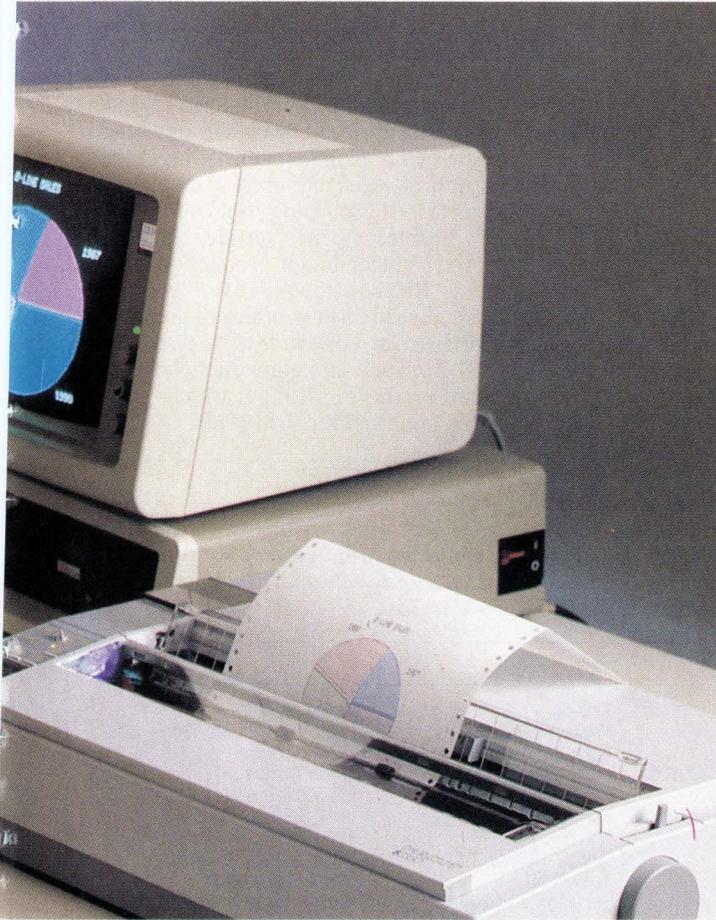
- Immediate paper tear-off without losing a single form – great when you use expensive paper
- Parking a continuous form while printing cut-sheets – a real time-saver if you frequently switch paper types
- Accurate feed of thick paper, such as forms and labels



Adding a four-color ribbon gives you seven-color capability for highlighting, labels, business graphics, etc.

You can also equip the printers with an optional single- or double-bin cut-sheet feeder. The double-bin capability is very convenient as it gives you immediate access to two types of paper, such as cut-sheets and envelopes.

makes your printouts efficient and fun.



The B-line printers can be used with a wide range of computers ranging from IBM PCs (and compatibles) to large DEC systems.



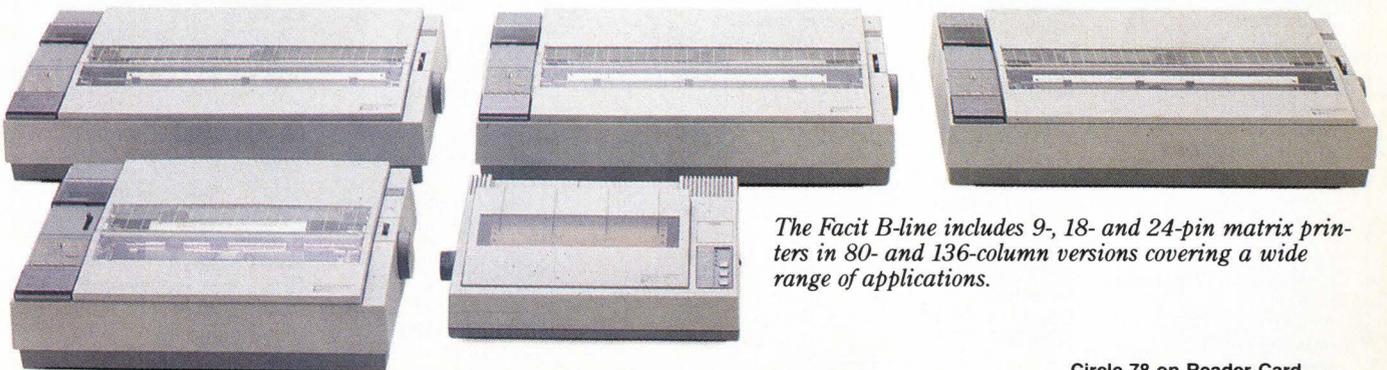
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sales represent 40% of all Toshiba laptop sales. This year, the company's laptop sales in Japan should also increase.

With No. 7 Mitsubishi Electric Corp. and No. 9 Nippon Telegraph and Telephone Corp. chalking up relatively unspectacular revenue gains (8% and 7% in yen, respectively), the most compelling stories among the second tier of IS vendors in Japan belong to Nippon Univac, Matsushita, Canon, and Ricoh Co. Ltd. No. 8 Nippon Univac, which moved up from No. 9 in last year's rankings, benefited from the same mainframe buying surge that lifted Fujitsu, NEC, Hitachi, and IBM Japan. The company may have realized further benefits from its merger toward the end of the year with the Japanese subsidiary of Burroughs. (The new entity is called Nihon Unisys.)

Nippon Univac saw strength in its new midsize Swift 2200/200 machines and its high-end 1100/90 mainframes. Securities firms, utilities, and airlines were all active buyers. With the addition of Burroughs revenues, Nihon Unisys began 1988 with a broadened base of roughly ¥260 billion (\$1.8 billion) and

should move up on next year's Top 10. No. 10 Oki Electric Industry Co. Ltd., along with Matsushita, Canon, and Ri-

Fastest Growers In Japan

JAPAN 10 RANK	COMPANY	% CHG (YEN)	JAPAN IS REV (\$ MIL)
10	Oki	18.2	\$921.2
5	Toshiba	16.3	2,684.3
6	Matsushita	16.0	2,207.9
3	Hitachi	16.0	5,144.4
4	IBM Japan	15.4	5,140.6

coh, showed double-digit revenue growth on the strength of participation in flourishing laser printer and/or facsimile markets.

Matsushita and Canon are classic examples of strategic refocusing by Japan's consumer giants. Matsushita (along with Sony, a rising force in the Japanese workstation market) has recognized that Japan can no longer expect to be the low-cost producer in the price-sensitive sector of consumer electron-

ics. Matsushita is therefore anxious to expand into industrial and office applications. With products such as personal copiers, personal computers, printers, and facsimiles, Matsushita is actually pioneering a sort of transitional or intermediate market: the home office.

Canon's transition is more complete. It would, in fact, be hard to find a more classic case of diversification based on core technology. Canon has leveraged its optical expertise earned in cameras into three promising optics-intensive new businesses: laser printers, facsimile, and semiconductor production equipment. Ricoh also rode the boom in facsimile and laser printers to an overall 36.6% rise in worldwide IS sales, to nearly \$1.3 billion—not quite enough to earn a spot on the Top 10, but watch out for both Canon and Ricoh in 1989. ■

BY NORM ALSTER

Norm Alster is a freelance writer based in Cambridge, Mass. He frequently covers systems and electronics developments in the Far East.

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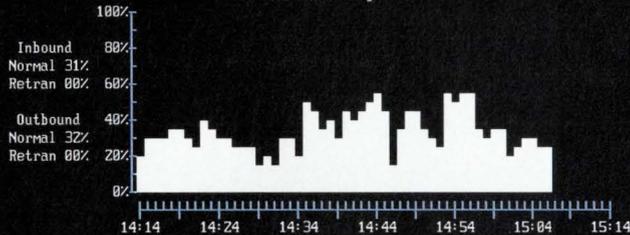
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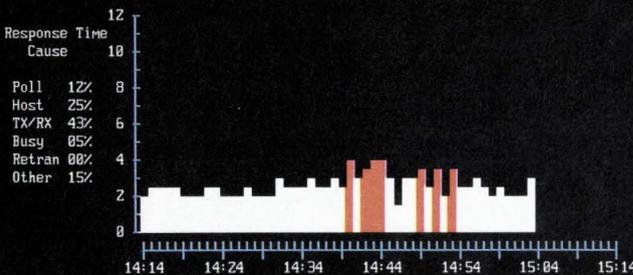
F1/R1	STATUS	COUNT	START TIME	STOP TIME	IDLE	FRAME
R	EOT	0	13:48:39.28	13:48:39.28	0.19	
T	EOT	0	13:48:39.46	13:48:39.46	0.19	
T	POLL	4	13:48:39.46	13:48:39.47	0.00	40 00 7f 1f
R	EOT	0	13:48:39.48	13:48:39.48	0.20	
T	EOT	0	13:48:39.66	13:48:39.66	0.19	
T	POLL	4	13:48:39.67	13:48:39.67	0.01	40 00 7f 1f
R	I-ETB	243	13:48:39.71	13:48:39.92	0.23	02 40 4c 7d c2 5c 11 40 c1 c6 c1
T	ACK1	0	13:48:39.93	13:48:39.93	0.26	
R	I-ETB	243	13:48:39.94	13:48:40.14	0.02	02 11 c7 c7 11 c7 c9 11 c7 d7 11
T	ACK0	0	13:48:40.15	13:48:40.15	0.22	
R	I-ETB	243	13:48:40.16	13:48:40.37	0.02	02 11 d1 c6 11 d1 c9 11 d1 d7 11
T	ACK1	0	13:48:40.38	13:48:40.38	0.23	
R	I-ETX	33	13:48:40.38	13:48:40.41	0.01	02 5c d7 c6 f1 5c 40 40 40 40 40
T	ACK0	0	13:48:40.42	13:48:40.42	0.04	
R	EOT	0	13:48:40.43	13:48:40.43	0.07	
T	EOT					
T	POLL					

10:27:42 Line Utilization Screen Outbound Only DEC 31 99



TOD	LU	Total	Poll	Host	TX/RX	Busy	Retran
15:07:03	c30c	3.14	0.11	0.00	1.67	1.28	0.00
15:07:34	c315	0.69	0.11	0.05	0.44	0.00	0.00
15:07:19	c314	1.73	0.11	0.19	1.26	0.00	0.00
15:07:10	c317	1.39	0.23	0.00	0.87	0.00	0.00

10:26:49 Average Response Time Profile Screen DEC 31 99



TOD	LU	Total	Poll	Host	TX/RX	Busy	Retran
15:03:24	c30d	2.28	0.46	0.20	1.48	0.00	0.00
15:03:40	c319	2.01	0.11	0.55	1.25	0.00	0.00
15:03:54	c314	1.72	0.10	0.20	1.22	0.00	0.00
15:03:27	c317	2.83	0.47	0.38	1.82	0.00	0.00

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The Acquisition of
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The Development of
UNDERSTANDING

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A European IS Culture for the 1990s

European corporations increasingly are concentrating on using IS in applications that improve both customer service and their own competitive positions, and that increase management effectiveness. But the responsibility for IS development is being spread more widely across senior executives, line managers, and IS specialists—each with their own priorities and levels of understanding. A partnership between these management sectors is vital to get the best out of technology in the future.

BY ROGER TOMLIN

If Europe's information systems departments are to get the most out of technology during the 1990s, they will need to target strategic applications, create a partnership between IS professionals and the different layers of corporate management, and avoid quantum leaps into the unknown. These are the central conclusions of a survey of 300 IS executives in major European corporations across the continent that was completed earlier this year on behalf of the Amdahl Executive Institute in the U.K.

The survey provides strong evidence that the business focus of IS developments in Europe is rapidly moving away from the back-room, cost-saving applications that have characterized traditional dp operations. IS is now mainly focused on adding value where the strategic competitive battle is won and lost.

One of the key obstacles to the creation of these strategic applications is that the purchasing and development responsibilities for IS systems are increasingly—and dangerously—being split three ways among the management of European corporations. Those responsibilities are now divided among the following three groups:

- senior corporate executives who are taking charge of the strategic IS direction, but who often have an inadequate understanding of the true possibilities and limitations of information technology;
- line managers who are being given control of user-led IS projects, without having the required technical know-how or experience to cope effectively;

- IS managers who remain responsible for providing the necessary technical infrastructure and services, yet who generally do not have the authority and expertise to participate productively in the business planning and decision-making processes that shape the corporate IS strategy.

What is needed now is a coordinated set of management policies and actions designed to create a corporate IS culture that ensures everyone involved works toward common goals. Given the growing strategic value of IS, the ability to create such a culture will be a key factor in deciding which companies will be tomorrow's business winners.

View of the Benefits of IS Is Changing

The foundation for this new IS culture is a clear understanding of where the real benefits from IS will be gained in the years to come. The chart called "Changing Focus of IS Benefits" compares what surveyed executives believe to have been the areas of most significant benefit over previous years with what they expect them to be in the next three years.

The most important changes between the rankings in the past and in the future are found in those activities most critical to the overall corporate mission: better service to customers, improving competitive position, increasing managerial effectiveness, and enhancing product quality.

These factors are beginning to change the way companies operate in Europe entirely. For example, John Whitmarsh, computer and warehouse director at U.K. mail order company Grat-tan plc, Bradford, England, comments that "information technology is now a

critical part of the business. Virtually every area is touched and almost everyone in the business uses a terminal in some form. At this stage, information technology is not just doing the old jobs better. It is doing entirely new jobs."

Activities with a more internal, cost-saving focus are still regarded as important, but they are becoming increasingly less urgent compared with more strategic applications. This does not mean cost-containment applications are becoming irrelevant, but it does indicate that most of the benefits have been squeezed from them and more strategic developments are taking center stage.

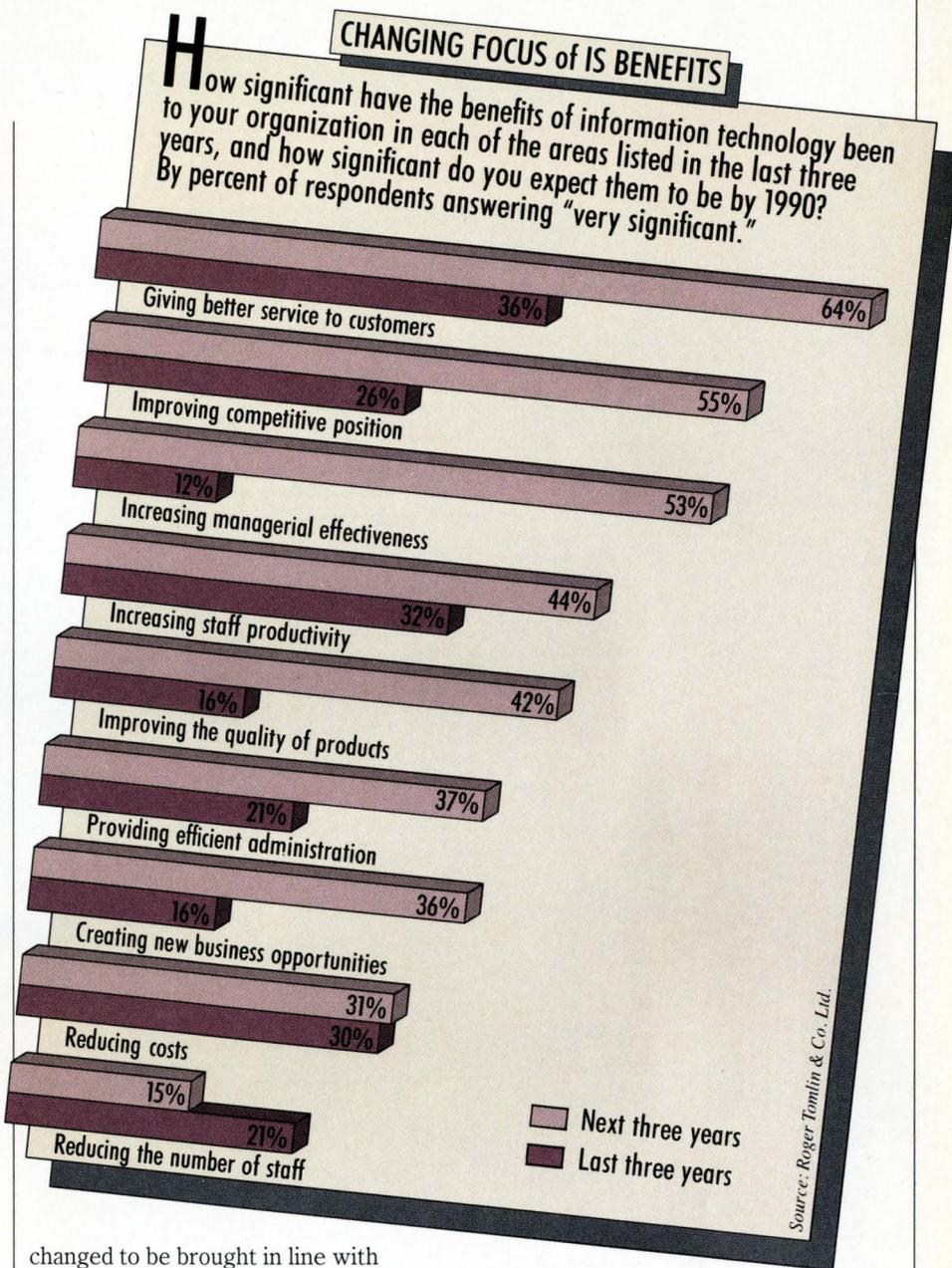
The chart "Future Priorities in IS Development" illustrates what this shift in benefit focus means (see p. 48-18). The most relevant developments integrate a variety of old and new systems via telecommunications links. For example, Alan Jacobs, information processing department director of J. Sainsbury plc, London, the largest U.K. supermarket chain, says that the creation of an integrated environment in which different systems talk to each other has enabled his company to be managed in a new mode, with the business driven firmly from the center: "We are now able to spread our wings and not worry about the mechanics of information flow."

One major new application area is the establishment of IS-based trading links between organizations, such as electronic data interchange (EDI). This is particularly important for European corporations as the European Commission strives to create a single market in Europe, with common customs, technical, and trading procedures, by 1992.

As one senior IS executive in a European retail chain points out, "We are getting to see information technology as a competitive weapon in forging interfaces with customers and trading partners. We see that if we get terminals into our customers and suppliers, it becomes much easier for them to order from our company and to ask us for advice on how to keep their business running. There is nothing like a successful computer link to make people dependent on the company which supports that service."

Concern Over Replacing Outdated Systems

A dark cloud on the integrated systems horizon is the fact that over half of the people questioned in the study say replacing outdated systems is a key future priority. Many older systems are unsuitable for the modern distributed network. Some systems may have to be



changed to be brought in line with new interfacing standards. Moreover, the rapid pace of information technology innovation means that systems can become obsolete very quickly.

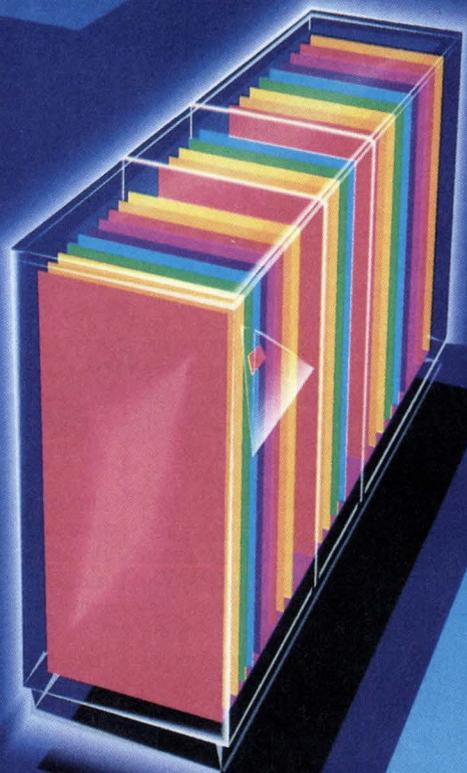
Frequently, there has been a lack of foresight in management planning. One large European service company was forced to throw out all its computers in 1981 because of "neglect and mismanagement in the 1970s," according to its current MIS director. He has, however, found a silver lining: "Millions of pounds later, it is proving to be a considerable competitive advantage to have none of our systems pre-date 1982."

The problem of obsolete systems is just one aspect of the complex demands on management and IS skills created by the trend toward integrated systems. The mixing of technologies, suppliers,

applications, standards, hardware, software, telecom facilities, network architectures, and inter-organizational and multinational systems could prove to be the recipe for disaster in many companies. It is this inherent complexity that is exacerbated by splitting IS responsibilities between corporate executives, line managers, and IS professionals.

"Sources of IS Initiatives" (see p. 48-18) shows how these responsibilities are now being distributed among different parts of European organizations. Generally, IS executives welcome the greater emphasis on user-led projects. They feel that a commitment from the actual user and line manager in charge of the relevant business areas is essential to the success of a system.

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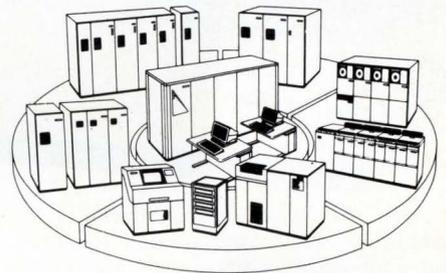
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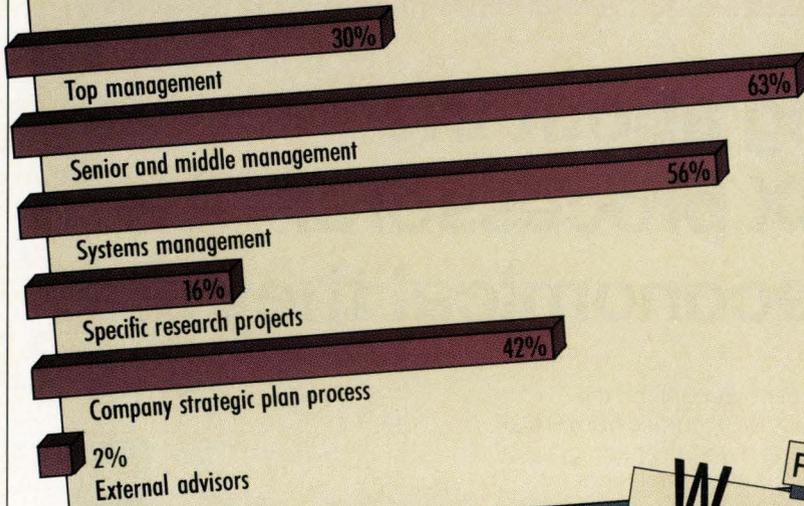
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SOURCES of IS INITIATIVES

From which sources are information technology applications initiated in your organization, and to what extent? By percent of very successful companies answering "often."



Source: Roger Tomlin & Co. Ltd.

European IS Culture for the 1990s

"Very successful" users were therefore taken as the baseline for what all companies should achieve. The fact that only 31% of the companies surveyed fell into this category shows that the majority of companies in Europe still have a lot of work to do.

A clear picture emerges of the characteristics that distinguish the "very successful" user from the rest:

- a perception by top management of IS as a key to business success, with a good understanding of what it can contribute to the company's progress;
- a positive search for increasing IS applications, without resistance from management or staff;
- a willingness to be innovative and to take risks; and
- a willingness by management to devote

On the other hand, Sainsbury's Jacobs, like many of his colleagues, fears that inadequate technical understanding among users could be a major problem. "I am afraid," says Jacobs, "that line managers in charge of IS projects will make the same mistakes we did 10 years ago." Another European IS exec adds that his boss is "extremely supportive of computing developments but is absolutely terrified of [the system] himself."

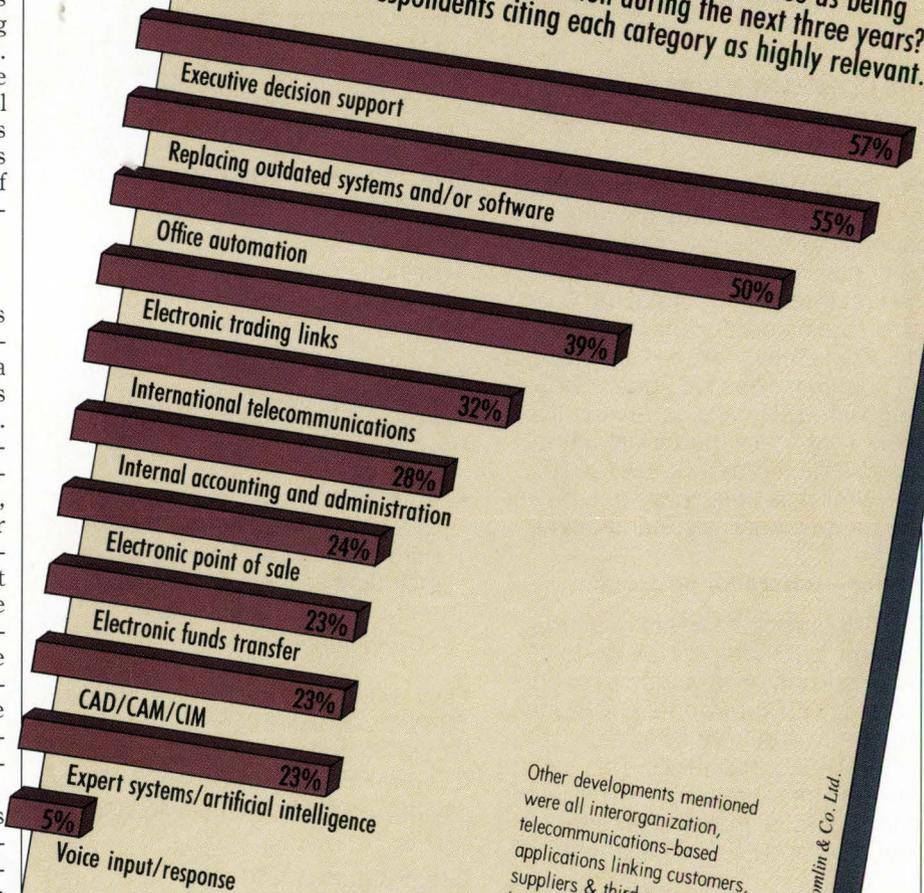
A Two-Way Street of Misunderstanding

The lack of understanding goes both ways. In building effective partnerships with managers and users, there is a general acceptance that IS professionals must come to grips with business needs. "The one thing we lack is computer people who understand the business," complains one senior manager. "Instead, they live in a technical world of their own." When a working partnership between these disparate management groups is achieved, the benefits become more obvious throughout the organization. This is shown by an analysis of the level of success with information technology achieved by the companies in the survey—broken down into very successful, fairly successful, and unsuccessful categories.

The study clearly showed that IS is now the very fabric of a successful business in all market sectors. Only the highest level of success with information technology will, therefore, be good enough for companies aiming to be among tomorrow's leaders.

FUTURE PRIORITIES in IS DEVELOPMENT

Which of the developments listed below do you see as being highly relevant to your organization during the next three years? By percent of respondents citing each category as highly relevant.



Other developments mentioned were all interorganization, telecommunications-based applications linking customers, suppliers & third-party databases nationally and internationally.

Source: Roger Tomlin & Co. Ltd.

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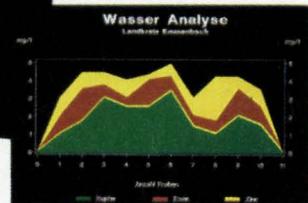
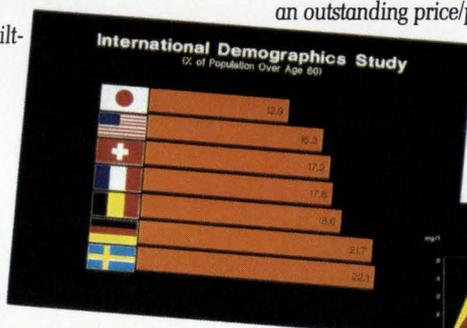
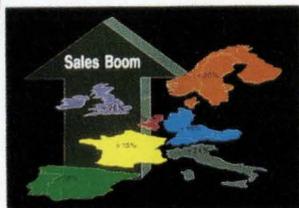
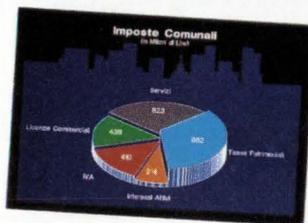
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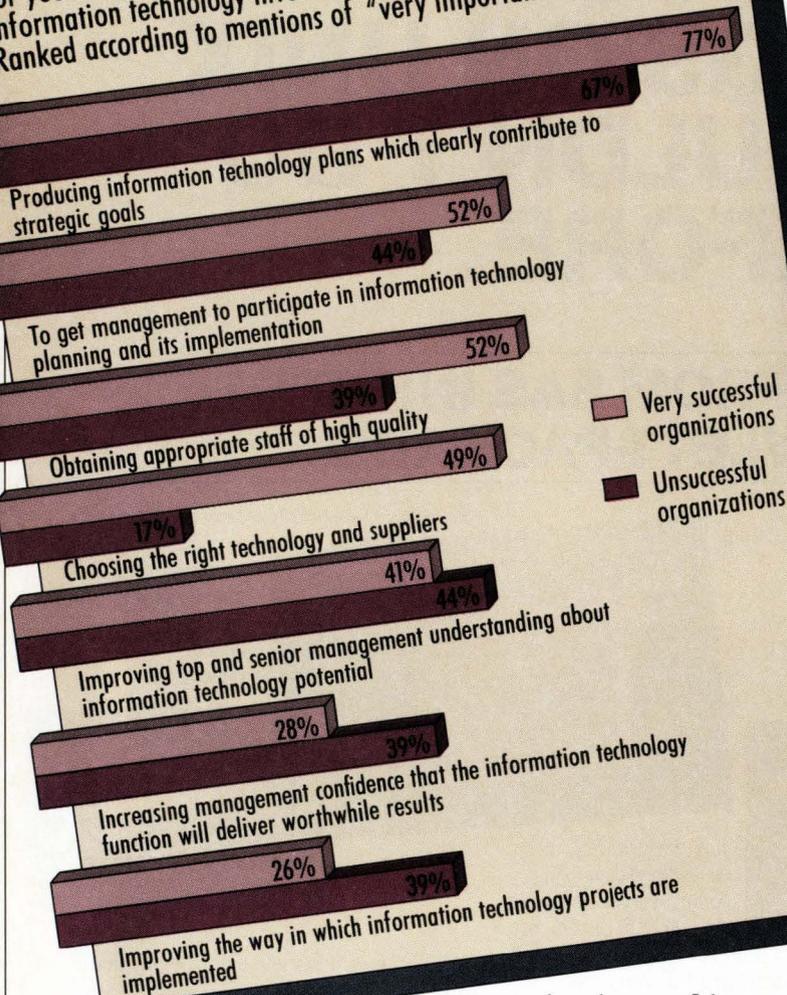
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IMPORTANCE of MAIN PREREQUISITES for OBTAINING MAXIMUM BENEFITS FROM IS

To what extent do you think the issues listed below are important for your organization to obtain the most benefit from future information technology investments? Ranked according to mentions of "very important" by percent.



Source: Roger Tomlin & Co. Ltd.

sufficient time for projects, to provide the right resources, and to ensure that projects are implemented effectively.

The "Importance of Main Prerequisites for Obtaining Maximum Benefits from IS" section of the survey summarizes the differences between "very successful" and "unsuccessful" users in their assessments of what it takes for IS success. Obviously, less successful companies place more emphasis on improving what has gone wrong in the past through poor systems development, which affected management confidence. The main lesson, however, is that IS success depends on a combination of business management leadership and high-quality technical skills, blended into an effective corporate partnership.

Leadership from top management is crucial in giving purpose and direction. One relatively unsuccessful IS user, for example, comments, "I am amazed to hear other executives talking about busi-

ness plans because I have never seen one that would allow me to deduce from it an IS plan."

Leadership usually begins with the vision of an individual or the board and

THE "QUANTUM LEAP" APPROACH IS DOOMED TO FAILURE.

leads to the positive role of IS in corporate strategic plans. But this will be successful only if it is followed through with well-planned policies and positive, coordinated actions. These must create a cultural attitude and infrastructure that

European IS Culture for the 1990s

encourages enterprise and commitment in exploiting information technology's benefits.

IS must become a normal ingredient in every manager's portfolio of skills, and it must be fully integrated into normal business planning processes. To achieve this, a considerable investment of time and money has to be made in developing a systematic approach to the education of all managers and staff in appropriate levels of technological and business understanding.

There must also be a willingness to spend time developing detailed IS plans. This involves not only deciding what to do, but when it is most appropriate to take particular initiatives.

Successful Users Follow Similar Pattern

All the very successful users followed a similar evolutionary pattern of development. They began by focusing on internal cost savings, which are relatively easy to cost-justify. As management confidence in IS grows and computer specialists learn how to develop a flexible IS infrastructure, the focus gradually broadens to a more strategic emphasis.

Many unsuccessful users, however, are seeking to make a "quantum leap" into sudden success. The approach is doomed to failure.

Colin Palmer, deputy managing director of Thomson Holidays, London, emphasizes, "We succeeded in using IS to improve our competitive edge precisely because we avoided taking a quantum leap. The root of our success was that we were doing something incrementally, building on a firm foundation."

That is not just a foundation for IS success, but also one for business success in the future. It is this emerging culture of management partnerships identifying competitive applications that will create the business leaders in Europe during the 1990s. ■

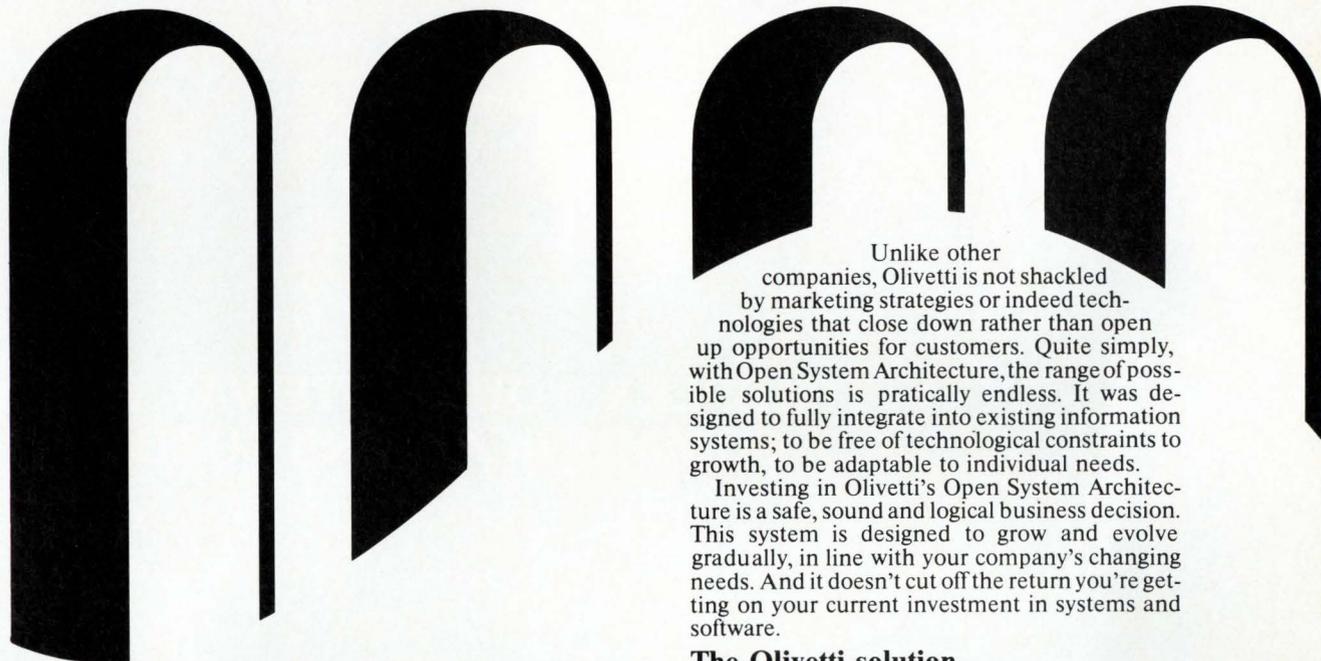
Roger Tomlin is the head of London-based management consultants Roger Tomlin & Co. Ltd., which conducted the European survey on behalf of the Amdahl Executive Institute. During late 1987 and early 1988, 276 replies were received to a survey questionnaire distributed to IS managers in West Germany, France, Italy, the U.K., and Switzerland. The survey was followed up by group discussions at the London Business School with 25 IS executives. The Amdahl Executive Institute is at Dogmersfield Park, Hartley Witney, Hampshire RG27 8TE, England.

An effective System Architecture should provide an open bridge to any need.

Sadly, many systems in the world of information management only **purport** to be "open". A few claims stand up under close scrutiny. But many are exaggerated; others are simply false.

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Olivetti developed Open System Architecture to provide across the board information management support, adaptable for whatever application the user wants to run, for whatever level in the system.



Unlike other companies, Olivetti is not shackled by marketing strategies or indeed technologies that close down rather than open up opportunities for customers. Quite simply, with Open System Architecture, the range of possible solutions is practically endless. It was designed to fully integrate into existing information systems; to be free of technological constraints to growth, to be adaptable to individual needs.

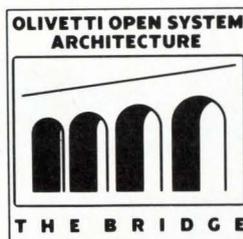
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The Olivetti solution.

Building the architecture on the UNIX system foundation was the logical approach. Open System Architecture supports an operating system that conforms to the UNIX System V and X/OPEN standards. It can provide specific data management solutions using ORACLE or INFORMIX; application development in third and fourth generation programming languages; and general office applications from the OLISOFT family. Of course, Olivetti maintains its commitment to MOS, the Olivetti operating system developed for specific market sectors.

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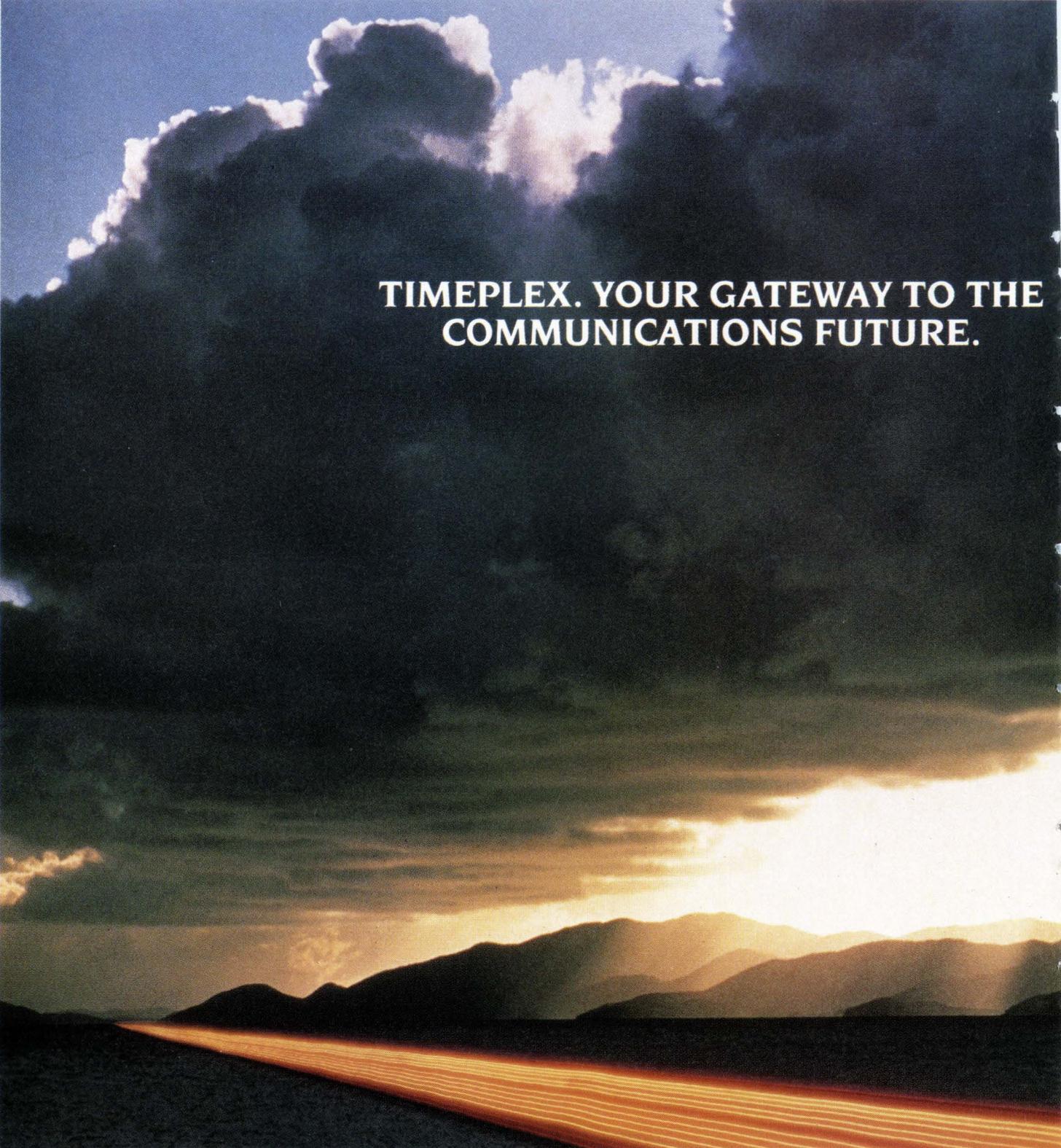
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Second Half 1988 Revised Editorial Calendar

Issue Date	Ad Closing Date	Special Reports	Surveys	Systems	Software & Services	Communications	International
July 1	June 1	Computers in R&D		CASE	PC Graphics		International Standards
July 15	June 15	Storage Management		Uninterruptible Power Supplies	Future of VM		
Aug. 1	July 1	Issues '88 - Part of a series exploring major new management, organizational, and systems issues	2nd Quarter Update	Managing Systems Transformation		Proprietary Networks	European 25
Aug. 15	July 15	DBMS/Mainframes	Enterprise Computing		Contract Programming		
Sept. 1	August 1	Major Corporate Profile	Salaries	Departmental Computing		Terminals	Japan 10
Sept. 15	Aug. 15	Best Computer Science Universities	Hall of Fame	Departmental Computing	OS/2	Network Management	
Oct. 1	Sept. 1	Issues '88	Industry-by-Industry Spending	Departmental Computing Printers	DEC-Apple Integration PC Maintenance		The Int'l Information Trade/South American Supplement
Oct. 15	Sept. 15	Changing Roles of MIS	3rd Quarter Update	CIM/CAE	Artificial Intelligence The Best & The Brightest Disaster Recovery		
Nov. 1	Sept. 30	Systems Integration Sales Force Automation		Database Machines	Performance Monitoring	ISDN	World MIS Cultures
Nov. 15	Oct. 14	Productivity Major Corporate Profile	DATAMATION/ Cowen Mini-Micro Spending	Portable PCs		Groupware	
Dec. 1	Nov. 1	Issues '88			Manufacturing Software	Modems	Global Information Networks
Dec. 15	Nov. 15	User Groups: Changing Roles	User Group Directory				

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Can Unisys Juggle Open Systems, Too?

Photograph by Walter Wick

BY JEFF MOAD

You might think W. Michael Blumenthal has enough to juggle already. For one thing, the 62-year-old chairman and ceo of Unisys Corp. is still working to fit together the pieces of Sperry Corp. and Burroughs Corp., which were merged nearly two years ago to form the \$10 billion company called Unisys. For another, he's got the large Unisys customer base to worry about: even before the merger, Burroughs and Sperry were fighting a constant—some say losing—battle to keep users happy and prevent defections. The merger only complicated those efforts. Sperry mainframe users, in particular, have voiced their dissatisfaction forcefully and frequently.

Add to those concerns the competitive implications of IBM's new Application System/400 product line—likely to pose a direct challenge to Unisys—and the company's recent unforeseen run-in with the federal government over alleged procurement improprieties. Put it all together and it wouldn't lead you to think Unisys would be out looking for major new challenges just now.

But it is.

Unisys Invests In Open Systems

Unisys is investing heavily in a move that represents both a significant break with its own traditions and a bid to remain in the ranks of major, broad-based information systems vendors into the 1990s and beyond. The company is trying to transform itself into a leading vendor of open systems-based solutions

First, it was combining the power of two leading industry players, Sperry and Burroughs. Now, only two years after the merger, Unisys has embarked on a major change of direction—open systems. In its vision of what it will take to remain competitive in the future and its consideration of its customers' changing needs, chairman W. Michael Blumenthal is attempting to reposition the company as a broad-based vendor of open systems-based solutions for the commercial market. Can he successfully transform the company's culture to capitalize on open systems while at the same time retaining the historic and still highly profitable proprietary Sperry and Burroughs customer bases? In short, can Blumenthal and Co. juggle the power of three?

for commercial users. This is clearly something new for a company that for years has clung tightly to the doctrine of closed, proprietary systems vendors, namely, lock users in and keep them locked in. In the early years, that strategy enabled Sperry and Burroughs to grow and, in later years, it enabled them to survive by feeding off a large customer base.

But that strategy failed to attract enough new users to enable Unisys to keep up with such fast-track competitors as Digital Equipment Corp. and IBM. Blumenthal used the merger to strengthen Unisys financially, slashing costs and combining operations where possible. While that made Unisys popular on Wall Street, it didn't solve its biggest problems: too little mainframe growth and too little market share, particularly in the booming parts of the market: distributed, workstation, and personal computing.

Competing on an Equal Basis

Blumenthal, in an exclusive interview with DATAMATION, explains, "We have concluded we want to promote it [open systems] because it will give us an opportunity to compete on an equal basis with some other companies where, in a closed-system world, we cannot compete on an equal basis. We only have 7% of the mainframe market worldwide, and it's very difficult to make that 10% or 15%; not because our systems aren't good, but because, in a closed world, the investments are such that it's difficult to compete. In an open world, the game is much more equal."

Blumenthal is betting that a push into open systems will help Unisys solve several of its chronic competitive problems at once by enhancing Unisys's long-deficient departmental systems offerings, giving Unisys new access to third-party applications software, and providing new growth potential by opening a window to a rapidly expanding set of users as yet untapped by Unisys. While emphasizing that Unisys will continue to invest in and support its current, proprietary mainframe products and customers, Blumenthal declares, "We have decided we are a new company unencumbered by the past... This is our chance, before we fall back in a rut. Unisys has identified its view of the future: what technology is making possible and what the market is demanding."

The question is, can Unisys really act like a company unencumbered by the past? Can Blumenthal make Unisys's own proprietary-oriented culture re-

spond fast enough to succeed in a market for open systems that is bound to attract more and more vendors and fiercer competition? And can Unisys continue to satisfy its bread-and-butter mainframe customer base while making a major commitment to open systems?

So far, the company's open systems efforts have been encouraging. Last year, Unisys forged into a single product line the Sperry and Burroughs Unix-based products that in 1986 had combined revenues of about \$150 million. In 1987, hardware, software, and services revenue for those products jumped to \$500 million.

Unisys estimates that combined revenue from its Unix-based systems will jump to \$800 million this year, and to \$1 billion in 1989. Industry analyst InfoCorp of Cupertino, Calif., predicts that, in 1988, Unisys will ship 3,795 Unix systems, bringing its installed Unix base to 9,905 and making it one of the leading Unix hardware vendors.

Not bad for a business that, at the time of the merger, was probably not considered a major asset by Unisys upper management, according to many observers. Analyst Steve Milunovich, who follows Unisys for First Boston Corp. in New York, recalls that "Burroughs had a strong 'not-invented-here' mentality and not much interest in Unix, while Sperry saw Unix as a way to capture a greater percentage of its customers' spending." Because the company's Unix products were sourced from outside manufacturers, many observers expected Unisys's Burroughs-dominated management to scrap or deemphasize them.

Instead, Unisys renewed contracts with most of its Unix hardware vendors, sought out third-party Unix DBMS and applications software vendors, and began to sell its Unix products aggressively. "After the merger, Unisys management had a sudden change of heart when it saw how fast the Unix business was growing," Milunovich says.

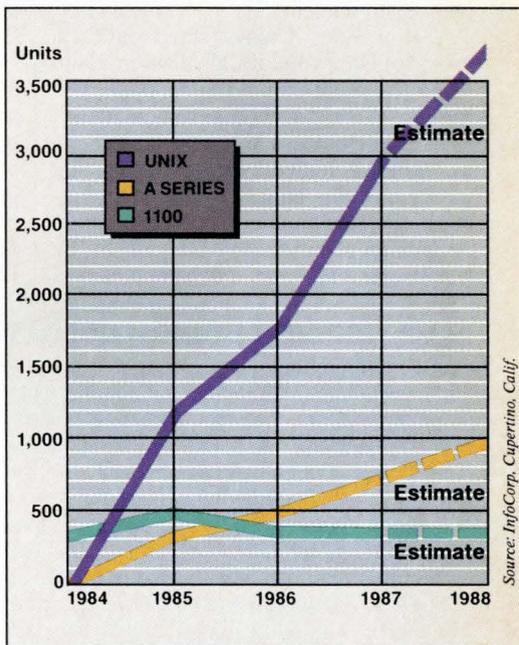
Unisys seems to have had most of its success with Unix-based products among users with a strong existing Unix requirement, such as the federal government and Bell operating companies. The U.S. Army is Unisys's largest Unix customer by virtue of a four-year contract valued by Unisys at approximately \$500 million. Another government user is the National Guard which, in April, awarded Unisys a \$17.5 million contract for 112 U

5000/80 departmental Unix systems.

Unisys is one of several bidders on a massive eight-year federal contract, which calls for the Air Force to select some 20,000 Posix-compliant systems to be used by the Department of Defense and other defense agencies to automate office applications.

A typical Unisys Unix customer among the Bell operating companies is Southwestern Bell in St. Louis, which has four of the company's high-end U 7000/40 systems. Three of the systems were bought specifically to run an engineering application developed for the operating companies by Bell Core. "We needed a Unix system because the application was written for Unix," says data center operations manager Daniel Faubion. "The Unisys systems seemed to offer the best performance for the money." Another operating company customer is San Francisco-based Pacific

Shipments of Unisys Products



Bell, which in April agreed to buy 50 U 7000 Unix systems, plus systems integration services.

The Hoped-for Leverage of 4GLs

Unisys's goals go far beyond selling open systems solutions to government and other users already sold on Unix. The company is aiming to package Unix hardware with enhanced open systems software, fourth generation languages, communications software, and integration services, and to sell it all to large commercial users who need to distribute

Can Unisys Juggle Open Systems?

transaction-oriented applications. In the past, such users would have turned to IBM, DEC, or even Hewlett-Packard, but rarely to Unisys.

As a vendor of closed systems, says Blumenthal, "one of the problems we had to overcome had to do with the argument, 'Well, that's a very good application, but if I have this kind of a system and I want more or



Blumenthal with DATAMATION's Brousell (l.) and Moad (c.).

different applications, they're not as amply available as if I had IBM.' People write more stuff for IBM. That's always been a problem. In the Unix world, we can say, 'Look, we have this application, but you also have available to you that whole rapidly increasing library of application programs. So, you can buy from us just as well as anyone else.' "

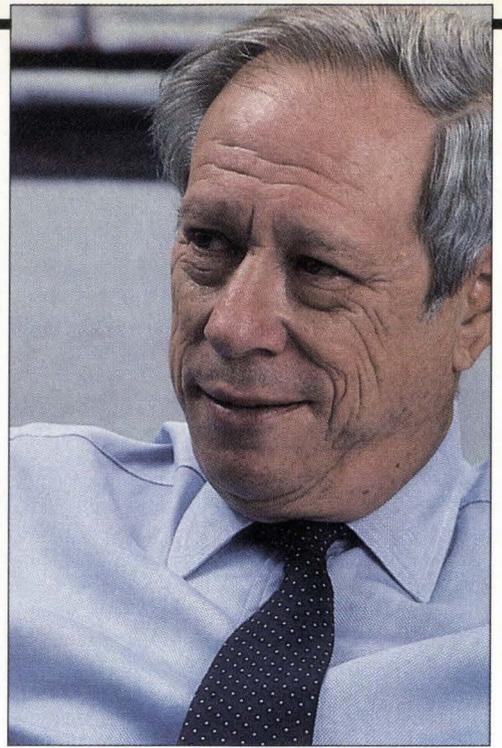
How does Unisys stand out in a crowd of Unix vendors, all of whom claim to be the most committed to open systems? "What's Unisys's value-added?" asks First Boston's Milunovich.

Unisys answers that it is investing plenty on value-added. Unisys is migrating both of its popular fourth generation development languages—Linc from the Burroughs A Series environment and

Mapper from the Sperry 1100—to its three Unix platforms, the U 7000, U 6000, and U 5000. Users such as Kellogg Co., Battle Creek, Mich., report that Mapper helped shorten development times by up to 10 times.

The company even plans to license Linc and Mapper to other companies in an attempt to make them industry standard development environments.

Unisys also is attempting to add value to Unix by developing transaction and security extensions to the operating system long known for its deficiencies in both areas. In March, Unisys became one of the first vendors to commit to support the moves of AT&T and Sun Microsystems Inc. to merge their versions of Unix and to develop applications binary



UNISYS'S BLUMENTHAL: A confident chairman.

interfaces to Sun's SPARC microprocessor and other architectures.

Unisys says it will contribute to the AT&T-Sun effort by developing transaction and security facilities that, it hopes, will become standard elements of the Unix System V extensions. At the same time, Unisys licensed Sun's SPARC chip "as the basis for future high-performance Unix system computers."

Although neither Sun nor AT&T has yet officially agreed to accept Unisys's transaction and security extensions as part of the new System V standard, Unisys says it is going full speed ahead on their development and anticipates delivery by 1991.

Was the Deal With Sun Premature?

Some observers have questioned Unisys's decision to commit early support to the AT&T-Sun Unix development effort, particularly in light of the subsequent formation of the competing Open Software Foundation (OSF) by IBM, DEC, HP, and other vendors. OSF members have doubted the competitive wisdom of allowing AT&T and Sun to control the evolution of the Unix standard.

Unisys has answered by challenging the motives of OSF organizers and citing its own active role in the Sun-AT&T alliance as proof of its commitment to open systems. "We see," says Blumenthal, "that no one can stop the inevitable march toward a world in which open systems will represent an important portion of the total demand for information systems. But we have a feeling that's not something equally welcomed by all large computer companies."

For Standard Brands, the Key Was Price/Performance

If Unisys is to continue to be a success as an open systems vendor, it will need more customers like Standard Brands Inc., a \$320 million paint retailer based in Torrance, Calif.

Last year, Standard Brands, a longtime 1100 mainframe user, decided to develop an automated point-of-sale and reporting system for its 149-unit retail store network. After rejecting MS/DOS machines as lacking in power, Standard Brands decided to put a multiuser Unix system in each store, supporting five terminals and two registers and connected over dial-up lines to Unix servers and the 1100 mainframe at company headquarters. According to Jack Scott, Standard Brands' MIS vice president, Unix was picked because it offered the best price/performance.

Unisys bid its U 5000/95 and won out over several Unix vendors, including NCR, which manufactures the U 5000 on an oem basis for Unisys. "They were pretty aggressive in going after the business," says Scott.

Standard Brands is rolling the system out gradually, and Scott reports that progress is good. He attributes that both to Standard Brands' decision to develop most of the system's applications software itself and to Unisys' integration assistance. Not only did Standard Brands develop most of the applications, but it also wrote a security system that overcame many of the security deficiencies of Unix.

Standard Brands decided to link the Unix systems and services via an Ethernet network and tie it into the 1100 mainframe. That's not a standard Unisys solution, but the company helped Standard Brands develop the software. "We proved it could be done," says Scott. Now Unisys is planning to market the Ethernet-to-1100 software commercially. Concludes Scott, "I'd have to say the whole thing has been working pretty well."

Although Unisys is still committed to the AT&T-Sun Unix camp, its decision to license SPARC has been widely misunderstood, say some observers. Far from having decided to base an entire new generation of open systems products on SPARC, Unisys is only evaluating the Sun-developed RISC architecture as one option among many. Unisys senior vp for market strategy and development, Jan Lindelow confirms that. "We're simply evaluating SPARC. It only cost us a \$10,000 license fee to do that. That doesn't commit us to anything."

Whether it's SPARC or some other architecture, however, it is clear that Unisys intends to manufacture more of its open systems products itself, both as a way to gain control of its future and to improve profit margins. Surprisingly, Blumenthal claims that the company's margins on open systems products are on a par with those earned on its proprietary systems.

"The box itself may turn out to be a commodity," says Blumenthal, "but we don't sell [just] those . . . We sell them in multiple units to larger users who use them in networks with special applications or total solutions with 4GLs, service, and support. The total package . . . So our margins are good, and I think we can improve them further as we increasingly manufacture ourselves."

Unisys is investing heavily in communications software, tying its Unix products both into its proprietary networks from the Burroughs and Sperry world and into open environments via OSI. The company already is shipping the proprietary communications software as well as a third release of its SNA APPC implementation and a link between its own proprietary office automation package and IBM's DISOSS.

Unisys Introduces OSI-Unix Wares

In addition, Unisys this spring introduced and demonstrated communications products for its Unix systems covering the top four layers of the OSI model. The products included Message Handling Service (MHS) software for X.400 electronic mail applications and File Transfer, Access, and Management (FTAM) software for data exchange services. Unisys says it will ship those products this quarter, with similar OSI support for its proprietary networks and program-to-program type support following in about 18 months.

Altogether, Unisys vice president for product programs, Peter D. Bakalor, says the company last year increased

open systems hardware research and development spending by 20%, and open systems software spending by 27%, compared with a corporatewide R&D spending increase of only 3%. "It's clear Unisys is very serious about the open systems business," says Gartner Group program director Chuck White.

There has been speculation that Unisys's investments in open systems may soon go well beyond the scope of its

Convergent also supplies a 386-based Unix product marketed by Unisys as the U 6000/50. Unisys has had manufacturing rights to each of the three workstation products and had exercised those rights. The company also has had rights to the U 6000 line but had not exercised them at the time of the acquisition announcement.

As a result of the proposed acquisition, Unisys intends to create a corporate

A Dual Identity for the PC, Workstation Lines

Unisys' open systems push extends to its personal computer and workstation product lines, although the company isn't quite ready to move away from proprietary technology altogether. The company continues to market both a line of MS/DOS-compatible pcs inherited from Sperry and a line of proprietary single- and multiuser workstations from the Burroughs side. But the company is attempting to integrate both into the open systems world.

Unisys is developing OSI software for its 286 and 386 PC-compatible products and for its proprietary workstation line, based on the BTOS operating system and sourced from its recent acquisition target, Convergent Inc., San Jose. In addition, Unisys says it will standardize on IBM's Presentation Manager user interface for both product lines, eliminating a jumble of several user interfaces currently offered by Unisys. Unisys also began shipping MS/DOS capability on the BTOS line and it plans to develop a set of BTOS interfaces that will be compliant with the IEEE Posix standard. The BTOS machines already support the APPC connection to IBM's SNA network.

On the pc side, Unisys says it will support the standard edition of OS/2 this year, but it has announced no schedule so far for supporting OS/2 Extended Edition. Unisys already offers Xenix on a multiuser pc platform and is planning a low-end Xenix pc soon.

"When the merger occurred, we had the choice to kill one product line or the other," says Michael A. Brewer, Unisys vice president and program general manager for workstations and office systems. "Instead, we developed a coexistence strategy. We can sell both the performance of the BTOS line as an attack product against IBM, and the compatibility of the pc line."

So far, it seems to be working. In about three years, Unisys's PC-compatible line has grown by over 30% per year to an installed base of 450,000. The BTOS line has grown at a double-digit pace for over six years and has an installed base of about 300,000.

internal product development efforts. Recent unconfirmed rumors had Unisys negotiating to acquire NCR, one of the company's three key Unix hardware vendors. Such an acquisition would put Unisys well on the road to becoming the \$20 billion company Blumenthal has said it needs to be by 1990 in order to remain competitive. It would also give Unisys manufacturing control of at least some of its Unix hardware products.

Even as rumors about NCR abated, Unisys moved in mid-August to realize at least part of the desire to achieve manufacturing control of its Unix hardware offerings. The company announced that it would buy Convergent Inc. (founded in 1979 as Convergent Technologies) for \$350 million. Convergent has been a supplier of B20-25 and 35 workstation lines running the BTOS operating systems.

organization to oversee its open systems business, clearly signaling the importance of the open systems business to the company. With Convergent, Unisys's open systems business will exceed \$2 billion. Paul C. Ely Jr., chairman of Convergent, will head the new unit and will join the Unisys management board, reporting to Blumenthal.

The systems integration strategy that Unisys is using with Unix customers such as Standard Brands (see "For Standard Brands, the Key Was Price/Performance") is similar to the approach it has used successfully in marketing its proprietary products. Some Unix users, however, say that although Unisys has plenty of experience working with large mainframe applications and its proprietary systems, integrating distributed, Unix-based solutions is something new for Un-

Can Unisys Juggle Open Systems?

Recent Financial Results for Unisys Corp.

(In \$ millions except for earnings per share)

	Second Quarter		First Half	
	1987	1988	1987	1988
Revenue				
Net Sales	\$1,586.9	\$1,485.2	\$3,197.3	\$3,159.6
Service and Rentals	805.8	789.8	1,563.1	1,531.2
Total Revenue	2,392.7	2,275.0	4,760.4	4,690.8
Research and Development Spending	175.4	144.5	339.8	291.9
Net Income	162.3	121.2	311.6	231.4
Earnings per Share	\$1.35	\$.94	\$2.58	\$1.78

Source: Unisys

isys. And, they say, that sometimes shows.

"We were one of their first 5000 users, and we discovered there wasn't a lot of support out there from Unisys in the beginning," says Philip Terry, clerk of the Delaware County Municipal Court in Sandusky, Ohio. The court bought a U 5000/80 system to automate its case management operations two-and-a-half years ago because the system offered better performance for the money than DEC or Tandem, and because the court saw in the Unix system the promise of future software portability. Although he says Unisys has improved, "In the beginning, it was clear they didn't have much experience with Unix applications."

Distributors and value-added resellers of the Unisys Unix products have voiced similar complaints. Unisys has trouble responding quickly to new orders for systems and spare parts, they say. Unisys acknowledges the problems, but says it has taken steps both to streamline product and service delivery systems and to field sales and support people who are familiar with open systems. Ultimately, says Blumenthal, it will take a change in Unisys's corporate culture to compete effectively as a true open systems vendor.

"That's my job," says Blumenthal. "I'm trying to challenge people to think differently, to cajole and harangue them. I'm trying to fight frozen, bureaucratic thinking... I'm telling people, 'Don't think mainframes. Think of what's happening. Do it. Let's get on with it. Make decisions. Make some mistakes. It's not going to be the last one you make. But if you go slowly, you're sure to make a mistake.'"

Slowly, says Blumenthal, the Unisys culture is changing: "We could function quite well in a closed systems world; we have a large installed base... But then it's a limited playpen we are playing in. There are people in this com-

pany who, when I first came and said, 'That doesn't make any sense,' answered, 'Yes, but it's our playpen.' The challenge to these people is to ask, 'Do you want to be satisfied with that, or do you have the courage of your convictions that we are as good as or better than our competitors and, in an equal, competitive game, we can more than hold our own?'"

At the same time, Blumenthal adds, Unisys is not going to abandon its large proprietary mainframe customer base. Unisys expects its mainframe revenues to expand somewhat faster than the industry average over the next couple of years, but still only in the 6% to 7% range.

Dissatisfaction Among 1100 Users

Keeping the mainframe user base happy may be easier said than done. As recent DATAMATION/Cowen & Co. studies and Unisys' own user surveys indicate, a large body of the company's mainframe user base—particularly the Sperry 1100 base—is dissatisfied both with the pace of new product development and with support levels.

"There is a relatively high level of dissatisfaction, something Unisys is working hard to change right now," says Martin Litsky, general manager at third-party software vendor Syster Inc. of Greenbelt, Md., and a member of the Sperry user group board of directors. The DATAMATION/Cowen data indicate that a significant number of 1100 users are actively contemplating a switch to another vendor.

One such user is Hertz Corp., the Oklahoma City car rental company. A longtime Sperry mainframe user, Hertz recently upgraded its 1100/84 system supporting its reservation system to a top-of-the-line 1100/94. But, as the Hertz reservation system grows, connecting with airline systems such as American Airlines' SABRE and United Airlines' Apollo, Hertz is concerned that the

1100 line won't be able to keep up.

"The 1100/94 is a short-term solution," says Robert Ong, Hertz vp for reservation center MIS and worldwide telecommunications. "We have a long-term corporate strategy to convert, and over the next three years we will do so," says Ong. Hertz isn't ready to say what will replace the Sperry mainframe.

Impatient users such as Hertz notwithstanding, Unisys says that, in recent months, it has begun to improve the satisfaction levels even of disgruntled 1100 mainframe users. Unisys says it has improved its new hardware installation process and local hardware maintenance response. In addition, many 1100 users are expecting Unisys to introduce the long-awaited 1100/90 upgrade code-named "Super 90." Unisys says its most recent user poll, which ended in June, showed high-end 1100 user satisfaction levels up 14%, though still falling below the "satisfied" level overall.

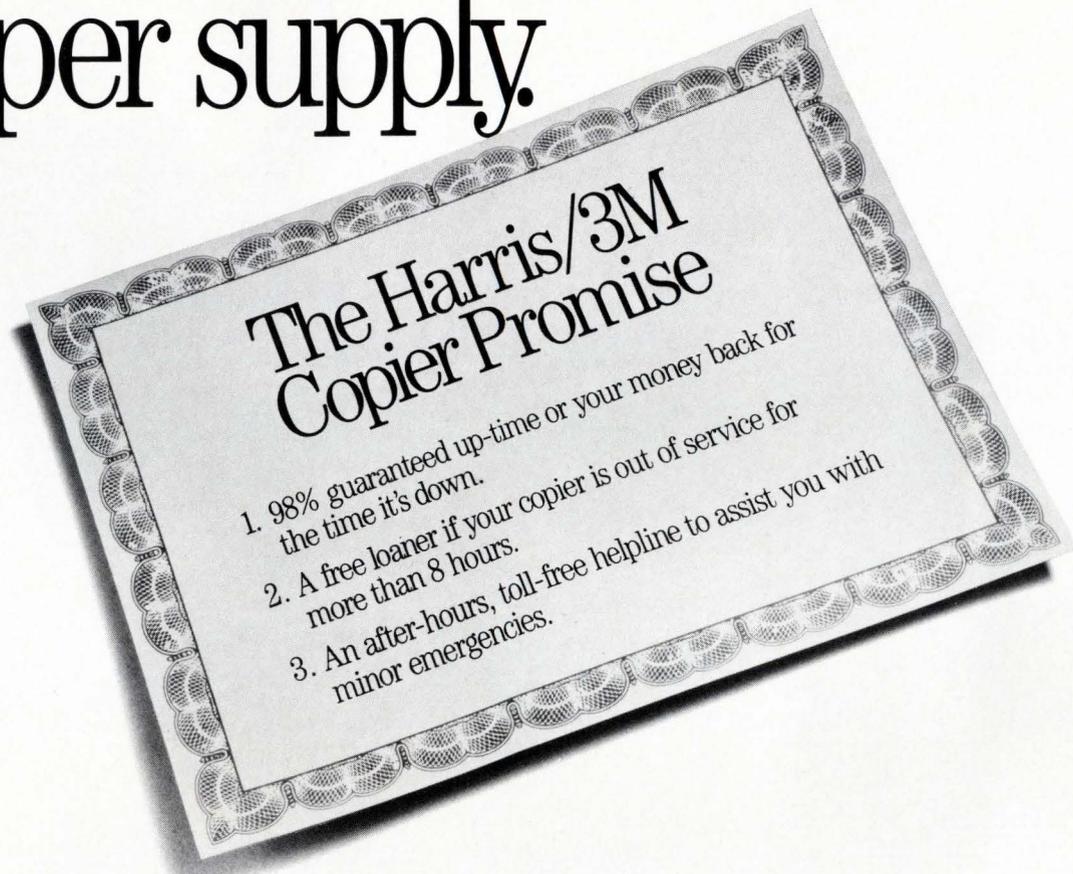
Impressed With the "Open" Strategy

Even some current Unisys customers that are considering leaving the fold say they are impressed with Unisys' open systems strategy. Fund-raiser WorldVision Inc., in Monrovia, Calif., runs both an 1100/91 and two IBM System/38s. It is currently studying standardizing its 2 million record database and related applications on one architecture or the other. According to WorldVision MIS director Mike McGavran, the 1100 will be replaced either with several of Unisys' new midrange 2200 systems or with IBM's new AS/400. "From what we can tell, they are directly competitive," says McGavran.

Even WorldVision likes the company's open systems approach. "We have taken a look at the 6000/50, and we are quite impressed," says McGavran. "We like it because we could integrate it with our 1100 communications network and have all the terminals connected to a common front end, communicating with the appropriate processor," he says.

If Unisys can pull off its ambitious open systems product plans, it just might be able to solve the problems of many of its current users and, at the same time, satisfy its own need for new customers and faster growth. "How else are we going to get into a DEC or IBM shop except to say, 'You can tie in your Unix network with what you've already got?'" asks Blumenthal. "We can say, 'We don't have to fight with you about throwing out your IBM mainframe. We know you're not going to do that.'"

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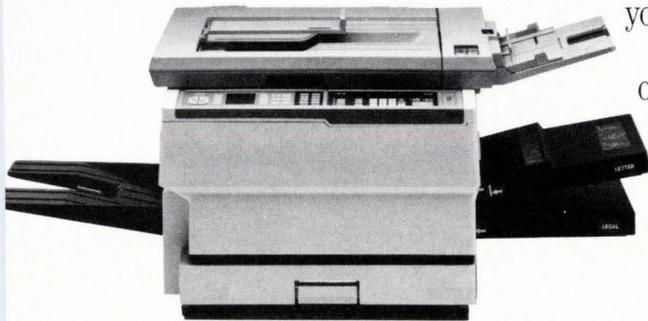
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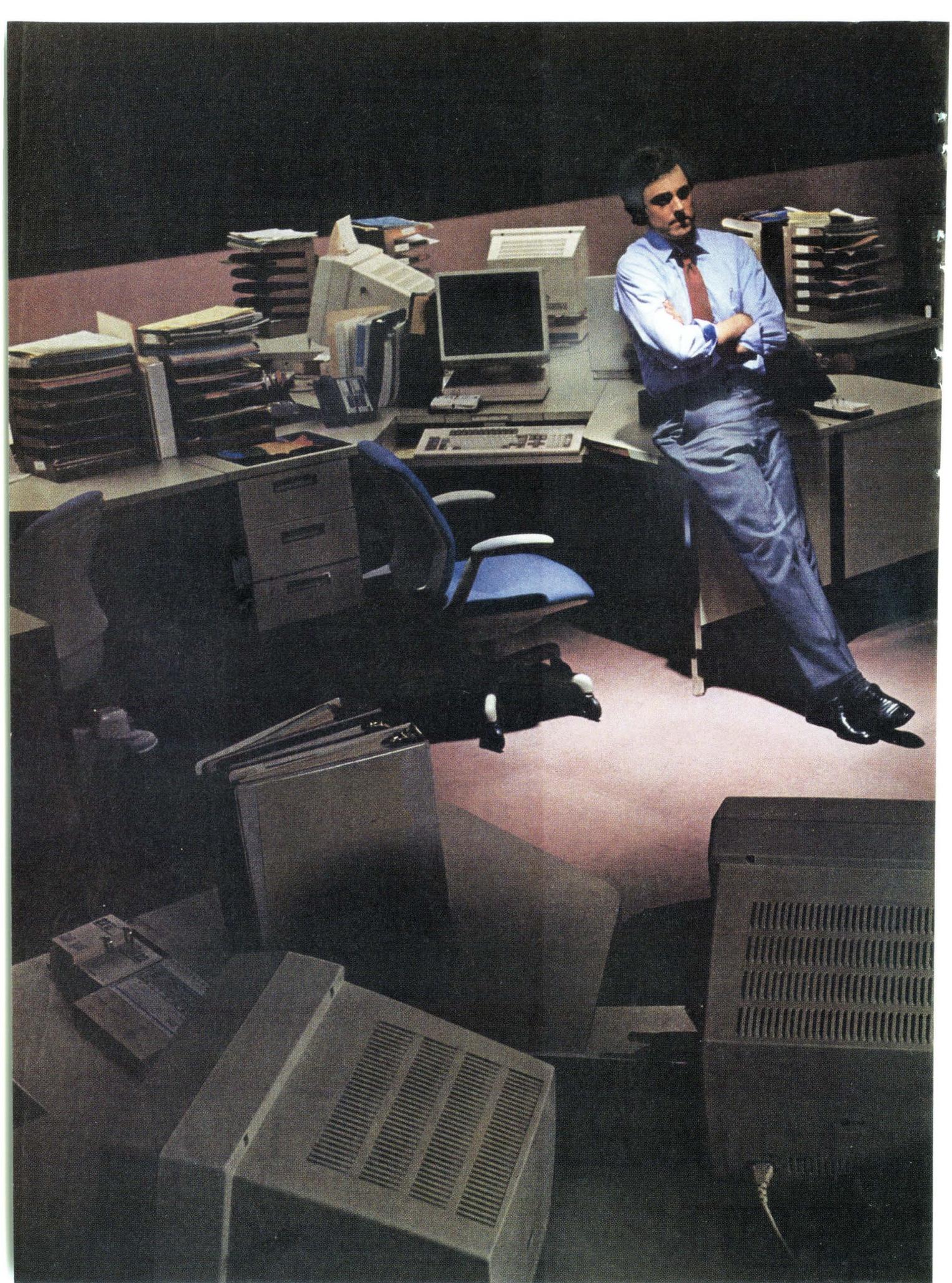


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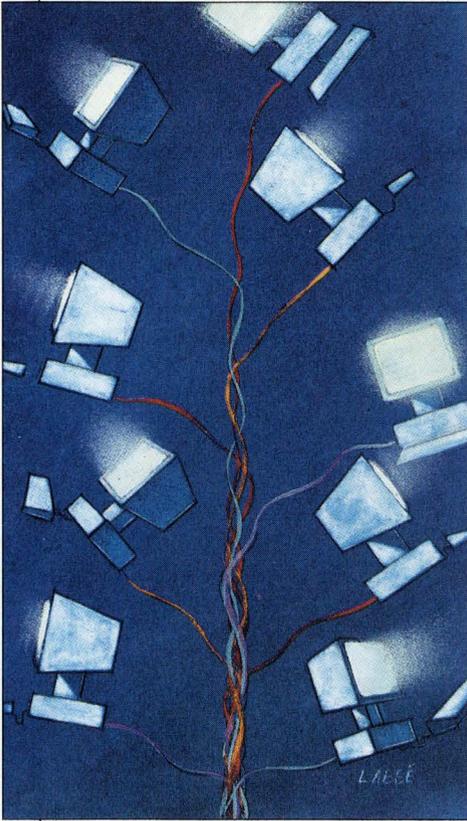
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Weaving Seamless Computing Systems

Implementing systems appropriate for departmental computing is a challenge. Blurred distinctions between the performance of various classes of hardware and the increased use of various types of network architectures have created a dizzying array of systems choices. While no choice is right or wrong, performance characteristics that are specific to each architecture can make one more suitable than another.

TBY CAROL LIBERSAT

The odds are that, as the manager of an MIS department, one of your biggest headaches is achieving connectivity for your company's various departments. Just when you get to the point of congratulating yourself for finally getting all of those pcs connected to the host, you find that the leading edge in departmental computing has left you in the dust, confused about the various system architectures now available.

According to market analysts, the trend in corporate departments is toward sharing resources over a network of multiple types of processors, operating systems, and applications. These mixed-breed architectures are driving demand for seamless connectivity, which may incorporate "cleaved" applications, and simultaneous, or, possibly, distributed processing to take best advantage of the network's horsepower.

Despite the headache of trying to set up seamless departmental networks without more industrywide product standardization than is now available, some sophisticated users have recently made great strides in that direction (see "Oh-mical's First Seamless Steps").

The multitude of departmental architectures that are available today demonstrates how ill-defined the term

"departmental computing" is. The term's origin can be traced to the 1970s, when minicomputer technology began to put computing power in users' hands. During those early days, the term accurately reflected a situation in which company departments used minis to develop and run their own user-friendly applications, but did not share data files or functionality with the company mainframe.

"Departmental" Definition Is Fuzzy

Because of its origin, departmental computing often is still considered to be synonymous with "minicomputing." But now that superminis offer mainframe power, mainframes offer interactive features, and pc networks rival the power of minis, functionality and terminology have become blurred.

Randy Rorden, research and development director at Icon International, an Orem, Utah-based maker of multitasking minis, prefers to think of a departmental computing system as "one in which users with common interests and needs share computer resources and costs."

Fulfilling such needs has fueled a demand for seamless connectivity that also plays a major role in vendors' new product design. Digital Equipment Corp., Prime Computer Inc. (Natick, Mass.), and Pyramid Technology Corp. (Mountain View, Calif.), for example, have been moving slowly and steadily into IBM's

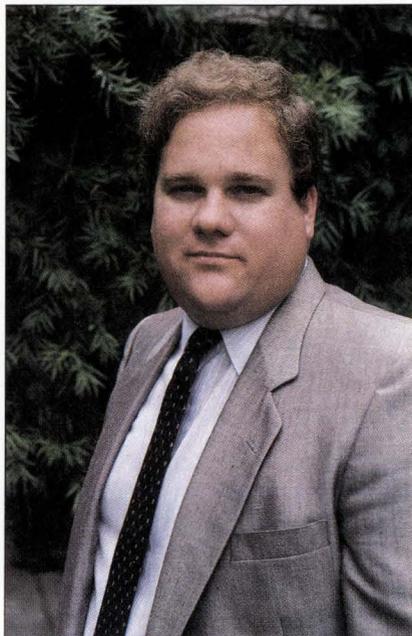
Departmental Computing

midrange market by offering better communications features and program portability on multivendor networks. IBM is trying to counter that competition by promising to implement its Systems Application Architecture (SAA) as a common, seamless interface for its incompatible line of processors and operating systems (see "SAA: The Yellow Brick Road to Cooperative Processing," July 1, p. 38).

The Value of Cleaved Applications

A cleaved application, which requires a client-server architecture and runs on both ends at the same time, facilitates more seamless distributed processing. At run time, it is divided into two portions. One of these runs on the serving processor, typically a mini, and performs functions such as searching a large database. The other portion performs typical client functions such as the display of extracted information in text or graphic form, usually on a pc or intelligent workstation. The user is not aware that two processors ran the job, but he or she is aware of better performance.

Simultaneous processing is another new idea in business computing. It is extremely useful to businesses such as stock brokerages, which rely heavily on



OHMICAL'S LITTLETON: Work from menus.

analyses of quick-changing information residing in several databases. These businesses are implementing networks of multiple, high-powered intelligent workstations, mainframes, and minis. Users can monitor in real time up to 20 processes running on other systems while simultaneously performing de-

tailed analyses on their system. Screen border icons flag significant developments—a major fluctuation in interest rates, for example—that occur in any of the monitored processes. When this happens, users can hot-key into the monitored process, extract relevant information, and incorporate it into their analyses.

In most corporate departments, four basic system architectures have emerged (see "The Evolution of Departmental Architectures"). For the purpose of discussion, these can be categorized as traditional, host-based, pc-based, and distributed networks. The four represent vendor-independent models, each with advantages and disadvantages.

Firms that still use a traditional architecture of standalone mainframes or minis may not be able to offer their users the flexibility of host-based or networked systems. Unless sharing data between company systems is necessary, however, there is no point in worrying about connectivity. It costs nothing to keep a system that is already paid for, provided that it continues to meet computing requirements.

Traditional Systems Lack Vendor Support

But if user demands don't eventually doom traditional systems, lack of vendor support most likely will. Quite a few shops, for example, have abandoned their System/34s due to IBM's shift in support from S/34s to the newer S/36s and S/38s. At the announcement of their successor, the Application System/400, IBM's emphasis was on migration of S/36 and S/38 sites to the AS/400, implying that they eventually will become dinosaurs in a new-age market.

Host-based architectures come in two basic flavors. Both use an emulation product that permits pcs or intelligent workstations to behave like dumb terminals native to a host computer, either a mini or a mainframe. The simplest and earliest type of host-based configuration requires an emulation board on each device that is to access the host. As pc networks became more common, gateway emulator packages were developed to attach an entire pc network via one emulation board on a single pc, which acts as the emulation server for the network.

In either case, the required emulation software consumes computer resources at both ends of the transaction. Where each emulating device has its own board, users usually don't notice a lag in response time. But a lag is often noticeable with gateway emulation, and some

Ohmical's First Seamless Steps

Ohmical, an insurance holding company in Irvine, Calif., has taken the first step toward creating a seamless distributed network, with the help of Icon International, Orem, Utah.

Ohmical chose to integrate its three old departmental computing systems, which were interfaced only by occasional tape transfers of data, via an Icon 4000 minicomputer and Icon's SMILE board. Icon's minis can run Unix, Pick, and DOS applications concurrently, without emulation.

The old systems consisted of a Novell pc network that handled accounting, a Datapoint ARCnet pc network that ran insurance applications, an ADDS Mentor 5000 mini that handled production requirements under the Pick operating system, plus five or six other standalone pcs running miscellaneous applications, such as Word Perfect.

The Icon 4000 provides a partitioned data area, or virtual disk, for DOS and Pick files. The partitioned data areas make it possible for all disk I/O requests in the system to be performed more quickly by the more efficient Unix operating system.

To integrate the three operating systems totally would require a software interface between Unix and DOS, and between Unix and Pick. Some software products can interface DOS and Unix, but, at this time, there is no means of interfacing Pick to Unix.

Consequently, the only distributed processing occurring now on Ohmical's system is the Unix-offloaded I/O functionality, but Ohmical can implement cleaved applications software on the system at any time in the future.

As the system has been in place for only a few months, it is not yet seamless. Users still log on and off the various operating systems to run their applications. But Brian Littleton, MIS director at Ohmical, says he soon will eliminate the seams by writing front-end software allowing users to work from menus that mix operating system applications.

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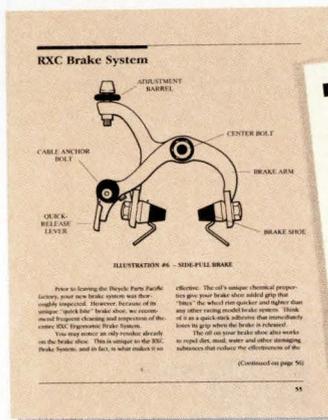
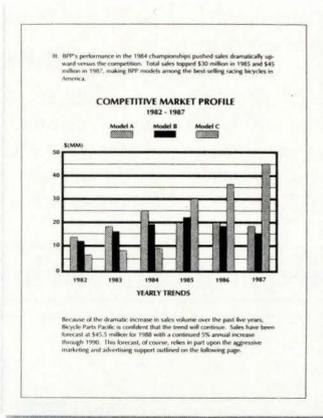
Bicycle Parts Pacific Outer Forecast

2nd Quarter, 1988

Part Number	Description	Units				Dollars	
		April	May	June	Total	ASP	Total
3003.1	Frame	340	200	300	840	\$4.02	\$3,384.00
3003.2	Frame	170	170	170	510	\$8.00	\$4,080.00
3013.2	Frame	100	170	100	370	\$17.00	\$6,290.00
3013.3	Frame	170	170	170	510	\$20.00	\$10,200.00
	Subtotal	780	710	670	2,160		\$28,954.00

4000.0	Frame	100	100	100	300	\$12.00	\$3,600.00
4000.0	Frame	110	110	110	330	\$20.00	\$6,600.00
4000.0	Frame	100	100	100	300	\$15.00	\$4,500.00
	Subtotal	310	310	310	930		\$14,700.00

Grand Total: \$66,434.00



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ITEM PART NO.	DESCRIPTION	UNIT PRICE
1001	Frame	4.00
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1005	Frame	12.00
1006	Frame	15.00
1007	Frame	18.00
1008	Frame	22.00
1009	Frame	25.00
1010	Frame	28.00
1011	Frame	32.00
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CYCLIST JAN BELL BRINGS HOME THE GOLD

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Departmental Computing

gateway products even lose keystrokes if one is too fast at the keyboard.

Users cannot perform true simultaneous processing using host-based architectures, but can submit a database search to batch on the host, continue with other tasks while it runs, and later toggle back via hot-key to collect the results. With emulation, users must always choose between being a host worksta-

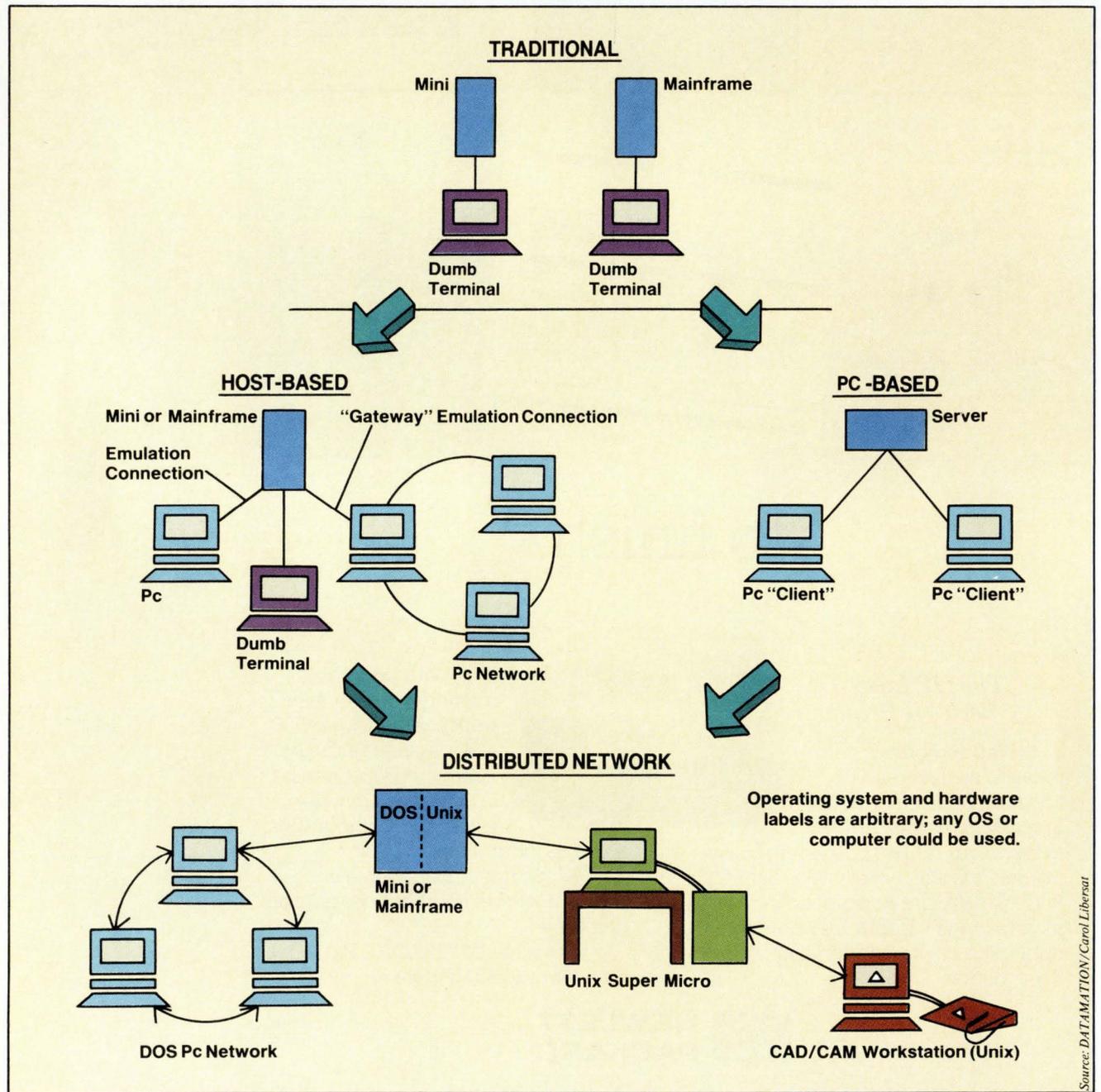
tion or a pc, and must know which applications reside on which system in order to access them.

Command Differences Vex Users

The most common user complaint about emulation-based systems is the distracting shift between different operating system commands and keyboard layouts. Some emulation products offer

keyboard remapping capability so users can stick to one keyboard layout; working from menus helps minimize command differences. Despite these problems, many users are satisfied with their host-based architectures. Kemmons Wilson Co., Memphis, a large holding company that manages such diverse interests as fried pork skins, airplanes, and hotels, has three IBM S/36s: one in Ten-

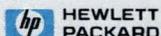
The Evolution of Departmental Architectures



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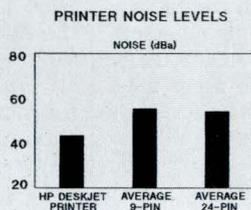


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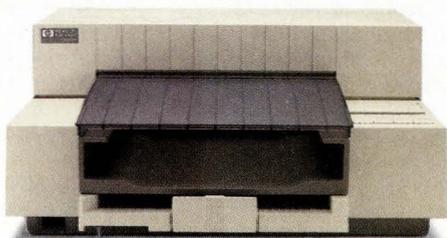
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nessee, two in Florida. It has installed IDEAScomm emulation boards from IDEAS-associates, Billerica, Mass., in its accounting department pcs, which have replaced dumb terminals.

Bob Schmidt, assistant controller at Kemmons, says, "We used to have to key data into the [pc] spreadsheet programs from financial reports off the /36. With the emulation connection, we can download the files, saving time and improving accuracy." Kemmons is experimenting with IBM's Token Ring network and may eventually attach a pc network to its S/36.

David Kowal, controller at McDanel Refractory in Beaver Falls, Pa., is less enthusiastic about host-based architectures. His company, a manufacturer of specialty ceramics, uses a fairly sophisticated configuration in which 12 pcs on a Novell network share data with an IBM S/38 using IDEA's gateway emulator. Kowal says that "what we have works fine," but he hopes to get rid of the S/38 eventually and switch to a pc-based network. "We think that we can get a better system for a lot less money by investing

in a supermicro or mini that will act as a server to our pc network."

When the company converted to the S/38 in 1985 from an obsolete Burroughs computer, it found that costly reprogramming was necessary to exploit the database capabilities of the S/38. It ended up simply converting most of its old applications to RPG III and developing enhancement applications on its pcs.

Kowal thinks that the time will be right in two or three years to acquire supermicros designed to function in a client-server architecture, along with sophisticated manufacturing software for them. He believes that such a system will cost less than what McDanel now spends in one year for S/38 maintenance alone.

A Server Is as Good as Its I/O

In host-based architectures, the mini or mainframe host operating software is unaware that it is connected to non-native devices and pc users must emulate the host in order to share its data. In pc-based networks, a mini or mainframe might be used as a server on the network, but users access the server

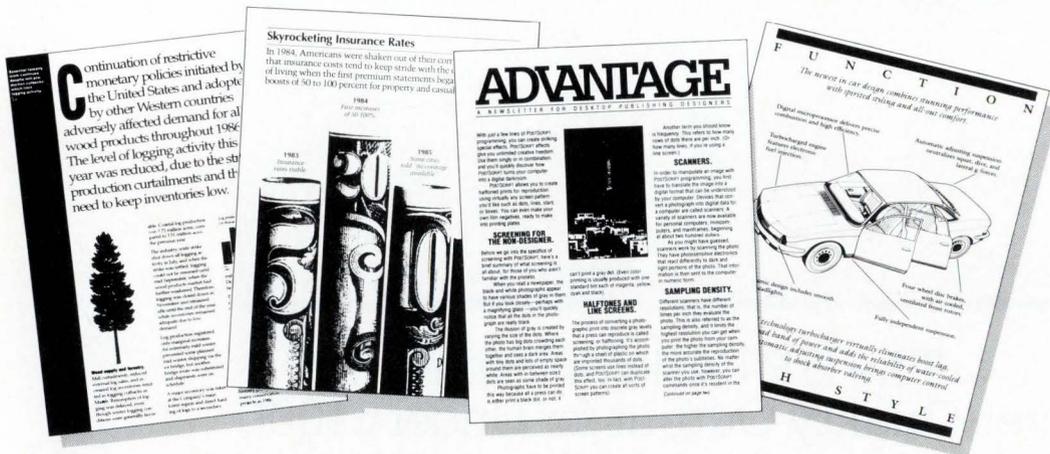
as if it were their own hard disk.

All pc-network architectures are based upon some version of the client-server model, in which one computer on the network is designated as a server to all the other clients. The server can be any pc, but the best servers are minis or supermicros. A good server is a multi-tasking computer that has I/O capabilities superior to those of the other pcs and offers efficient data management, security control, and data recovery applications. A pc network's physical pc-to-pc connections are made with special communications boards, and usually either coaxial or twisted pair cables.

Fiber-optic cables are available but expensive. The price buys improved data throughput, resistance to tapping, and protection against signal interference. Today, Ethernet products provide the fastest affordable physical connections on pc networks.

In simpler pc network architectures, which often have a microcomputer server, the server handles fixed memory requirements for all users, but applications processing is performed on the

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main memory processors of each client pc. These systems represent "distributed computing" because they distribute computer resources among users.

On these networks, the weakest link is usually the server's I/O capability. Small computer system interface (SCSI) boards can increase the I/O performance of micro hard-disk drives to 10MBps from the typical 1MBps or 2MBps. At the improved rate, micro servers could use the theoretical maximum 10MBps capability of fast Ethernet connections.

Even if your network's communication speed matches server I/O performance, main memory on client pcs often will be unable to process a file efficiently if it is too large. To sidestep both varieties of weak links, sophisticated pc network users are using cleaved applications to implement distributed processing instead of mere distributed computing.

Word Perfect Corp.'s customer service department in Orem, Utah, recently implemented a pc-based network capable of both distributed computing and distributed processing. Customer sup-

port personnel on a triplex network that consists of 230 pcs on three connected networks, using four Compaq 386s as servers running Novell's 2.1SFT fault tolerant software, respond to an average of 12,000 calls a day. The Compaq disks are fully duplexed to provide a constant mirrored data image as insurance against hardware failure. An Icon 1000 disk subsystem is attached to each of the four servers to give them minicomputer capability. Three of the servers and their networks are used to handle three basic types of customer problems; the fourth connects all three networks, manages the system, and monitors security.

Diagnostic Procedures Run From a Pc

When a customer service technician gets a call, he or she checks the network database to see if the problem has already been solved. If not, the staffer runs Word Perfect diagnostic procedures from a pc and posts the results of the analysis to the network. All searches of the diagnostic database are offloaded to the Icon subsystem, which uses a heuristic algorithm to guarantee quick re-

trieval of data from the server disk.

Both host- and pc-based networks are evolving into truly distributed network architectures, although those are still primarily a future goal in business computing. Distributed networks are based on efficient implementation of distributed processing, which takes the concept of cleaved applications one step further.

When applications are distributed, each application is sent to run on the most suitable processor in the network. Suitability is determined by innate processor capabilities, as well as by which processor is most capable at the time that the application is invoked. These distributed networks should be seamless, so that this multiple system processing is transparent to the user.

There are three important characteristics of seamless distributed networks. First, the user's terminal "knows" where all applications can be found on the system, so the user can simply request any job without emulation, hot keys, or logging on and off the various systems. Second, any application on

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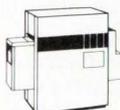
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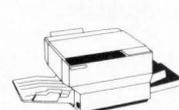
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the network can access any file on the network. Third, the applications have been coded for run-time distribution over the various processors in the network, and the network supports the necessary communication between application portions while they are running.

Aside from the need for standards, making seamless distributed systems a common reality will also, quite simply, take time. Icon's Rorden points out that while companies want the advantages of flexible, mixed-vendor systems, few shops would throw away their existing software investment to implement distributed applications, even if they already had hardware that could run them.

Is It All Just “Smoke and Mirrors?”

George Colony, president of Forrester Research, Cambridge, Mass., thinks that the concept of distributed processing is “all smoke and mirrors marketing,” and that “shipping pieces of applications around to run on various processors in a system just won't happen.” Instead, he thinks that the industry will see all processing shifted to client pcs that will become more and more capable of intensive processing.

Nevertheless, the successful distribution of applications over different processors already has been demonstrated in scientific environments. The CM* project, carried out at Carnegie-Mellon University in the early 1970s as an academic experiment by its computer science and electrical engineering schools, was one such success, according to Bill Pedersen of William Pedersen and Associates, a consulting and software development firm in Sunnyvale, Calif.

“They had all sorts of things set up that we are now seeing in the business world . . . user-friendly workstations, file servers, computer servers . . . and they experimented with distributed applications that ran simultaneously on different processors in the network.”

With such successful implementations, many people in the industry wonder why these systems have not evolved more quickly. Paul Loucas, an account manager at Icon and a computer industry veteran, thinks the naive and simplistic question he asked many years ago as a neophyte is still a good one. “Why can't computers be like stereos? If they can make electronic products that customers can hook together regardless of who manufactured it, why can't we?” ■

Carol Libersat is a freelance writer based in Oakland, Calif.

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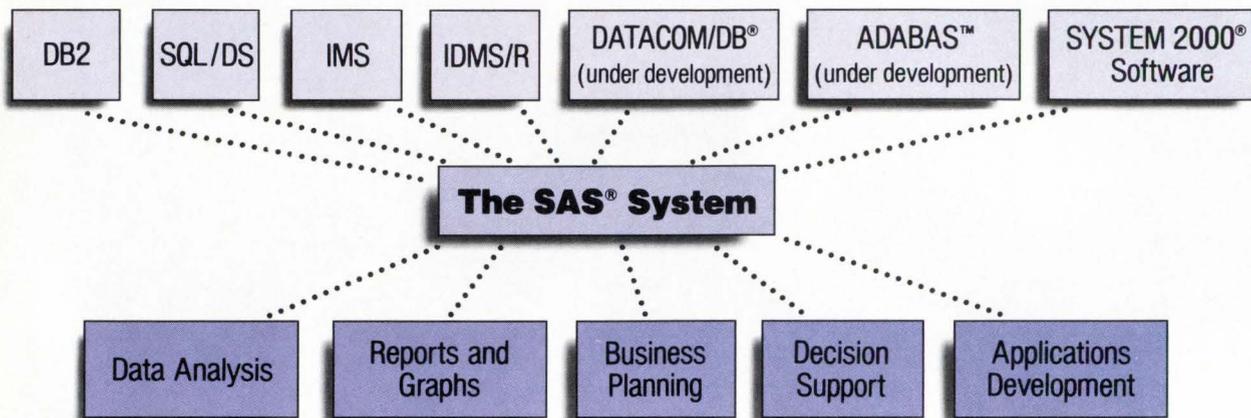
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DB2 INTERFACE          TABLE NAME DB2_PERSONNEL
DATA EXTRACTION PANEL SAS DATA SET PERS.SUBSET
(COMMAND=)
FUNC  COLUMN NAME          SAS NAME  FORMAT
1 ***  TABLE PERSONNEL          ***  COLUMN  14 * SELECTED  0 *
2  LASTNAME  .....  $10.
3  FIRSTNAME .....  $10.
4  MIDDLEINIT .....  $5.
5  ADDRESS   .....  $20.
6  CITY     .....  $20.
7  STATE    .....  $5.
8  ZIP      .....  $10.
9  PHONE    .....  $15.
10  SEX      .....  $11.
11  HIREDATE .....  $10.
12  DEPTCODE .....  $5.
13  SUPERVIS .....  $10.
14  DIVISION .....  $15.
15  TITLE    .....  $15.

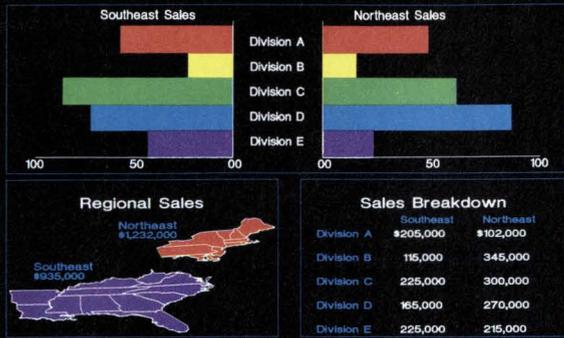
----- WHERE CLAUSE -----
city = baltimore_
    
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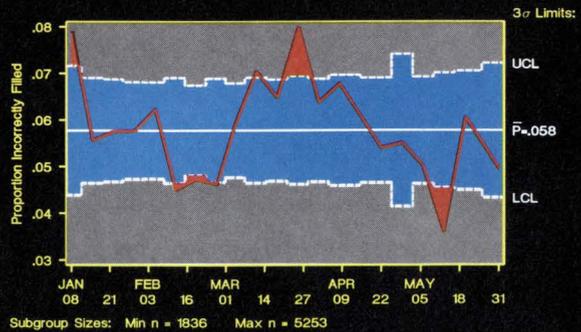
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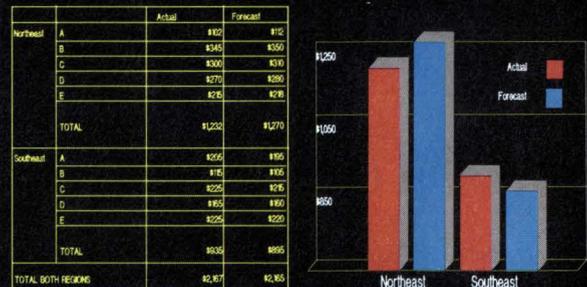
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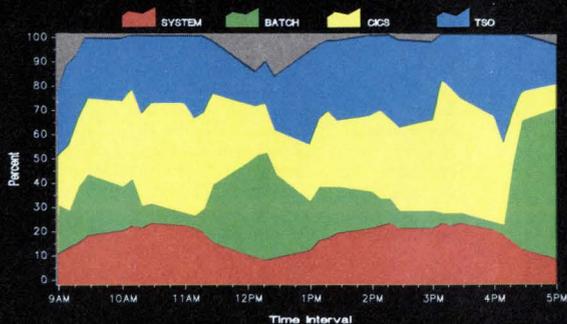
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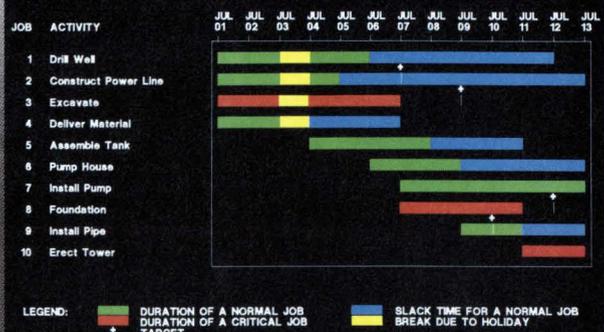
Quarterly Sales



CPU Utilization by Hour



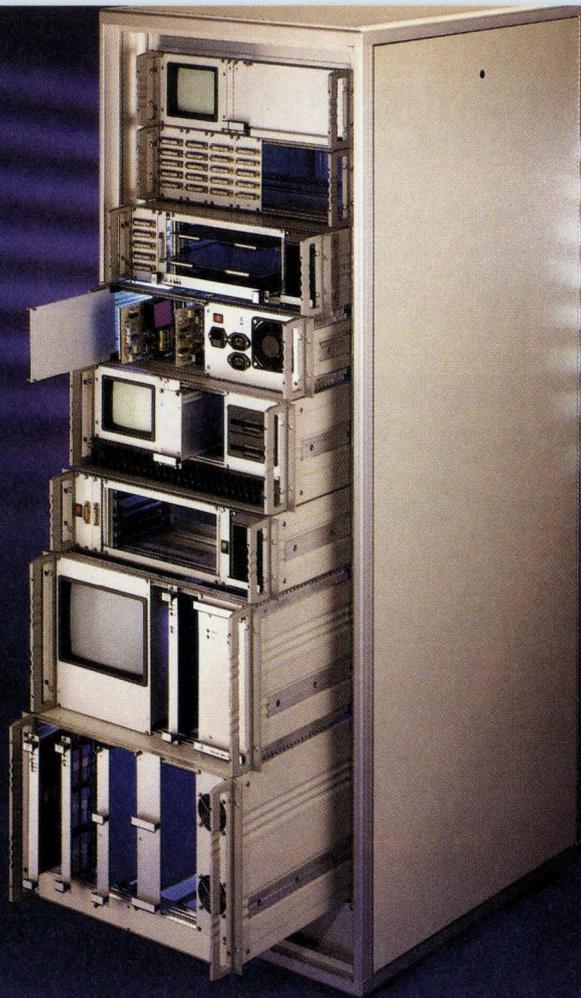
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Continued from the Aug. 15th issue

Fatal Flaws in SQL

In cases of missing information in a practical database, a DBMS should handle it independently of the type of missing information and relieve the user of the burden of devising three-valued logic. DBMSs with present IBM or ANSI Structured Query Language fail to provide adequate support for three-valued logic.

TBY E.F. CODD
his is the second half of E.F. Codd's article on SQL. The first half, which appeared in the Aug. 15 issue of *DATAMATION* (p. 45), discussed two flaws in SQL: that it permits duplicate rows in relations, and that it supports an inadequately defined kind of nesting of queries within queries. In this issue, Codd turns his attention to SQL's inadequate support for three- and four-valued logic. Codd also outlines the means for vendors to fix the problems and precautionary steps for take until the flaws in SQL are fixed.



DB2 is one of the few relational DBMS products that represents missing information independent of the type of data that is missing: a requirement of the relational model and a requirement for ease of use. It uses an extra byte for any column in which missing values are permit-

ted, and one bit of this byte tells the system whether the associated value should be taken seriously or whether that value is actually missing.

However, it completely fails to meet one more requirement of the relational model, namely, that missing information should be handled in a manner

that is independent of the type of information that is missing and that the user should be relieved of the burden of devising three-valued logic. Representation is one thing, but handling is quite another.¹

In fact, all DBMS products that fail to go beyond the present IBM or ANSI SQL versions also fail to provide adequate support for three-valued logic.

The occurrence of cases of missing information in a practical database is in most cases unavoidable. It is a fact of life. A short story concerning Manhattan is illustrative of how some DBMSs handle missing information. Whenever I have asked a person en-

countered in the streets of Manhattan for directions to some specific address, that person always responds with detailed directions, no matter whether he or she knows that part of the city. More often than not, I have found the directions quite incorrect. Therefore, I have discontinued the practice of asking for di-

Fatal Flaws in SQL

rections, at least in Manhattan.

When interrogating a database for information, I believe users would prefer the DBMS to take a conservative position as its normal behavior and avoid Manhattan-type guessing regarding the correct answer. Whenever it does not know some requested fact or condition, the DBMS should admit a lack of knowledge.

It should also support (as exceptional behavior explicitly requested) the extraction of all the items that could satisfy a request if unknown values were replaced by information that yielded as many values as possible in the target list of the query.

A database retrieval may, of course, include several conditions like $DATE \geq 66-12-31$ (where the DATE column has values of extended data type DATE) and $AMOUNT \leq 20,000$ (where the AMOUNT column has values of extended data type U.S. CURRENCY).

The conditions may be combined in many different logical combinations, including the logical connectives AND, OR, NOT, and the quantifiers UNIVERSAL and EXISTENTIAL. Suppose, as an example, both expressions noted above participate in some condition, and suppose that both of these columns are allowed to have missing database values. How does the DBMS deal with a query involving the combination of conditions where either the date condition or the amount condition or both may evaluate to MAYBE?

$(DATE \geq 66-12-31) OR (AMOUNT \leq 20,000)$

Clearly, the DBMS needs to know what is the truth value of combinations such as MAYBE OR TRUE, TRUE OR MAYBE, and MAYBE OR MAYBE. This means that the DBMS must support at least three-valued logic. If it does not, then the user will have to

- request the primary key values of those orders for which the $DATE \geq 66-12-31$ is TRUE;
- request the primary key values of those orders for which the $AMOUNT \leq 20,000$ is TRUE; and
- request the union of the two sets generated by the two requests above.

In the case of AND instead of OR, the user would have to request, in step three, the intersection of the two sets of primary keys. Users are liable to make numerous mistakes if they are forced to support three-valued logic mentally, because the DBMS provides no support. Who knows what crucial business decisions might be made incorrectly as a con-

sequence? From this we see that there is a clear need in any systematic treatment by the DBMS of missing values to extend the underlying two-valued predicate logic to at least a three-valued predicate logic.

In the following truth tables for the three-valued logic of the relational model, we use P and Q to denote propositions, each of which may have any one of the truth values: t for TRUE, m for MAYBE, or f for FALSE.

In the relational model the universal

P	NOT P	P OR Q	Q	P AND Q	Q
			t m f		t m f
t	f	t	t t t	t	t m f
m	m	P	t m m	P	m m f
f	t	f	t m f	f	f f f

and existential quantifiers are applied over finite sets only. Thus, the universal quantifier behaves like the logic operator AND, and the existential quantifier behaves like OR; both operators being extended to apply the specified condition to each and every member of the pertinent set.

When an entire condition based on three-valued, first-order predicate logic is evaluated, the result can be any one of the three possibilities TRUE, MAYBE, or FALSE. If such a condition is part of a query that does not include the MAYBE qualifier, the result consists of all the cases in which the complete condition evaluates to TRUE, and no other cases.

If to this query we add the keyword MAYBE, then the result consists of all the cases in which this condition evaluates to the truth value MAYBE (m), and no other cases. The MAYBE qualifier is used only for exploring possibilities, and special authorization would be necessary if a user is to incorporate it in one of his or her programs or in a terminal interaction.

Actually, the relational model calls for the DBMS to support the attachment of the MAYBE qualifier to any truth-valued expression, since a view is normally defined not using this qualifier, while a query on the view may involve it. The normal action of combining the view condition with the query condition using logical AND would, of course, give rise to a more comprehensive condition involving the MAYBE qualifier attached to just one truth-valued expression within that condition.

One problem, of which DBMS designers and users should be aware, is that, in rare instances, the condition part of a query may be a tautology. In other words, it may have the value TRUE no matter what data are in the pertinent columns and no matter what data are missing. An example would be the condition pertaining to employees where the date is less than 66-12-31 or equal to 66-12-31 or greater than 66-12-31.

If the DBMS were to apply three-valued logic to each term and it encountered a "marked" value (a value marked as missing) in the date column, each of the terms in this query condition would receive the truth value MAYBE. However, MAYBE OR MAYBE yields the truth value MAYBE. So the condition as a whole

evaluates to MAYBE, which is incorrect, but not traumatically incorrect.

To avoid this type of error, there are two options: warn users not to use tautologies, which are a waste of computer resources, as conditions in their relational language statements; and develop a DBMS which examines all conditions, not in excess of some clearly specified complexity, and determines whether each is a tautology or not.

Naturally, in this latter case, it would be necessary to place some limitation on the complexity of every query, because with predicate logic the general problem is unsolvable. It is my opinion that the first option is good enough for now, because this is not a burning issue.

SQL's Treatment of Missing Values

Flexible use of three-valued logic, let alone four-valued, is not supported in SQL commands. Their only concession to the existence of missing values is the clause IS NULL, which enables the user to pick up from any column those cases in which there are missing values.

An example of inflexibility is DB2's action when the condition part of a query is evaluated as unknown. It simply does not retrieve the corresponding instances of the target data. In practice, this is one of the options that users need, but they need other actions as alternatives.

A somewhat separate problem is the effect of missing values on aggregate functions. The relational model supports the following options: request the missing items to be ignored, or temporarily

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Fatal Flaws In SQL

replace each missing item by a specified value ("temporarily" means just for the execution of the pertinent command). SQL does not support these options, but instead always yields a NULL result if any case of a missing value is encountered as the argument to a function.

Overall, the SQL approach to handling missing values is quite disorganized and weak. This will lead to disorganized thinking on the part of users, an increased burden for them to bear, and many unnecessary errors. Errors that are not discovered can lead to more incorrect business decisions, based on incorrectly extracted data.

It also causes some users to wish for the old approaches like "default values" that were at least familiar, even if more disorganized. Of course, the old approaches are completely out of place in the relational approach.

In some cases, this problem is incorrectly perceived to be a problem of the relational model. In fact, it is a problem that stems from the inadequacies of SQL and its nonconformance to the relational model.

Corrective Steps for DBMS Vendors

In exploring corrective steps DBMS vendors can take, the three problems discussed above and in the first part of this article will be considered in turn. Immediately putting the following corrective steps into effect could easily give them a substantial competitive advantage in the eyes of prospective customers.

The duplicate rows problem (see "Fatal Flaws in SQL," Aug. 15, p. 45) should be handled in three stages. First, warn users that support for duplicate rows is going to be phased out in about two years' time. Second, install within the first year in some new release a "two-position switch" (in other words, a DBA-controlled bit) that permits the DBMS to operate in two modes with respect to duplicate rows: (1) accepting them, and (2) rejecting them. Third, drop support for duplicate rows within a relation altogether, and improve the optimizer accordingly.

With regard to loss of integrity from databases, it is well known that prevention is much better than cure. For this reason, the DBMS should check that duplicate rows are not being generated whenever an operator is executed that could generate duplicate rows. Three of the operators that are defined to remove duplicate rows are projection, union, and appending rows to a relation, including

initial loading. Most DBMS products today fail to conform to the definitions of these operators.

There is also a need for two separately authorizable operators: the first one checks for the existence of duplicate rows in any specified base relation; the second removes duplicate rows from any specified base relation.

To correct the psychological mix-up caused by SQL's support for inadequately defined nested queries within queries, DBMS vendors should treat the latest version of IBM's SQL (even if the duplicate row concept has been removed) as a language that stands or falls on its psychological or ease-of-use properties. A new relational language should be created with features that are highly orthogonal to one another, that includes all of the



**WHEN THE
DBMS CAN'T
ANSWER A RE-
QUEST, IT
SHOULD AD-
MIT A LACK OF
KNOWLEDGE.**

logical properties necessary to manage a relational database, that is readily extensible and compilable, and that is convenient to use as a target language by all the software packages that interface on top of the DBMS.

Within three years, DBMS vendors should introduce support for four-valued logic, which is a sublogic of the three-valued logic cited above. Implementing the four-valued logic is not noticeably more difficult or time-consuming than implementing the three-valued logic.

Four-valued logic treats information that is missing for a second reason, namely that a property happens to be inapplicable to certain objects represented in the pertinent relation; for example, requesting the name of an employee's spouse, if the employee happens to be unmarried. With adequate support for three-valued logic, the IS NULL clause becomes redundant and should be phased out.

Users can take their own precautionary steps (and are strongly advised to do so) until these three flaws are corrected. Then the changes in subsequent releases of their DBMS will prove to be far less traumatic.

The first such step for the user is to avoid duplicate rows within relations at all times by continued use of the DISTINCT qualifier immediately following the SQL SELECT and to totally avoid use of the word "ALL" after "UNION." The second step is to avoid nested versions of SQL statements whenever there exists a non-nested version. The third step is to take extra care in manipulating relations that have columns that may contain missing values, and, as far as possible, to separate the handling of missing information into easily identifiable pieces of code that can be readily replaced later.

Is it too extreme to call these SQL blunders fatal flaws? I do not think so, in view of the fact that more and more business and government institutions are becoming dependent on relational DBMS products for the continued success of their operations.

In my view, the three flaws described in this article must be fixed, even though the repair may cause some users to have to change some SQL portions of their programs. All three changes advocated in SQL also represent a great opportunity for ANSI to take the lead.

How did SQL get into the undesirable state described here? It is just one more case of inadequate investigation by its developers, and, in this case, totally inadequate theoretical investigation. ■

E.F. Codd is president of the Relational Institute, San Jose, a nonprofit organization that conducts public seminars throughout North America on the entire spectrum of relational database technology. Yvonne Morkner tested the SQL examples cited in the text on the personal computer versions of the Oracle, Codd and Date Campus, and XDB relational DBMS products. With Campus, counterparts of the SQL queries were tested, since SQL is not supported by its present version. Sharon Weinberg and Nathan Goodman also assisted in the article's preparation.

Footnotes

¹E.F. Codd, "Missing Information (Applicable and Inapplicable) in Relational Databases," ACM SIGMOD Record, December 1986; and E.F. Codd, "More Commentary on Missing Information in Relational Databases," ACM SIGMOD Record, March 1987.

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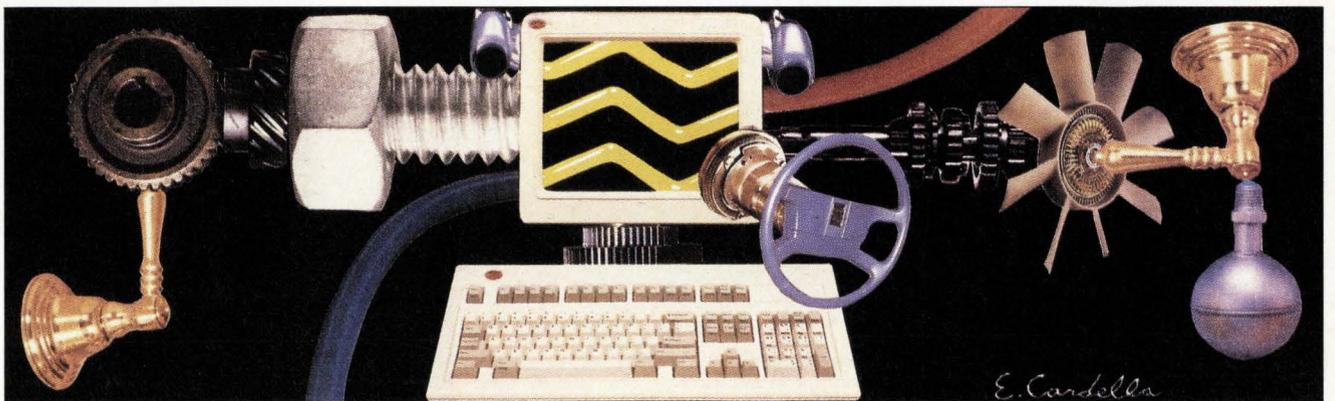
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VDTs Soup Up To Meet The PC Challenge



BY MARK MEHLER

Users of video display terminals have never had it so good. The presence of application-specific technology, the competition with microcomputers for limited desk space, and the improvement of service and warranty deals have all contributed to an attractive new generation of low- and high-end units.

"The clearest trend is toward improved price/performance," says John Chun, a product manager at San Jose-based Wyse Technology, one of the largest independent terminal makers. "We are taking advantage of gate array technology to add a higher level of functionality. Greater resolution, color, graphics capability, more flexibility in connectivity . . . it's not the cheap \$400 terminals that are driving the market today, it's the integration of more features and the attempt to satisfy customer demands for increased functionality at the same price."

Dollar Volume of Shipments Will Be Flat

But Eileen O'Brien, a senior analyst at International Data Corp., Framingham, Mass., feels that the terminals market is in a classic mature stage. She projects that dollar shipments of standard ASCII and ANSI text-only terminals will decline to \$805 million in 1992 from

last year's \$894 million, a 3.3% annual slippage. Unit volume, on the other hand, will rise 7.2% annually over the next five years, according to IDC.

While unit shipments of graphic terminals will experience an 8.8% annual growth rate through 1992, their dollar volume will be virtually flat. (In 1987, it was \$205 million; the projection for 1992 is \$207 million.) Moreover, O'Brien suggests that when personal computer prices begin their predicted sharp decline in the early 1990s, graphics terminals will be especially hard-hit.

The U.S. market now has about 50 VDT vendors and O'Brien feels a shake-out is inevitable. She notes that Wyse's acquisition of Link Technologies suggests the beginnings of a healthy consolidation.

Pc Competition Is the Spur

Competition with the pc in traditional multiuser, multiple operating system, and local area network environments is probably the biggest reason behind the moves to increase VDT functionality and enhance appearance.

John Capobianco, director of MIS for Scalamandre, a Ronkonkoma, N.Y.-based supplier of designer fabrics and home to multiuser systems, observes that the necessity for VDTs to have small footprints, easy-to-use keyboards, clear

The demands of sophisticated users who have grown accustomed to the functionality and appearance customarily found in micros have forced VDT suppliers to achieve some kind of parity with their newest generation of products. Those demands, combined with the limits of a mature market and liberating, application-specific technology, have created a true buyers' market. That market now boasts 24-hour response time on service and repair, and is undergoing a shift in emphasis from warranties to guaranteed system uptime.

The VDT-PC Struggle

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CIRCLE 101

CIE Terminals Inc.

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Irvine, CA 92714
(714) 660-1421
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CIRCLE 102

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Atlanta, GA 30341
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CIRCLE 104

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graphics, and other ergonomic and aesthetic features has increased due to this competition.

Eighteen months ago, high-end terminals (\$700 and up) alone offered more than one communications port; today, midrange products (\$500 to \$600) may offer as many as three ports, thus allowing connections to multiple hosts. There are still problems, however, because not all "multiple host connection" systems have the software that allows simultaneous communication.

Another development is the "virtual" terminal that, through one wire, can hook into a multiple operating system environment and act as a display for accessing DEC's VMS, Unix, Pick, DOS, or a local area network. The LAN segment of the "diskless workstation" market, says Wyse Technology's Chun, is only beginning to emerge. "We're addressing it with a networking/processing terminal

that has more intelligence and the ability to tap into the network and disappear as a node," he explains.

Richard Hodge, president of Salt Lake City-based Beehive International, which makes 3270-based terminals, suggests that "the key point is that you no longer need different terminals for every operating environment. The connectivity issue plays into the user's desire to have more power on the desk and to automate the entire process." Adds Laurie Carter, supervisor of technical support at Bay State Health Care of Cambridge, Mass., "We want to have all our terminals interacting with pcs in a multi-operating systems environment. Compatibility is the single major issue we face."

VDTs Could Displace Some Pcs on LANs

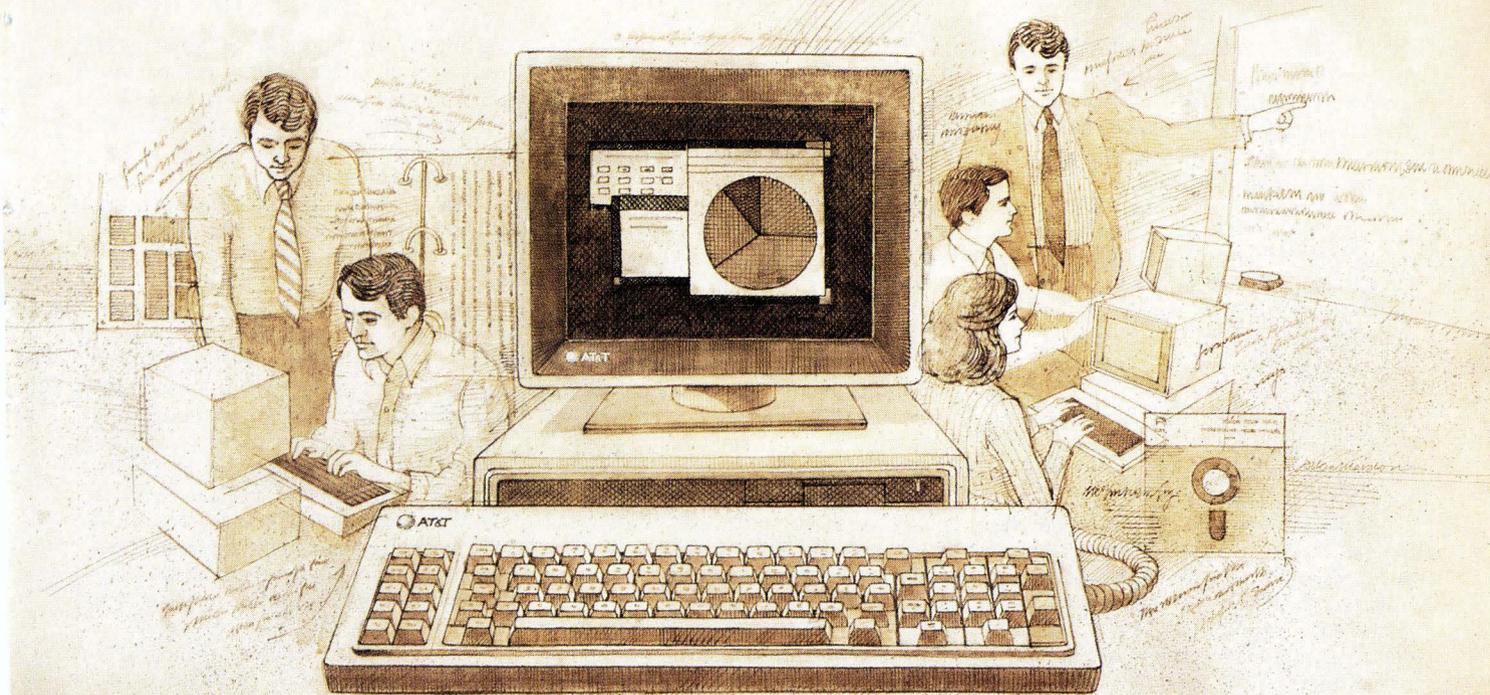
Hodge sees intelligent terminals displacing pcs on the LAN for certain dedi-

cated processing tasks such as financial consolidation and other database applications that do not require a disk. He expects that pcs will continue to dominate in general purpose computing applications. Carter agrees: "The majority of people in our company have terminals only. Only the high-level people who do a lot of sophisticated data crunching need pcs."

Dave Hutchings, operations manager for Argos Software, a value-added distributor of Wyse, Esprit, and other lines, is impressed by the power and the ergonomics of the new generation of VDTs. "A product like Esprit's Lanterm [a virtual terminal with graphics capability and 768KB of memory] looks like a terminal and has the features of a pc."

Gordon Hope, director of marketing at ADDS, a Hauppauge, N.Y.-based supplier of general purpose terminals, says that the presence of IBM's VGA stan-

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The VDT-PC Struggle

dard (640 x 480 dots), which offers improvement in vertical resolution over the basic EGA standard (640 x 350) and provides the flexibility of color, has pressured his company to increase the visual freedom of its terminals.

The company has moved to 70HZ video, a major step in Europe, where television is 50HZ and users have no trouble noticing the 40% improvement. "It's the difference," says Hope, "between a jumping picture and a piece of paper . . . in certain areas of Germany, we have to guarantee 70HZ or faster." In the U.S., he concludes, the improvement over standard 60HZ tv is only 18%, but the impact in terms of reduced eye fatigue is still noticeable.

IDC's O'Brien says the success of the independents in addressing microcomputer applications with VDTs by merging functionality from both has prompted the giant systems houses to act. IBM, which controls some two thirds of the 3270 market, has begun to address the lower end of the terminals business, and AT&T and Hewlett-Packard are both more active in the general purpose market.

Bay State's Carter says the quality of VDT maintenance is improving: "More and more, vendors are aiming to please. Immediate response on any service problem is becoming more common. For us, this is absolutely critical. When the system goes down, 500 people are out of work." (Bay State has a system of ADDS 1010 terminals integrated with pcs throughout the company.)

The Focus Is on Support

Scalamandre's Capobianco believes the terminals industry has been getting away with murder in the service arena for years. "Price doesn't matter to me," he says, "although it does to the people I report to . . . more important is that we couldn't deal anymore with three-week turnaround. We have 40 users hooked up on the system for everything from word processing to order entry, to inventory control, to customer service. I have to know that we are going to be supported, and fast."

Typical of the new focus on service is Esprit Systems' guaranteed 24-hour response on service and repairs. "We're

starting to see the industry move away from a total emphasis on warranty time to uptime as the critical factor," says Esprit marketing vp Sal Lanuto. "Users can't afford the traditional three- to six-week turnaround anymore."

Hope says ADDS has begun looking at "alternatives to the [standard] warranty. In a very mature market like this one, these issues are critical. In terms of the mean time between failures, for example, the industry was at sub-10,000 hours in the early 1980s. Now it's in excess of 20,000 hours and climbing. It's no longer acceptable to break down twice a year."

Warranty periods also are increasing. Palo Alto-based Cumulus Technology has entered the market with a five-year warranty offering, says IDC's O'Brien, who sees these commitments eroding bottom-line performance. "Vendors will pay a price for improved service and support," she says.

In the 3270 market, which witnessed unit shipments of 701,000 last year, according to IDC, the same basic trends apply.

Alfred Mockett, executive vp of U.S. sales and service for Memorex Telex Corp., which just entered the VT 220 market with an ASCII product to complement its mainstream 3270 business, sees application-specific integrated circuits similarly driving prices down, while new features such as light pens and flatter tubes become standard at the high end.

Hal Steiner, senior corporate systems analyst at Prudential Property & Casualty, a major Telex customer, looks for future improvements in the connection of the terminal to the controller. "Twisted pair [wire] is just too cumbersome," he says. "We need another solution, such as telephone cabling, or radio waves."

Beehive's Hodge believes that when IBM supports ISDN in its mainframe connectivity scheme, the terminal vendors will follow, and users will gain additional flexibility in communications.

Service is fast becoming as crucial here as in the lower-end market, say Hodge and others. "The capability to swap out parts easily is more important in quick turnaround," says Hodge. "And IBM's move to a three-year warranty is having a big impact on the industry."

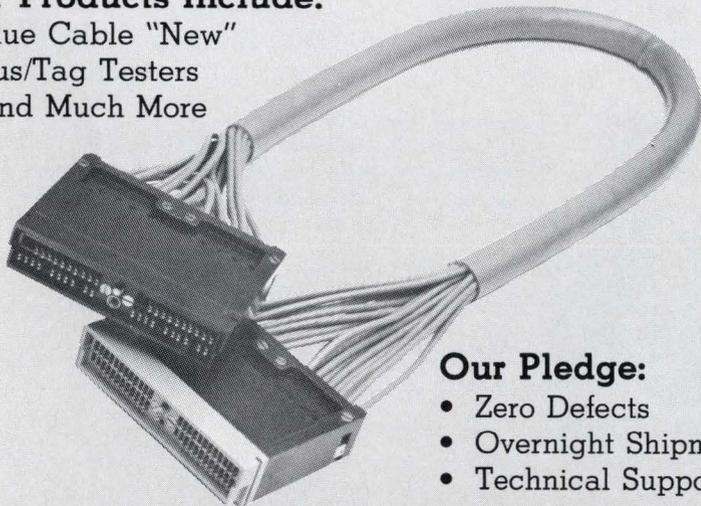
"If the controller goes down," adds Prudential's Steiner, "I expect response in [a few] hours. A terminal down, we expect 24-hour service." ■

Mark Mehler is a freelance writer based in New York.

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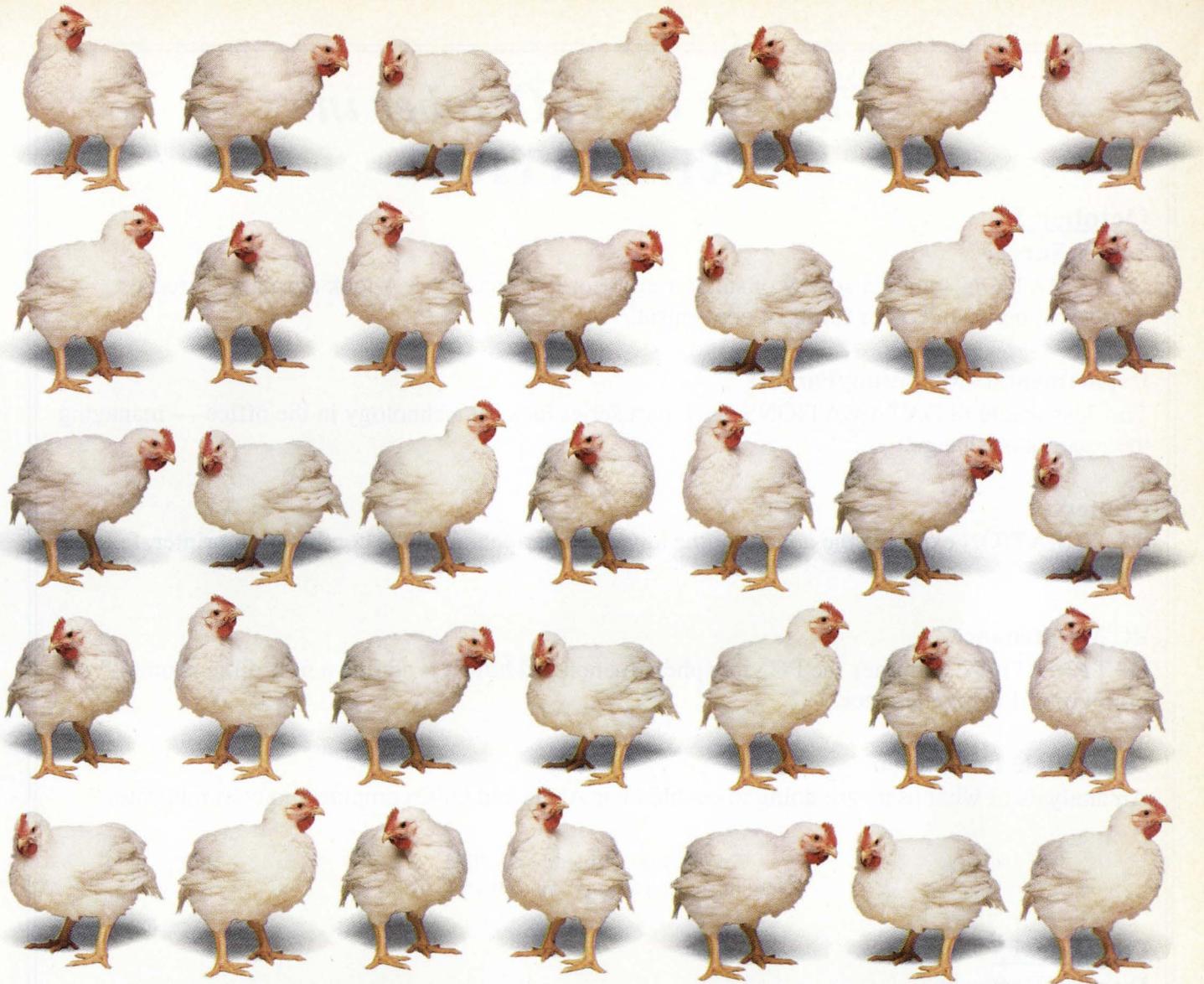
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Vendor	Lee Data SmartStation	IBM® 3194
Mod 6	X	
API	X	X
Multiple Async Sessions	X	
80286 Processor	X	
MS-DOS Support	X	
Mods 2-5	X	X
30K Keystroke Record/Playback	X	X
Hard Disk Option	X	

LEE DATA CORPORATION

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Subject
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PROJECT STARLIGHT

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CA-TELLAPLAN

CA-TELLAGRAF

PROJECT STARLIGHT

CA-DISSPLA

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Circle 50 on Reader Card

New Products

TRENDS

PLOTTER PRICES ARE PLUMMETING. In June, Hewlett-Packard staggered the vendor community when it brought out the low-priced 7600 series of electrostatic plotters. HP claims the new series is half the price of competing machines. The summer months continued to deliver good news to plotter users: plotter makers in both the electrostatic and the pen plotter markets slashed prices.

The HP 7600 series consists of two models. Both are said to produce typical architectural/engineering/construction and mechanical engineering drawings in less than one minute. Featuring resolution of 406 dots per inch, they produce pen-plotter quality output, according to HP. Model 240D, priced at \$22,900, produces 24-inch wide, or "D" size, drawings. Model 240E, priced at \$27,500, produces 36-inch wide, or "E" size, drawings.

In late July, Xerox Co.'s Santa Clara-based Versatec chopped the prices of the electrostatic plotters in its 8500 series—marking down its 24-inch model 8524 to \$16,900 from \$19,900 and its 36-inch 8536 to \$19,900 from \$24,900. Russ Yarp, Versatec's manager of product marketing, explains that the pricing action comes in response to HP's 7600 series. Although Versatec's new prices beat HP's, HP wins on resolution quality. HP's electrostatic plotters produce output of 406dpi, compared with Versatec's 200dpi.

Another reason that Versatec lowered its prices, says Yarp, was to compete more closely with pen plotters, which are priced well below electrostatic plotters. Electrostatic plotters run between \$15,000 and \$100,000; pen plotters are priced between \$4,000 and \$12,000. According to HP, pen plotters are a good choice for users that produce less complex drawings, with volume under 25 plots a day. Although it produces excellent quality, says HP, a pen plotter takes much longer than an electrostatic plotter to produce a complex drawing, such as a printed circuit board layout.

While electrostatic plotter vendors are trying to narrow the price gap between their offerings and pen plotters, pen plotter makers are also lowering their prices. In August, Austin, Texas-based Houston Instrument reduced the prices of its pen plotters by up to 20%, dropping the price of its A-to-E-size DMP-61 with a six-pen accessory to \$4,890 from \$5,445.

If you'd like additional information about products covered in this issue's hardware Trends, please circle 228 on the reader service card.

HARDWARE



DEC Integrates OLTP With Its VAX Line

New range of products and services is being offered under the umbrella of a single system.

BY MARY KATHLEEN FLYNN

Digital Equipment Corp. is bidding to increase its share of the OLTP market. It has introduced a broad line of products designed to integrate transaction processing with other functions in a general purpose computing environment.

The vendor touts its DECTp as a systems environment that integrates the capabilities necessary to build transaction processing applications. The new environment brings transaction process-

ing speeds above 100tps to DEC users.

DECTp includes a new transaction processing monitor, called DECintact; a new version of the VAX ACMS monitor; higher-performance versions of the VAX Rdb/VMS RDBMS, which includes VAX SQL and features that increase data integrity and system availability; Rdb/VMS-supporting software; DECLink software; and the SA600 disk storage system, which is said to offer nearly double the storage capacity of mainframe-level devices.

A typical DECTp starter system,

New Products

based on a MicroVAX 3500 with DECintact, is priced at about \$380,000. A relational DBMS using a VAX 6220 and VAX ACMS/Rdb costs about \$967,000. A high-end VAX 8842-based transaction processing system with DECintact and the 9.7GB SA600 storage array is priced at approximately \$3.88 million.

DECTp is designed to work across the vendor's entire range of systems—from MicroVAXs to VAXclusters—and it reportedly does not require any rewriting of applications. DECTp users can complete their transaction processing tasks and then exchange data with office engineering, office information, or scientific applications, says the company. The system also offers users interoperability with IBM systems, allowing databases on IBM mainframes to be used in a flexible DECTp environment. DIGITAL EQUIPMENT CORP., Maynard, Mass. CIRCLE 201

Printer Interface

Interface from Murata allows laser printing of fax documents.

Murata Business Systems has rolled out a fax/printer interface that allows facsimile users to print fax documents on their existing laser printers. The Laser Printer Interface (LPI) is being offered as an option on Murata's F-50 fax machine.

The LPI option allows the laser printer to be shared by word processing, desktop publishing, and other office applications. The interface also has a backup feature that gives users the option of using the F-50's built-in thermal printer. The 2-inch tall interface fits under the F-50 and is priced at \$995. MURATA BUSINESS SYSTEMS, Dallas. CIRCLE 202

Superminis

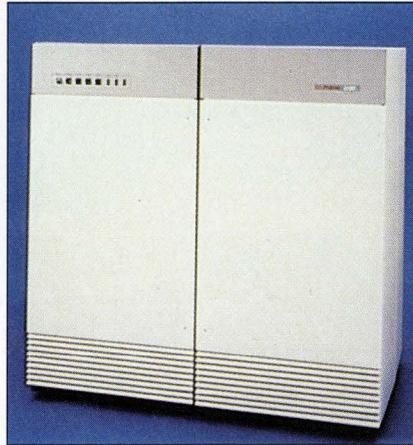
New office and computer-room superminis are unveiled by Prime.

Prime Computer has introduced a mid-range office computer and a high-end superminicomputer designed to handle mainframe applications.

The midrange Series 4450, said to process up to 5.8MIPS, is 40% more powerful than the 4150, which, at 4.1MIPS, was the line's most powerful office computer. Standard system packages range in price between \$290,700 and \$353,800. A standard system includes 32MB of memory, and a 496MB fixed media disk with an intelligent controller.

The high-end 6150, with 8.5MIPS performance, is the new entry-level com-

puter-room system. Prime says the 6150 can function as the main computing engine for a small- to medium-sized business. It can also coordinate a corporate pc network.



Prime's entry-level computer-room system.

The 6150 can be upgraded easily, says Prime, to a 6350 or 6550 system with in-cabinet board changes. Configuration prices begin at \$443,400. The top package price is \$554,300. All machines are available now. PRIME COMPUTER INC., Natick, Mass. CIRCLE 203

Database Processor

Teradata brings out the third generation of its DB machine family.

Teradata Corp. has unveiled the third generation of its DBC/1012 family of fault tolerant computer systems, which are optimized for relational database management. The Model 3 system processors are rated at 3MIPS and provide internal processor performance of two-and-a-half to three times that of Model 2, Teradata claims. The new system is configurable from three to 1,024 processors.

The Model 3 uses Intel's 386 microprocessor and 80387 numeric coprocessors operating at 20MHz with zero wait states. Each processor module includes at least 4MB of DRAM.

The Model 3 performs more than twice as fast as the Model 2 in a transactions per second benchmark for credit authorizations, says Teradata. Available in November, Model 3 has an entry-level price between \$275,000 and \$325,000. A system with 22 processors costs between \$1.7 million and \$2 million. Model 1 and 2 processor modules may be combined in a single Model 3 system. TERADATA CORP., Los Angeles. CIRCLE 204

BRIEFS

Sytek Inc., Mountain View, Calif., has brought out the 4208 **Ethernet Terminal Server for TCP/IP Telnet protocols**. It is available now for \$2,495. CIRCLE 206

Sysgen Inc., Milpitas, Calif., has delivered Omni-Bridge, a **floppy disk drive controller for IBM XTs and compatibles**. It is available now for \$95. CIRCLE 207

Presentation Technologies Inc., Sunnyvale, Calif., has rolled out the first in a new line of desktop presentation products. With the Montage **Film Recorder**, users can make slides with 4,000-line resolution and full bit-mapped graphics. The film recorder is available now for \$5,995. CIRCLE 208

Computer Network Technology Corp., Minneapolis, has delivered a series of **interprocessor networking gateway products** to support high-speed communications between Cray supercomputers and IBM and Digital Equipment Corp. computers. The initial product, the LANlord 8023, connects up to four Ethernet links directly to the I/O channel on the Cray machine. A two-Ethernet configuration is priced at \$38,000. It is available now. CIRCLE 209

Packard Bell, Woodland Hills, Calif., has brought out a new **laser printer** for desktop publishing. The six-page-per-minute, 300-dot-per-inch PB9000 printer is available now for \$2,495. CIRCLE 210

Corvallis Microtechnology Inc., Corvallis, Ore., has added a **PC-compatible handheld computer** to its product roster. The MC-II, which runs on a "DOS-like operating system," weighs 1.3 pounds and features an eight-line, 21-character display. It is available now, priced at \$750. CIRCLE 211

NEC America Inc., San Jose, has introduced the I-Series of **intelligent chassis, controllers, subcontrollers, and modems for datacom applications**. The I1000 chassis is priced at \$1,200; the I1001 controller is \$345; the I1002 subcontroller is \$165. The I2432C and I2432 dial-up modems are priced at \$995 and \$895, respectively. CIRCLE 212

Elexor Associates Inc., Morris Plains, N.J., has a new **handheld data acquisition system**. The RS-5000 automatically takes data from a transducer and stores that data in nonvolatile RAM. It is available now for \$4,790. CIRCLE 213

Is your printer tying up your computer?

Because an extraordinary number of data centers still output to impact printers, the latest data processing technologies are often lashed to 25-year-old printer technologies. As a result, your data center may be suffering from a lack of productivity, low print quality and other production inefficiencies.

All would be different if you had a state-of-the-art Xerox 4050 or 4075 Intelligent Printing System. Xerox printing intelligence is resident on the printer, so while your Xerox electronic printer prints at maximum throughput speed, your mainframe meets the payroll or compiles annual report data. You're using the same cut-sheet paper everybody in the office uses. Preprinted stock is a thing of the past because the

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Xerox Intelligent Printing Systems are products in support of Xerox leadership in document processing. Whether creating, copying, distributing or filing,

we turn ideas and information into electronic and hard copy documents that are superior in look and content.

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For specific information about Xerox Intelligent Printing Systems and how they can meet your data center's unique applications requirements, call us at 1-800-TEAM-XXR (1-800-832-6979), ext. 192 D, or send the coupon below. Xerox Corporation, P.O. Box 24, Rochester, NY 14692.

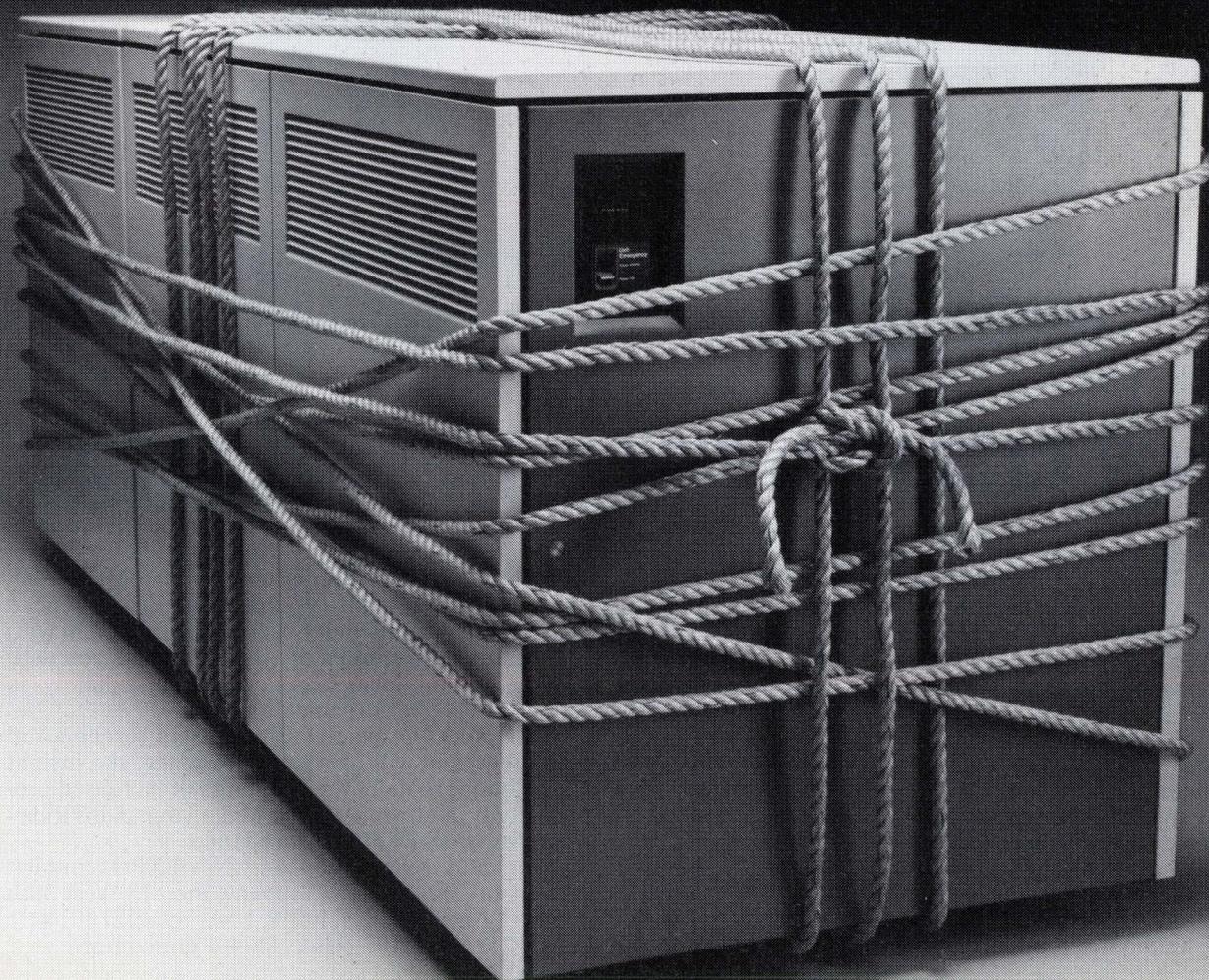
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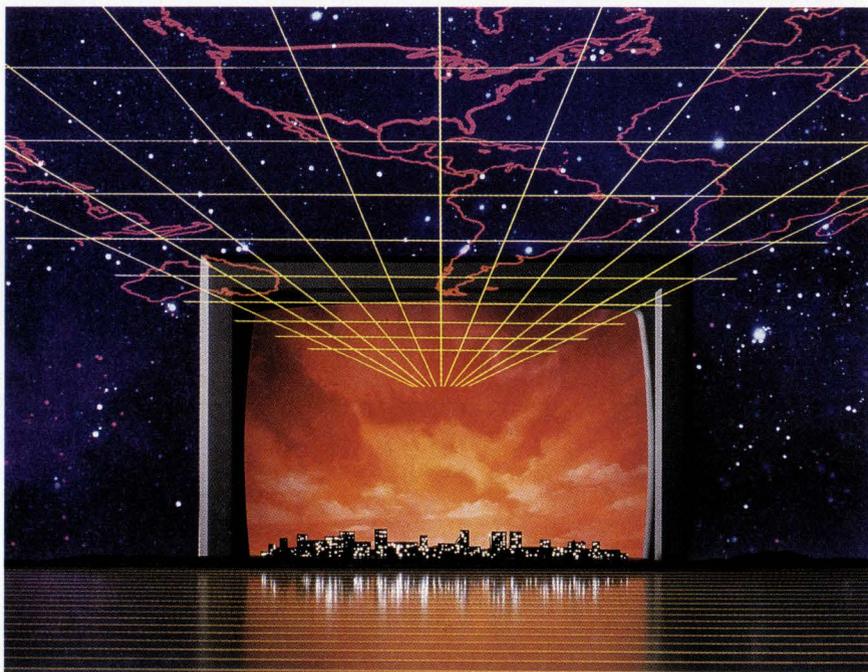
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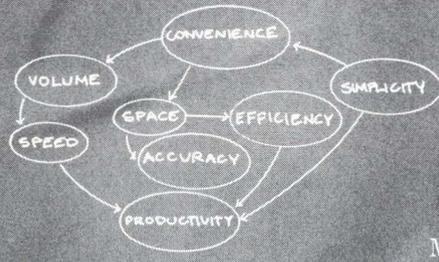
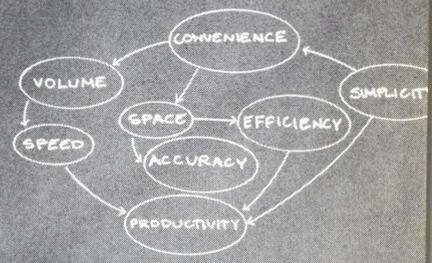
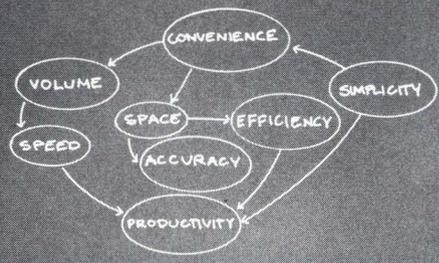
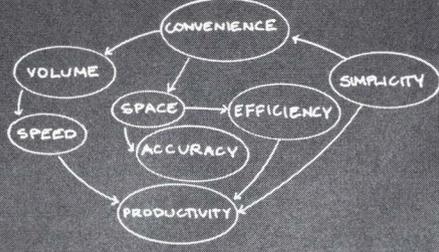
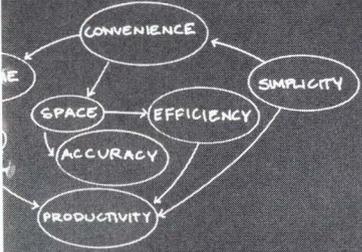
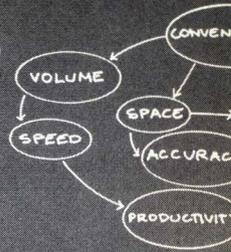


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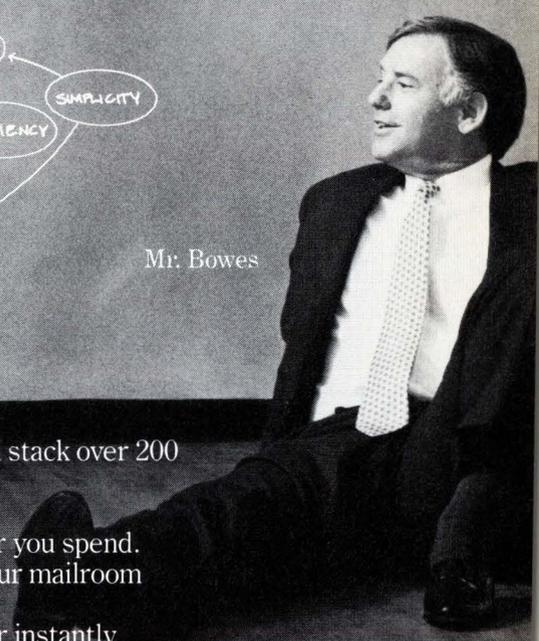
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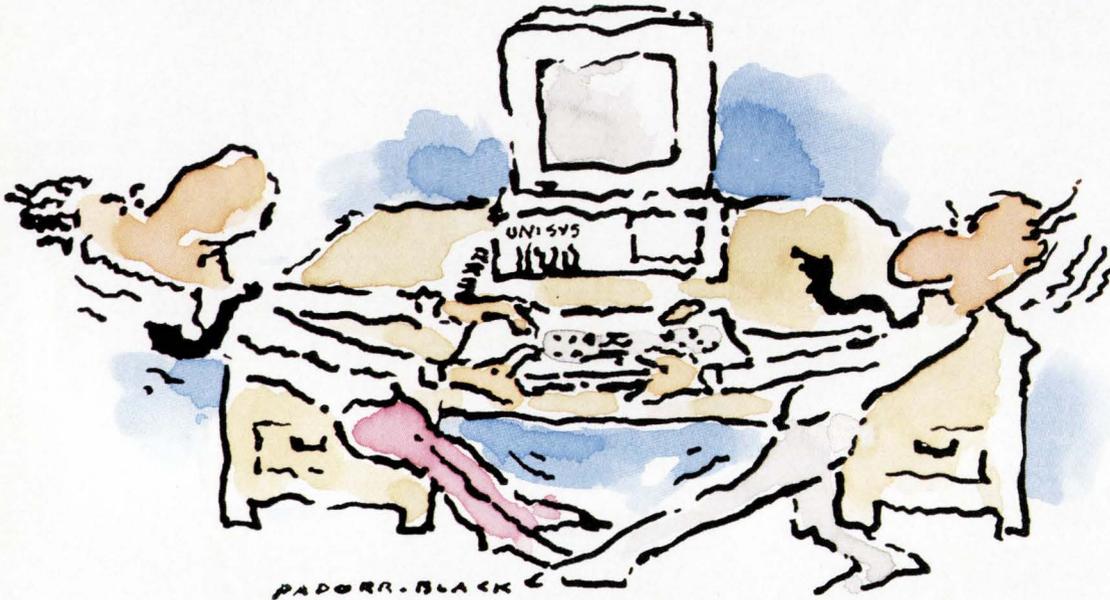
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New Products

TRENDS

MEASURING SOFTWARE QUALITY and productivity is becoming increasingly important to in-house development shops. A survey published by the Quality Assurance Institute (QAI) finds that 94% of the 69 organizations it polled expect to focus more on software measurement this year and in '89. Bill Perry, director of the QAI, attributes the growing interest to "increased competition, budget-cutting, and the new need for productivity." As banks, manufacturers, and government organizations tighten their belts, software development gets closer scrutiny, he says.

For Perry, the old way of measuring productivity—by lines of code per programmer per day—doesn't add up anymore. "When you measure lines of code, people produce more code. A lot of bad systems have been made with lots of lines of code," he says. As an alternative, the Orlando, Fla.-based QAI recommends counting defects. At the moment, counting defects in source code has to be done by hand. Products on the market—such as PATHVU from the Chicago-based Catalyst division of Peat, Marwick, Mitchell, and Inspector from Salem, Mass.-based Language Technology Inc.—analyze source code, measure complexity, and provide statistical data, but they can't count certain kinds of defects, such as defects in logic.

Measuring the defect rate hasn't yet become standard practice in most IS shops. The survey shows that only 7% of participants knew their defect rate per 1,000 lines of source code. But counting defects was one of the four most frequently mentioned measures that respondents plan to introduce in the next year. Other popular barometers are customer satisfaction surveys, defects occurring in system/program development, and function point analysis.

All four methods are used at AuxCo, a Maitland, Fla.-based division of Cincinnati Bell. For each project, a quality assurance representative is responsible for software inspection. Quality assurance manager Larry Campbell says, "We sit down and analyze every product. 'What is it that we're producing? Is the process we are following indeed producing what we want it to?'"

Campbell believes his company's commitment to quality is unusual. "A lot of companies aren't following these practices because the concepts are so new," he says. In coming years, Campbell hopes to see recruitment pages fill up with ads for quality assurance analysts.

If you'd like additional information about products covered in this issue's software Trends, please circle 227 on the reader service card.

SOFTWARE

ORACLE

TP1 Benchmark Performance Comparison

OS	CPU	DBMS	Database Size	tps
■ IBM MVS	3090 600E	ORACLE	100,000	265
■ IBM MVS	3090 600E	ORACLE	1,000,000	245
■ Tandem	16 CPUs	NonStop SQL	100,000	240
■ UNIX	Sequent	ORACLE	100,000	124
■ UNIX	Sequent	ORACLE	11,000,000	110
■ DEC VAX	6240	ORACLE	100,000	49
■ DEC VAX	6240	ORACLE	5,000,000	43
■ DEC VAX	8800/8700	Sybase	100,000	29
■ IBM MVS	4381	ORACLE	100,000	26
■ IBM MVS	4381	ORACLE	3,000,000	22

Using the TP1 benchmark, Oracle claims its new release breaks speed records.

Oracle Unveils OLTP Version Of Its Relational DBMS

The firm claims its new on-line package sets speed records in several environments.

BY MARY KATHLEEN FLYNN

Oracle Corp. has brought out a transaction processing version of its Oracle relational database management system. The company says the release sets new speed records in IBM MVS, VAX/VMS, and Unix environments. Oracle also claims that the new product offers the lowest cost per transaction in each computing environment.

Using the TP1 standard benchmark for transaction processing, Oracle version 6 runs at 265tps on the MVS-based 3090 Model 600E mainframe, according to the company. Oracle says the old record was 240tps, set by a cluster of 16 Tandem computers.

On the VMS-based VAX 6240, version 6 logs 49tps, reportedly breaking the previous VAX/VMS record of 29tps, which was set on a VAX 8700 connected to a VAX 8800 computer. The company also claims Oracle sets a new Unix record of 110tps on a Sequent mini.

The TP1 benchmark, first defined in a 1985 DATAMATION article, simulates the transactions and updates generated by a bank teller (see "A Measure of Transaction Processing Power," April 1, 1985, p. 112).

In the midst of a recent database benchmarking controversy (see "All TP1s Are Not Created Equal," Aug. 15, p. 51), Oracle has taken the extra step of getting its results audited and verified by the Codd and Date Consulting Group, San Jose.

Version 6 is currently available for MVS, VMS, and Unix. It is priced between \$4,000 and \$99,000, depending on the configuration. A 33% discount is available for Oracle's installed customer base.

Releases for other environments, such as VM/CMS, Sun, Pyramid, Hewlett-Packard, Data General, Apple Macintosh, and pcs running MS/DOS and OS/2, will follow shortly, Oracle says. ORACLE CORP., Belmont, Calif. **CIRCLE 214**

New Products

Electronic Data Interchange

GE package allows translation of EDI-formatted documents.

GE Information Services has added a mainframe-based package to its line of electronic data interchange (EDI) systems.

The EDI*Central System is designed for users with multiple remote applications. It enables users to translate EDI-formatted documents to and from the formats used by their internal business system applications, even when those systems are far-flung. Control systems monitor the translation process and the worldwide transmission of EDI documents between users and trading partners. The program also offers internal routing of received documents, exception report tracking of documents sent to trading partners, and support of multiple versions of EDI standards.

Available now, the first-copy license price is \$20,000, with additional copies at \$12,000 each. The annual subscription service fee per copy is \$2,400 after the first year. GE INFORMATION SERVICES, Rockville, Md. CIRCLE 215

COBOL Development

Generator for COBOL applications is unveiled by Sage Software.

Sage Software Inc. has expanded its line of development tools for IBM users with a generator for COBOL applications.

Based on PS/2 technology and the Micro Focus COBOL/2 Workbench, the APS/PC Workstation generates applications for execution in either the PC or MVS mainframe environment.

The software house claims its system is the first full-function applications generator to support the development of COBOL applications throughout the cycle—from physical design and prototyping to generation and unit testing—without the use of a mainframe. With the new product, users that traditionally have designed programs on the pc but then moved them to the mainframe will no longer have to relocate to a new environment in the middle of a project, Sage claims.

The recommended environment for the workstation is an IBM PS/2 Model 70 or 80, 3MB of extended memory, 640KB RAM, a 5MB hard disk, PC/DOS 3.3, and the Micro Focus COBOL/2 compiler. The APS/PC is available now, priced between \$5,000 and \$7,500. SAGE SOFTWARE INC., Rockville, Md. CIRCLE 216

Banking Software

Package is targeted for banks in the post-deregulation world.

Tek-One Ltd., founded four years ago by former EDS vp Shellie Shonk, has rolled out a real-time data processing system designed for banks and savings institutions. The program is designed specifically to help users compete in the post-deregulation marketplace.

Features of Tek-One include a database architecture, which provides central information file capabilities; real-time information access; fourth generation language structure, which allows custo-

The screenshot shows a banking software interface. At the top, it displays 'IN-HOUSE NETWORK BANKING SYSTEM' and 'CUSTOMER ACCOUNT(S) (M)' with a date of '06/30/88'. Below this, there are fields for 'INTERNAL CUSTOMER NO.', 'NAME - LAST, FIRST, MIDDLE', 'STREET ADDRESS 1', 'STREET ADDRESS 2', 'CITY', 'STATE', 'ZIP', 'PHONE', 'FAX', 'TELETYPE', and 'FACSIMILE'. A table below shows account balances:

DEPOSIT ACCOUNT	DEP BALANCE	PC	1 DAY	LOAN ACCOUNT	LOAN BALANCE
1000000000	1450000000			1000000000	1450000000
1000000001	1450000000			1000000001	1450000000
1000000002	1450000000			1000000002	1450000000
1000000003	1450000000			1000000003	1450000000
1000000004	1450000000			1000000004	1450000000
1000000005	1450000000			1000000005	1450000000
1000000006	1450000000			1000000006	1450000000
1000000007	1450000000			1000000007	1450000000
1000000008	1450000000			1000000008	1450000000
1000000009	1450000000			1000000009	1450000000
1000000010	1450000000			1000000010	1450000000

mization of the system by users; and parameter-driven tables. The package runs on the Hewlett-Packard 3000 series and on the IBM System/36. Available now, it's priced between \$40,000 and \$70,000. TEK-ONE LTD., Dallas. CIRCLE 217

Networking

Improved connectivity is offered by new systems products.

APX Labs Inc. has brought out two families of products that reportedly enable any program on any system in an SNA network to connect, communicate, and exchange data with any other program in that network.

The apXCHANGE system offers connection of local programs through cross-memory services and connection of remote programs through VTAM LU 6.2, according to APX. The MVS-based product is available now. The license fee for apXCHANGE is based on the processor on which it will run; for an IBM 3090 system, the fee is \$78,000.

In the second family, APX is offering two new products, apXPLORE-CICS and apXPLORE-IMS. These packages allow CICS Commands and DL/1 calls issued from programs outside CICS or IMS regions to access the resources within the regions. Available now, the apXPLORE programs are licensed by processor type. On an IBM 3090-class system, for example, the CICS and IMS products are each priced at \$22,000. APX LABS INC., Natick, Mass. CIRCLE 218

BRIEFS

Microsoft Corp., Redmond, Wash., has brought out version 3.0 of its **COBOL Optimizing Compiler** for developing mainframe applications in micro environments. Available now, it is priced at \$900. Users of COBOL 2.2 can upgrade to it for \$300. CIRCLE 219

Pansophic Systems Inc., Oak Brook, Ill., has delivered an **interface to Supra, Cincom's relational DBMS**. Available now, Easytrieve Plus-Supra is priced between \$2,400 and \$10,200. CIRCLE 220

Data Design Associates, Sunnyvale, Calif., has a new **general ledger system** with enhanced calculation capabilities. GL/e is available at prices ranging between \$110,000 and \$170,000. CIRCLE 221

Novell Inc., Provo, Utah, has brought out two new **X.25 gateways**. Priced at \$550, the NetWare X.25 gateway supports up to 32 concurrent ASCII host sessions over eight assigned LAN workstations. The NetWare X.25 Extended Gateway, which is priced at \$1,150, supports up to 254 ASCII sessions on 100 workstations. Both products are available now. CIRCLE 222

Software AG of North America Inc., Reston, Va., has announced a **DBMS for DEC VAXs**. ADABAS 1.5, which is available now, is priced between \$10,000 and \$80,000. It enables users to initiate automatic mass changes to active data files within the system. CIRCLE 223

Integrity Technologies Inc., Metuchen, N.J., has unveiled a **package to detect viruses and glitches in MS/DOS applications**. Packages for the Macintosh and other micro operating systems are under development. VIRALARM 2000 is priced at \$2,500 for 10 licenses and \$8,000 for 100. It is available now. CIRCLE 224

Kinetics Inc., Walnut Creek, Calif., has released the latest generation of its **Ethernet-LocalTalk gateway**. FastPath 4, available now for \$2,495, automatically starts and configures itself on AppleTalk LANs and automates communications between the Apple Macintosh and TCP/IP hosts. CIRCLE 225

TaxCalc Software Inc., Fort Worth, has released a **spreadsheet template for tax flow analysis**. The Cash Flow Planner provides a number of statements in a single keystroke. It is available now for \$95. CIRCLE 226

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Sept. 26, Chicago. Contact the Omni User, P.O. Box A 3031, Chicago, IL 60690.

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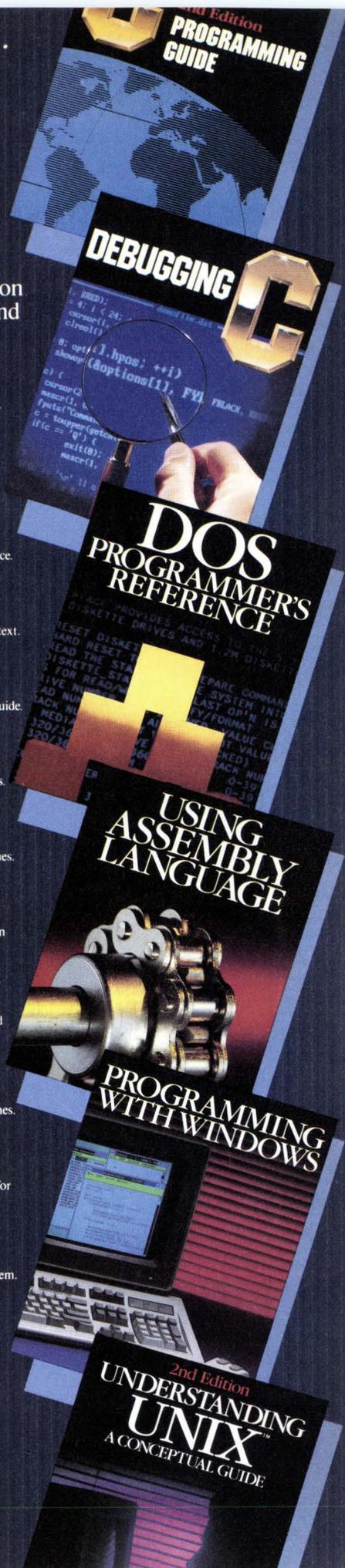
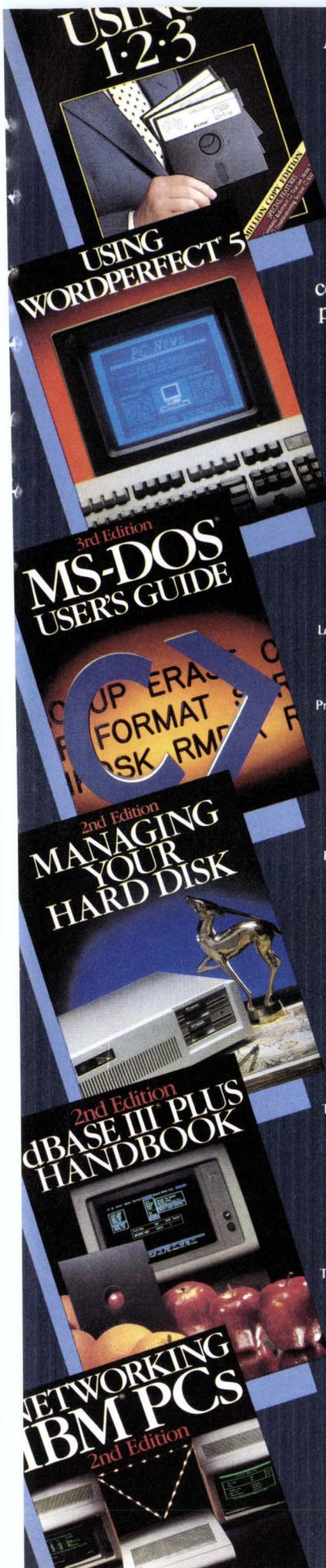
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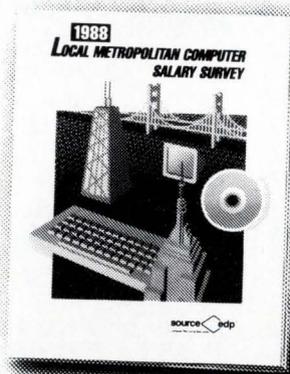
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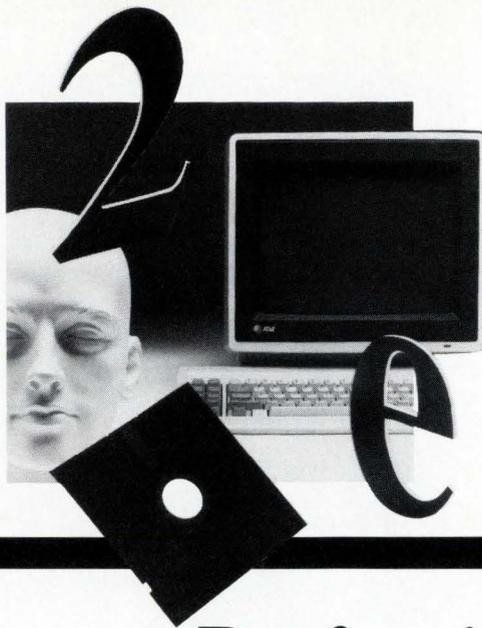
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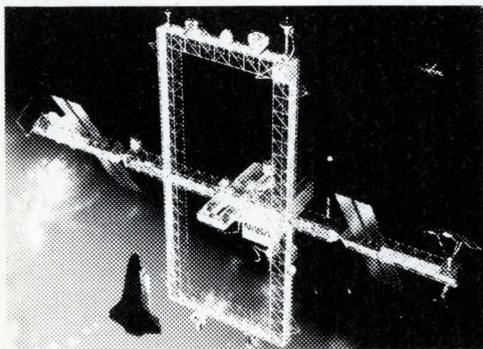
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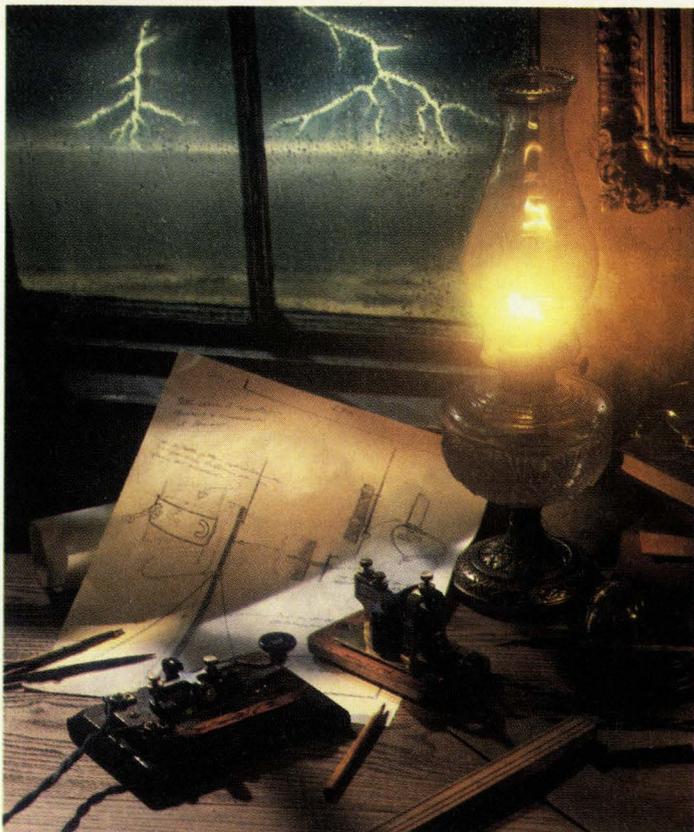
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