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AUGUST 15, 1988
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SPECIAL REPORT: DBMS

Fatal Flaws In SQL

By E.F. Codd

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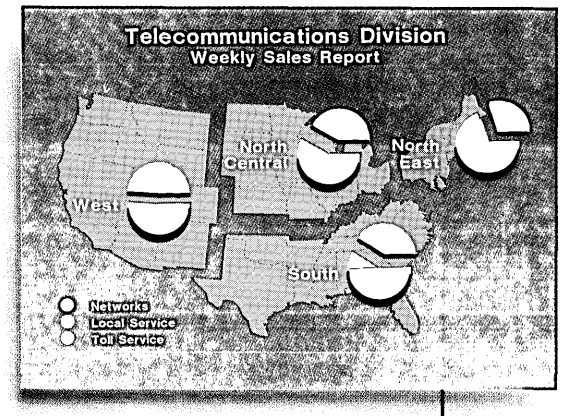

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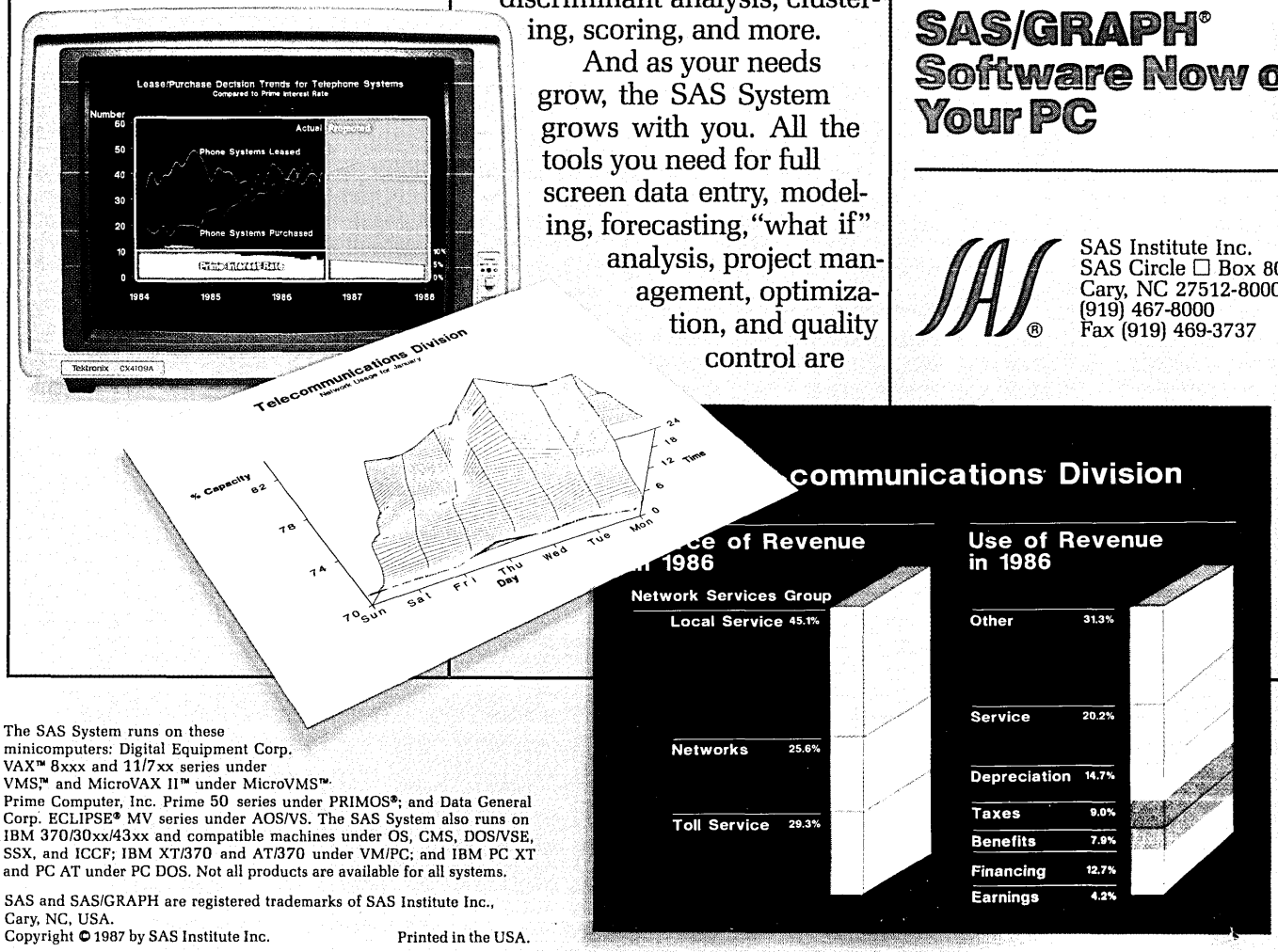

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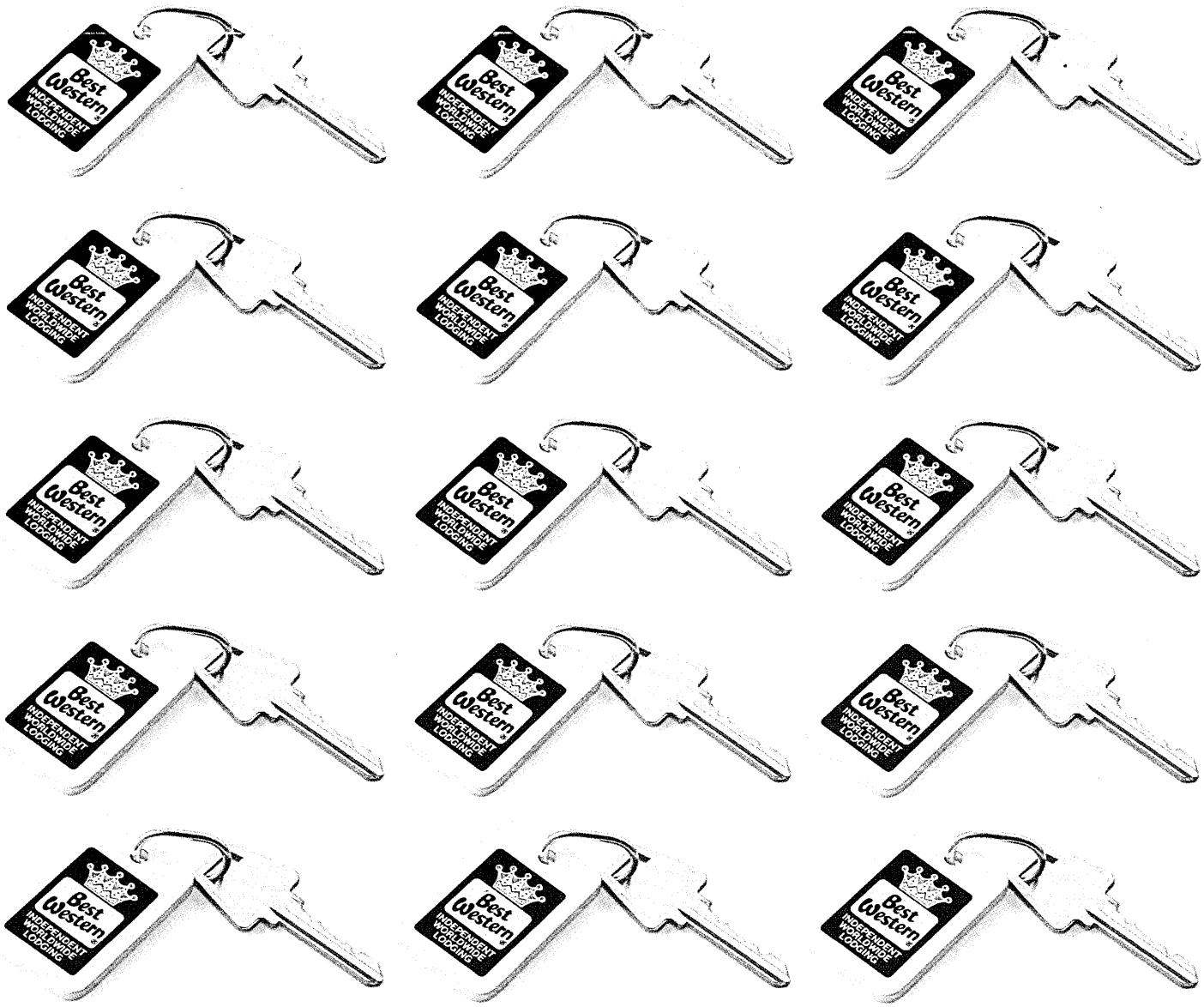

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Mr. Robert C. Seate
Manager, Management Information Systems
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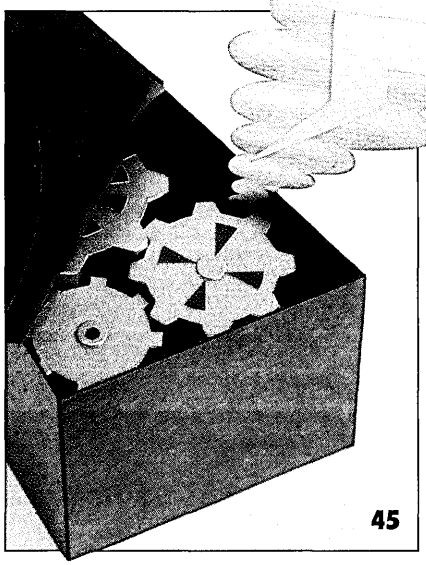

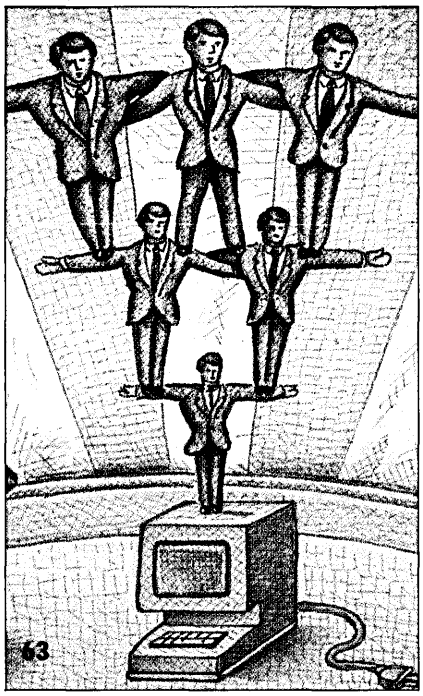

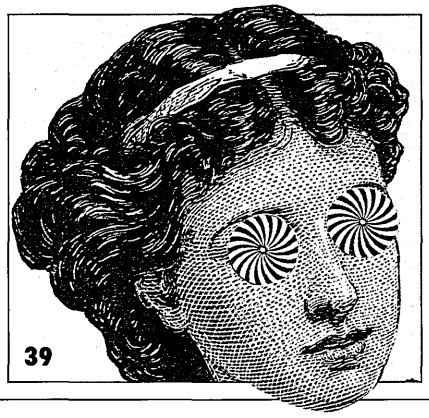

SPECIAL REPORT: DBMS

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NEW PRODUCTS

DEPARTMENTS

Cover Paper Sculpture by Ajin

Coming in the next issue:
A Corporate Profile of Unisys
Fatal Flaws in SQL, Part 2
How New Technologies Show the Maturation of the IS Industry

CALLING ALL USER GROUPS!
Please send information about your User Group so it can be included in DATAMATION's upcoming User Group Directory. If possible, please include address, phone number, number of members, names of officers, date of next meeting, statement of purpose, and a list of services provided. The address is:
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1988 JESSE H. NEAL AWARD

1987 JESSE H. NEAL AWARD

Editorial

Time To Go On The Offensive

It's neither the biggest nor the richest company in its field, yet that hasn't prevented Con Edison from assuming a leadership position in managing information age workers. Specifically, the 23rd-largest U.S. utility has gone on the offensive in protecting the health of employees who use video display terminals, the subject of Willie Schatz's Behind the News report (p. 39).

Not satisfied with steps it has already taken, such as eye exams and work breaks, Con Ed plans to embark soon on an ergonomic training program to teach employees how to avoid screen glare, among other things. Unfortunately, several other user organizations have taken a defensive posture on VDTs—investing sums in lawyers and lobbyists to thwart legislative moves to govern VDT use in the workplace.

We find little fault with organizations that oppose VDT-use laws on Constitutional grounds—they have every right to oppose government intrusion into their markets. But we can't help wondering whether the money wouldn't be better spent on research and retrofits. Although more states have rejected VDT-use legislation than have approved it—the score is 24 states to nine at this point, according to one association—the issue is unlikely to go away. Local governing bodies will step in where state legislatures or employers fail to act, just as Suffolk County, N.Y., has recently done. The sheer number of VDTs in use—30 million by one estimate—and the growing populations of pcs and workstations will require that greater attention be paid to health concerns surrounding such modern-day tools.

"It's an issue we can't afford to turn our back on," says Paul Berger, president of the influential Society of Information Management. "But we shouldn't do an overkill either." He points out that although no scientific studies have concretely linked VDT use to health problems, some U.S. companies are already improving the environments of VDT workers, playing catch-up to their counterparts in Europe and, he suspects, Japan. "Maybe we weren't as conscious of those environments when people were using typewriters," he says.

Being conscious of such matters early on certainly hasn't cost Con Ed anything. Its ROI ranks second among utilities. Maybe the best offense isn't a good defense after all. Maybe it's just a good offense—especially where the health of workers is at stake.

Tim Mead

TIM MEAD
EDITOR-IN-CHIEF

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Letters

Distortion

"The Supercomputer Breaks Through" (May 1, p. 50) distorts Boeing Computer Services' pricing and unfairly positions the company as being grossly overpriced for its services.

The article [quoting John Taylor, manager of Du Pont's scientific computer division] states that Boeing Computer Services charged a customer "$10,000 per cpu hour." To set the record straight, Boeing Computer Services did not offer pricing based on cpu hour to any customer.

In point of fact, there are no acceptable industrywide cpu pricing standards. Further, rate comparisons based on cpu hours alone can be misleading. The run times of specific jobs on a machine are heavily influenced by the system configuration. For example, using a solid-state storage device, run times on our machines have been lowered from 24 to four hours and cpu hours have also been reduced considerably.

Boeing Computer Services has and will continue to provide its customers with rates that are competitive with university and in-house installations. We would welcome the opportunity to provide an industry-competitive or benchmark quote to any prospective customer.

SURESH SHUKLA
National Product Manager
Boeing Computer Services
Bellevue, Wash.

Israeli Realities

I would like to comment on your article entitled "Israel: Where Necessity Mothers Innovation" (April 1, p. 54-11). The article states that Israel lacks "centralized planning for high technology." This is incorrect at least in one respect. Computers and telecommunications in academia are being coordinated by a central government-financed organization. We currently have a network spanning 47 mainframe systems located in over seven universities with connections to the European Academic Research Network (EARN), as well as to BITNET and CSNET.

This centralized planning has allowed us to coordinate our efforts and, sometimes, to learn from others' mistakes. Currently, the U.S. research and academic networks are attempting to coordinate their efforts since they now realize that each is running a parallel network. The DOD (ARPANET), the DOE (HEPNET), the NSF (NSFNET), the list is endless. The problem now is to establish a centralized coordinating unit that will remove the redundant links that currently crisscross the continental United States and to create a single high-speed backbone of 1-3Gbits per second. Israel is not at the stage to create networks of that speed, but at least we are able to coordinate our efforts.

Your article did not cover the major reason companies in Israel are not able to produce up to their potential. Telecommunications was touched upon but was covered as a side note to the overall problem. A 64Kb international link from the U.S. to Europe costs approximately $4,000. The cost of the European end is approximately $9,500 (based on a 10-country average). This represents a total monthly cost of $13,500 for a 64Kb link. On the other hand, Israel's sole PTT, Bezek, charges $21,000 for the same link, bringing the total monthly costs up to $25,000 (when including the American side of the link).

The situation for data communications within Israel is no better. Typical 64Kb digital tariffs are between three-to-five times the European average. Small software houses cannot afford the exorbitant prices that Bezek demands on behalf of the services they supply.

HANK NUSSBACHER
Computer Consultant
Israel

Health and Networks

Regarding the McDonnell Douglas Information Systems profile in the DATAMATION 100 (June 15, p. 99), your description implies that the company is no longer in the business of providing either health information or network systems to customers. This couldn't be farther from the truth.

While McDonnell Douglas Information Systems Co. did sell a minor physician systems operation, the company continues to be a major health care systems provider. In fact, one in every four U.S. hospitals uses a McDonnell Douglas health system.

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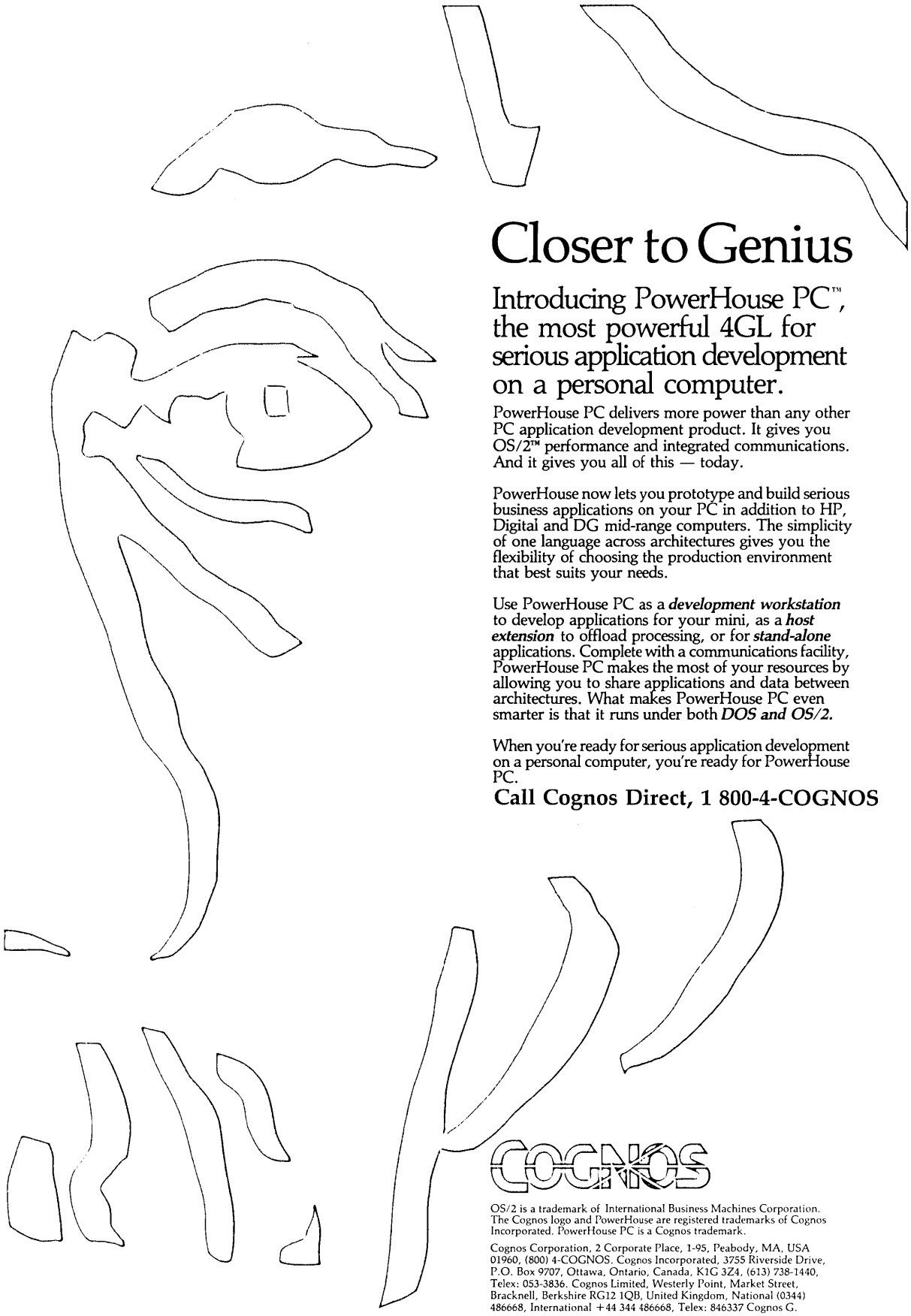
JEREMY J. CAUSLEY
President
McDonnell Douglas
Information Systems Co.
Irvine, Calif.



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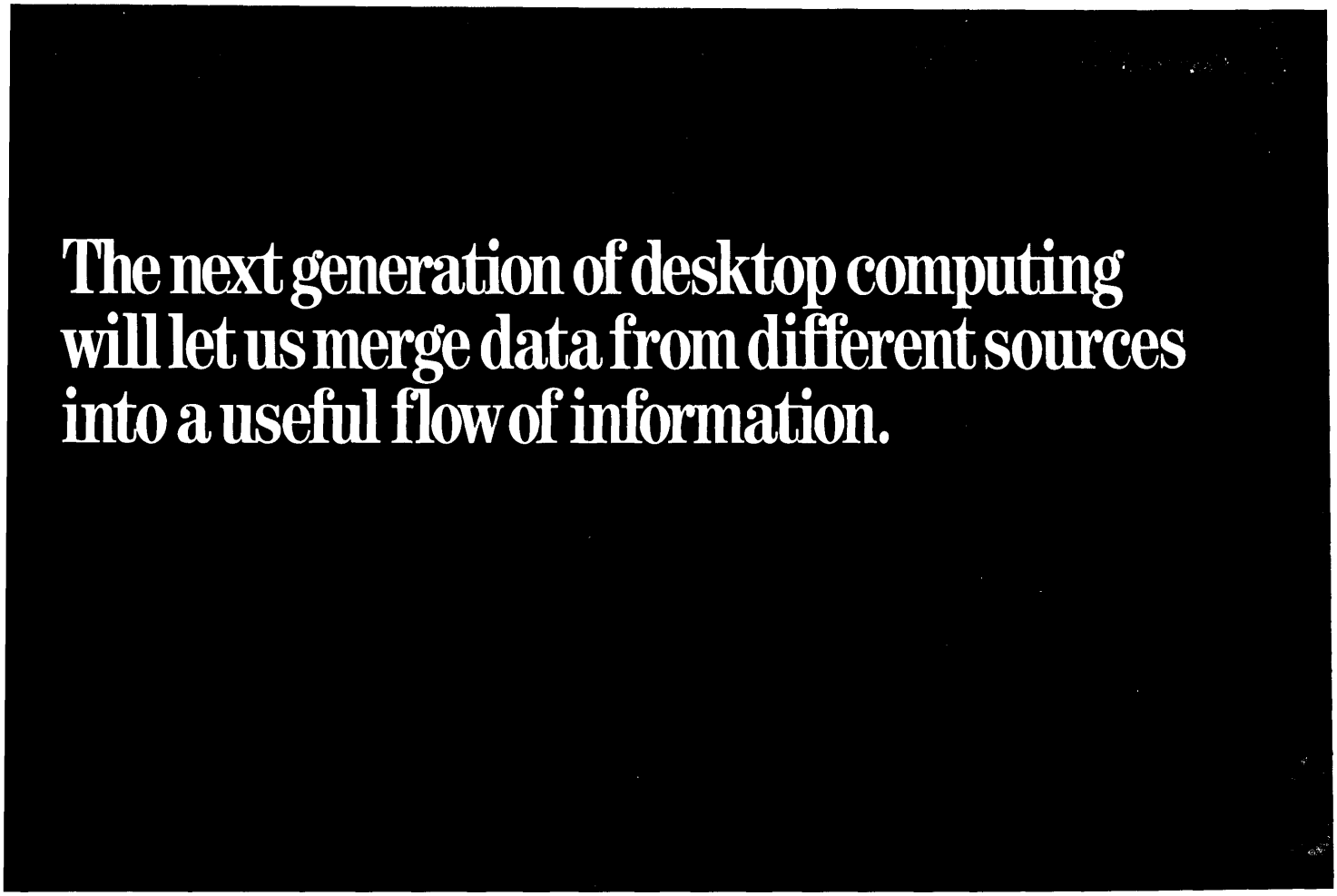

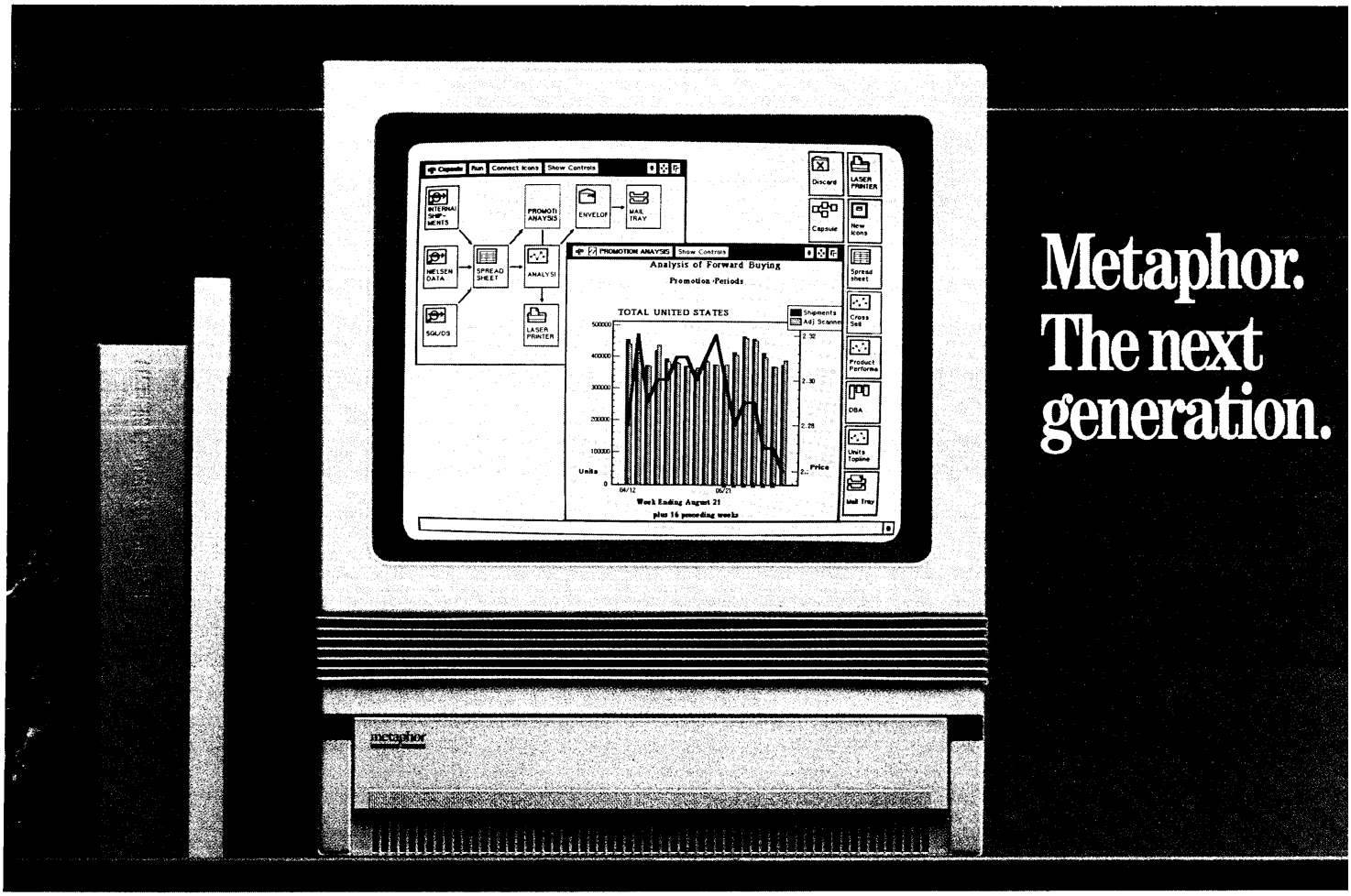

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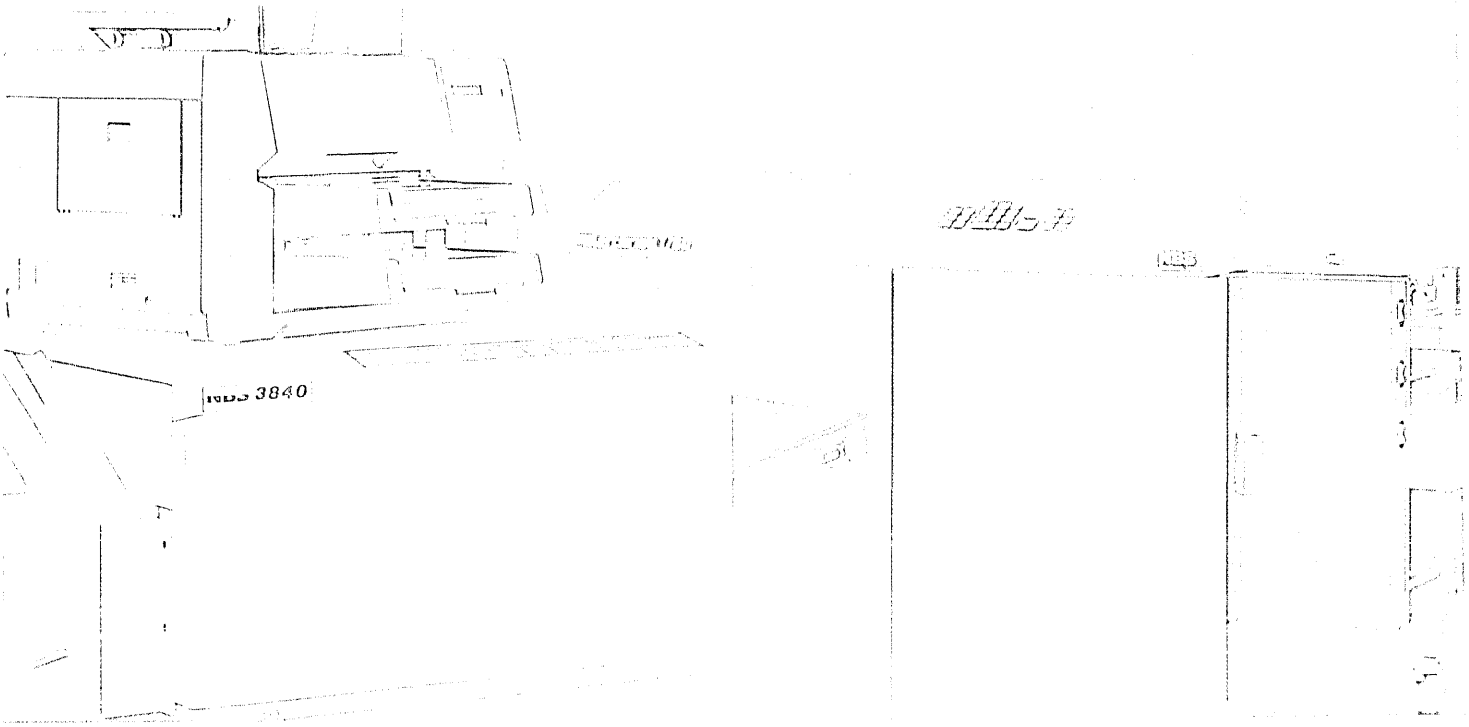

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Look Ahead

PCMS NERVOUS ABOUT MVS/ESA...

SUNNYVALE, CALIF. -- It turns out that supporting IBM's popular new MVS/ESA operating system extension may not be quite as easy as plug-compatible mainframe vendors and their customers assumed at first. Amdahl Corp. says that in order to account for engineering changes that will be necessitated by ESA, it recently increased the standard financial reserve it usually carries on its books. The company, which normally sets aside a larger reserve to pay for engineering changes than it is likely to need, won't say by how much the amount was increased. Amdahl cfo Ed Thompson does say that it's likely to be more expensive for Amdahl to support ESA because hardware changes will be necessary on more boards than was initially expected.

...AS WELL AS IBM'S DISK DRIVE PLANS

SAN JOSE -- Meanwhile, pcm storage hardware makers are nervous as they anticipate the next IBM disk move. Word has it that IBM's storage engineers in San Jose are at work on two projects that could cause headaches for pcms while solving some problems for users. Both are projects to replace IBM's current 3380-class disk storage devices with drives using smaller disks and taking up less of users' valuable floor space. One project is thought to be based on multiple 5¼-inch drives, and the other on a drive using a 10.7-inch disk. The problem for pcms is that, while changing disk size from the current 14-inch standard, IBM may also alter track lengths and disk rotating speeds, making it harder to make devices that match.

HITACHI CHECKS OUT SINGAPORE

SINGAPORE -- Japanese IS giant Hitachi is determined to get its fair share of software development expertise from one of the fastest growing software centers in Asia--the city-state of Singapore. By early next year, it plans to establish a regional Software Development Center here. NEC, HP, Cullinet, Sony, and Nixdorf already have similar software centers in place. Sources say the Singapore center will likely focus on three key areas: English versions of Hitachi's Japanese-developed AI and expert systems products; new manufacturing applications software; and a special project to create protocols and communications software for linking Hitachi systems with other vendors' machines, particularly those from IBM and DEC.

ISDN TO BE LAUNCHED BY WEST GERMANS

BONN, WEST GERMANY -- Watch for the official launch of ISDN services in West Germany this fall following successful trials of the technology by the West German Bundespost in Stuttgart and Mannheim involving some 800 business users over the last two years. The offi-

cial ISDN system will begin with eight ISDN switching centers coming into operation over the next few months, and the Bundespost hopes to be able to meet around 90% of the country's demand for ISDN ports by the end of 1993. But, as many users point out, that demand will depend on the pricing policy covering the new services--an issue that is still being hotly debated by users and the West German telecom authority.

EAST SEEKING WESTERN TARGETS

TOKYO -- Kobe Steel is hunting for IS investment targets in the U.S. as part of a plan to expand revenues from its data processing and electronics division. It has already backed Los Angeles-based disk maker Racet Computers and Boston-based laser company QC Optics. Sources here say Kobe's plan is to hit revenues of $75 million from its IS and electronics businesses by 1990 and $750 million by 1995. Over that period, Kobe expects to hire an extra 1,000 people to run its IS business. Plans are cheap though, and putting them into practice in an environment where many other traditional industries are diversifying is really going to test the steel company's mettle.

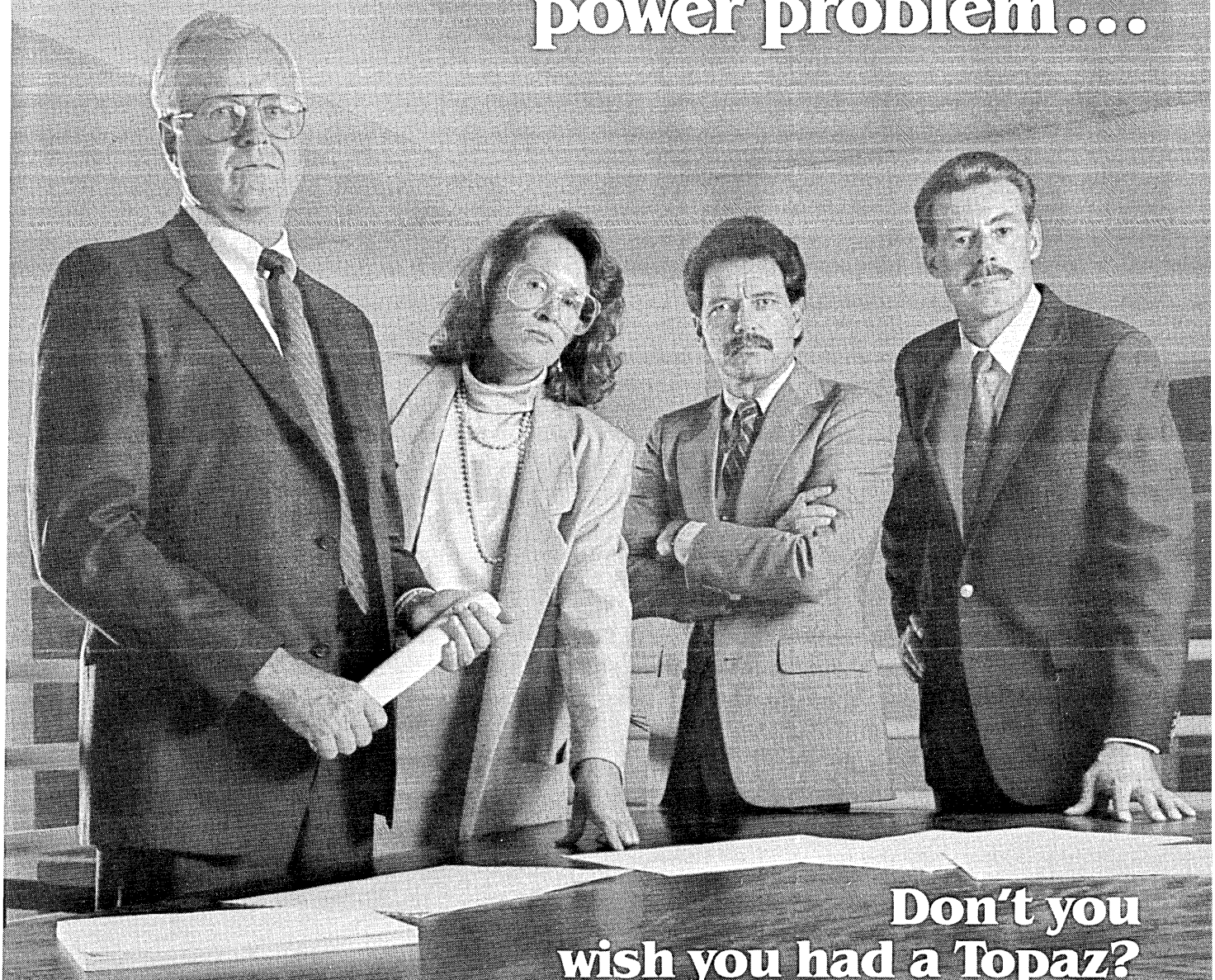
GOV'T EYES NEC SUPER

LOS ALAMOS, CALIF. -- The last few benchmarking teams from the government lab here have returned from Japan and spread the rumor that it might not be such a bad move to buy an NEC SX 3. That machine won't hit the streets until next year, but when it does, it promises to blow its competition away. "A lot of people at Los Alamos are very interested in the SX 3," says a close observer of the scene.

IS EVERYBODY HAPPY?

GENEVA -- Are the trade barriers that hinder free trade in telecom and IS services in some countries actually receding? That's the implication in the lack of response from major multinationals to a call from the U.S. trade office for examples of the trade barriers faced when marketing IS services in foreign countries. The request for examples is in preparation for the Uruguay Round of negotiations of the General Agreement on Tariffs and Trade (GATT) here later this year. The lack of response has surprised U.S. trade officials. A list of complaints compiled in 1984 cited Australia "for protecting its domestic software industry through excessive taxation of software licenses," Brazil for its "market reserve policy limiting the foreign telecom services that can be offered," Canada's banking laws, which "discriminate against remote accessed foreign processing," and Norway's privacy laws relating to intracorporate dataflows.

You lost the data because of a power problem...



Don't you wish you had a Topaz?

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Look Ahead

DEC WEIGHS U.S. EDI OFFER

MAYNARD, MASS. -- Digital Equipment Corp. is lining up applications for an expected September launch of a U.S. value-added network service. The computer maker already has agreements with vendors of financial, purchase order, funds transfer, and other applications that could reside on a planned X12 electronic data interchange (EDI) network. A spokesman would say only that the company "is considering" a U.S. EDI network offering. Having built a nationwide voice/data fiber-optic network to link its U.S. facilities, the company earlier began studying a value-added network offering in a U.K. pilot program.

JAPANESE HAVE A YEN FOR CONSORTIA

TOKYO -- Japan, now preparing for its next-generation research scheme, may launch consortia next year to conduct basic research in neural and optical computing. The Ministry of International Trade and Industry (MITI) thinks neural computers would be more adept than conventional computers at pattern and voice recognition and robotic control. The optical project MITI is considering would develop materials that could be used in optical computers, which use light rather than electricity. MITI has until Sept. 1 to make its requests to the finance ministry in time for legislative bodies to consider funding for next April. The Key Technology Center, a government foundation, already has decided to form a consortium with industry and academia to study fuzzy computing over a six- to eight-year period beginning next March. Fuzzy computing, based on multivariate rather than binary logic, could be applied to machine translation, expert systems, and defense.

RUMORS AND RAW RANDOM DATA

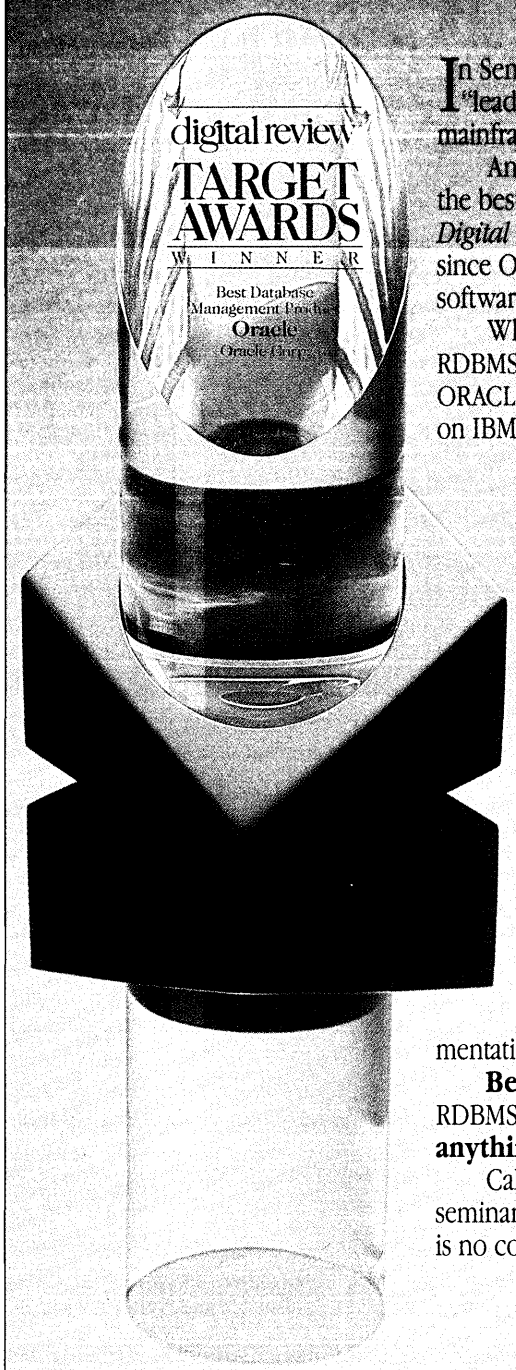
Digital Equipment Corp. seeks to boost its transaction processing contingent with some near-term distributed database support. The company is promising an enhanced VAX Rdb relational database that will allow users to build physically distributed databases over multiple nodes or design distributed access to an Rdb database that makes a remote database appear as if it were local. . . . Wang Laboratories Inc.'s new VS 5000 line finally cracked the development logjam that has made every computer released since January 1985 an exercise in repackaging. In its research and development, Wang now can focus on putting together replacements for its VS 7000 family. In the works are two new families based on CMOS and ECL gate array semiconductor technologies, high-speed system buses, and multiprocessor support beyond the present limit of two central processing units.

No Contest!

Users name ORACLE the #1 DBMS

"Oracle Corporation's lead was substantial... No contest!"

Target Awards Tabulation, Survey Tabulation Services, Inc.



In Sentry Publishing's 1988 DBMS/4GL study, ORACLE "leads the independent field" for projected IBM mainframe DBMS acquisitions.

And by a wide margin, DEC users named ORACLE the best database management product in this year's *Digital Review Target Awards*. Which isn't surprising, since Oracle Corporation is twice as large as any other software vendor in the DEC marketplace.*

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U.S. SEMINARS

AL	Birmingham	Oct 11
AR	Little Rock	Oct 13
AZ	Phoenix	Sep 13, Oct 13, Nov 8
	Tucson	Oct 25
CA	Costa Mesa	Sep 1, Oct 4, Nov 11
	Los Angeles	Sep 15, Oct 18, Nov 15
	Oakland	Oct 6
	Sacramento	Sep 22, Nov 10
	San Diego	Sep 8, Oct 6, Nov 3
	San Francisco	Sep 14, Oct 11, Nov 9
	San Jose	Sep 20, Oct 26, Nov 17
CO	Denver	Sep 22, Oct 27
	Colorado Springs	Oct 25
CT	Farmington	Oct 4
	New Haven	Sep 8
	Stamford	Nov 15
DC	Washington *(Federal)*	Sep 16, Oct 21, Nov 18
FL	Ft. Lauderdale	Oct 18
	Jacksonville	Oct 19
	Orlando	Sep 14
GA	Atlanta	Sep 7, Oct 5, Nov 9
HI	Honolulu	Sep 13
IA	Des Moines	Sep 13, Nov 10
ID	Boise	Oct 5
IL	Chicago	Sep 15, Oct 11, Nov 16
	Springfield	Sep 14, Nov 9
IN	Indianapolis	Oct 13, Nov 17
KS	Wichita	Sep 13
KY	Lexington	Sep 14
	Louisville	Oct 12
LA	New Orleans	Oct 28
	Shreveport	Oct 13
MA	Boston	Oct 12
	Burlington	Nov 18
	Springfield	Oct 12
MD	Bethesda *(Commercial)*	Sep 21
	Baltimore	Oct 19
ME	Portland	Oct 5
MI	Detroit	Sep 13, Oct 4, Nov 8
	Grand Rapids	Oct 12
MN	Minneapolis	Sep 27, Oct 19, Nov 10
MO	Kansas City	Sep 14, Oct 18
	St. Louis	Sep 6, Oct 6, Nov 7
NC	Charlotte	Oct 20, Nov 17
	Raleigh	Sep 15, Nov 2
	Winston-Salem	Oct 5
NE	Omaha	Oct 4
NH	Concord	Sep 20
NJ	Iselin	Sep 15, Oct 13, Nov 17
	Princeton	Sep 15, Oct 4, Nov 22
NM	Albuquerque	Sep 29
NV	Las Vegas	Sep 22, Nov 10
NY	Albany	Sep 20, Nov 9
	Buffalo	Oct 4
	Long Island	Sep 20, Oct 19, Nov 16
	New York City	Sep 14, Sep 28, Oct 12, Oct 26, Nov 9, Nov 16
	Rochester	Sep 14, Nov 2
OH	Akron	Sep 20
	Cincinnati	Sep 15
	Cleveland	Oct 19
	Columbus	Sep 22
OK	Oklahoma City	Sep 13
	Tulsa	Oct 25
OR	Portland	Sep 8, Nov 15
PA	Harrisburg	Sep 26
	Philadelphia	Sep 19, Oct 26, Nov 18
	Pittsburgh	Oct 26
	Valley Forge	Sep 8, Nov 10
RI	Providence	Sep 22
SC	Charleston	Oct 5
	Columbia	Nov 16
	Greenville	Oct 19
TN	Memphis	Sep 14
	Nashville	Nov 9
TX	Amarillo	Sep 20
	Austin	Oct 20
	Dallas	Sep 7, Oct 4, Nov 2
	Ft. Worth	Nov 9
	Houston	Sep 8, Oct 6, Nov 10
	Midland	Oct 19
	San Antonio	Oct 21
UT	Salt Lake City	Sep 20, Nov 9
VA	Norfolk *(Federal)*	Oct 4
	Richmond	Oct 6, Nov 1
VT	Burlington	Sep 28
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WI	Madison	Oct 5
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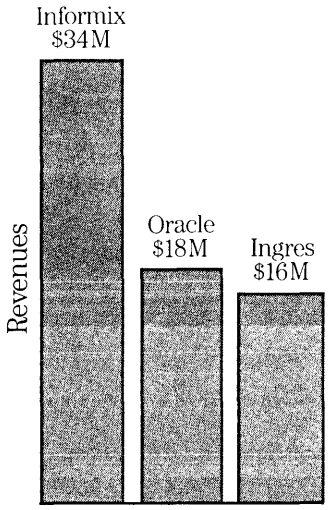

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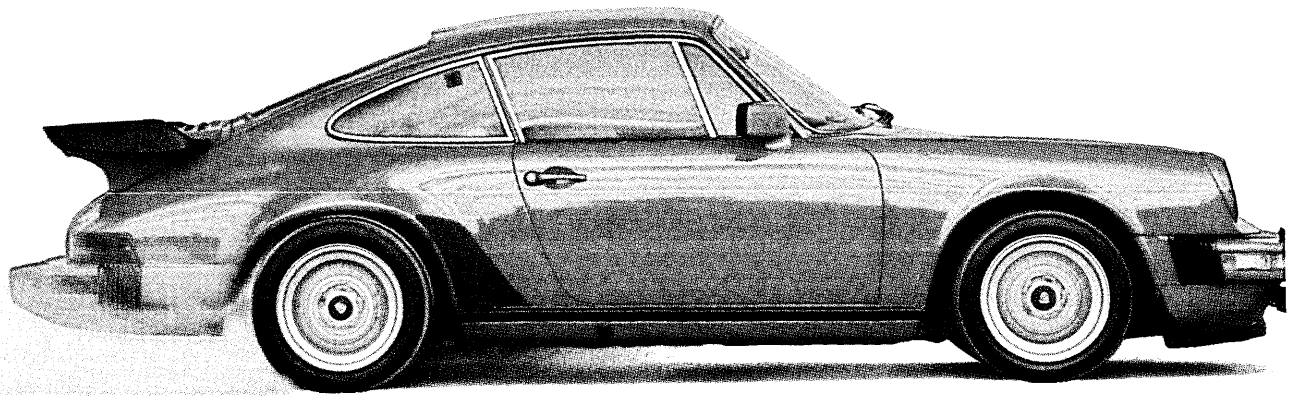

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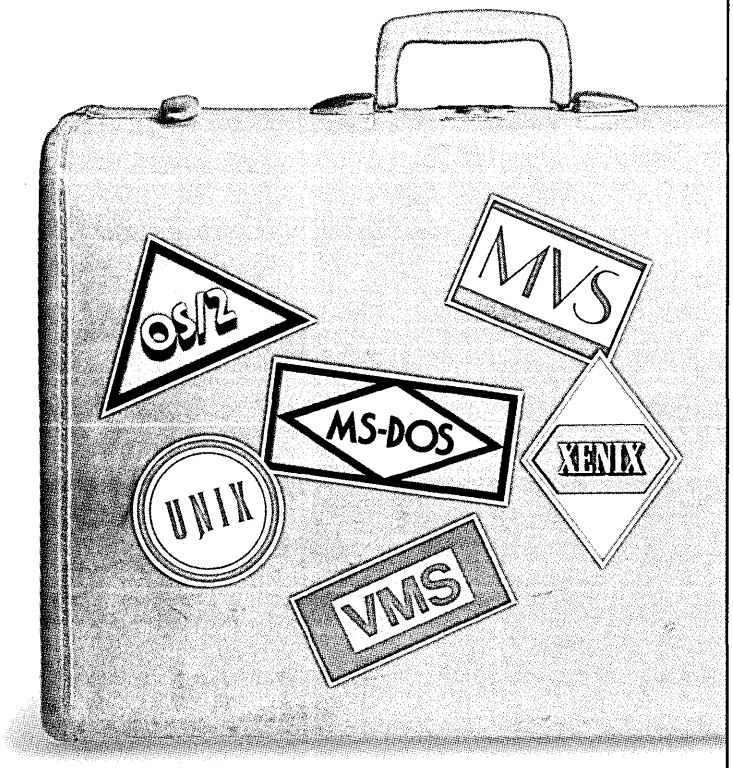

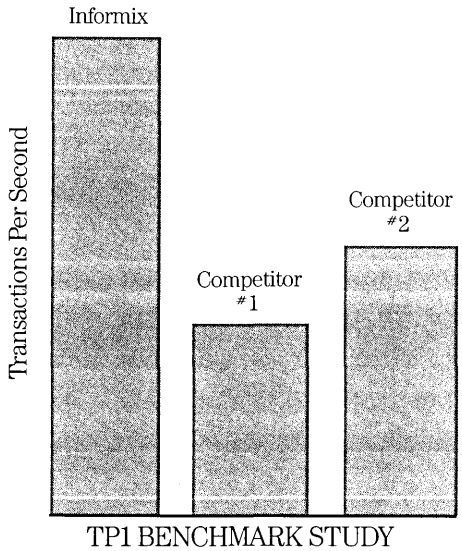

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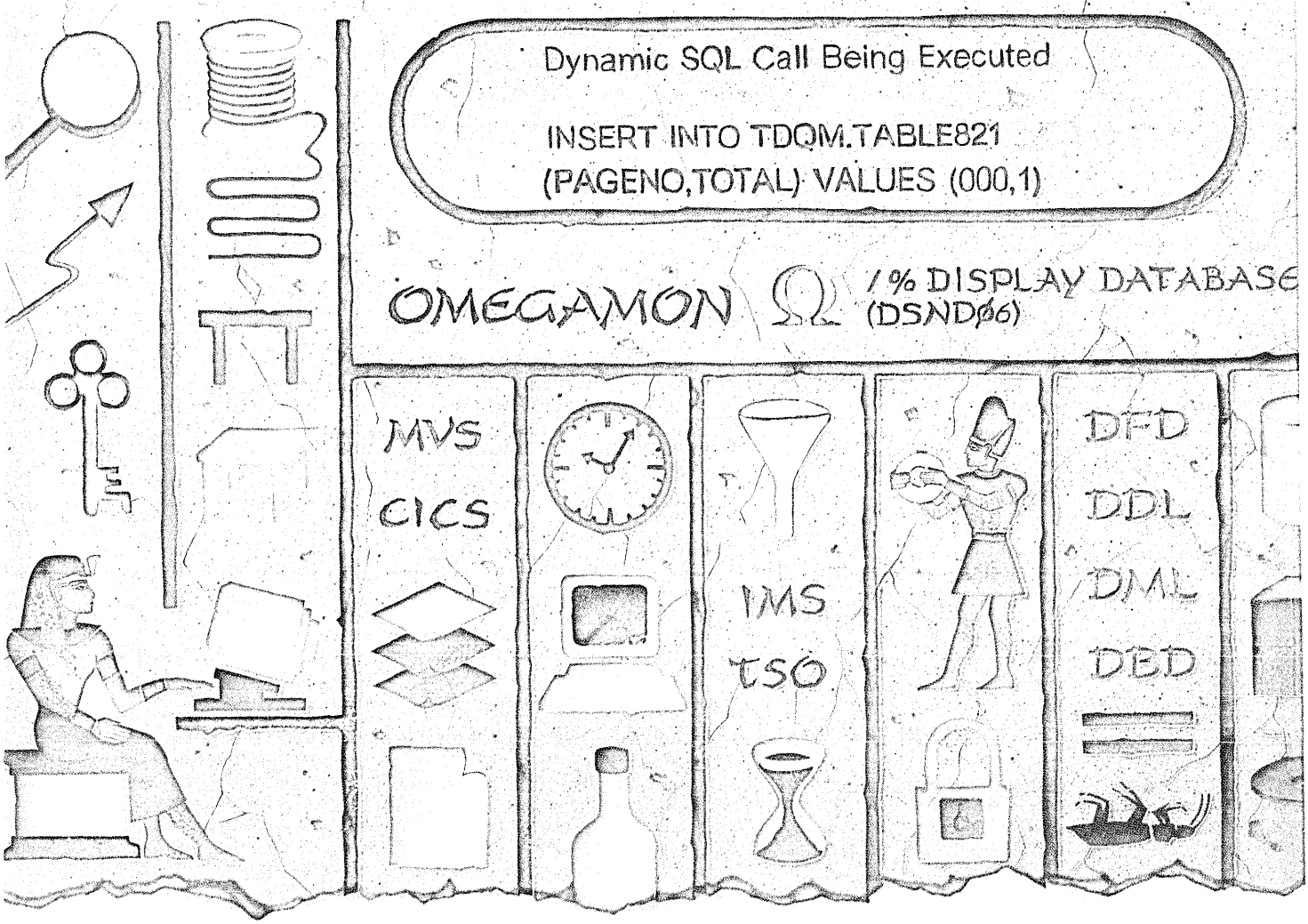

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SUPERCOMPUTING

IEEE Warns of the Japanese Supercomputer Threat

A new study finds that the U.S. must act now to stem the perceived Japanese invasion and suggests a new civilian agency focused on long-term national interests.

BY WILLIE SCHATZ

The IEEE's Committee on Communications and Information Policy has made available to DATAMATION a new report on how the Japanese are wiping out the U.S. supercomputer industry. Entitled "U.S. Supercomputer Vulnerability," it leads to the inexorable conclusion that "we better do something," according to its principal author, Alan McAdams, an assistant professor of managerial economics at Cornell University.

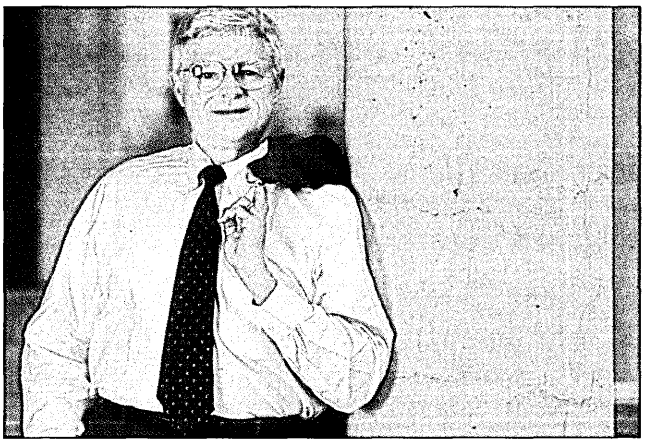
The Scientific Supercomputer Subcommittee of IEEE contends that the U.S. supercomputer industry is in deep trouble thanks to a focused market strategy by the Japanese. To overcome U.S. firms' vulnerability will require coordination by government to a degree seldom achieved in peacetime—and time is of the essence.

What's new about this? "The IEEE has never taken a position like this before," McAdams says. "This is the nonpartisan IEEE taking a policy position. Things must be pretty bad for them to start screaming."

Finding the Framework

The something McAdams refers to is finding "an acceptable institutional framework in which government, industry, and academia can pursue these objectives to the long-run benefit of the nation as a whole." Were that to occur, the institutional framework would still be useless without a guarantee that economic and technological decisions be made according to economic and technological—not military and political—criteria.

"The answer may well require that the coordination and leadership functions be nested in a new, lean, expert civilian agency of government that is capable of focusing on the longer-term national interest," find McAdams and friends. "Only through a coordinated approach to all these issues will we able to ensure a strong U.S. base for innovation, productivity, and international competitiveness."



CORNELL'S McADAMS: The threat isn't limited to supercomputers.

Grass-Roots Commitment

"A new agency is fine if you've got a professional government with a long-term interest," says a government official intimately involved in the supercomputer industry. "But if Congress thinks it can just create it with a few pieces of paper, then it will be another bureaucracy that won't work. What you really need is a grass-roots commitment. Hopefully, the new administration will have more of a commitment to understanding high tech. But it's still not worth creating another bureaucracy."

That opinion isn't confined to the government. "Any proposal to establish a new government agency isn't something I favor," says Sid Karin, director of the National Science Foundation's (NSF's) San Diego Supercomputer Center (SDSC). "I've heard all this before. There's nothing earthshaking in here."

The IEEE begs to differ. "People aren't realizing the real crisis that exists," McAdams contends. "The whole U.S. technological base is at risk, and it's getting worse.

To emphasize that this report is different from all the others that have reached the same conclusion, McAdams rests his case on economics and technology.

"To overcome [U.S. supercomputers'] vulnerability will require a systems solution: an integrated cooperative effort among industry, universities, and government," the report says. "It appears that such a solution will require coordination by government to a degree seldom if ever achieved in this country in peacetime. But the threat is real, and it is not limited to supercomputers. Supercomputers appear to represent only a next step in an ongoing process."

Banging the Drum Slowly

Thus, while Cray and ETA may say that Japanese components are not yet available for export to those two companies, the devices are readily available to end users in the Japanese supercomputer systems.

"This continues the familiar, oft-repeated pattern," the report contends. "Japanese firms plan and act in accord with long-range goals. When they achieve a technological advantage in one area, they use that advantage to insure their advance into new areas. They have targeted supercomputers as the next high-tech area in which to establish a dominant position."

You couldn't tell it from looking at the Japanese supercomputers in the U.S., though. The only one is an NEC SX 2 leased by the Houston Area Research Consortium (HARC). There have been many other efforts to land a Japanese supercomputer, but none has succeeded (see "Supercomputer Dumping Alleged at U.S. Universities," Sept. 15, 1987, p. 17).

The SDSC would just as soon keep it that way, but it sees the U.S. government tripping all over itself.

"The supercomputer agreement with Japan contains seeds which can further undermine the position of U.S. manufacturers," the report contends. "It requires of Japan a number of actions which, if made reciprocal to

Photograph by Bob Mahoney/Picture Group

the U.S., could facilitate the entry of Japanese supercomputers into the U.S. market."

Supercomputer Partnerships

Now, the supercomputer trade agreement requires the Japanese in government or university supercomputer procurements to give equal preference to U.S. manufactured supercomputers. The Japanese essentially have agreed to avoid unfair pricing by their manufacturers. According to McAdams, however, what looks unfair to a trade administrator looks to a manufacturer like recognition of partnership with a government agency or university.

"This sounds like a complete misunderstanding of the trade agreement," says Lauren Kelley, a supercomputer analyst in the Department of Commerce (DOC) Office of Computer and Business Equipment. "The agreement is based on the international GATT [General Agreement on Tariffs and Trade] government procurement code. In fact, nothing in the agreement is different from the standard General Services Administration procedures. To say this is a one-sided arrangement is completely untrue."

Nonetheless, the IEEE thinks a hard rain's gonna fall. Here's the U.S. telling the Japanese to open their markets or else, while simultaneously blocking the Massachusetts Institute of Technology (MIT) from purchasing an SX 2 from NEC. Of course, even a Freedom of Information Act search wouldn't uncover a written policy on the subject, but you can bet the national debt that government agencies aren't about to open their doors to the Japanese.

(The Department of Defense, which sees national security in every byte, is legislatively prohibited from buying any foreign—Congress meant Japanese—supercomputers in 1988.)

"How long can such a pattern last?" the paper asks. "Is it realistic to believe that the Japanese machines are foreclosed from U.S. institutions? If the requirements we now impose on the Japanese were made reciprocal for U.S. universities and government laboratories, Japanese supercomputers would have to be acceptable to those agencies on nondiscriminatory terms."

For some supercomputer users, that day can't dawn soon enough.

"We Want the Best Product"

"The economic leverage of supercomputers is irrelevant and always will be," NSF's Karin says. "What matters is the use of supercomputers. We need the best supercomputers, and we need to make the best use of them. Who makes a supercomputer is far less important than how it's used."

"There's a genuine concern here about foreign competition," says a user at a major federal lab. "But when it comes to computers, we just want the best product. And by keeping out the Japanese, the government and the U.S. supercomputer industry are pretending the situation is better than it really is."

However, by letting in the Japanese, the IEEE sees the industry living on desolation row.

"The new requirements could greatly facilitate the entry of the Japanese into the U.S. At the same time such requirements could disrupt the implicit partnership between U.S. manufacturers and U.S. government laboratories and/or U.S. universities, and transfer the benefits of partnership to Japanese firms. In response to a low bid, U.S. national labs could be required to become partners to Japanese firms in perfecting their systems for penetration of U.S. markets."

No U.S. lab would want to do that, at least on the record. But the Japanese clearly have the fast single-processor system and are expected to increase that lead with their next generation product expected next year (see "Peak Supercomputer Performance Rates"). So how much longer can users be shut down at their expense? Not very. So it's only a matter of time before HARC has company.

Japan's Software Is Lacking

That could be very soon if the Japanese get their software act together. Their software isn't quite up to their hardware, but therein lies the danger.

"Once general portability of applications is achieved, the avenue to continued market leadership by U.S. firms would be solely through technical leadership," the report says. "But how can U.S. firms simultaneously rely on componentry manufactured by their competitors, the Japanese, and assure their customers that they, the U.S. firms, can maintain technological leadership?"

They can't.

"As soon as Japanese firms have software that U.S. companies need, they'll be selling heavily here," the government official says. "NEC is working its butt off to develop software. When those developments take place, we have no laws to restrict them." This is generally expected to be sooner rather than later.

So why not let them come and fight it out nanosecond-to-nanosecond in the tried-and-true capitalist tradition?

"Because our entire economy is at risk," McAdams contends. "Supercomputers are the key to industrial design. If you lose supercomputers, you're in real trouble." ■

Peak Supercomputer Performance Rates

	SINGLE CPU PEAK 64-BIT MFLOP RATE	ALLOWING MULTIPLE CPUS
Cray-1	160	160
Cray X-MP	233	932 (4 cpus)
Cray-2	488	1,952 (4 cpus)
Cray-3 (1989)	1,000	16,000 (16 cpus) est.
Cyber 205	200 (2 pipe)	400 (4 pipe)
ETA 10 (1986)	350	1,400 (4 cpus)
ETA 10/E	415	1,660 (4 cpus)
ETA 10/G (1988)	643	5,142 (8 cpus)
Fujitsu VP 100	271	271
Fujitsu VP 200	533	533
Fujitsu VP 400	1,067	1,067
Hitachi S-810/20	630	630
Hitachi S-820/80	2,000	N/A
IBM 3090/VF	116	696 (6 cpus)
NEC SX 1	570	570
NEC SX 2	1,300	1,300
NEC SX 3 (1989)	5,000	20,000 (4 cpus)

Source: "U.S. Supercomputer Vulnerability," IEEE's Scientific Supercomputer Subcommittee.

SOFTWARE

Developers Ponder Choices Among Graphic Environments

The array of windowing options and other features in various icon-based systems leads some to ask if a scroll bar in one system is still a scroll bar in another.

BY GARY McWILLIAMS

It's almost enough to make a programmer yearn for the simpler days. With nearly a dozen graphical user interfaces and operating environments soon to be available and contending for attention, the obtuse C > and $ prompts quickly may prove to be relics. Color bands, scroll bars, menus, and buttons are taking their place.

Another change may be equally obvious. Those confused and puzzled looks that used to identify a new system user may turn up instead on the faces of veteran programmers. "It's a difficult time to be a developer," says Cheryl C. Currid, departmental computing services manager for Coca-Cola Foods, Houston.

Significant Issues at Work

Behind the merely cosmetic differences lie significant development issues. They can be as basic as a choice of windowing systems, or as substantial as the computing philosophy.

Many emerging graphical environments impose a client-server approach that invokes a minicomputer or other server to execute parts of an application. Others allow the application to reside wholly on the workstation. The degree of differences within environments can be as varied as the applications themselves.

For instance, Hewlett-Packard's NewWave initially employs Microsoft Windows as its windowing system. Future versions will be available for IBM's Presentation Manager and the X11 window system, according to Robert J. Frankenberg, Hewlett-Packard's Information Systems Group general manager. "We made a decision to use industry standard windowing capabilities and the associated toolkits as well," he says.

Intelligent Workstations

To developers, the environments bear on issues as diverse as the computer type and the way an application is approached. Richard Treadway, Digital Equipment Corp.'s manager of DECwindows programs, says the client-server approach of X11 enables the lowliest of workstations to display the results of an application running elsewhere on a network. However, X11's demands on computer performance rule out enabling the DECwindows graphical environment to run directly on the most widely used workstations.

Such differences should not obscure the common features of various graphic environments (see "Graphical Interface Environments"). Both client-server and networked pc approaches position intelligent workstations as the focal point for rendering an application. Similarly, each graphical environment positions C as the common language for developers. With the exception of Apple Computer Inc., all profess a readiness to license their environments to hardware and software developers.

Some developers anticipate a gradual reduction of differences to alleviate the dilemma for programmers. Jaime Knoble, group leader for strategic technology at American Cyanamid Co., Wayne, N.J., says the Open Software Foundation, the X11 consortium, and pacts involving Microsoft, Hewlett-Packard, and IBM should decrease the variations within each environment.

Knoble, currently testing HP's NewWave, says that differences among window systems and toolkits are not being explained to developers by the vendors of those systems. Knoble says it is "my hope and understanding" that HP will be able to use one environment "by and large. If we have to do development and integration [across environments] to any significant level, I'll be unhappy."

Third-Party Features

Others already working within a graphical environment say they expect third-party software developers to have the greatest say on which environments and features will remain. "To us," says Kevin M. Maloney, a technical consultant with Fidelity Software Development Co., Boston, "the issue is which environment will offer the greatest number of applications that we will not develop ourselves."

Aaron Goldberg, vp of pc services at market research firm International Data Corp., Framingham, Mass., estimates that such graphical environments largely will be the province of third-party software developers.

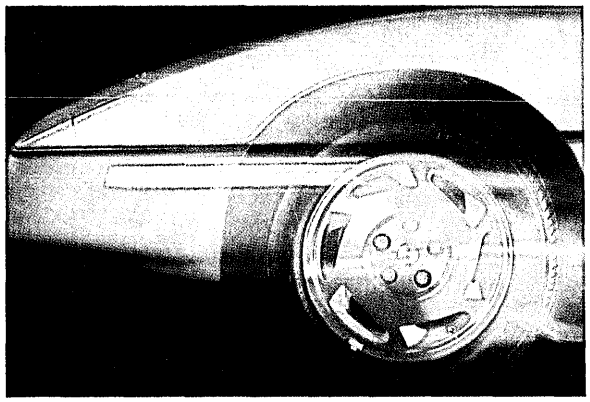
HP's Frankenberg says programmers will have to learn to view development from an "event-based" perspective: "This programming

Graphical Interface Environments

VENDOR	INTERFACE	AVAILABILITY	WINDOWING ENVIRONMENTS	TOOLKITS
AT&T/Sun	Open Look	Q1 '89	NeWS, X-11	NDE, XT+
DEC	DECwindows	Fall '88	X-11/Windows	DECwindows
HP	NewWave	Nov./Dec. '88	MS-Windows*	NewWave
IBM	Presentation Manager	Oct. '88	Presentation Manager	Presentation Manager
Microsoft	Windows 2.03	Current	MS-Windows	MS-Windows
Apple Computer Inc.	Macintosh	Current (Macintosh only)	Macintosh	Mac Toolkit
Apollo Computer	Open Dialog	Current	X-11	Object Manager

* NewWave is being migrated to run on Presentation Manager and X-11 windowing environments.
Source: DATAMATION

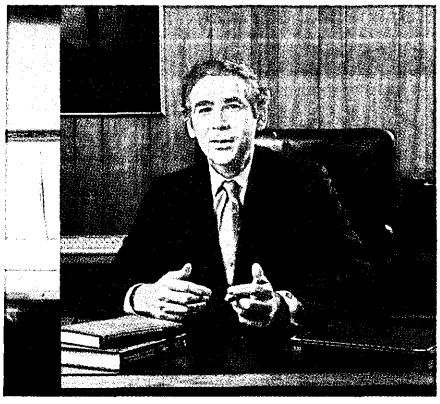
Digital has it now.



In the past few years, Wilmar Inc., a member of the National Auto Parts Association, has enjoyed a substantial increase in productivity. Not to mention a growth rate that's twice the standard in the auto parts distribution and service industry. How do they do it? With a database tied to a computer network from Digital. One that allows Wilmar's three distribution centers and 150 stores to provide customers with fast, accurate and knowledgeable service.

As President Gary Davis explains, "We're a transaction processing-oriented organization. And in a service industry as competitive as ours, speed is everything. Nobody wants to wait. Whether it's for inventory information or for a part to be delivered. And with our system working in real-time, they really don't have to."

"Speed is one of the reasons we chose Digital's systems, as well as their proven reliability and uptime." Davis continues, "Because our computer is interactive, it has become the heart of the operational aspect of our business. It keeps track of everything. From over 2 million individual part



"A computer network for transaction processing that's moving NAPA/Wilmar's growth rate and productivity into high gear."

numbers to 850,000 different prices. We even use it for forecasting and simulation. All of which helps us keep Wilmar customers coming back."

Davis also sees Digital's capabilities as a driving force in NAPA/Wilmar's future.

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CYANAMID'S KNOBLE: Graphic environments improve productivity.

Photograph by Bill Kelly

puts control in the hands of the user.

Regardless of some of the difficulties that graphical environments present, most companies are more concerned with the greater problem of getting end users to learn new applications readily—and users tend to like graphic environments. A pilot application that Fidelity developed using Microsoft Windows had users "up and running in a half hour. From a user's perspective, the learning curve is very short with Windows," says Maloney.

Frank Nagy, now developing a DECwindows-based control application at the Fermi National Accelerator Laboratory, Batavia, Ill., says, "We see this helping both our traditional users and those visiting experimenters who will find the system's use more obvious." As a result, it may be systems performance that represents the strongest challenge that early developers face. "On anything working over a local area network, you are going to need a powerful file server," says American Cyanamid's Knoble.

Nagy says his test version of DECwindows "is slow, but not objectionally so. The [more powerful] VAXstation 3000 would be the ideal environment."

Last year, for similar reasons, Coca-Cola stopped buying all but Intel 80386-based pcs. Departmental computing services manager Currid took a look at the rising demand for systems performance and called a halt to the purchase of any models with lower performance cpus. "Because of that rule, we'll be in a better computing position in 1989 than we would be without it," she adds.

Such development issues aside, Knoble sees the graphical environments improving end-user productivity. "Users are telling us it is a nightmare worrying about where they are—on the pc, the LAN, or the host—all the time," she says. "That is the real benefit of an icon-driven system: there won't be that worry." Coca-Cola's Currid agrees that graphical applications development may initially require more programming time "but it will be worth it. As it nets out, there will be plenty of toolkits and libraries to compress that development time."

Even if developers are forced to deploy various toolkits for competing graphical environments, the end user should see more similarities than differences, she adds. "When I look at some of the graphical environments, they were developed differently but the user will have no problem. A scroll bar in one is a scroll bar in another." ■

MICROCOMPUTERS

Death of Soviet Pioneer Leaves Gap

The future of Boris Naumov's Five Year Plan for pcs is in doubt as the Soviets search for his successor.

BY DAVID HEBDITCH

The death on June 11 of Soviet computer pioneer Academician Boris Nikolaevich Naumov has left a gap in the Soviet computing hierarchy that may set back the process of creating East-West high-technology joint ventures to spur Soviet IS development.

In many ways, the 61-year-old Naumov provided a bridge for the Soviet IS industry, not only between old and new styles of Soviet computing, but also between East and West IS industries.

In 1983, Naumov earned the post of Academician and the first directorship of the Institute of Informatics Problems (IPIAN) in the Soviet Academy of Sciences, which has a central role in the computerization of Soviet society (see "Opening Moves," March 15, 1987, p. 43).

Views of Naumov from the West

Christian Wedell, general manager for Microsoft in West Germany, which has been dealing with Naumov for many years, recalls, "He was the sort of person you could talk to openly. He was able to get things moving. It is hard to say what the effect of his death will be at this stage. We

The Structure of the Soviet IS Industry

The Soviet computer industry remains heavily centralized, as the chart of its infrastructure shows (see p. 26).

Level 1 deals with policy decisions relating to the production and use of information technology. GKNT used to be the key organization influencing information systems, but it has been somewhat upstaged by the newly formed GKVTI—the State Committee for Computer Technology and Informatics. The Bureau of Machine Building, a staff organization of the Council of Ministers, is a powerful ad hoc group set up over the more traditional state committees to blitz the country's crisis in volume production of computers such as pcs.

Level 2 covers R&D and production. Research is done primarily by institutes within the Academy of Sciences, and there are additional coordinating bodies (MNTKs) that liaise between them and manufacturing. Any of these three types of concern can now set up SKBs (Special Design Bureaus) or small firms to specialize in foreign trade. Essentially, MINRADIOPROM makes mainframes, MINPRIBOR makes minis, and MINELEKTRONPROM and MINPROMSVYAZI make micros.

At Level 3 are the organizations concerned with service. On the traditional side, branches of the ministries deal with maintenance and software. The poor performance of these has encouraged the growth of the profit-motivated cooperatives, which will succeed only if they respond to the users in Level 4. Of this complex and top-heavy structure, only the co-ops are genuinely motivated by market needs rather than by decisions flowing down from the top.

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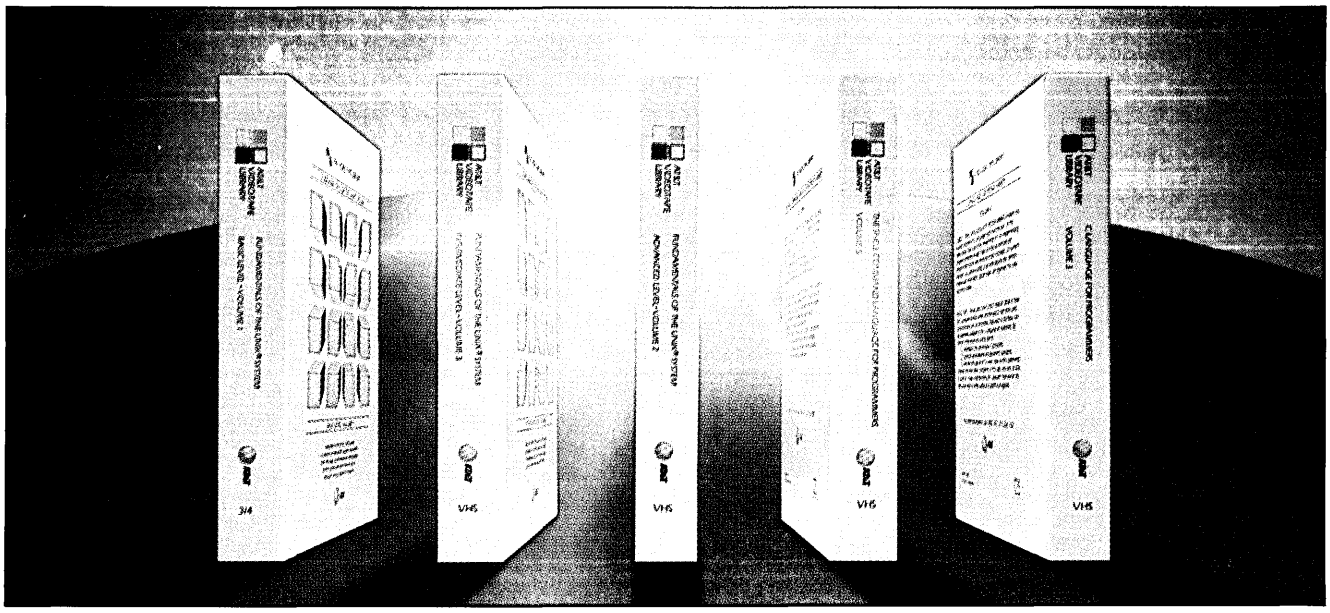

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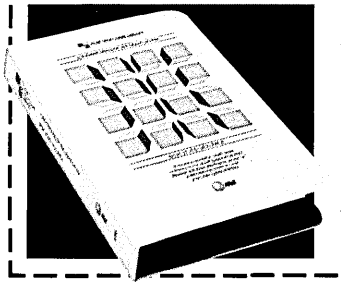

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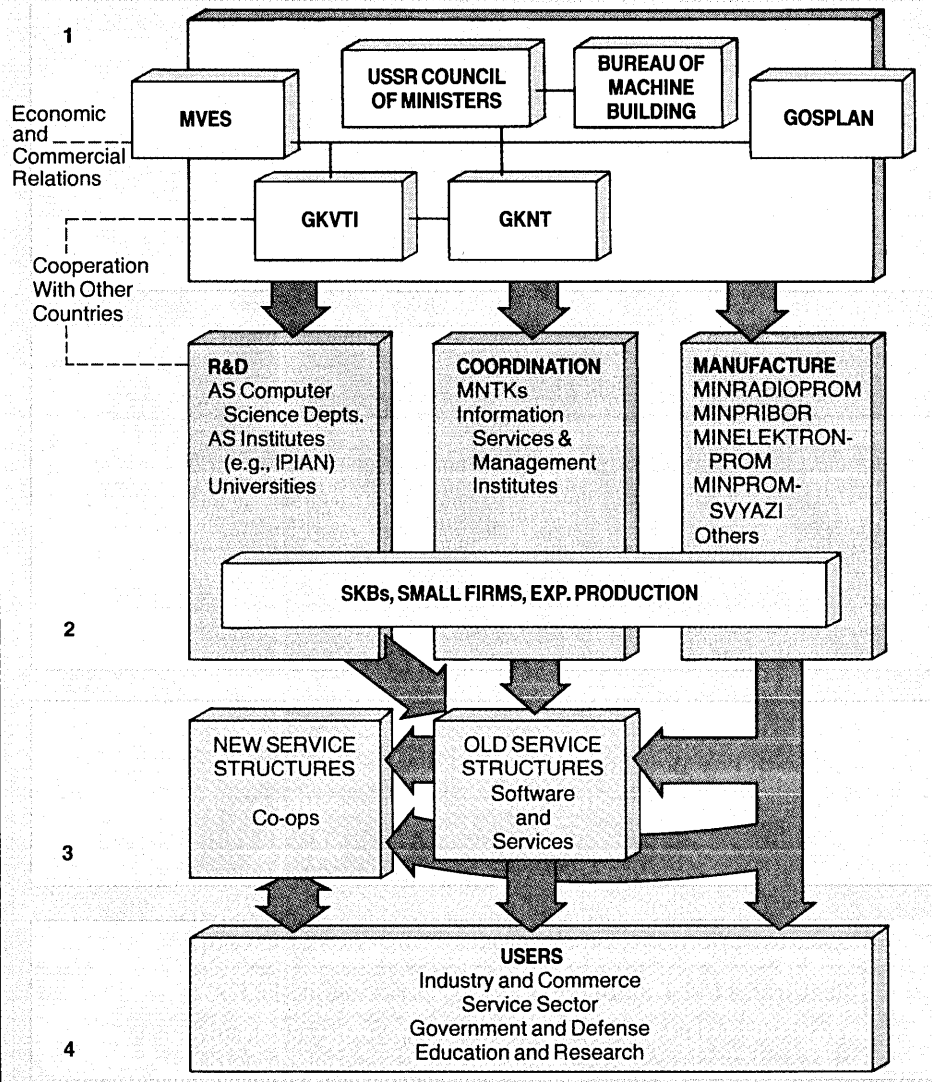

ACRONYMS

AS: Academy of Sciences of the USSR

GOSPLAN: State Planning Committee

GKNT: State Committee for Science and Technology

GKVTI: State Committee for Computer Technology and Informatics

IPIAN: Institute for Informatics Problems

MINRADIOPROM: Ministry of the Radio Industry (mainframes, pcs)

MINPRIBOR: Ministry of Instrument Making, Automation Equipment, and Control Systems (minis, pcs)

MINELEKTRONPROM: Ministry of the Electronics Industry (pcs, multiuser micros)

MINPROMSVYAZI: Ministry of Communications Equipment Industry (pcs, consumer electronics)

MNTK: Intersectional Scientific and Technological Complex

SKB: Special Design Bureau

NOTE: Old software and services groups are part of ministries, AS, and other bodies. Co-ops are owned by members and react to consumer demand.

Source: David Hebditch, with the assistance of Heikki Auvinen.

Chart by Paragraphics

have lost a valuable contact."

Another Western technology specialist who knew Naumov well is Jeffrey Barrie of Phargo International, an East-West trade consultancy in Toronto. "Naumov was seen by the Soviet dp industry as a loose cannon. But he was a key figure in developing East-West trade," he says.

Barrie credits Naumov for pulling the strings necessary for his company to get permission to set up two Alphagraphic Mac-based desktop publishing operations in Moscow later this year.

For Naumov, links with the West were major pillars of his development strategy. One of the first problems he faced at IPIAN was how to accelerate the process of getting computer power out to the many enterprises that comprise the country's cumbersome economy. The pc was regarded as a key part of this process. The Soviet Five Year Plan (FYP), covering the second half of the 1980s, required that over 1 million pcs be made and shipped.

Joint Ventures Urgent

But Naumov knew this target would prove too much for the USSR's limited manufacturing capacity, and he urged the formation of joint ventures to set up Western technology production lines.

When DATAMATION interviewed Naumov at CeBIT '88 in Hannover in March, he confided that one of his biggest frustrations was the inability to get these ventures set up quickly (see "Pc Coordination is Aim of East Bloc," April 15, p. 21).

For the time being, Naumov's place has been filled by Y.N. Filinov, now First Deputy Director. Although Filinov is an experienced administrator, he is not an Academician and without that status is not eligible to be considered in the September election for the permanent post.

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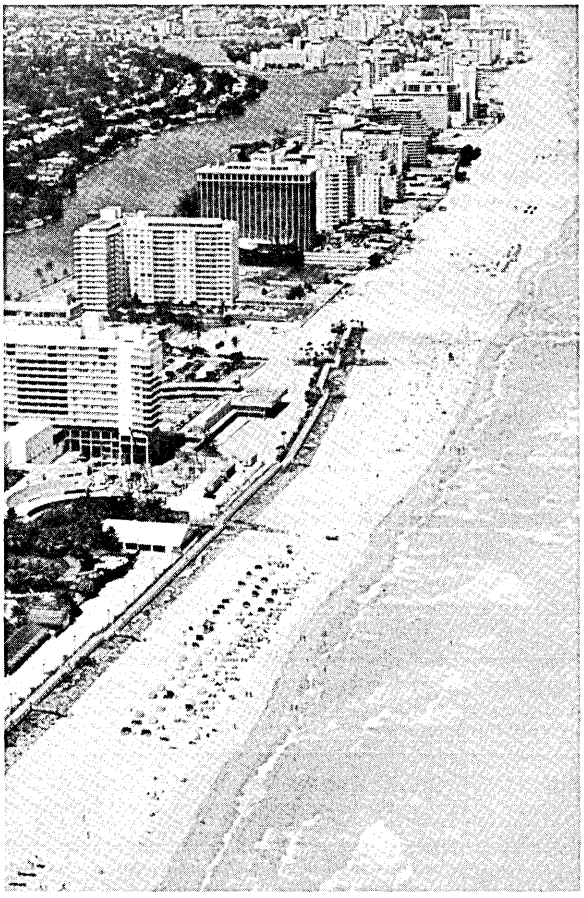

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- **Jake LaMotta**, former world boxing champion and subject of the movie "Raging Bull."

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"This was the best run conference I have ever attended and I have attended many different vendor and user conferences; Also you had the best speakers and workshop leaders." Rita Stracka, Assistant Dir., Facilities/Security, State of NJ. Dept. of Treasury

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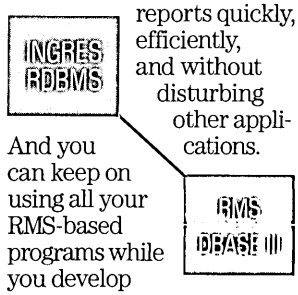

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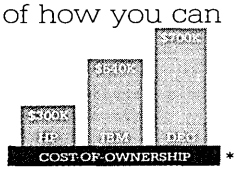

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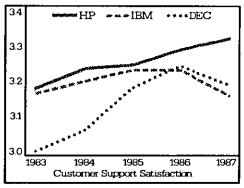

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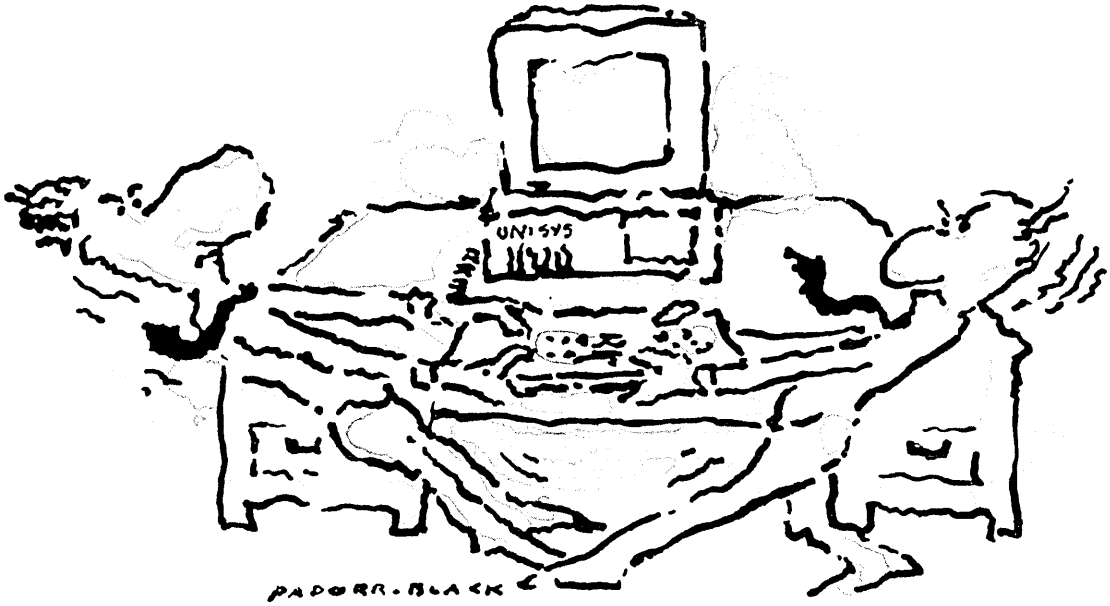

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Behind the News

TERMINALS

Suffolk Law, New Studies Reinvigorate VDT Debate

The issue of whether VDTs pose a health hazard may never be fully resolved, but some firms are moving to improve conditions in the workplace.

BY WILLIE SCHATZ

For a time, the controversy about the alleged harmful effects of video display terminals (VDTs) had cooled to the point that it was almost considered a past battle. Now, new studies and the recent decision in Suffolk County, N.Y., to require employers to provide a safe working environment for those working on VDTs have combined to raise the heat around this issue to the boiling point again.

For some organizations that are heavy users of VDTs, the issue of whether the devices are hazardous will continue to generate defensive reactions. For others, the issue has already been addressed by a variety of ergonomic and organizational remedies.

Take Con Edison, for example. Dr. Thomas Doyle, assistant vp and chief medical officer for the New York utility based in Brooklyn, says that Con Ed had already taken steps to address the concerns raised by VDT usage. "We've been providing for all employees almost all the things the Suffolk law requires anyway," he remarks. "We offer eye exams and whatever remedial action is necessary from them. We have work breaks based on union-management agreements.

"We've made ergonomic changes independently, based on recommendations from our industrial hygienists," Doyle continues. "They investigate issues and give advice. We have gotten a proposal from an outside organization to do a pilot to see if ergonomic training will be at all useful to our employees. We're probably going to put it into effect this fall. We're going to offer employees who work on VDTs more than 20 hours per week [there are about 1,000 in this category] a chance to participate.

"The training will involve how to position arms and hands to avoid muscle strain and how to avoid VDT glare. We've gotten a minimum of complaints about VDTs. If there's been any sickness or carpal tunnel syndrome [a debilitating wrist condition] from any of our 5,000 units, I'm totally unaware of it."

Suffolk's Law Doesn't Apply Universally

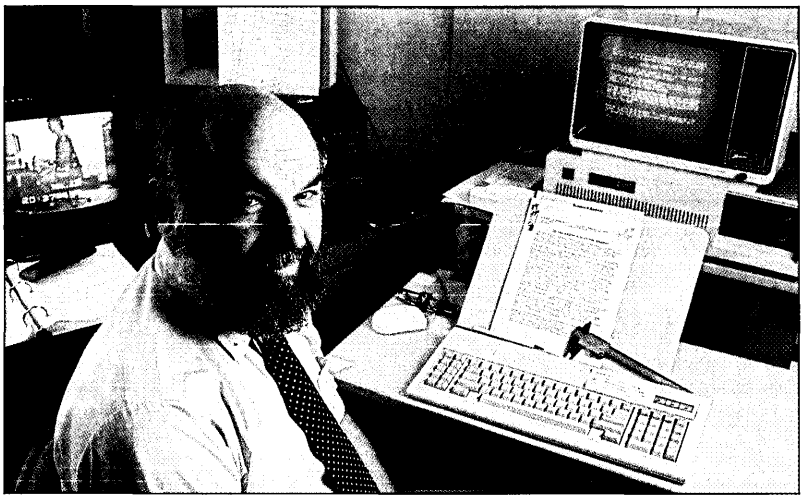
The VDT issue wasn't getting much airtime until Suffolk County Resolution 378-1988, "A Local Law providing Employee Protection against Video Display Terminals," was reached. The bill applies only to employers with 20 or more terminals and employees who operate a terminal for 26 or more hours per week. Terminal means only a VDT or CRT. Memory typewriters and self-contained pcs are specifically exempted.

Many firms in Suffolk County won't be affected by the law, but judging from the passion of the debate you would think it applies throughout the cosmos. "The VDT thing is workplaces, not the machines themselves," says Marvin Dainoff, psychology professor and director of the Center for Ergonomic Research at Miami University, Oxford, Ohio.

Illustration by Marc Yankus

Even the most vitriolic VDT opponent would agree that VDTs are proper tools. So management hasn't hesitated to provide them. According to Cleveland-based 9 to 5, AKA the National Association of Working Women, there are 30 million VDTs and 30 million VDT users in the U.S. Are some of them at risk? The latest study, from the Northern California Kaiser Permanente Medical Care Program, documented that women in early pregnancy who spend more than 20 hours per week on VDTs are about twice as likely to have miscarriages as those who don't use terminals. But the study team said the findings didn't necessarily mean that VDTs were the sole cause of the reproductive problem, since the study didn't measure other potentially relevant factors, such as ergonomics and stress.

Are VDTs dangerous to your health? Management says no, workers say yes. If it's possible, both sides now may become more intransigent. Supporters of VDT legislation surely will keep pressing their case. So far, they've tried and failed to pass laws in 24 states, although according to Deborah Meyer, associate director of 9 to 5, nine states and the Department of Justice have passed regulations regarding VDT usage.



MIAMI UNIVERSITY'S DAINOFF: "How much abuse is one's body supposed to take?"

Photograph by Andy Snow

Will Push Come to Shove?

"We're going to continue to push for state regulation and legislation," Meyer says. "Employers' attitudes haven't changed. Employers aren't willing to take positive action, so they have to be pushed."

Make that shoved. Either way, employers will gladly return the favor.

ADAPSO's associate general counsel, Joe Ruble, says the Suffolk law poses a significant risk to the computer industry of similar legislation being passed throughout the country. "Our major campaign to counter that will be twofold," he states. "Let's wait and see what the economic and productivity impact is in Suffolk, and let's increase the training for employees on ergonomics.

"If state legislatures started their sessions July 1 instead of January 1, we'd be in a world of hurt. Hopefully, we can defuse the issue in the next six months."

That may not be as easy as ADAPSO would like.

"They're taking away the flexibility of each work environment," says Roger Cawley, staff manager of New York Telephone Co. in Babylon, Suffolk County, of the new law. "Any office arrangement would be resentful of an outside arbitrator of the work flow."

Employers certainly manned the trenches in the Suffolk war. They stressed that the bill presumed that VDTs pose a health risk where there was none and that passing it would damage Suffolk's reputation as an attractive place for high tech. They also made much of their voluntary compliance with many of the bill's provisions.

"Most employers voluntarily do the things the bill requires because it's good for their workers and it increases productivity," says John Mancini, Washington, D.C.-based director of state government affairs for the Santa Clara-based American Electronics Association (AEA). "This [Suffolk's] approach won't help workers. It's based on old science. Stressing flexibility in the workplace, not rigid legislation, is the most effective way to deal with whatever VDT problem there is. This bill is too rigid to be helpful."

Some Find Parts of the Law Onerous

Then someone forgot to tell the legislature, because it required employers to provide specific eye care benefits.

"That's the health care feature that we find most onerous," says Ralph Baum, vice president of ILC Data Device Corp., a Bohemia, Suffolk County-based manufacturer of high-tech electronic devices. "We've addressed the ergonomic issues as the equipment became available. That wasn't a heartache for us. And if we're not state of the art, we're close. It's in our interest to make the workplace as productive as possible."

Although few companies seem to have quantified what complying with the VDT law will cost them, the mere thought of spending an extra penny has been reason enough for several businesses, including the Chubb Corp. and Doubleday & Co., to cancel planned expansions into Suffolk. And at least one company, New York Telephone, is bidding the county farewell.

But the affected companies haven't been reluctant to financially support a legal action, in which the Long Island Association, representing 3,600 companies with over 450,000 employees, is suing Suffolk for preempting New York State labor law.

NY Telephone Resents "Intrusion"

New York Telephone may be as VDT-savvy as they come. With 1,500 VDTs in Suffolk County, it couldn't afford not to be. The company says it has kept abreast of the latest ergonomic trends and is intimate with the details of potential VDT hazards. It apparently had clearer vision than the Suffolk County legislature, having instituted an internal eye care program a few years ago. Company employees are allowed to have an eye checkup as needed, with New York Telephone reimbursing them on a sliding scale for the exam and any lenses, glasses, or other required remedies. Reimbursements for employees range from $25 to $90.

So why is the company going to shut down its Babylon facility when the lease expires in December?

"The government's intruding on our business," staff manager Cawley contends. "Our benefits come out of collective bargaining. That's where changes should be decided. We've got more than

1,000 users who would have to be covered, in addition to our existing eye program. We figure that's a minimum of $25,000. It's simple common sense."

New York Telephone had been considering several options, including staying in Babylon and signing a new lease. It had tentatively decided to do just that when the VDT law was passed. Once that was a fait accompli, the company was gone.

Scientific Evidence Is Inconclusive

Yet, scientific evidence on the VDT issue is still inconclusive. For each report that links VDTs and adverse health effects, there's another that says the two issues aren't in the same universe.

Now the basic issue has changed. Early fears about radiation from VDTs causing pregnancy problems, among other putative effects, had supposedly been put to rest. We were never talking gamma rays, but in the last several years a series of small clusters of miscarriages by heavy VDT users has kept the radiation issue from being completely buried. The National Institute of Occupational Safety and Health (NIOSH) has said that VDTs don't emit unsafe levels of electromagnetic radiation. The response to that theory is that any additional radiation, no matter how minute, means additional risks.

Today, the debate centers around the office environment. Ergonomics, not radiation, is the new buzzword.

"How much abuse is one's body supposed to take in the service of an employer?" Dainoff asks. "What's a reasonable effort?

"The initial introduction of VDTs exceeded that amount," he says. "There have since been significant improvements in the workplace, but now there's evidence that forcing someone to sit in a fixed position for a long time can lead to such musculoskeletal problems as low-back pain."

Res ipsa loquitor on that one. But that's an ergonomic issue, not a VDT one. The machine per se doesn't cause the pain. Sitting in front of it does. So if the employer provides the user with a state-of-the-art work space, those physical problems theoretically will be history.

So what else can they do now?

Train. Not the two-a-days that football players love so much, but the serious work of learning how to use that expensive workstation.

"Training is incredibly important," Meyer says. "If they throw good equipment at you, it's useless if you don't know how to use it."

"It's a joint burden," says Beth O'Neill, director of the Center for Office Technology, a Washington, D.C.-based information group supported by about 40 companies. "Users need to be encouraged and educated on why the proper use of a workstation is important. Management needs to be made sensitive and aware that the right work space helps productivity by protecting their employees."

All the adjustments in the world won't alleviate the different treatment of different employees under the Suffolk law. The measure mandates a minimum 15-minute break every three hours for operators. It also makes those breaks part of the working day.

You can't beat that, no way, no how, if you're a terminal operator. But if you pound a typewriter in the adjoining desk, you could be up the creek because the same legislative standard doesn't apply to you.

Suffolk Companies Receiving Suitors

"The different rules for different employees and different sets of benefits for different people will have a ripple effect on both employers and employees," says Judy MacAvoy, director of the Long Island Association's small business council.

"There's already been an influx of recruiters from economic development areas in other parts of the country," she notes. "They're chasing our companies. That's the cycle that the county executive perceived, but the legislature, in its infinite wisdom, did not.

"We've only seen the immediate impact of the eye care provision, which is the most onerous because there's no cap on cost. We're not going to know the final effects for five years." ■

Using Ergonomics To Improve the Bottom Line

Okay, admit it. Your company's work spaces aren't quite what they should be, and you're thinking of redesigning them. Like any reasonably savvy businessperson, you want proof that you won't be wasting your money.

You got it. The statistics don't lie, and you could look them up, right in Chapter 34 of *Ergonomics of Working Posture* (N. Corlett, J. Wilson, F. Manencia, eds., Taylor and Francis, New York, 1986).

The study found there, "Cost-Benefit Analysis of Work Environment Investment at STK's Telephone Plant at Kongsvinger," documents the fact that a little investment today can go a very long way later.

Located in Kongsvinger, about 100 kilometers northeast of Oslo, STK's plant was plagued by high rates of musculoskeletal and long-term sick leave and an astronomical turnover rate. From 1967 to 1974, musculoskeletal sick leave was 5.3% of total production time.

Long-term sick leave in that period was 9.9% of possible working time, reaching highs of 13.4% in 1973 and 16.9% in 1974. The turnover rate was the most staggering of all, averaging 30.1% annually.

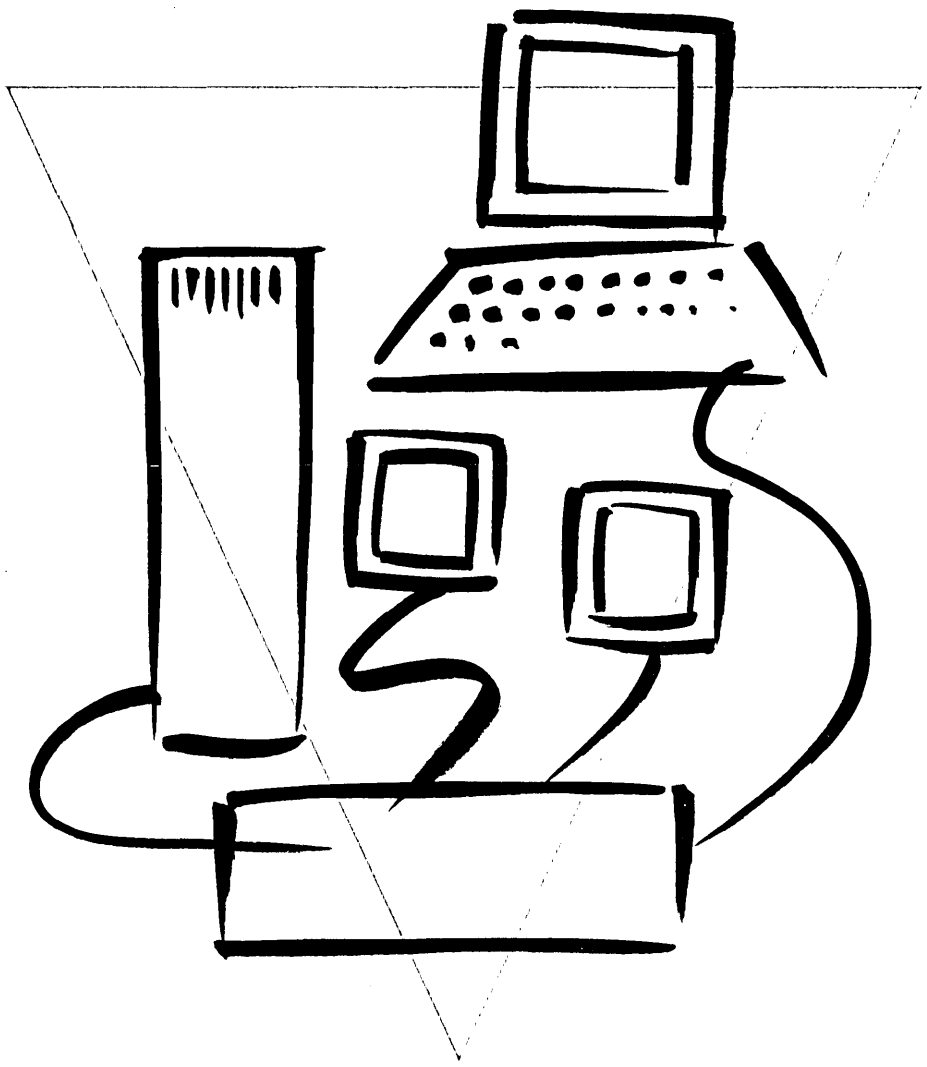
In 1975, STK, obviously aware of what was going on, anted up for what the authors call "an extensive redesign of all workstations, which gave each operator greater flexibility to vary working posture."

The results were mind-blowing. The old workstations had a fixed height, which, according to the study, caused muscle strain as a result of struggling with "excessive muscular loads due to the need to adopt awkward postures . . . ."

The next time they ran the numbers, there was about a 400% improvement. The turnover rate from 1975 to 1982 plummeted to 7.6% of total production time. Musculoskeletal sick leave from 1975-1982 also dropped drastically, to 3.1% of total production time. The decline in long-term sick leave wasn't as dramatic, falling to 9.4% for the seven-year period. But even a 0.5% drop is nothing to sneeze at.

The bad news? The total investment in ergonomics, ventilation, lighting installation, lighting, and running costs for the lighting at 1986 value was NKr338,992 ($45,872).

Now the great news. The reductions: recruitment cost (thanks to less turnover), NKr108,812 ($14,724); training cost, NKr1,645,720 ($222,696); instructors' salary cost, NKr812,019 ($109,881); and sick payments, NKr659,643 ($89,262). For you math wizards, that's a total of NKr3,226,194 ($436,562).



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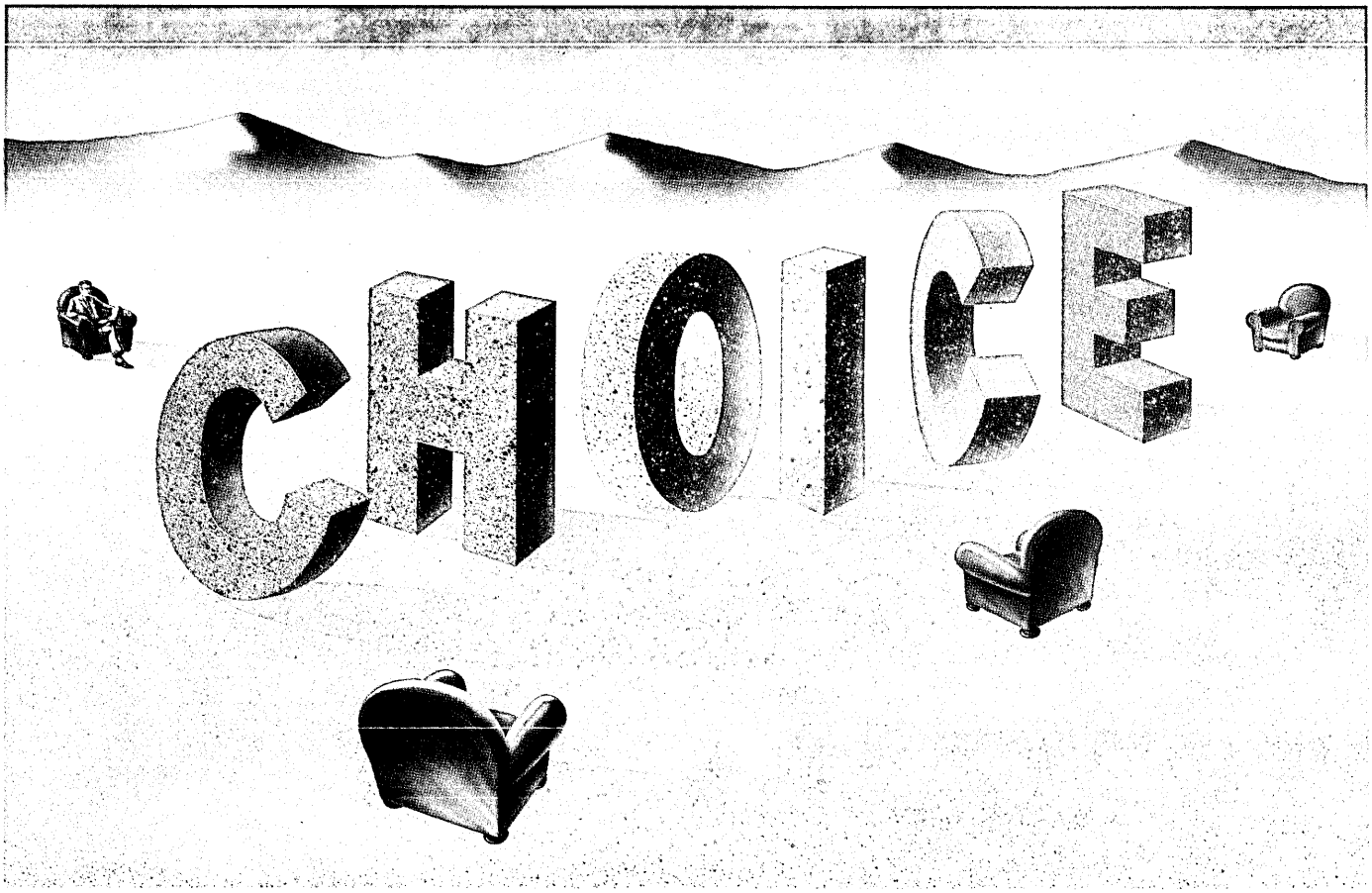

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The penetration of database management systems in the computer rooms of large organizations has become so widespread as to be nearly complete. At sites with IBM 308Xs, 3090s, or compatible mainframes, in fact, it's rare not to find DBMSs: installation rates are approaching 90%.

Although DBMSs haven't penetrated departments and desktops to the same degree as they have data centers, they are increasingly finding their way onto the midrange and microcomputer systems found there. As companies automate more functions and as computer power becomes available to greater numbers of people, the amount of data generated grows correspondingly, as does the need for software to handle the storage, retrieval, and updating of that data.

Moreover, organizations typically have several different types of DBMS software, often for different purposes and applications. It is not unusual to see more than one brand of DBMS running at a large manufacturing company. Nor is it unusual to see different types of DBMSs—hierarchical, network, or relational—running at the same company, depending on whether the need is in a production environment or in an environment that is less production-intensive. The hardware, too, is often mixed and matched, which can mean different brands and types of DBMSs on various hardware platforms within the same company. Ratchet up exponentially this phenomenon in the pc/workstation world.

This first wave of DBMS usage is, however, giving way to a new reality—the need to integrate these systems and make productive and efficient use of the information generated by them. Paving the way is IBM's Structured Query Language, the de facto standard in DBMSs today. Nowhere are DBMSs more important than in OLTP applications. That's why in this special report DATAMATION

- calls on E.F. Codd, the noted father of relational technology, to examine SQL on behalf of users and software developers. See "Fatal Flaws in SQL," at right;
- follows up on a ground-breaking TP1 article, which first ran in DATAMATION in 1985, that benchmarked the performance of DBMSs in on-line transaction processing environments. See "All TP1s Are Not Created Equal," p. 51;
- surveys nearly 1,000 users regarding their current use of DBMSs and future purchasing intentions. See "The New Era of DBMS Integration," p. 57.

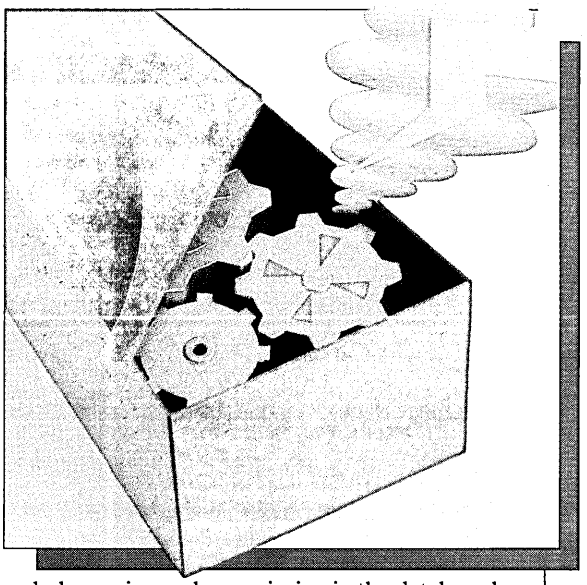
Fatal Flaws in SQL

Three properties of Structured Query Language have potentially devastating consequences for users and software developers. Two of them, regarding duplicate rows in relations and separation of psychological and logical features, are examined in part one of an article to be continued next issue.

BY E.F. CODD

It is clear that DBMS vendors are rushing to support Structured Query Language—either IBM's version or its weaker ANSI cousin. To an observer, this is like watching a flock of lemmings congregate on a beach in preparation for marching into the sea. With the exception of Teradata, there is no sign that any vendor, including IBM, is considering the question of which parts of SQL are technically worth supporting and which parts will get them and their customers into trouble, if they are supported.

The criticisms of SQL in this article or in the second half of it (to appear in the Sept. 1 issue of DATAMATION) are certainly not intended to be interpreted as criticisms of the relational approach to database management. SQL departs significantly from the relational model, and, where it does, it is SQL that falls short. Neither are they intended to be interpreted as wholesale criticisms of DB2, which supports SQL, but on the whole is a good product.



Paper sculpture illustration by Ajin

The Ways In Which SQL Is Flawed

What then are the flaws in SQL that have such grave consequences? Here are just three:

- Flaw No. 1: it permits duplicate rows in relations;
- Flaw No. 2: it supports an inadequately defined kind of nesting of a query within a query;
- Flaw No. 3: it does not adequately support three-valued logic, let alone four.

In an article entitled "Where SQL Falls Short" by C.J. Date (see May 1, 1987, p. 83), numerous errors of omission and commission in the database language SQL were cited. I agree with the errors cited, but feel that three of the most serious errors were omitted altogether. Two flaws are addressed in this article. The third, regarding four-valued logic support, will be the subject of the second part of this article in the next issue of DATAMATION.

My position on these three flaws is as follows:

• duplicate rows within relations ought to be prohibited, as Teradata has done with its version of SQL;
• even though I am not totally opposed to nesting, it requires precise definition and extensive investigation prior to being included in a relational language; and
• four-valued logic should be fully supported within the DBMS.

Why Duplicate Rows Cause Problems

Relations in the relational model and in mathematics do not have duplicate rows. There may, of course, be duplicate values within a column. Relations in which duplicate rows are permitted will be referred to as improper relations.

At first sight, permitting relations to have duplicate rows appears to be a disarmingly simple extension. When this extension was conceived, I was asked for my position on it. I indicated that, before any such extension was made, it would be necessary for the proponents to investigate the effect of duplicate rows on the definitions of each and every relational operator, as well as on the mutual interaction of these operators. It is worth noting that the relational operators were originally defined and their mutual interaction was originally investigated assuming (as in mathematics) that relations had no duplicate rows.

This task was simply not done by IBM, Oracle, or any other vendor that later adopted SQL. Neither was it addressed by the ANSI committee X3H2. The consequences of their inactions are devastating.

The contention that the DBMS must permit duplicate rows if its statistical functions (such as SUM and AVERAGE) are to deliver correct answers is quite incorrect. Clearly, duplicate values must be permitted within columns. For example, it is impossible to rule out the following possibilities: two values of currency happen to be the same (for example, the cost of two distinct parts); or two employees happen to have the same birthday; or the inventory levels for two distinct kinds of parts happen to be identical.

The statistical functions can and should operate in the context of relations that do not have duplicate rows. This means that the relation name as well as the column name are arguments for a statistical function applied to that column.

When manipulating true relations (duplicate rows NOT permitted) using the relational operators of the relational model, there is a high degree of immunity to the specific ordering chosen for executing these operators. To illustrate this point, we consider the operators projection and equi-join. Suppose that the projection does not discard any of the columns whose values are compared in the join. Then, providing no duplicate rows are allowed, the same result is generated whether the projection is executed first and then the join, or the join is executed first and then the projection.

Note that if, as usual, the projection cites the columns to be saved (instead of those to be dropped), there would need to be a change of this list of columns depending on whether the projection preceded or followed the join. If, however, the projection cites the columns to be discarded, there need be no change in the list of these columns. Both forms of projection are useful.

An Example Involving Join and Projection

This degree of immunity to the sequence of operators is lost when duplicate rows are permitted within relations—the adverse consequences of which will be detailed later. For now, let's examine an example involving join and projection. Suppose duplicates are allowed in the result of projection, but not in the result of join. In SQL this means that the qualifier DISTINCT is used in the join command only.

R(A	B	C)	S(D	E)
a1	1	c1	d1	1
a2	1	c1	d2	1
a3	1	c2	d3	2
a4	2	c2		
a5	2	c1		

Taking the projection R[B,C] first, and retaining duplicate rows, we obtain the result shown below. Then, let us take the equi-join of this relation with S comparing column B with column E, permitting duplicate rows in the operands, but not in the result.

R[B,C] (B	C)	R[B,C][B=E] S(B	C	D	E)
1	c1	1	c1	d1	1
1	c1	1	c1	d2	1
1	c2	1	c2	d1	1
2	c2	1	c2	d2	1
2	c1	2	c2	d3	2
		2	c1	d3	2

The final result has just six rows and no duplicate rows.

Now, let us reverse the sequence of operators, executing the equi-join first to generate relation T and then executing the projection of T onto B,C,D,E.

R[B=E] S(A	B	C	D	E)	T(B	C	D	E)
a1	1	c1	d1	1	1	c1	d1	1
a2	1	c1	d1	1	1	c1	d1	1
a3	1	c2	d1	1	1	c2	d1	1
a1	1	c1	d2	1	1	c1	d2	1
a2	1	c1	d2	1	1	c1	d2	1
a3	1	c2	d2	1	1	c2	d2	1
a4	2	c2	d3	2	2	c2	d3	2
a5	2	c1	d3	2	2	c1	d3	2

The final result has eight rows, including two cases of duplicate rows. Clearly, when duplicate rows are permitted, the result obtained by executing the projection first and then the join is different from that obtained by executing the join first and then the projection. If duplicate rows had not been permitted, the results would have been the same as one another, whichever sequence of relational operations was adopted. What this example shows is that changing the sequence in which relational operations are executed can yield different results if the DBMS permits duplicate rows within a relation.

Difference In Results Is Significant

It is useless for an advocate of duplicate rows to dismiss the difference between these results as nothing more than two rows being duplicated, because that suggests that duplicate rows are meaningless both to users and to the DBMS. If so, why support duplicate rows, along with their penalties? Opponents of duplicate rows assert that such rows are meaningless to users and a probable cause of user errors. They also reduce the effectiveness of optimization by the DBMS. Consequently, they should be prohibited by the DBMS.

Another possible argument from the advocates of duplicate rows is, "Why not express the projection and join combined into a single SQL command? Then it will be impossible to use the qualifier DISTINCT on one of the operators without it becoming effective on the other." A first reply to this is that one of the two operators may define a view and the other a query on that view. A second reply is that the DBMS undoubtedly does not prevent a programmer from expressing these operators in separate SQL statements, whether one is a view definition or not.

It is worth noting here that, if the

DBMS permits duplicate rows in results, it must also permit duplicate rows in operands due to the operational closure feature of relational database management systems. The principal relational language is mathematically closed with respect to the operators it supports. This means that, in the principal relational language, the results of manipulative operations must always be legal as operands. If improper relations are permitted, then they also must be permitted as operands. This closure feature is intended to make it possible for users to make investigative inquiries in which, from time to time, it is necessary to use as operands the results of previous queries.

In case you think this is just an isolated example, let us look at a quite different example involving three simple relations, each concerned with employees, first their names, second their qualifications, and third their ages:

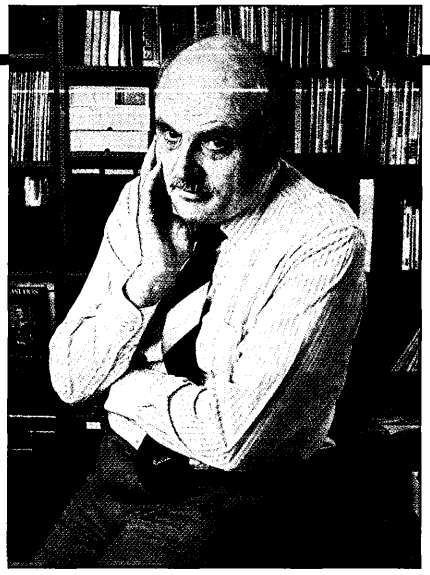
E1(E# ENAME) E2(E# QUAL) E3(E# AGE)

As usual, E# stands for employee serial number. Using SQL we can find the names of employees who have the degree PhD or whose age is at least 50 (or who satisfy both conditions). One of the distinct ways in which this query can be expressed in SQL involves using logical OR. Another way involves using UNION on the serial numbers for employees that satisfy each of the conditions. These two approaches should always yield the same result, but do they? The answer is that, if one is using SQL, it depends on when and in what context the user requests that duplicate rows be retained or eliminated. If UNION ALL is used in this context, the result contains the names of employees duplicated whenever each employee satisfies both of the conditions (that is, he or she has the PhD degree and is at least 50 years old).

Adverse Consequences of Duplicate Rows

Consider two or more rows in some improper relation that happen to be duplicates of one another. One may well ask what is the meaning of each occurrence of these duplicate rows. If they represent distinct objects (abstract or concrete), why is their distinctiveness not represented by distinct values in at least one component of the row (as required by the relational model)?

If they do not represent distinct objects, what purpose do they serve? A fact is a fact, and, in a computer, its truth is adequately claimed by one assertion—the claim of its truth is not enhanced by repeated assertions. In database management, repetition of a fact merely adds complexity, and, in the case of duplicate rows within a relation, uncontrolled redundancy.



E.F. CODD: SQL has three major flaws.

The reduction in interchangeability of the sequence in which relational operations are executed can adversely affect both the DBMS and users of the DBMS. As we shall see, it damages the production by the DBMS of efficient target code (this process is usually called optimization) and substantially increases the user's burden in determining the sequence of relational commands, when the user chooses to make this sequence explicit.

Optmizer Seeks Efficiency

A relational command usually consists of a collection of basic relational operations. Part of the optimizer's job is to examine the various alternative sequences in which these basic operations can be executed. For each such sequence, it determines the most efficient way of exploiting the existing access paths.

Finally, it determines which of the alternative sequences consumes the least resources. It should be clear, then, that any reduction in the interchangeability of ordering of the basic relational operations will reduce the alternatives that can be explored by the DBMS, and this, in turn, can be expected to reduce the overall performance attainable by the DBMS.

Occasionally, the user may (for various reasons) express in two or more relational commands what could have been expressed in just one. For example, he or she may decide to express a projection in one command and a join in another command. Because the sequence of these commands can affect the ultimate result when duplicate rows are permitted, the user must give the matter much more careful thought than would have been necessary if duplicate rows had not been permitted. One consequence will be a proliferation of unnecessary bugs in programs and in terminal activities. The extra thinking and the extra bugs will undoubtedly cause an unnecessary reduction in the productivity of users. A far more serious consequence is that undiscovered bugs may lead to poor business decisions.

The relational model is based on at least 11 fundamental laws. One of them is as follows: every row in a relational database taken together with the name of the relation in which it occurs must uniquely identify some object in the micro-world being modeled. This fundamental law is violated if duplicate rows are permitted. This is an important part of the job of maintaining the database in a state of integrity. The DBMS must help the DBA in this responsibility.

The Psychological Mix-up

As used here, the term "psychological" refers to what is often called the human factor aspects of a language. The term "logical" refers to the logical power of a language, especially the power achievable without resorting to the usual programming tricks, such as iterative loops.

Normally, if proper relations are employed, a manipulative command or query expressed in terms of nesting and using the term IN can be reexpressed in terms of an equi-join. However, let us look at an example involving improper relations. Suppose we are given the relations EMP and WAREHOUSE:

EMP(E#	ECITY)	WAREHOUSE(WNAME	WCITY)
E1	A	W1	A
E2	B	W1	A
E3	C	W2	D
		W3	C
		W4	E

EMP is intended to list all the employees by employee serial number and city in which the employee lives; and WAREHOUSE is intended to list all warehouses by serial number and city where located. Suppose we wish to find each employee name and the city he or she lives in whenever that city is one in which the company has a warehouse. One might reasonably expect that this query could be handled equally well either by an equi-join or by a nesting that uses the IN term as follows:

Photography by Liane Enkelis

```
Select E# ECITY        Select E# ECITY
From EMP,              From EMP
  WAREHOUSE            Where ECITY in
Where                    Select WCITY
  ECITY=WCITY            From WAREHOUSE
```

The results obtained, however, are not identical:

E#	ECITY	E#	ECITY
E1	A	E1	A
E1	A	E3	C
E3	C		

Once again we have a problem that arises, in part, from permitting duplicate rows.

This case, however, is somewhat more complicated. Whenever the DBMS encounters a query in nested form, it needs to transform such a query into a nonnested form in order to simplify the optimizer's task. Some excellent work on this has been done by Won Kim, R.A. Ganski, and H.K.T. Wong. However, there appears to be two major omissions from this work: first, the question of duplicate rows is not discussed; second, even if duplicate rows were prohibited, the remaining question is whether the coverage in this is complete with respect to all nested versions permitted in SQL.

My position on the nesting of SQL is that, when conceived, about 1973, it was an attractive idea, but one needing careful scrutiny and investigation by its proponents. It was advocated by them along with other features of SQL as a replacement for predicate logic in the relational world, and as a more user-friendly language than the preceding relational database sublanguage ALPHA.[1]

The first cited basis is simply not true. As time has progressed, the SQL advocates have found it necessary to incorporate bits of predicate logic in the language. The second had some credibility—however, in that case, SQL would be a curious mixture of the logical aspects of a relational language and the psychological aspects.

These two kinds of concern should be kept separate from one another for two reasons. First, a relational language has to be effective both as a source language and as a target language because of the myriad of subsystems expected on top (e.g., expert subsystems and natural language subsystems). Second, the relational approach is intended to serve a great variety of users, and, therefore, different users may have entirely different educations, training, and backgrounds—and that means that it is very unlikely that just one approach to psychological support will be adequate.

Accordingly, all of the statements in each of the several distinct languages providing psychological support should be translatable into the single language providing logical support. Until that translatability is demonstrated for SQL, serious problems in using that language will keep turning up.

While on the subject of nesting queries within queries, there are two features of IBM's SQL that I feel drastically reduce both the comprehensibility and usability of SQL. To illustrate these features, let's modify slightly the previously mentioned examples concerning employees and warehouses.

Some city names occur several times in the United States, but only once in any selected state. For example, Portland occurs both in Maine and in Oregon. Suppose to each relation (EMP and WAREHOUSE) we add a column pertaining to the state in which the city is located. Then let us try the query:

```
Select E#, ECITY, ESTATE
From EMP
Where (ECITY, ESTATE) in
    Select (WCITY, WSTATE) from
    WAREHOUSE
```

The DBMS refuses to handle this query, even though it is just like the original, except that in this case the IN clause involves a combination of columns instead of a single column. To a user, this seems totally inappropriate behavior for a DBMS. DB2's ability to concatenate the name of a city with the name of a state can be used to alter this query into an executable one. However, this is neither a general nor a natural solution to the problem.

Now let us return to our original relations, and merely alter the query to elicit more columns of data. Let us request:

```
Select E#, ECITY, WNAME, WCITY
From EMP, WAREHOUSE
Where ECITY in
    Select WCITY from WAREHOUSE
```

This time the DBMS yields the Cartesian product of EMP with WAREHOUSE, except that rows that contain the cities that fail to qualify are excluded. This is clearly not what was requested. Like the previous example, this kind of surprise is the hallmark of a poorly designed language.

When the prototype System R was passed from IBM Research to the product developers, the question of SQL's translatability from a nested query to a nonnested version had not been investigated. Subsequently, the product development divisions found the problem too difficult to handle in its optimizer. As a result, the first three releases of DB2 perform poorly on nested queries compared with nonnested queries. This is truly ironic, because SQL had been sold to IBM's management on the basis of its alleged ease of use and power due to the nesting feature.

The difference in performance of nested and nonnested versions of the same query puts an unnecessary performance-oriented burden on users, which will not disappear until nesting is prohibited or the translatability problem is completely solved and incorporated into DBMS optimizers. In nested queries, as in nonnested versions, duplicate rows must be prohibited to avoid the additional burden of unexpected discrepancies in the results. ■

In our next issue, Dr. Codd addresses the third flaw in SQL—namely, that it does not support three-valued or four-valued logic. More important, he also suggests steps that users can take to avoid severe difficulties before vendors take action to fix all three flaws.

E.F. Codd is president of the Relational Institute, San Jose, a nonprofit organization that conducts public seminars throughout North America and Europe on the entire spectrum of relational database technology.

Footnotes

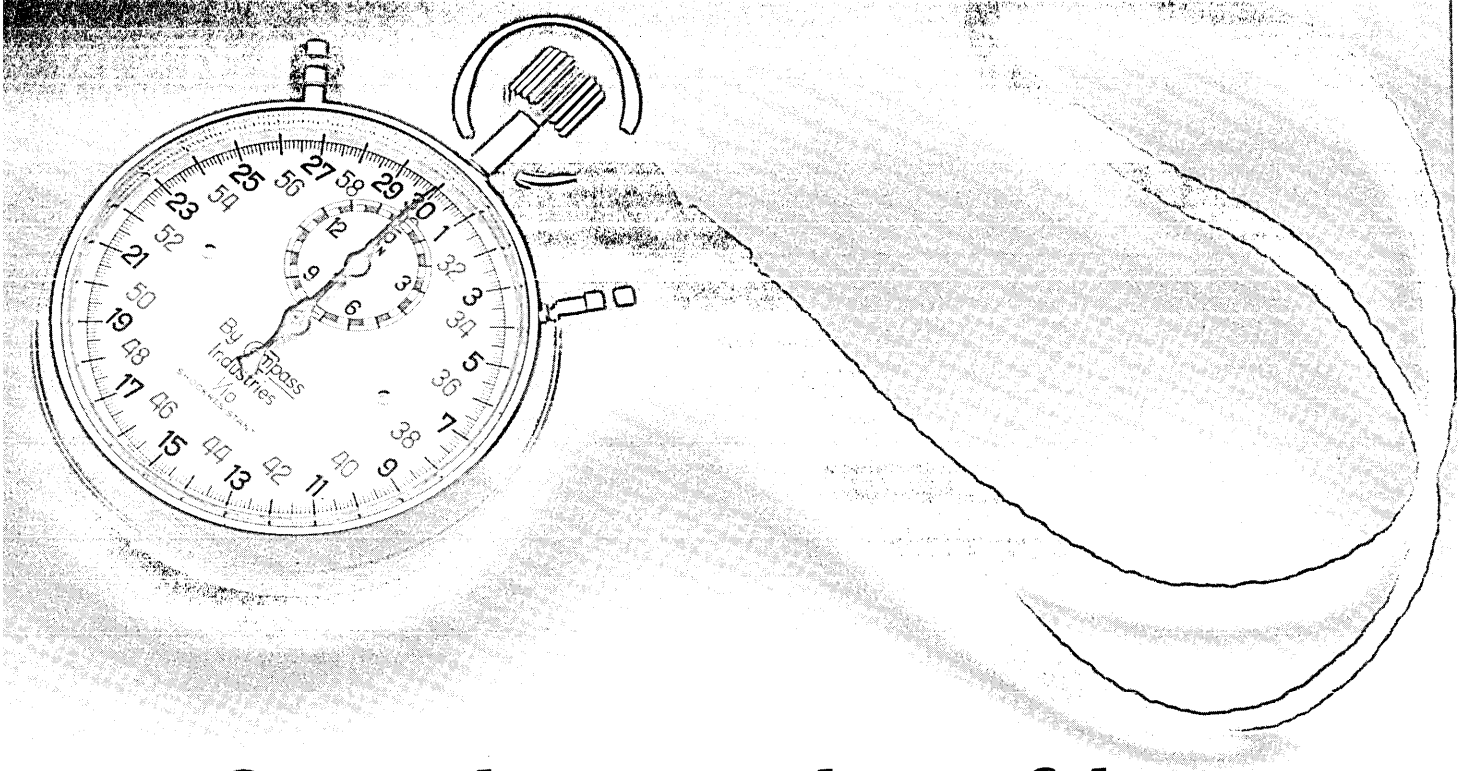
[1]E.F. Codd, "ALPHA: A Data Base Sublanguage founded on the Relational Calculus," proceedings of the 1971 ACM SIGFIDET Workshop, San Diego. Available from ACM, New York.

General References

E.F. Codd, "Missing Information (Applicable and Inapplicable) in Relational Databases," ACM SIGMOD Record, December 1986.

E.F. Codd, "More Commentary on Missing Information in Relational Databases," ACM SIGMOD Record, March 1987.

THERE ARE FOUR WAYS TO MEASURE THE SPEED OF A LAN.



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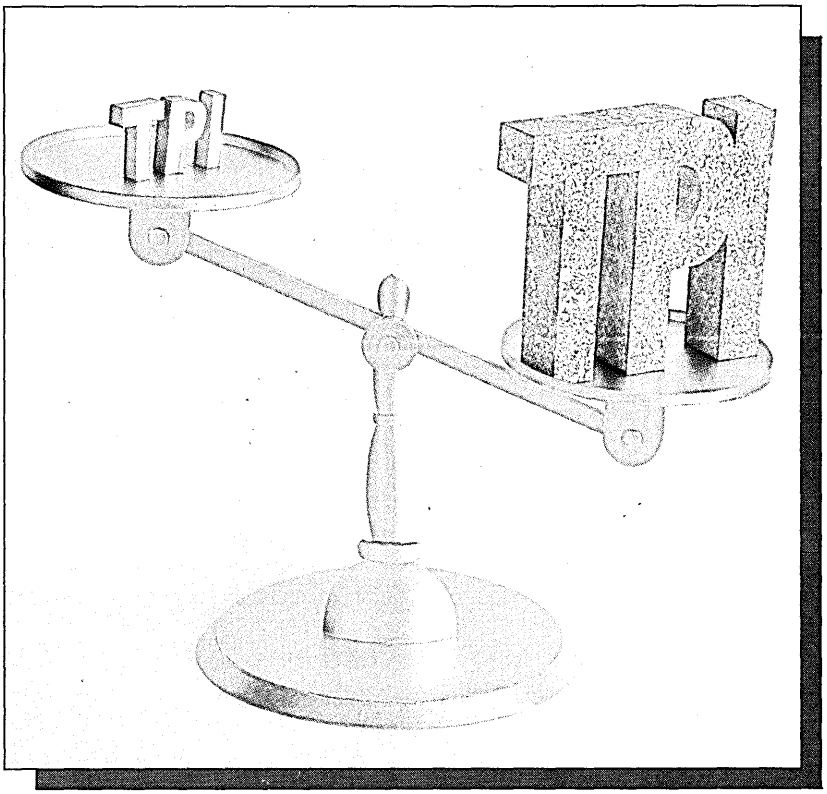
Circle 24 on Reader Card

All TPIs Are Not Created Equal

Experience in evaluating OLTP DBMS products has shown that the TP1 benchmarks used by different vendors cannot be considered equivalent to one another. The following article contains a series of questions that will help you determine how to make a comparison.

BY STEVEN CANIANO



Paper Sculpture Illustration by Ajin

In selecting a database management system for on-line transaction processing applications, one typically encounters discussions of the TP1 benchmark. This benchmark, which was first introduced to the public in DATAMATION in 1985 (see "A Measure of Transaction Processing Power," April 1, 1985, p. 112), described a means for quantifying and comparing the throughput and price/performance ratios of various transaction processing systems.

The original OLTP measure was comprised of three generic operations. The first is a single interactive transaction that would be the basis of a transaction-per-second (tps) rating as well as a cost-per-transaction figure. Simulating a debit/credit operation in a banking application, it came to be known as a "TP1." The second operation is a minibatch transaction that updates small batches of records. The third is a utility that does batch data movement. The outputs of the latter two are elapsed time and cost.

As one in the business of DBMS comparisons and selections, I have designed and developed several benchmarks, spoken to many people, and read many documents describing TP1 results for particular products. The problem I have encountered is that once you go beyond the surface, it becomes clear that no two versions of these so-called "TP1s" can be considered equivalent.

As has been reported in the trade press, it seems that each vendor (or

Work Sheet for Comparing TP1 Benchmarks

	Benchmark 1	Benchmark 2	Benchmark 3
Activities Benchmarked			
Hardware Environment			
Communications Protocol			
Think Time Rate			
Response Time Requirements			
Outputs of Benchmark			
Size of Database			
Tuned at Expense of Maintenance?			
Excessive Redundant Data?			
Degree of Locking			
Logging Requirements			
Syntax Errors in Input Data?			
Negative Balances Permitted?			
Deadlocks Restarted?			
Stable State Defined?			
Randomized Input Data?			
TP Monitor or Timeshare?			
Version of Products			

benchmarker) has included the portions of TP1 that will show the particular product in the best light and has chosen to omit or modify other portions without regard for the preservation of the original TP1 definition. This practice is fine if all products in question are exercised through an identical test, but it does not permit the comparison of the results of different TP1 test groups.

Since it would be impossible to get all parties to buy into one standard definition of TP1, it is important to evaluate any TP1 results carefully. The following list of questions, while not all-inclusive, provides a starting point for knowing when two TP1s definitely are not the same. The accompanying work sheet can be used to chart the results of a TP1 benchmark comparison.

Does your TP1 benchmark include all three defined activities, only the banking transaction, none of the defined activities, or some or all of these activities and several new ones? Different activities can greatly affect the nature of the benchmark. Of the original benchmark's three defined activities, the most popular is the TP1 debit/credit banking transaction. The minibatch transaction and utility are omitted in most TP1 benchmarks.

Does your TP1 benchmark specify type of hardware, operating system version, and system configuration in which the benchmark was run? Obviously, the hardware environment will greatly affect the benchmark results. The original benchmark was performed on Tandem computers.

How does your TP1 benchmark simulate users? It is important to know how users are simulated and what communications protocols are used. The original benchmark simulated users with block-mode terminals (e.g., IBM 3270) sending and receiving messages through communications lines using the X.25 line protocol. Different types of communications will cause different degrees of overhead on the system. Obviously, no communications overhead should allow the benchmark transactions to provide better response time.

What transaction rate does your TP1 benchmark use? The original debit/credit transaction simulated users entering transactions at a rate of one per 100 seconds. This can be thought of as the user "think time." It is important to know whether your benchmark uses this think time or defines its own standard think time, uses a variable think time, or uses no user think time. The think time ratio will greatly affect the response time provided to the users. The greater the think time, the better the response time, if the number of users remains constant.

Does your TP1 benchmark impose any response time requirement? The original debit/credit transaction imposed the requirement that 95% of all the transactions must be completed within one second. A benchmark that concentrates more heavily on transactions per second than on response time may be ignoring user requirements. The response time figure is usually the more important factor to users in an on-line application.

What outputs does your TP1 benchmark produce? The outputs produced are a good indication of the priorities of the benchmarkers. The original benchmark

produced outputs such as transactions per second, cost per transaction, and elapsed time.

How large is your TP1 benchmark database and what files are present? The original benchmark database consisted of four files, defined as follows:

- Branch: 1,000 records, 100KB, random access;
- Teller: 1,000 records, 1MB, random access;
- Account: 10 million records, 1GB, random access; and
- History: a 90-day record of activity, 10GB, sequential access.

The use of a database that is greatly scaled down may indicate that the system has problems handling large amounts of data and may also provide better results. If the files are scaled down enough, they may be residing in core memory during the execution of the benchmark, providing much better results than can be expected in a real system due to the elimination of much input/output.

Does your TP1 benchmark allow file structures to be tuned to benefit the benchmark transactions, at the expense of normal maintenance activities? The original database was designed so as not to detract from the performance of normal file maintenance activities (e.g., add/delete/modify record) for the purpose of improving benchmark transactions. A benchmark that allows this is not simulating a "real world" application.

Does your TP1 benchmark database contain unusual amounts of redundant data that eliminate the need to access certain files at times? This design technique may not depict a typical system and usually will not give a good indication of real performance.

What type of locking does your TP1 benchmark have? The original benchmark required that all files be locked with fine granularity locking. Fine granularity locking is mandatory in most OLTP applications. At the minimum, page-level locking is usually required. A lesser degree of locking is not very realistic for OLTP systems.

What are the logging requirements of your TP1 benchmark? Most OLTP applications require transaction logging, and the original benchmark required that all updates be logged and that the log file be duplexed. Omitting logging would probably increase transaction performance. A duplexed log is an added security measure and may or may not affect performance, depending on its implementation.

How does your TP1 benchmark handle transaction input data? Does it allow data to be rejected for syntax errors or are all input data always correct? Does it allow transactions to be rejected for insufficient funds or does it allow negative balances in accounts? Does it reject transactions in deadlock situations or are they restarted until they run to completion? In any of the previous three cases, if rejection of transactions is permitted and the benchmark counts rejected transactions, the performance results are improperly high due to the fact that all transactions have not done the intended work. In fact, with this scenario, the system with the most deadlocks or input errors would provide the best results since those transactions would do no work, yet would be counted as though they had been successfully completed.

Does your TP1 benchmark count all transactions or does it define a "stable state," a period when all users are executing concurrently, and count only transactions completed within that period? Transactions completed outside of a stable state will provide better results due to a lighter load on the system, with the exception of the first several users who initially will have to read some of the critical database files into memory.

Does your TP1 benchmark require that the transaction input data be randomized? If the input data are not randomized, it could be that much of the work is being performed in memory, eliminating the need for I/O, which may not be realistic.

Does your TP1 benchmark execute through a transaction monitor or in a timesharing mode? A transaction monitor usually will provide better throughput than will running in a timesharing mode (e.g., one database back-end process per user). If a transaction monitor was used, it should be noted whether or not it is a part of the product in question. If not, it should be noted whether the products it is compared to were benchmarked using a transaction monitor.

Does your TP1 benchmark provide results for the commercial version of the product in question, an early version of a new release of the product, or a special version of the product that is used exclusively for benchmarking? If you cannot purchase the product today or in the near future, the results really are not pertinent.

With all of these permutations, TP1 benchmarking as defined in today's industry is far from a standard science. It is not my assertion that the original TP1 is the only valid TP1. Rather, this exploration is intended to emphasize that before one can compare products through TP1 benchmarks, it is necessary to analyze and compare the TP1s themselves. ■

Steven Caniano is a DBMS specialist at AT&T in Piscataway, N.J. He is responsible for the evaluation, recommendation and technical support of DBMS products for the Unix operating system within AT&T. He is a member of the Unix Technical Support District within the Operations Technical Support Div. of the AT&T Information Management Services organization.

Clearing the Benchmark Air

In an effort to standardize on-line transaction processing benchmarks, Omri Serlin, of Itom International, Los Altos, Calif., and Tom Sawyer, senior consultant with Codd & Date Consulting Group, San Jose, have proposed new test guidelines under the auspices of the DebitCredit Council (DCC), which Serlin is establishing.

Relational database vendors that refer to TP1 test results as an overall measure of OLTP system performance have obscured the fact that the TP1 benchmark "measures only database engine performance," Serlin says.

The Serlin-Sawyer test, proposed to some 50 OLTP hardware and DBMS vendors, seeks to clarify mandatory and optional benchmark requirements for an overall measure. Among the proposal's mandatory requirements are the execution of a cost-per-transaction measure and use of networking software.

If a vendor does only the mandatory requirements, it would get a compliance point rating of 70; if it fulfills all of the optional parts as well, it would get 100 points. The options include using an exponential arrival rate of transaction and protecting the log file with mirroring to make it recoverable.

BY MARSHA J. FISHER

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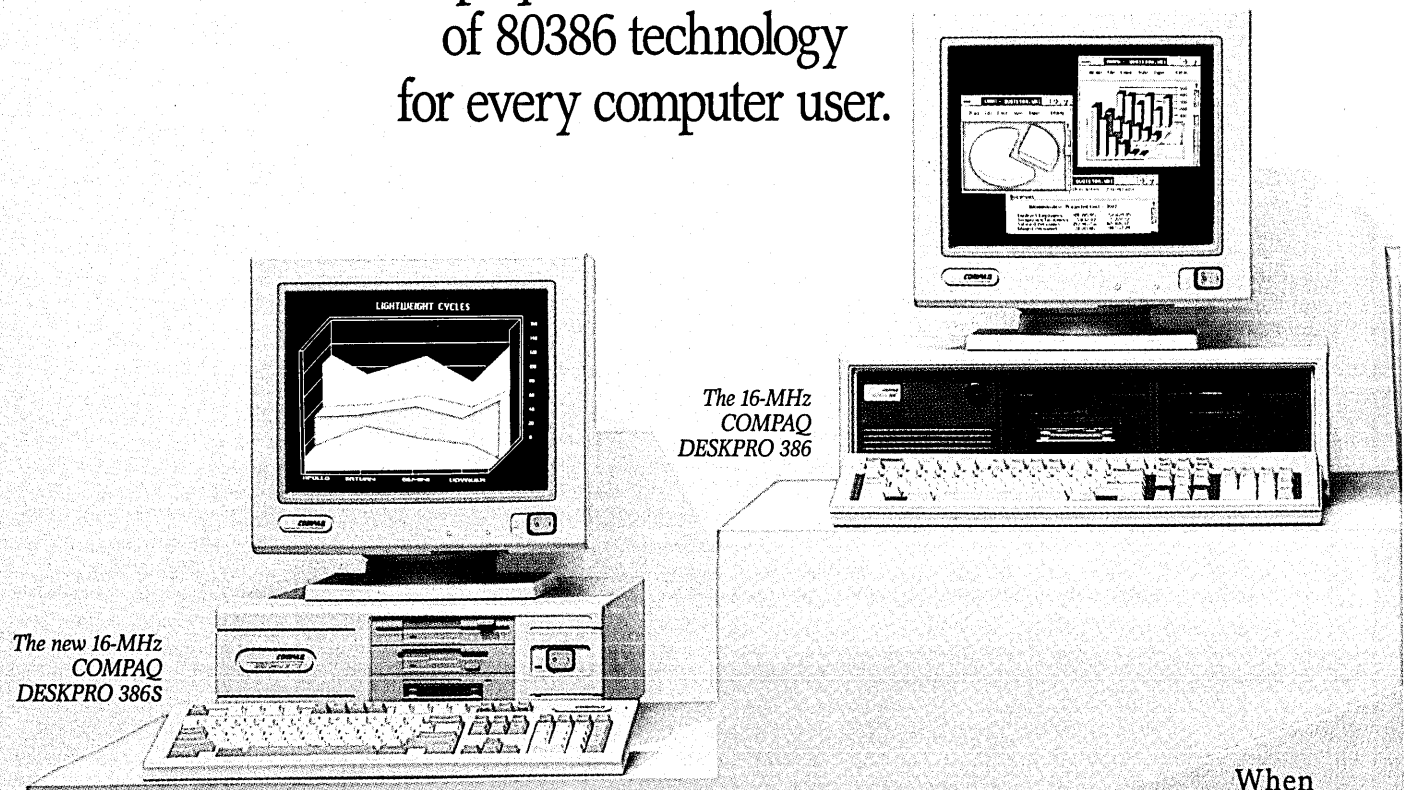

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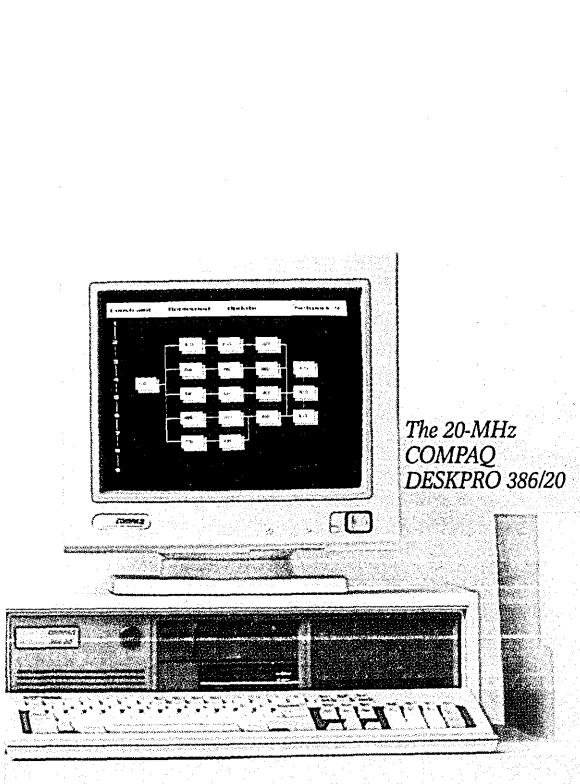

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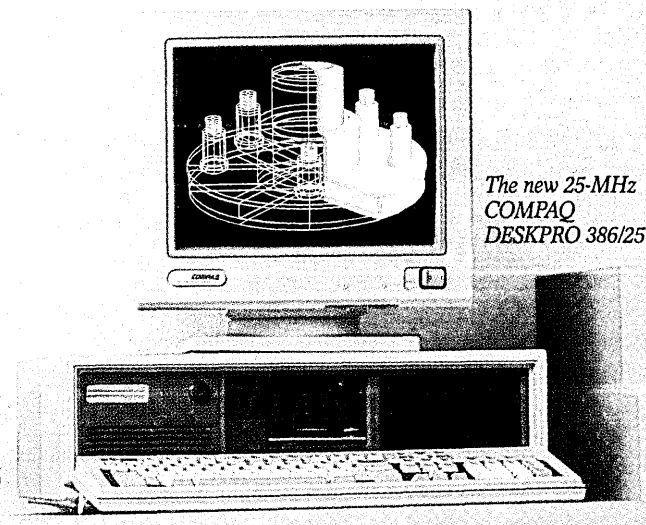

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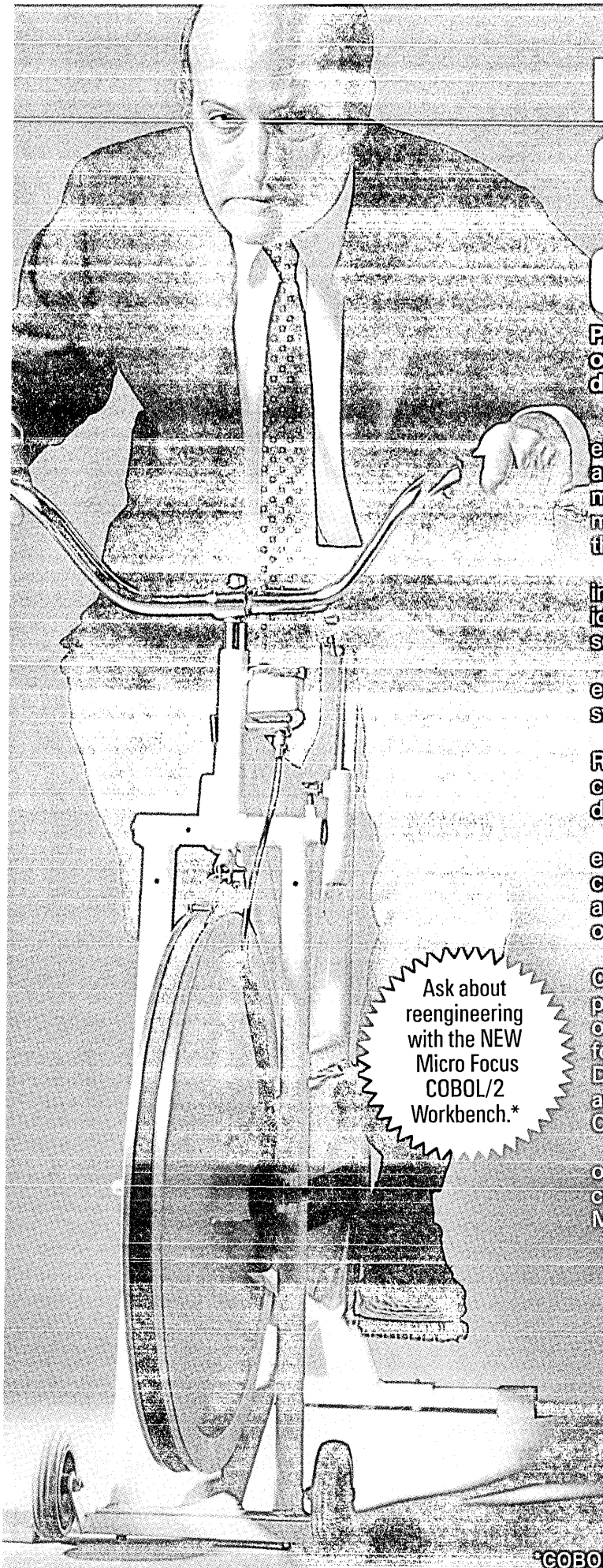

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The New Era of DBMS Integration

Integration and connectivity may be popular buzzwords to toss about the computer industry these days, but users of database management systems are serious about linking their databases and the mainframe, minicomputer, and microcomputer levels, according to the findings of an exclusive DATAMATION poll.

BY DAVID R. BROUSELL

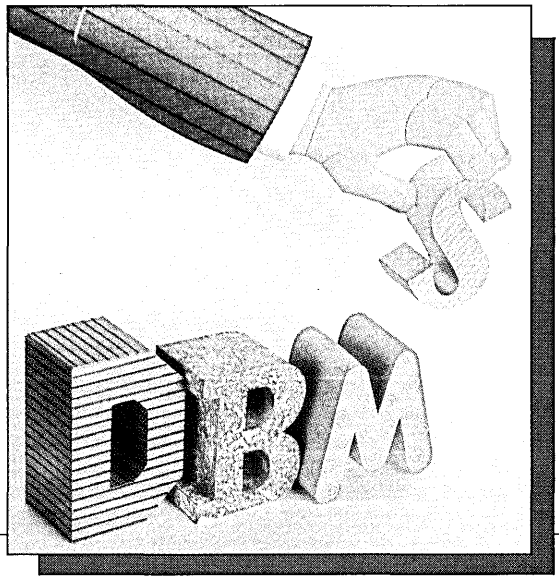
DBMSs have become an essential part of computing, and, as such, they are presenting IS managers with a new challenge—integrating DBMSs at all levels of their systems organizations. Of greatest interest is melding DBMSs in their data centers with those on end users' desktops.

Three out of four IS managers plan to integrate their mainframe DBMSs and the database systems used on their organization's pcs and workstations—one of many findings in an exclusive DATAMATION survey, conducted in May. The survey drew 158 responses from 800 users who received questionnaires, a response rate of 19.8%. The sample was limited to users at IBM or IBM-compatible mainframe sites.

Integration intentions drop significantly at other levels: only 34% of surveyed users say they plan to integrate their mini DBMSs and their mainframe counterparts, and even fewer—19%—see any connection from pcs to minis.

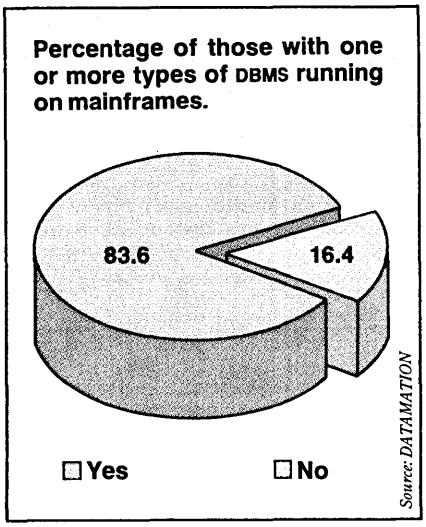
At the data center level, a large majority—83.6%—say they have one or more types of DBMSs running on their mainframes. On the DBMS side, IBM is still clearly dominant, with 56.4% of respondents saying they currently employ an IBM DBMS on their system. Software AG, Reston, Va., and Cullinet Software, Westwood, Mass., came in second and third with 17.8% and 13.9%, respectively.

When queried on their buying plans, users are strongly in favor of Oracle Corp.'s DBMS products. Although just 2% of survey respondents currently use the company's products on their mainframes, of users surveyed, 31.3% plan to purchase Oracle database software for those machines. The results confirm the 1988 DATAMATION/Cowen & Co. large-scale systems



Paper Sculpture Illustration by Ajin

DBMS Diversity



survey, which also showed Oracle's momentum (see "IBM Puts on the Gloves with MVS/ESA," May 15, p. 56). IBM again took first place in this category with 56.3% of mentions. Digital Equipment Corp. places third with 12.5%—further evidence that the lines between mainframes and high-performance minicomputers are nearly completely blurred. Software AG, at 6.3%, drops to fourth, tied with five other companies. Cullinet was not mentioned.

A minority percentage of respondents—34.7%—indicate they are now running or intend to run separate DBMSs on their minicomputers. As might be expected, a majority—58.5%—of those mini separatists are on DEC platforms. Some 31.7% of them are on IBM minis, while 12.2% are using Hewlett-Packard systems.

The overwhelming choice as DBMS supplier for those users currently running separate database software on their minis is Oracle, which was mentioned 20% of the time. HP, IBM, and Cincom followed, each with single-digit percentages. For those users planning to purchase separate DBMSs for their minis, Oracle again wins the popularity contest, garnering 63.6% of mentions. Relational Technology, heretofore a single-digit player, jumps to second place with 27.3%, and DEC takes third with 9.1%.

At the microcomputer level, 65% of survey respondents are either using or plan to use a DBMS on their personal computers/workstations. More than three quarters of respondents have IBM or compatible pcs. For those currently using a DBMS, 53.4% cite Ashton-Tate as their supplier, with Oracle in the number two spot with 9.6%. But the tables may turn in the future: Oracle captures 37.5% of plan-to-purchase responses versus 25% for Ashton-Tate.

Many Plan DEC-IBM Integration

Only a small percentage of those participating in the survey—23.5%—say they have DBMSs running on their DEC VAXs, but 46.2% of these people indicate they plan to integrate it with their IBM systems. A nearly corresponding number—43.1%—say they have particular applications they want to integrate with their central DBMSs. The application mentioned most frequently is personnel, followed by financial services, accounting, materials requirements planning, marketing/sales, customer accounts, mortgages, order entry, and shipping.

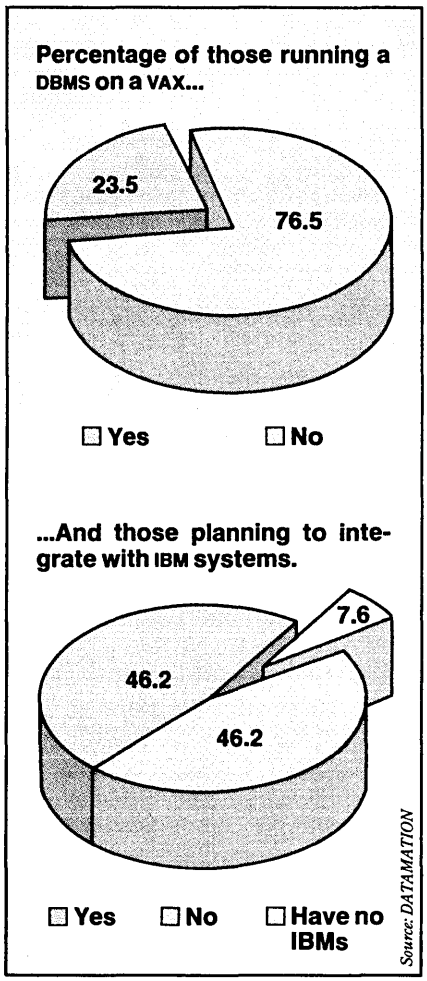
There are also a wide variety of other applications that users are interested in integrating with their central DBMSs. Some of these, as revealed by single mentions by survey respondents, are budgeting, blueprints, CAD/CAM, CASE, claims processing, geographic information, international banking, trading, and payments, mortgage-backed securities, oil and gas production, policy writing/rating, process control, production reporting, contract management and customer service, scheduling, service request/customer record, custom software, marketing information systems, and student record systems.

An overwhelming majority of respondents—85%—say they plan to accomplish this integration themselves.

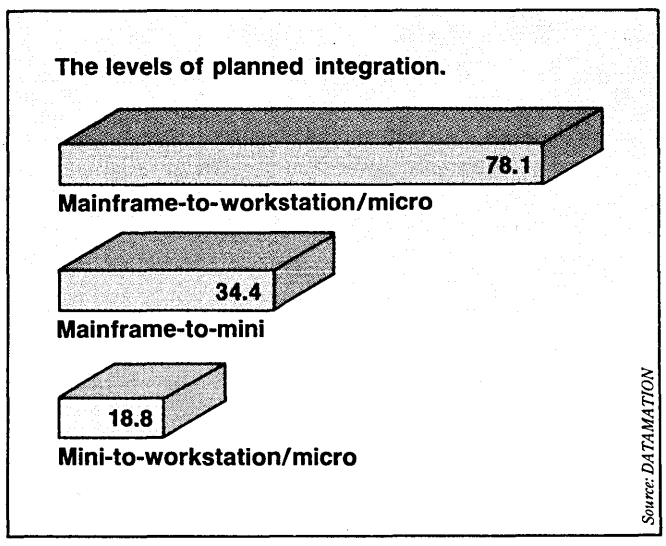
A surprisingly low percentage of survey respondents indicate any plans to buy a distributed DBMS. Only 21.1% say they have such plans.

Relational technology, on the other hand, has clearly become the standard type of DBMS technology, with the survey showing 69.2% of respondents currently using a relational DBMS. Of those respondents who are not using a relational product now, 37.8% say they are planning to convert to one. ■

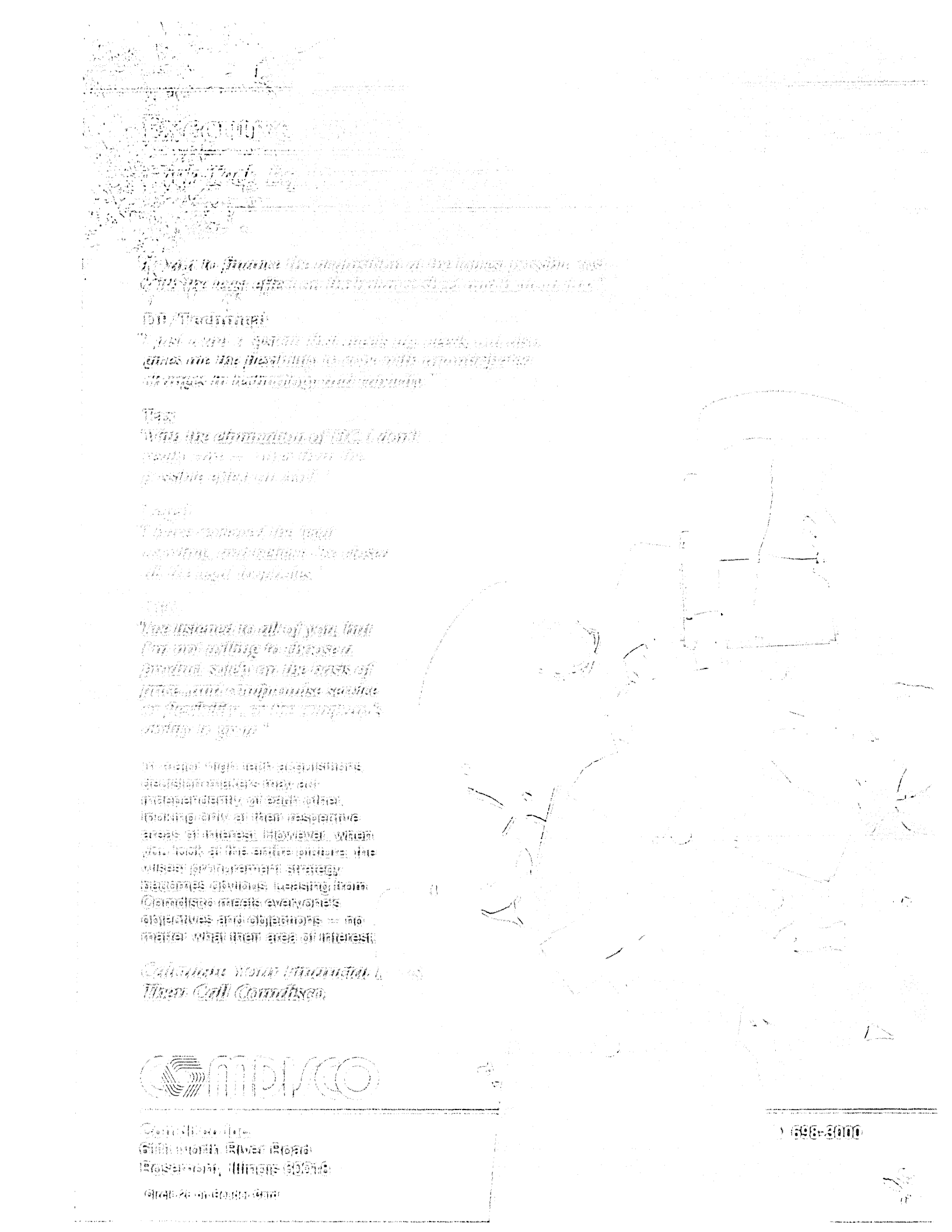
The Courtship of VAX



Targeted Integration



Charts by Catherine Francis



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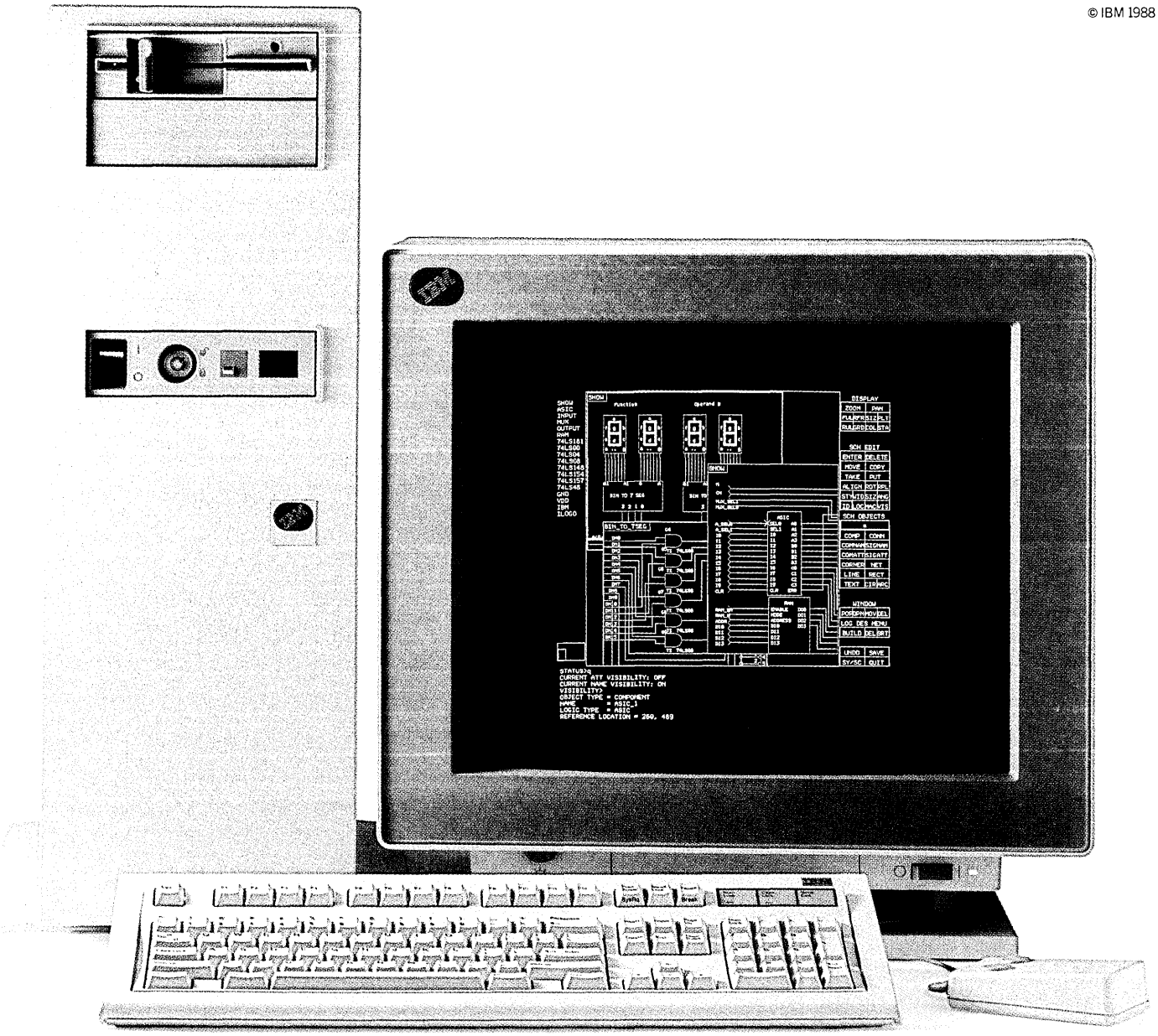

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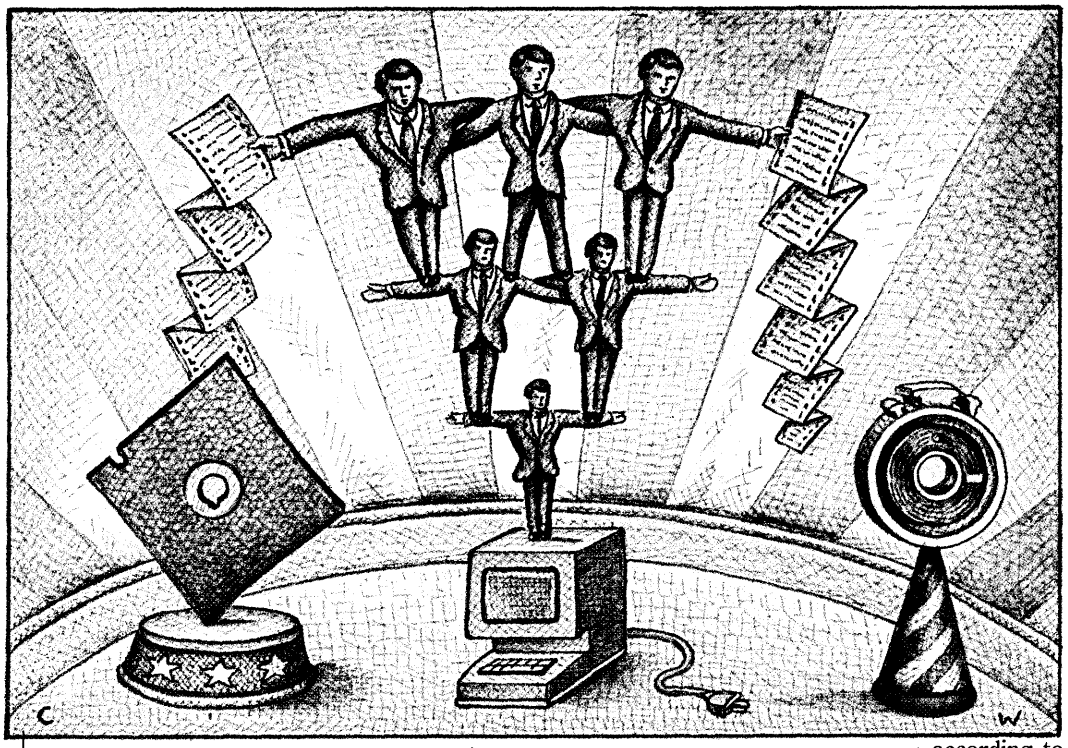


Hiring third-party software programmers is still popular, despite the increase in the availability of packaged software that empowers users to program and the competitive onslaught of systems integrators. Contributing factors to this demand are the difficulty in keeping skilled programmers in-house, the requirement for customization even with packaged software, and the ability of contract programmers to deliver systems quickly.

BY MARY JO FOLEY

By most reckoning, the demand for contract programming services should be declining, and fairly rapidly.

On one side, contract programmers face competition from an increasingly large pool of vendors hawking the latest generation of relational databases, fourth generation languages, computer aided software engineering tools, and expert systems products, which are putting more programming power directly in the hands of users.

On the other side, contract programming is seen by many today as the poor relation of its trendy cousin, systems integration. Thanks to the slick marketing of systems integrators, a growing number of users are coming to "define their needs in terms of the entire system, instead of the 'software' to accomplish the applications need," explains Michael Cohn, an analyst with Input, a market research firm in Mountain View, Calif.

Instead of dying out, however, contract programming is bucking the trends and experiencing a continued level of solid popularity. "Acceptance of using contractors has gone up a lot over time," comments William Hendry, manager of corporate systems for the Coca-Cola Co. "It used to be that using contractors meant you weren't up to a particular job. Today, it's difficult to get and keep high-quality staff."

The Coca-Cola Co.'s Corporate Information Services department uses contractors to handle as much as 75% of its information systems work, Hendry says. At any time, he adds, the company can be employing software engineers and programmers from 20 different contracting firms.

The Atlanta-based soft-drink vendor is not alone in its dependence on contract programmers. Computer Task Group, a Buffalo, N.Y., computer services vendor, claims that 84 members of the Fortune 100 are clients for its contract programming services. The jobs that CTG handled for about 30 of those companies totaled more than $1 million each, according to J. David Ehlke, executive vice president of marketing.

High-technology firms are as likely as any other type of company to use contractors. IBM and AT&T are customers of AGS Information Systems, a Mountainside, N.J., services firm that recently was purchased by Nynex.

"Even companies that say they don't use 'consultants' [contract programmers] still do," declares Alex Bleier, project development director for AGS. "Things happen. People quit. You can't deliver the systems you've promised, etc." Contract programmers allow IS departments to overcome these obstacles on fairly short notice, Bleier explains.

Two Kinds of Professional Services

Industry research firm Input divides the professional services arena into two major segments: contract services and systems integration. Contract

Illustration by Charles Waller

services is comprised of software development, consulting, education and training, and facilities management. Of those, software development, the piece most commonly equated with contract programming, is the largest, according to Input. In 1987, U.S. users spent $7.6 billion on software development contract services; by 1992, that should almost double to $14.5 billion, the firm estimates.

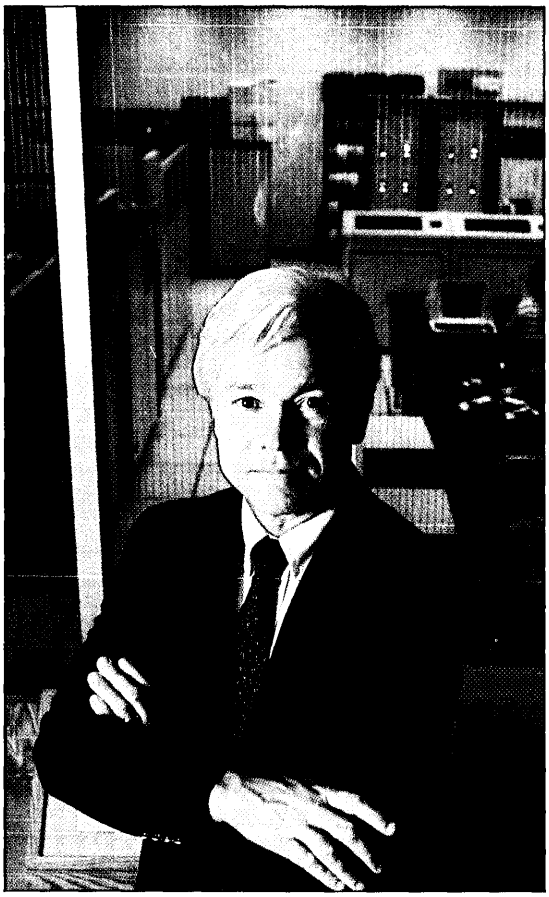
Services Vendors Shy from Label

A number of services vendors find the "contract programming" label limiting. "Technically, we may do the same work as a contract programmer, but we also share management and risk with customers," says Lawrence Levitan, a managing partner with Arthur Andersen & Co. "We'll still go after this [contract programming] business very hard. But we'll say to a customer, 'You may think you want to buy programmers, but we'll show you why you need more—entire systems.' "

A few contractors are even in the software sales business, having hammered out agreements with clients to market less specialized versions of their software to other firms or having devised joint-marketing agreements with third-party software vendors to customize and support their packages.

Because there is no clear-cut definition of where consulting ends and software development begins—or, often, even a way to distinguish between contract programming and systems integration—many users are hesitant to say whether they are using contract programming services. Some think of contract programming as "body-shopping," or hiring temporary employees, usually on a dollars-per-hour basis, to perform predetermined programming tasks. (One example of this is the practice of hiring offshore programmers.) Others consider the contract programming and systems integration markets to be almost one and the same.

Input's definition falls somewhere in between. For the research firm, "software-development contract services" includes custom software development, modification of commercially available software packages, software testing, software conversion, and maintenance and enhancement of existing applications. Many others would call the same services systems integration tasks.



NASA'S STALLINGS: Working with CSC since the 1970s.

Photograph by Katherine Lambert

The Coca-Cola Co. uses this broader definition of contract programming. "We use 'nonemployee workers' for everything from business strategy consulting and strategic planning to board stuffing and [local area network] cable pulling, as well as programming," says corporate systems manager Hendry.

SOME CONTRACTORS SELL SOFTWARE.

Overall project management is virtually the only task Hendry exempts from the contract-programming realm.

Government agencies, which continue to be the single largest group of users to employ contract programmers, also seem to entrust a lot of work besides programming to contractors. The Department of Health and Human Services' Office of Administration for Children, Youth, and Families, for example, has used Planning Research Corp., a subsidiary of Emhart Corp., for the past two years to design and write its Headstart Program's Funding Guidance System.

The IBM 4361 mainframe-based system tracks recipients of grants under the low-income educational supplement program for the entire U.S. Currently, PRC is updating and modifying the system to respond to various user suggestions, says Joseph Wechsler, chief of the MIS branch for the office. Its next task will be to work on migrating the mainframe system to the pc level and to do some of the on-site training for the new systems. Ultimately, Weschler says, HHS would like to get PRC to do support nationwide.

Two Kinds of Federal Contract Bids

Although most, if not all, contract-programming vendors aspire to provide everything from design to support for the systems on which they work, this situation does not always materialize. The National Aeronautics and Space Administration (NASA), like many federal entities, solicits bids for two separate types of contracts: development, and maintenance and operations. Usually, one vendor helps develop the software, and another acts as an agent to test and then take over the system.

The Goddard Space Flight Center, Greenbelt, Md., has taken this dual-award route with both its Space Telescope and Packet-Processor Data Catcher Facility contracts. Computer Sciences Corp., El Segundo, Calif., handled the contract-programming assignments on both, according to the head of the Data Catcher Systems section, William Stallings. (The maintenance portions have not yet been awarded.) Goddard has been working with CSC since the 1970s, Stallings says, as a result of a shortage of programmers skilled in developing real-time software for spacecraft telemetry.

In the course of developing four major software systems for the center's Gould Inc. (Fort Lauderdale, Fla.) Concept machines, "CSC has built quite a knowledgeable staff," Stallings says. "They've developed their own software development methodologies tailored toward building systems for the space effort." At the same time, he points out

Have Software, Will Travel

Note: This list is not to be taken as comprehensive; most major vendors should provide contract programming services.

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Chicago, IL 60602
(312) 580-0069
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Cambridge, MA 02238
(617) 491-1850
CIRCLE **082**

Computer Sciences Corp.
2100 E. Grand Ave.
El Segundo, CA 90245
(213) 615-0311
CIRCLE **083**

Computer Task Group
800 Delaware Ave.
Buffalo, NY 14209-0198
(716) 882-8000
CIRCLE **084**

CSK Group
Shinjuku Sumitomo Bldg.
6-1 Nishi-Shinjuku 2-chome
Shinjuku-ku, Tokyo 163 Japan
(81-3) 344-1811
CIRCLE **085**

Digital Equipment Corp.
software services manager,
local branch office
CIRCLE **086**

Electronic Data Systems
7171 Forest Lane
Dallas, TX 75230
(214) 661-6000
CIRCLE **087**

IBM
Local branch or
Professional Services Group
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Milford, CT 06460
(203) 783-7000
CIRCLE **088**

McDonnell Douglas
Information Systems Co.
11701 Borman Dr.
Suite 295
St. Louis, MO 63146
(314) 432-0345
CIRCLE **089**

Peat, Marwick, Main & Co.
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24th Floor
New York, NY 10022
(212) 758-9700
CIRCLE **090**

Planning Research Corp.
(a subsidiary of Emhart Corp.)
1500 Planning Research Dr.
McLean, VA 22102
(703) 566-2749
CIRCLE **091**

Price Waterhouse
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Tampa, FL 33607
(813) 876-9000
CIRCLE **092**

Société Générale
Blvd. Haussmann
75009 Paris, France
(33-1) 40 98 20 00
CIRCLE **093**

TRW/Systems Development
1 Space Park
Redondo Beach, CA 90278
(213) 535-4321
CIRCLE **094**

Unisys Corp.
Local branch or
Professional Services Group
Blue Bell, PA 19422
(215) 542-4011
CIRCLE **095**

Wang Laboratories Inc.
1 Industrial Ave.
Lowell, MA 08141
(617) 459-5000
CIRCLE **096**

that CSC has been "very open regarding technology exchange with the government." The Data Catcher Systems division employed 40 CSC programmers at the peak of its latest Packet-Processor project.

Both Goddard and HHS used the standard government contract-award process to select their contract vendors. In addition, both have found themselves subject to federal budget constraints. "This fiscal year the budget is tighter, so we're doing less contract programming than in the past," acknowledges HHS's Wechsler.

"For one thing," he says, "we've lost staff and haven't been able to replace them. But if we didn't have these constraints, our need for contract programming would increase, primarily because users are becoming more familiar with what data processing allows them to do."

The demand situation at Coca-Cola Co. is the same, Hendry says. "We use packaged software a lot. It reduces the amount of coding needed. But it doesn't result in much decrease in demand for contract programmers," since customization is still required.

Commercial Clients Use Several Vendors

Unlike federal users, commercial contract-programming clients are unlikely to rely on a single vendor to handle all of its customization and other software-development chores. For instance, on one of its most recent development projects—a Retirement Tracking System that will monitor employees' eligibility and requirements for various retirement plans—the Coca-Cola Co. used multiple contractors to handle different phases in the design/development/test process. Likewise, the company employs a variety of contracts in hiring its contractors, ranging from fixed-price, closed definition contracts, to simple time and materials (dollars per hour) arrangements.

When selecting a contractor, "we use the same interviewing process as if we were hiring someone full time," Hendry says. "Individuals must fit our image and work ethic, and we're pretty fussy." To Hendry and other users, one of the key advantages of contracting is that "you can act and react quickly, in terms of hiring and firing." It's this kind of flexibility that can make or break a project . . . and, sometimes, even a company. ■

Mary Jo Foley is a Washington, D.C., business and technology freelance writer.

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New Products

TRENDS

PAGE PRINTERS are becoming the peripheral of choice for many IS managers, thus helping fuel growth in the nonimpact printer market.

A survey conducted by Datek Information Services shows that 20% of all printers shipped in 1987 were nonimpact printers—up from 16% in 1986. The survey, published in June, also found that nonimpact printers generated 40% of the whole printer market's $8.5 billion sales in 1987, compared with 31% in 1986. Page printers—particularly zero- to 10-page-per-minute machines—account for much of the growth in nonimpact printers, says Naomi Luft Cameron, associate director of research for the Waltham, Mass.-based company. Datek estimates that in 1986, 290,000 page printers were shipped, representing 5% of all printers shipped and generating $1.8 billion—24% of the printer market's dollar value. In 1987, 583,000 page printers were shipped, accounting for 9% of the market and bringing in $2.8 billion—33% of the revenues.

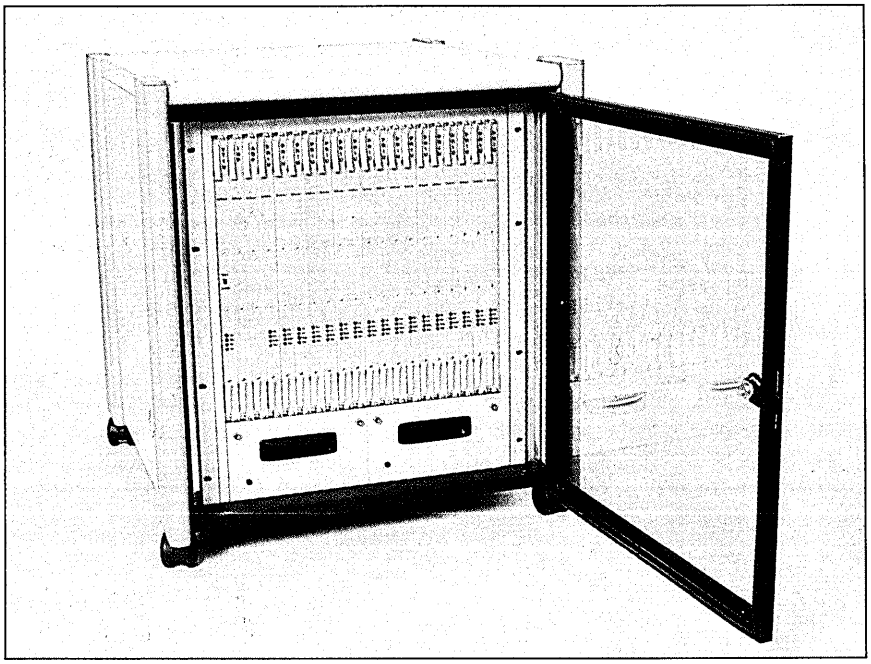
At the high end of the market, page printers—such as IBM's 3800 (which prints line by line, but is considered a page printer) and Xerox's 97XX models—have been replacing line printers in many shops for applications such as on-demand forms printing (see "The Printer Promise of SAA," Nov. 1, 1987, p. 58). Datek's Cameron tells DATAMATION that page printers allow IS managers to "design forms electronically, change them, and print data and forms at the same time."

At the low end, the clear leader in page printers is Hewlett-Packard. According to Cameron, much of the growth in the micro market has been spurred by HP's low-priced LaserJet Series II. Before its introduction in 1987, HP's laser printers were between $3,000 and $4,000; Series II was $2,500, and it's now $2,700.

Tony Graffeo, senior vp of information systems at Home Insurance Co., New York, tells DATAMATION he's purchased about 200 HP Series II machines in the last year. The machines are now printing documents previously handled by other technologies: charts that used to be sent out for typesetting and customer declaration pages that used to require typing on preprinted forms, for example. Laser printers account for 20% to 30% of all pc printers at the company. "That's been growing geometrically over the last eight months," he says. "I expect that to double or triple within 12 months."

If you'd like additional information about products covered in this issue's hardware Trends, please circle 269 on the reader service card.

HARDWARE



The IAP6000 acts as a switch between BRI circuits and PRI circuits.

Tools for Developing ISDN Applications are Introduced

A premises controller that switches between BRI and PRI offers ISDN services for less.

BY MARY KATHLEEN FLYNN

Teleos Communications Inc. has unveiled three products that are said to handle true Integrated Services Digital Network switching between basic rate interface (BRI) and primary rate interface (PRI) circuits on a customer's premises.

The IAP6000 is an ISDN premises controller; the ASK200 and ASK300 are tools for developing ISDN applications. All three are based on the vendor's ISDN Adjunct Processor (IAP). According to Teleos, which is headed by Ungermann-Bass cofounder Charlie Bass, the IAP can provide voice, data, and image networking in a local environment, as well as transparent access to metropolitan and wide area networking with the public switched ISDN network.

According to the vendor, the IAP6000 Premises Controller offers end users bundled access to network services from local and interexchange carriers. Geared toward larger customers, the IAP6000 acts as a switch between on-premises BRI circuits—which include two B channels and one D signaling channel—and PRI circuits, which include 23 B channels and one D signaling channel.

With bundled network access using PRI, the number of individual BRI connections to the central office can be reduced, producing savings on access charges and monthly service, says Teleos. Because it can extend to 100 miles or more, the IAP6000 provides access to ISDN services for remote locations that are too far away for BRI circuits. Such circuits are limited to between 12,000 feet and 16,000 feet. The IAP6000, which is available now, is priced at $12,500.

The ASK200 simulates basic voice and data features of an ISDN central office switch. Software designers can use it to create, test, and implement end-to-end ISDN BRI applications without having to access public BRI lines. In addition to the IAP, the product includes two ASK100 development systems—a micro-based de-

velopment tool introduced by the company last year. The ASK200 is available now. Prices begin at $37,000.

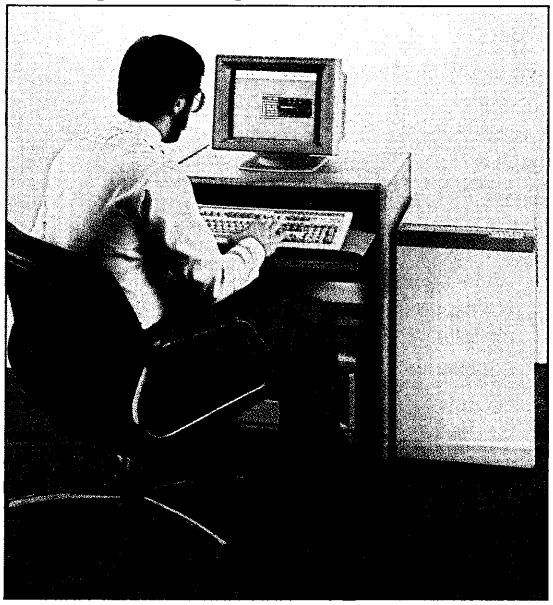
The ASK300, which contains a Unix applications development processor and a mass storage subsystem as well as the IAP, is designed for creating custom switching and applications software for oem versions of the IAP. It is available for $56,000. TELEOS COMMUNICATIONS INC., Eatontown, N.J. CIRCLE **247**

Uninterruptible Power

New on-line UPS for minis is smaller, lighter than traditional systems.

Emerson Computer Power has added to its product line an on-line uninterruptible power system (UPS) that it says combines a size and a price tag associated with less effective off-line systems.

The AP130 3KVA UPS is the latest in a series of compact on-line systems that are designed to complement the vendor's full-featured AP101 series for minis. The new product is one third the size and weight of the AP101 series.



The machine has the same power rating and offers a three-to-one crest factor design that enables it to handle current peaks three times its KVA rating without degrading performance, the vendor claims. The new product is aimed at users of newer computer systems, which are smaller, less expensive, and require less starting power.

Priced at $6,190, the AP130 3KVA UPS is available now. EMERSON COMPUTER POWER, Santa Ana, Calif. CIRCLE **248**

Fiber LAN

10NET debuts a 10Mbps fiber-optic local area network system.

Touting a unique design that connects hundreds of micros without repeaters, 10NET Communications has brought out a new 10Mbps fiber-optic local area network system. 10NET, a division of Digital Communications Associates Inc., says it offers three to five times the throughput of its 1Mbps fiber-optic system.

The hub design allows users to connect pcs over six kilometers apart without repeaters, the vendor says. Using a star topology with up to three levels of the eight-port hubs, customers can connect 392 micros over a five-hub span.

For secure government environments, the new LAN offers an interface for TEMPEST applications.

Available now, the product is priced at $1,295 per node. The 10MEG hub is offered separately for $2,995. 10NET COMMUNICATIONS, Dayton, Ohio. CIRCLE **249**

X.25 and SNA

IBM NetBIOS LANs gain in X.25 and SNA gateways.

Gateway Communications Inc. has made its G/X25 Gateway and G/SNA Gateway wide area networking products available for IBM NetBIOS-based LANs. Both new gateways create session transport protocols in an IBM standard NetBIOS environment to allow shared network access to communications facilities, the vendor says. They allow users on any Novell NetWare or IBM NetBIOS-compatible LAN to connect to a variety of mainframes, minicomputers, and pcs via public or private data networks.

Available now at $1,695, the G/X25 Gateway features 20 terminal emulations, which include DEC, IBM, Televideo, Data General, Hewlett-Packard, NCR, ADDS, Viewpoint, Honeywell, Tandem, Alpha Micro, Hazeltine, Datapoint, and Zenith machines.

The G/SNA Gateway is available now for $2,580. It features IBM 3270 and 3770 terminal emulation and accommdates up to four simultaneous host sessions. GATEWAY COMMUNICATIONS INC., Irvine, Calif. CIRCLE **250**

BRIEFS

Altos Computer Systems, San Jose, has brought out an **IBM AT-compatible networked workstation** designed for concurrent access to MS/DOS and Unix-based multiuser applications. The Altos Workstation 100 is available for $1,800. CIRCLE **251**

Alliant Computer Systems Corp., Littleton, Mass., has introduced a **minisupercomputer** targeted at classified defense, intelligence, and commercial environments. Available in the fourth quarter, the FX/80T TEMPEST system, which runs on Alliant's Unix and on a real-time operating system, is $449,000. CIRCLE **253**

Digital Equipment Corp. has added six new models to its **VAXstation 2000** family. They run VMS or Ultrix (DEC's Unix). Prices begin at $13,830. CIRCLE **254**

Univation, Milpitas, Calif., has delivered a new high-performance **80386-based LAN server** in a tower configuration. The LifeServer 386/ST is IBM AT-compatible. Available now, it comes in three models, priced between $18,170 and $27,450. CIRCLE **255**

Boca Research Inc., Boca Raton, Fla., has brought out an **I/O adapter** that offers extra ports to Micro Channel users. Priced at $210, the Boca.MCA Serial/Parallel provides two RS232C serial ports and one parallel port per board. It is available now. CIRCLE **256**

Proteus Technology Corp., Hasbrouck Heights, N.J., has introduced an **80386-based Unix multiuser system**. The System 3400M, which is available now, also comes with multiple operating systems. It is priced at $6,499. CIRCLE **257**

Concept Communications, Dallas, has delivered a pair of **expansion boards,** which provide full-motion, full-color **video conferencing** for IBM PCs and compatibles. The Image 30 boards—one a video processor, one an audio processor—are available now, priced at $11,000 each. CIRCLE **258**

Sony Microsystems Co., Palo Alto, has announced it is filling out its NEWS **Unix technical workstation** family with a series of machines that will incorporate dual Motorola Corp. 68030 processors. Workstations in the NEWS 1800 Series will be priced between $35,000 and $45,000. Shipping is scheduled for the year's end. CIRCLE **259**

TRENDS

CICS USERS CAN SORT ON-LINE with a new product from Syllogy Corp.

Until now, the COBOL sort verb—used in many applications for producing reports, summarizing information, and matching and merging—has been available only in batch environments. In the world of CICS—IBM's 19-year-old, on-line Customer Information Control System—sort is a restricted verb.

Syllogy's ceo Martin Goetz, a founder and former president of Applied Data Research, Princeton, N.J., says that to get around the restriction on sort, CICS users have had to write their own sort routines, use secondary indexes of VSAM files, or delay reports and write them in batch mode. The Hackensack, N.J.-based company's CICSORT will be available at the end of this month, priced between $6,000 and $17,000.

Walter Masterson, a New York-based independent software consultant and eight-year CICS veteran, has dealt with the lack of a sort verb until now by "going into the database and requesting different access paths." This "burdens the database," he says, and has been "a pain in the neck." Masterson, who is enthusiastic about Syllogy's CICSORT and is urging his clients to bring the product in-house, considers it "helpful because it's flexible. It will let me add new applications quickly." One application that Masterson cites is on-line reporting of invoices. "Sort would let me list invoices in various sequences—depending on user's request—by due date, order date, or customer."

For users content with sorting in batch mode, there are many offerings available—from IBM, from Synchsort Inc., Woodcliff Lake, N.J., and from Computer Associates International, Garden City, N.Y., to name a few. Whether or not the batch players will come to market with on-line sort utilities remains to be seen. Goetz says it's likely that they will, but not for a year or two.

IBM may help speed up the process, if it includes in its new COBOL compiler a standard interface to support the sort verb. Goetz says Syllogy is discussing this possibility with IBM, and he believes it will make it easier for software vendors to build sort utilities. If, as he hopes, many CICS users want an on-line sort utility, there's a huge market waiting. Syllogy estimates there are 25,000 CICS users worldwide and 14,000 U.S. CICS installations.

If you'd like additional information about products covered in this issue's software Trends, please circle 268 on the reader service card.

SOFTWARE

Walker Interactive Systems brings its financial software package to the DB2 world.

Walker Debuts Financial Software for DB2

Line of mainframe financial packages for MVS is now available under IBM's DBMS.

BY MARY KATHLEEN FLYNN

Walker Interactive Systems has made its line of mainframe financial software products available under IBM's DB2 relational database management system for the MVS operating system.

The packages, known as Strategic Management Systems, include Management, Budgeting, and Accounting general ledger; Accounts Payable Management; Purchase Order Management; and a set of productivity tools. The company targets its products at sophisticated, large IBM mainframe users.

Because its software is DBMS-based, the vendor says that users can migrate to DB2 without data loss. Walker estimates that DB2 accounts for over 40% of DBMS sales over the last two years. In addition to DB2, the following database management systems are supported by Walker's products: IMS, ADABAS, IDMS, and DATACOM.

Depending on system configuration, the upgrade to the DB2 product will cost current customers between $15,000 and $100,000. As IBM enhances DB2, Walker says it will make its packages compatible with new releases; upgrades to new DB2 versions will be included in the Strategic Management Systems service contract. The DB2 products are available now.

Walker is planning to add the following modules to its product line next year: stores inventory, fixed assets management, and capital system tracking. WALKER INTERACTIVE SYSTEMS, San Francisco. CIRCLE **260**

Project Management

New release of POC-IT's pc-based system has enhanced LAN support.

POC-IT Management Services has introduced release 1.1 of its project and staff management system, MicroMan II. Enhancements to this release provide greater power and flexibility for project planning, scheduling, and monitoring, according to the vendor. POC-IT, an IS consultancy, has designed the product for IS managers.

New features incorporated in the release include an interactive Gantt

DATAMATION's Editors Win Another Neal Award!

We are proud to announce that for the second year in a row, DATAMATION's editors have won a Jesse H. Neal Award, the business press equivalent of the Pulitzer Prize.

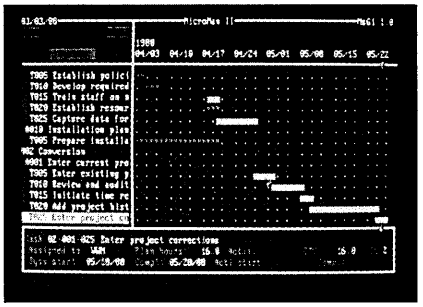
The Association of Business Publishers presented DATAMATION editors, Paul Tate, Willie Schatz, Parker Hodges and David Brousell with the 1987 Neal Award for "Excellence in Reporting," for two exclusive reports covering information systems in Russia (March 15) and China (September 1).

In 1986, DATAMATION's "Behind the News" column earned a Neal Award for "Best Section or Column."

DATAMATION - The Leader in Information Technology Coverage.

New Products

chart, programmable list entry, and resource histograms, which illustrate schedule commitments. Also featured to enhance support for local area networks are full record and file locking for up to 100 concurrent users, the ability to direct



system output to personal directories, and improved printing management, POC-IT says.

The package requires 512KB, a hard disk, a monitor, and a printer. It runs on the IBM PC and compatibles under PC/DOS, MS/DOS, or OS/2. Versions for Unix and Xenix are planned for release shortly. MicroMan II release 1.1 is available now for $2,895, with volume discounts. POC-IT MANAGEMENT SERVICES INC., Santa Monica, Calif. CIRCLE **261**

Reference Software

Goal brings out mainframe-based reference software for business.

Addressing a new area of business, Goal Systems has introduced Preference, a tool for creating and accessing reference materials.

With Preference, users can create manuals, training materials, new product demonstration materials, and application documentation. The vendor says the package offers accessible on-line documentation.

The package includes a concurrency feature that permits a user to move with a single keystroke from an on-line software application program to an on-line reference source and back again. A context-sensitive help feature furnishes reference material based on the context in which the help was requested.

The tool includes Writer's Editor, which provides word processing, windowing, and graphics capabilities.

Preference is available now. A permanent license price is $70,000, which includes maintenance for one year and four days of on-site training. Leasing options are also available. GOAL SYSTEMS INC., Columbus, Ohio. CIRCLE **262**

Expert Systems

Information Builders debuts mainframe version of development tool.

Information Builders Inc., which acquired the Level5 expert systems development tool last year, has brought out new versions of the product that will run on IBM mainframe and Apple Macintosh computers. The original product runs on pcs and VAX/VMS.

According to the vendor, the tool enables users to develop expert systems applications that will run across all four hardware environments. Applications, such as portfolio analysis, software debugging, materials selection, and inventory control, can be developed with the package. Level5 also provides direct access to data stored in Focus, Information Builders' 4GL and DBMS package.

The production version of mainframe Level5 for VM/CMS is available now; VS/TSO release will ship in November 1988. A one-time license fee ranges between $48,000 and $57,600; the Focus DB interface ranges between $6,500 and $7,800. INFORMATION BUILDERS INC., New York. CIRCLE **263**

Text Retrieval

Verity introduces tool with expert searching capabilities.

Verity Inc. has announced Topic, a document retrieval system that enables users to perform document searches with accuracy and speed, according to the vendor. With Topic, users can customize searches by ranking documents in order of importance, thereby accessing the most relevant information first. Outlines represent search requests so that users can see all of the search components and their relationships.

Topic is designed for distributed computing environments in which files exist in multiple formats, so documents can be retrieved from pcs and workstations, as well as from departmental computers. With Topic, a library of topics can be created by an expert, enabling other users to run queries simply by selecting a topic by name.

Two configurations of Topic are available now: a networked environment version that consists of server software for $15,000, with software for each workstation priced at $695 (MS/DOS) or $2,500 (Sun bit mapped); and a multiuser version available for a $39,500 license fee. VERITY INC., Palo Alto. CIRCLE **264**

BRIEFS

Network Software Associates Inc., Laguna Hills, Calif., has brought out CompleteSNA, a **program for pc and PS/2 communications applications.** Priced at $1,495, it supports the following micro-to-host protocols: 3270, 3770/RJE, LU6.2/APPC, LU0, and SDLC. It is available now. **CIRCLE 265**

On-Line Software, Fort Lee, N.J., has introduced Filesave/RCS, **a journal management and recovery package for the CICS and batch program journal environments.** It's available for $12,500 per cpu. **CIRCLE 266**

Boole & Babbage, Sunnyvale, Calif., has brought out **a performance management product for IBM's DB2.** DB2 Manager, scheduled to be available in the first quarter of 1989, will be priced between $25,000 and $40,000. **CIRCLE 267**

MSA Advanced Manufacturing Inc., Atlanta, has made its AMAPS/3000 **manufacturing system software** available for Hewlett-Packard's HP 3000 Series 900 minis. The materials management application modules are priced between $8,000 and $12,000. **CIRCLE 268**

Computer Associates International Inc., Garden City, N.Y., has released CA-Optimizer/CMO (COBOL Migration Option). It **converts COBOL programs into COBOL II.** Priced between $20,000 and $28,000, the product runs under MVS and MVS/XA. It is available now. **CIRCLE 269**

Advanced Graphic Applications Inc., New York, has introduced AGAVIEW, an **image decompression package for OS/2.** Priced at $500, it enables users simultaneously to retrieve, view, size, scale, or expand any number of stored bit-mapped images without using controller boards or high-resolution monitors. **CIRCLE 270**

Globenet, Alexandria, Va., has made available a reduced-rate night service for its **U.S. public packet switched network.** Between 6 p.m. and 6 a.m., rates dip to $2.04 per hour and an average of 50 cents per kilosegment, a 32% drop from daytime rates. **CIRCLE 271**

Gupta Technologies Inc., Menlo Park, Calif., has delivered a **database applications development system for the Microsoft Windows environment.** SQLWindows, which is available now, is priced at $1,295. **CIRCLE 272**

Departments

CALENDAR

SEPTEMBER

Sixth International Conference in Enterprisewide Information Management.
Sept. 7-9, St. Louis. Contact Marilyn M. Parker, Washington University, Campus Box 1220, 1 Brookings Dr., St. Louis, MO 63130, (314) 889-6185.

Aerospace and Defense Computing '88 Conference and Exposition.
Sept. 20-22, Los Angeles. Contact Norm De Nardi Enterprises, 289 S. San Antonio Rd., #204, Los Altos, CA 94022, (415) 941-8440.

OOPSLA '88.
Sept. 25-29, San Diego. Contact Barbara Noparstak, Digitalk Inc., 9841 Airport Blvd., Los Angeles, CA 92680, (714) 731-9022.

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

OCTOBER

TeleCon VIII (Teleconferencing Users Conference).
Oct. 10-11, Anaheim, Calif. Contact Applied Business teleCommunications, Box 1506, San Ramon, CA 94583, (415) 820-5563.

Info '88 (Information Management Exposition and Conference).
Oct. 11-14, New York. Contact Info '88, 999 Summer St., Stamford, CT 06905, (203) 964-0000.

Federal Computer Conference (FCC) and Defense and Government Computer Graphics Conference (DGC).
Oct. 25-27, Washington, D.C. Contact the National Council for Education on Information Strategies, 15200 Shady Grove Rd., #350, Rockville, MD 20850, (301) 670-2818.

SYSTEC '88 (CAD/CAM/CIM Show).
Oct. 25-28, Munich, West Germany. Contact Gerald G. Kallman, Kallman Associates, 5 Maple Ct., Ridgewood, NJ 07450-4431, (201) 652-3898.

Unix Expo.
Oct. 31-Nov. 2, New York. Contact National Expositions Company Inc., 15 W. 39th St., New York, NY 10018, (212) 391-9111.

Big MIPS, Little Plans

BY NORMAN STATLAND

Over 60% of the members of the DATAMATION/Price Waterhouse executive panel expect to increase the MIPS capacity of their shops within the next 12 months. A minority of IS shops now have written systems development plans that are integrated with the corporate plan. These are among the chief findings of a DATAMATION/Price Waterhouse survey focused on management issues such as the administration of IS departments; the delivery of increased services—including leading-edge technologies—to user constituencies; and the attempt to hold close to current IS budget levels.

Planning

Only 40% of respondents have a written overall plan for systems development that is integrated with the corporate plan. Computer services and finance are the only sectors to report over 50% of organizations with such plans (see "Systems Development Planning Activities"). In contrast, less than 40% of the organizations in education/research and retail/distribution have written, overall systems development plans integrated with the corporate plan. Big operations are the best organized: in those with over 5,000 employees, 58% of respondents say their written overall plan is integrated with the corporate plan.

In response to the question, "Is there mutual agreement among department heads on development priorities?" 49% reply "yes," 50% reply "no." Perhaps more surprising is that only 30% of the respondents say they have separate development and maintenance budgets, mostly from the government and computer services sectors, which tend to organize along functional lines. Retail/distribution operations and utilities are least likely to have separate development and maintenance budgets.

Answers in the affirmative in the areas above indicate that the IS department plays an important role within the organization structure, and that user departments have become experienced in dealing with development activities.

Almost 60% say their organization has a separate data administration function/group/person. Again, the size of the company appears to be the key factor: in organizations of over 1,000 employees, two thirds or more have separate data administration functions. Here, "yes" answers demonstrate formal recognition of technology's impact on the corporate database.

Sixty-one percent of the respondents expect the MIPS rates of their cpus to increase in the next 12 months; 37% anticipate a constant MIPS capacity. Only 7% expect a decrease. Companies of over 1,000 employees will increase their MIPS rates most significantly. The largest planned increases in these rates are reported in the utilities and process manufacturing industries. The distribution of MIPS rate utilization by industry is shown in "Hardware Capacity Changes."

AUGUST 15, 1988

- ☐ **Half the respondents say there is mutual agreement among department heads on development priorities.**
- ☐ **Computer services and finance are the only sectors in which over 50% of the organizations have integrated systems development plans into their written corporate plan.**
- ☐ **Utilities and process manufacturing industries will see the most MIPS growth in the next year.**
- ☐ **Only 39% say they'll use automated analysis and design tools—CASE—more extensively during the next 12 months.**

Over two thirds of respondents from midsize and larger firms are using increased MIPS to solve the problem of developing integrated systems, i.e., systems serving large numbers of end users, accessing common data.

Software Issues

An interesting trend emerges from answers to the question, "Do you expect your efforts on hardware contingency and disaster planning to increase?" Only 43% will increase, while 55% say they will stay the same. Those respondents most conscious of their need to increase their contingency and disaster planning activities are in the utilities and government sectors. (The distribution of security efforts by size of company is shown in "Data Security Software Implementation Efforts"). For the relatively small sector of respondents—38%—who expect to increase their efforts in implementing data security software, the majority says that when the importance of data security is recognized, the activity level typically almost doubles.

While a great deal of attention is being focused on the use of CASE tools for analysis and design, only 39% of the respondents will increase their use of such tools to increase productivity within the next 12 months. Organizations with over 5,000 employees are the trendsetters in the use of CASE tools.

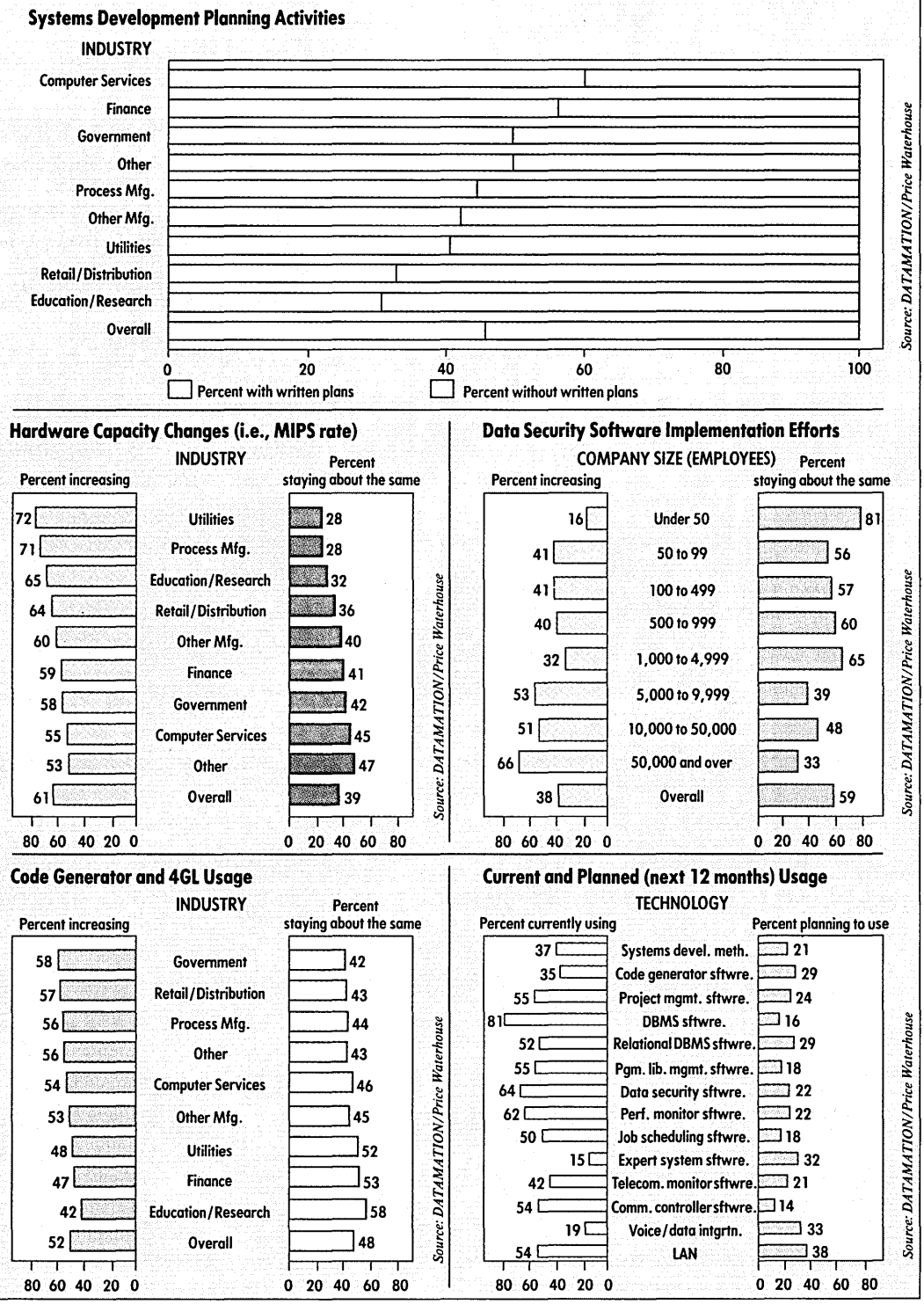
More positively, 52% of the organizations expect to increase the use of code generator software and/or fourth generation languages in the next 12 months. This trend is consistent throughout all organizations of over 100 employees (see "Code Generator and 4GL Usage"). Similarly, while 43% of the organizations report a planned increase in the use of a software-based data dictionary tool, 55% indicate that the levels of data dictionary use would stay the same.

In our experience, data dictionary software is perhaps the most significant tool in developing systems through prototyping that could result in considerable integration between dp functions shared by various departments.

Perhaps the most disappointing trend, in terms of increasing the level of professional discipline within the information systems industry, is that only 25% of the organizations intend to increase the use of a professionally developed systems development methodology. It is difficult to see how the 72% that says it will "stay the same" can evaluate the effectiveness of their systems development activity. We have found it very difficult for internal administration to compare the effectiveness of systems development activities with the general level expected in the industry. Incidentally, almost two of every three IBM mainframe installations report use of a professional systems development methodology.

Forty seven percent of respondents expect the degree of voice and data inte-

Trends for the Next 12 Months



gration among their communications networks to increase over the next 12 months. The significant increase is within companies of over 5,000 employees. Approximately one in every four installations is a user of integrated voice and data facilities; by 1990 the number may increase to four out of 10 installations.

It is significant that only 37% of the respondents expect an increase in the number of applications that have parts of their processing done at more than one dp center in the form of distributed processing. The dividing line seems to be 5,000 employees: 57% of companies below that level say their distributed processing will stay the same, while 5% intend to decrease the amount of distributed processing. The latter is evidence of the backlash caused by difficulties in implementing distributed processing activities.

The problem of integrating advances in technology into current IS management practices has been present since the beginning of IS. DATAMATION/Price Waterhouse constructed a matrix of current and planned use of various technologies (see "Current and Planned Usage"). Not unexpectedly, most organizations indicate that expert systems, voice and data integration, use of code generators, use of a standard systems methodology, and management of telecommunications receive the least amount of attention. This is yet more evidence of a maturing set of IS management practices.

The survey reveals that the two IS organization areas due to receive the largest amount of management attention in the next 12 months are integration of IS development plans with corporate business development plans, and agreement among department heads on IS development priorities.

On the positive side, 81% of respondents say that database software is used as a technical tool and 52% say they use relational databases in their organizations. Over 50% report doing some form of automated job scheduling.

Surprisingly, the leading technology-based activities that are planned are the increased use of local area networks, voice and data integration, expert systems, code generators, and the increased use of relational database technology. All other areas lag significantly behind. ■

Norman Statland is the national director of information resource management services at Price Waterhouse. He is the author of Controlling Software Development *(John Wiley & Sons, New York, 1986).*

Charts by Paragraphics

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DATAMATION

1988 Editorial Calendar and Planning Guide

Issue Date	Recruitment Deadline	Editorial Emphasis
Sept. 15	Aug. 24	Best Computer Science Universities
Oct. 1	Sept. 14	Salaries
Oct. 15	Sept. 26	Changing Roles of MIS
Nov. 1	Oct. 12	Productivity
Nov. 15	Oct. 26	Mini-Micro Spending
Dec. 1	Nov. 10	Applications Software Spending
Dec. 15	Nov. 28	Information Assets

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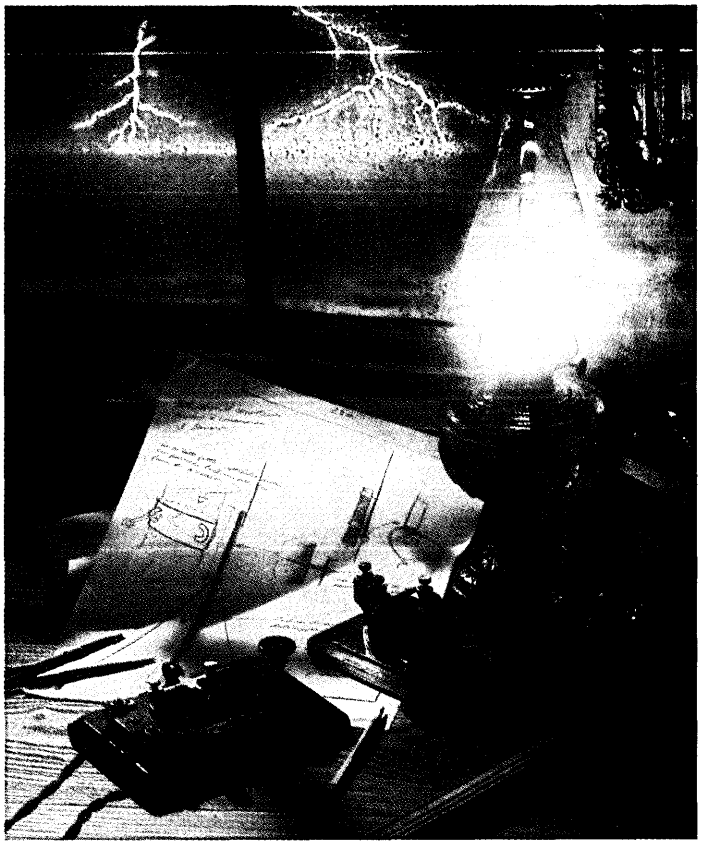

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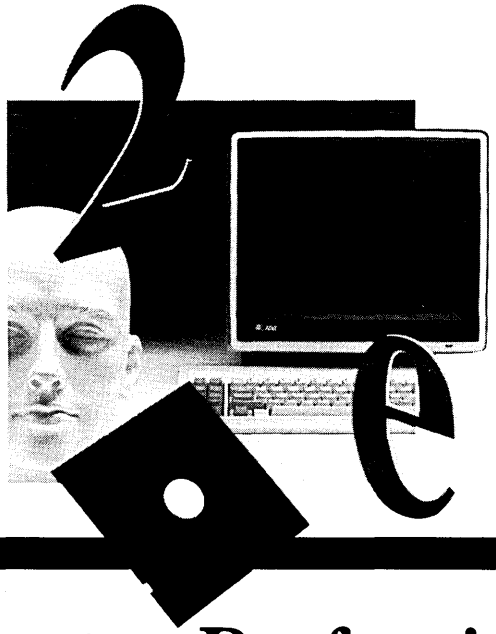

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(Continued on Next Page)

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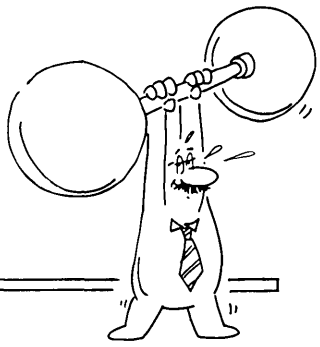

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PRESENT OR MOST RECENT EMPLOYER

Parent Company _____
Your division or subsidiary: _____
Location (City, State) _____
Business Phone if O.K. to use: _____

EDUCATION

Degrees (List)	Major Field	GPA	Year Degree Earned	College or University

POSITION DESIRED

_____

EXPERIENCE

Present or Most Recent Position From: To: Title: _____

Duties and Accomplishments: Industry of Current Employer:

_____

_____

_____

Reason for Change: _____

PREVIOUS POSITION:

Job Title: _____
Employer: _____ From: _____ To: _____ City: _____ State: _____
Division: _____ Type of Industry: _____ Salary: _____
Duties and Accomplishments: _____

COMPENSATION/PERSONAL INFORMATION

Years Experience	Base Salary	Commission	Bonus	Total Compensation	Asking Compensation	Min. Compensation

Date Available | I Will Travel ☐ Light ☐ Moderate ☐ Heavy | ☐ I own my home. How long? _____ I rent my home/apt. ☐

☐ Employed ☐ Self-Employed ☐ Unemployed | ☐ Married ☐ Single | Height_____Weight_____

Level of Security Clearance | ☐ U.S. Citizen ☐ Non-U.S. Citizen | My identity may be released to: ☐ Any employer ☐ All but present employer

☐ WILL RELOCATE ☐ WILL NOT RELOCATE ☐ OTHER _____

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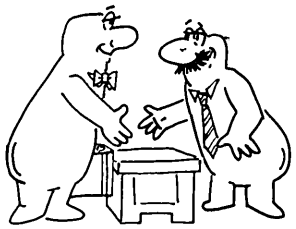

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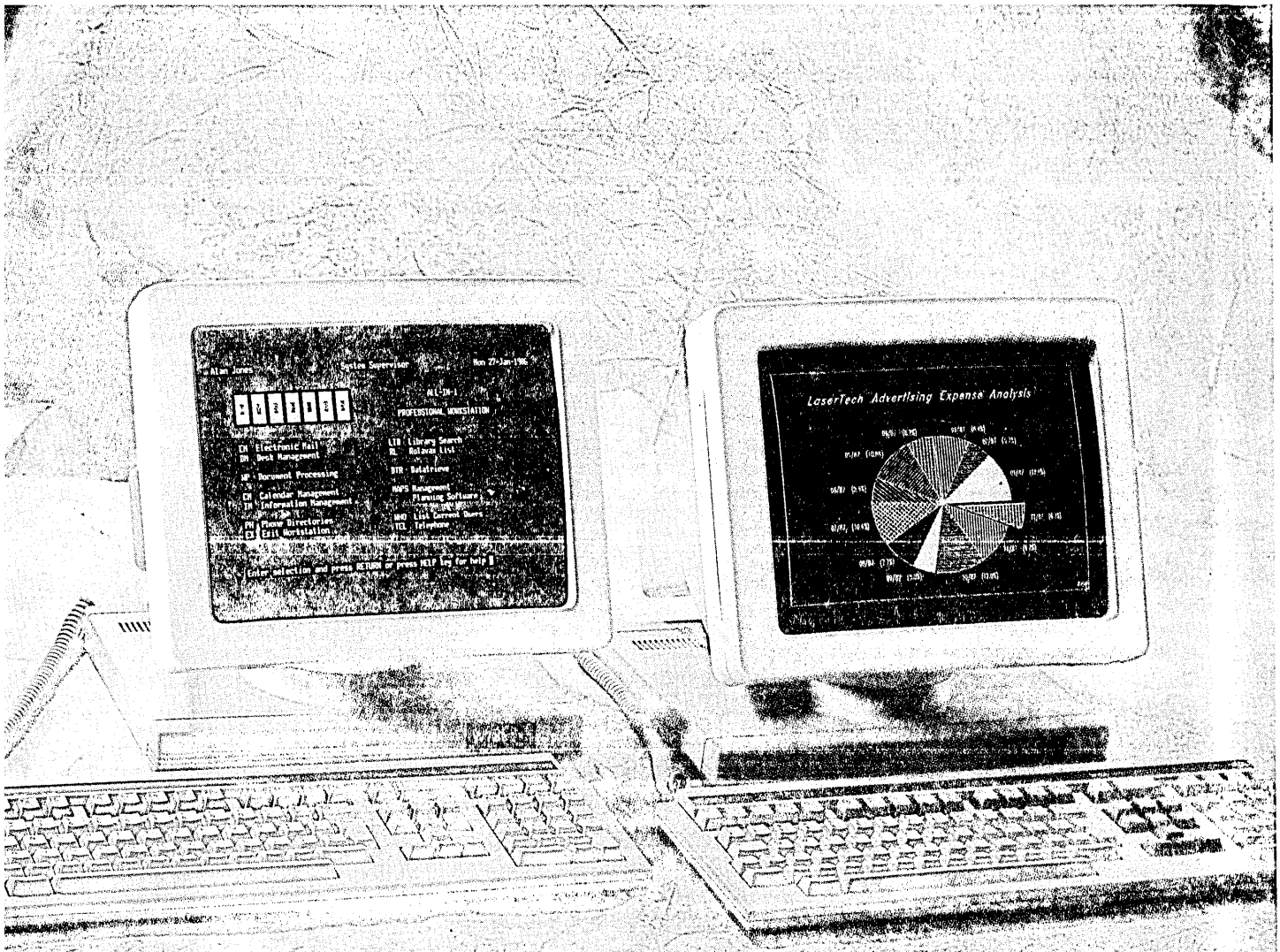

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