

DATAMATION®

AUGUST 15, 1988
A CAHNERS PUBLICATION

SPECIAL REPORT: DBMS

Fatal Flaws In SQL

By E.F. Codd

THE GEORGE A. FREEMAN LIBRARY
STATE TECHNICAL INSTITUTE AT MEMPHIS
5983 MACON COVE AT INTERSTATE 40
MEMPHIS, TENNESSEE 38134

82443422 (9812)0637 00
STATE TECH INST MEMPHIS
LIBRARY PERIODICALS
5983 MACON COVE
MEMPHIS TN 38134

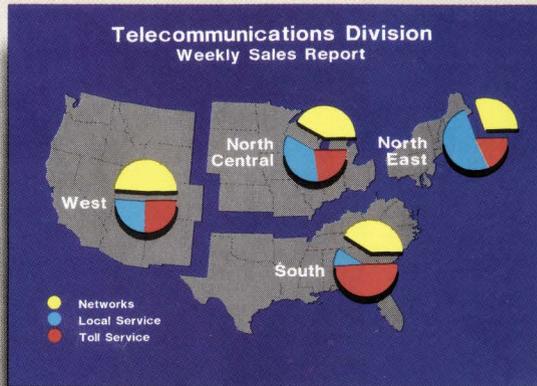
Also In This Issue:

- Why Management Must Confront the VDT Issue
- Contract Programming Is Hotter Than Ever
- IEEE Warns on Japanese Supercomputer Threat

The SAS[®] System

The Graphics Tool You Won't Outgrow.

When you've got to turn those numbers into a presentation, turn to the SAS[®] System. The SAS System includes easy-to-use procedures for charts, plots, maps, and three-dimensional displays. At a glance, you can grasp detailed statistics, spot relationships among items, and trace emerging trends. And when your manager wants more, the SAS System lets you customize your graphs and present multiple displays on the same page for easy comparison. You can produce your graphs on terminals, plotters, transparencies, or slides.



You can even use the SAS System to analyze your data before you present them. We've got tools for every kind of analysis—from simple descriptive statistics to advanced regression, analysis of variance, discriminant analysis, clustering, scoring, and more.

And as your needs grow, the SAS System grows with you. All the tools you need for full screen data entry, modeling, forecasting, "what if" analysis, project management, optimization, and quality control are

available in the SAS System. You choose the products you need, and enjoy the same easy-to-use language and syntax in each. Whether you license one product or several, you'll enjoy the same high-quality software, training, documentation, and

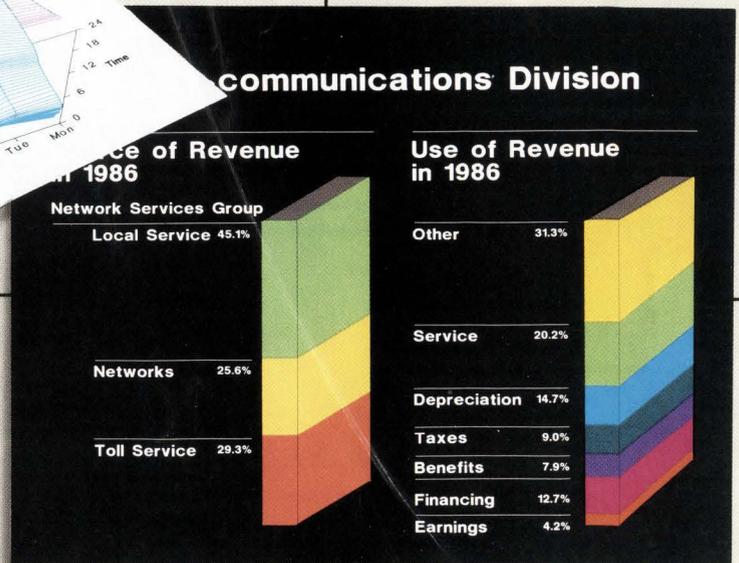
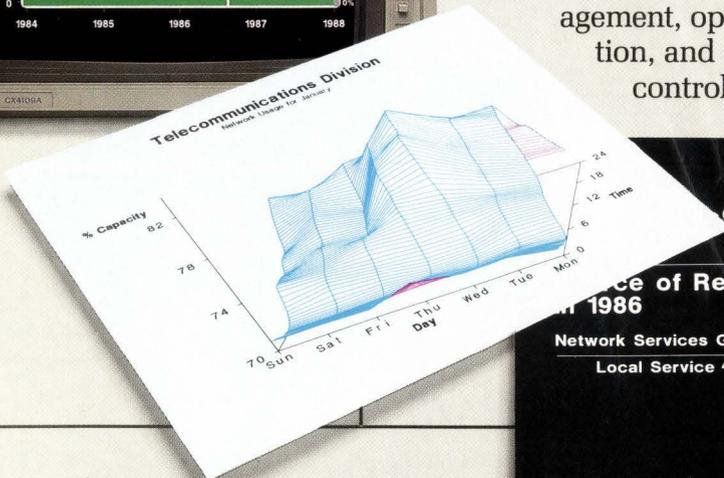
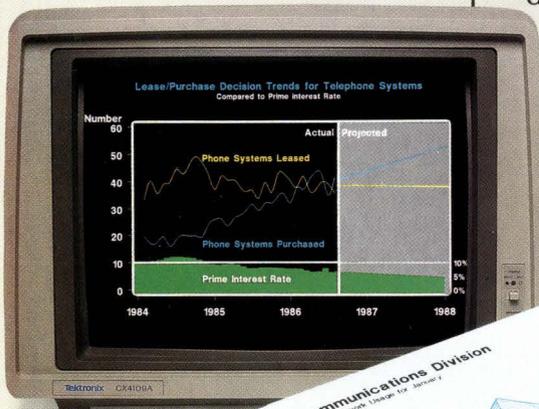
support we've offered for more than ten years.

For details, send us your name and address. Or call a Software Sales Representative today.

SAS/GRAPH[®] Software Now on Your PC



SAS Institute Inc.
 SAS Circle □ Box 8000
 Cary, NC 27512-8000
 (919) 467-8000
 Fax (919) 469-3737



The SAS System runs on these minicomputers: Digital Equipment Corp. VAX[™] 8xxx and 11/7xx series under VMS[™] and MicroVAX II[™] under MicroVMS[™]; Prime Computer, Inc. Prime 50 series under PRIMOS[®]; and Data General Corp. ECLIPSE[®] MV series under AOS/VSE. The SAS System also runs on IBM 370/30xx/43xx and compatible machines under OS, CMS, DOS/VSE, SSX, and ICCF; IBM XT/370 and AT/370 under VM/PC; and IBM PC XT and PC AT under PC DOS. Not all products are available for all systems.

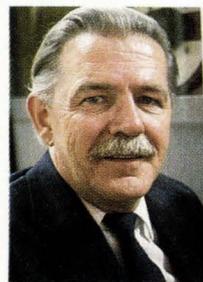
SAS and SAS/GRAPH are registered trademarks of SAS Institute Inc., Cary, NC, USA.
 Copyright © 1987 by SAS Institute Inc. Printed in the USA.



CINCOM Opens Doors For Best Western.

PROBLEM: How to easily access and update large volumes of corporate information vital for strengthening image and facilitating expansion

CINCOM SOLVED IT: With SUPRA Advanced Relational DBMS and MANTIS, a powerful application development tool



Mr. Robert C. Seate
Manager, Management Information Systems
Best Western International, Inc.

Tracking and managing information for 3,300 hotels in more than 30 countries around the world is enough to give any MIS manager some sleepless nights. But, thanks to the SUPRA™ Advanced Relational DBMS from Cincom®, Best Western's Robert Seate (along with member hoteliers and guests) can rest assured things are running smoothly.

"With SUPRA, we really have the best of both worlds," explains Seate. "We get the advantages of a relational environment and, at the same time, get a system that performs very well in a large volume production environment."

SUPRA's superior performance lets the world's largest hotel chain access and update the marketing data as well as the property and travel publications essential to support and promote each hotel. SUPRA also works in concert with MANTIS®, a flexible application development tool in the CASE ENVIRONMENT™, to drive multiple programs designed to monitor and upgrade quality standards throughout the Best Western organization. "When you increase the value of the chain, people want to become a part of it," Seate explained.

"SUPRA and all the Cincom products work together to help us meet our corporate expansion and quality goals," Seate points out. "It's a set of tools that is very flexible, very easy to use and learn, and very capable of developing and supporting a wide variety of applications."

As for SUPRA's reliability, Seate has no reservations. "Let's put it this way," he says, "we're running our payroll on it. We'd be crazy to do that if we didn't have a high degree of confidence in the system."

If you're looking for a relational data base with IBM and VAX compatibility, high performance and reliability, plus the option of a flexible application development tool, it's time you checked into SUPRA and MANTIS.

Call us today for more product and customer success information, or write our Marketing Service Department, Cincom World Headquarters, 2300 Montana Avenue, Cincinnati, OH 45211.

1-800-543-3010

In Ohio, 513-661-6000

In Canada, 1-800-387-5914

CINCOM
The Better The Solution, The Better The Value.™

DATAMAT

NEWS

11 **Look Ahead**

Amdahl expects MVS/ESA support to cost more.

19 **Supercomputing**

In a new IEEE study made available exclusively to DATAMATION, grave concerns are expressed about the U.S. supercomputer industry's ability to compete with Japan. Willie Schatz explores the reasons why.

21 **Software**

Gary McWilliams investigates the jumble of graphical user interfaces and operating systems vying for developers' favor. Behind the obvious cosmetic differences lie some substantial issues.

24 **Microcomputers**

The death of Boris Naumov, the man overseeing computerization in Soviet society, may hinder any East-West high-tech joint ventures. David Hebditch probes what's ahead.

With:

24 *The Structure of the Soviet IS Industry*

30 **Networks**

Brad Schultz illuminates a little-known research project into so-called MEMNETS. If successful, the need for products to implement conformance to network protocols may be over.

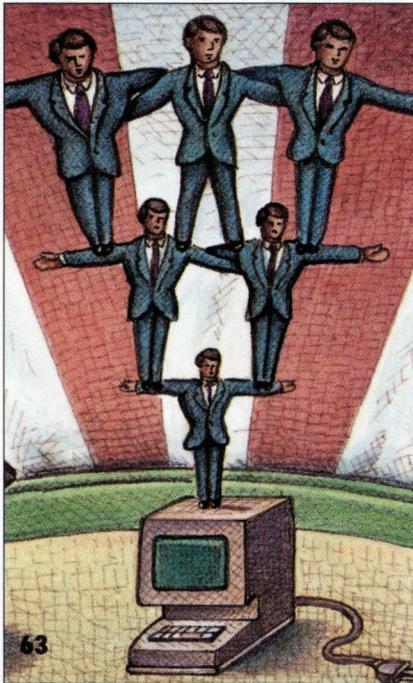
39 **Behind the News**

The recent Suffolk County, N.Y., mandate for VDT worker "protection" has rekindled the debate over VDT safety. Willie Schatz examines how the focus has shifted to ergonomics and what the work environment is like at several firms.

With:

41 *Using Ergonomics To Improve the Bottom Line*

FEATURES



SPECIAL REPORT: DBMS

45 The first wave of DBMS usage is ending. New tasks for IS are at hand, namely, achieving integration. This report examines the state of DBMS today.

45 **Fatal Flaws in SQL Part 1**

BY E.F. CODD

SQL is the de facto standard in DBMS today. Here, "the father of relational technology" examines two of the three flaws he sees in SQL.

51 **All TP1s Are Not Created Equal**

BY STEVEN CANIANO

Different evaluations of OLTP DBMS products with TP1 benchmarks don't always produce equivalent results. Herewith, a guide to making useful comparisons.

With:

53 *Clearing the Benchmark Air*

New TP1 guidelines.

57 **The New Era of DBMS Integration**

BY DAVID R. BROUSELL

Three of every four IS managers surveyed in an exclusive DATAMATION poll say they plan to integrate mainframe DBMS with those on PCs and workstations.

63 **The Traveling Programmer's Popular Show**

BY MARY JO FOLEY

Packaged software and systems integrators were expected to crimp third-party programmers' style, but it ain't necessarily so. With:

65 A partial list of contract programmers.

74 **The DATAMATION/Price Waterhouse Survey**

Over 60% of IS execs surveyed expect to increase MIPS capacity.

NEW PRODUCTS

68 Hardware

New Teleos Communications releases for ISDN switching between basic rate interface and primary rate interface circuits. In Trends: page printers fuel nonimpact printer sales.

70 Software

Walker Interactive Systems makes its mainframe financial software available under IBM's DB2 RDBMS for the MVS operating system. In Trends: a way for CICS users to use the COBOL sort verb on-line.

DEPARTMENTS

4 Letters

73 Calendar

OOPSLA '88, a conference on object-oriented programming, is coming up in San Diego.

76 Career Opportunities

88 Advertisers' Index

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:
249 W. 17th St.
New York, NY 10011
Attn.: Managing Editor

AUGUST 15, 1988
VOLUME 34
NUMBER 16
THIS ISSUE, 184,089
COPIES



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
EDITOR-IN-CHIEF

DATAMATION

Editor-in-Chief Tim Mead
Senior Editor Linda Runyan

Managing Editor/News & Features David R. Brousell
Senior Writer Ralph E. Carlyle
Deputy News Editor Theresa Barry
Deputy Features Editor Marsha J. Fisher
New Products Editor Mary Kathleen Flynn
Editorial Assistant Karen J. Scher
Editorial Secretary Anne M. Mangieri

Managing Editor/Production & Special Projects Parker Hodges
Copy Chief Steven Korn
Production Editor Hernalee Walker
Copy Editors René Matthews, John Quain
Production Assistant Suzanne P. Jones

International Editor Paul Tate
Editorial Assistant (London) Lauren Murphy
Correspondents James Etheridge, Paris; David Hebditch, Eastern Europe; Janette Martin, Milan

U.S. Bureau Managers
Boston Gary McWilliams
Dallas Robert Francis
Los Angeles Tom McCusker
San Francisco Jeff Moad
San Jose Susan Kerr
Washington Willie Schatz

Art Director Robert L. Lascaro
Associate Art Director Anne Cooney
Assistant Art Director Carolee Young

Contributing Editors Joseph Kelly, Fred Lamond, Hesh Wiener
Advisory Board Joseph Ferreira, John Imlay, Angeline Pantages, Russell Pipe, Carl Reynolds

Publishing Director Donald Fagan
Associate Publisher William Segallis
Promotion Manager Stacy Aaron
Production Manager Eric Jorgensen
Research Manager Laraine Donisi
Director of Production Robert Elder
Director of Art Department Barrie Stern
Circulation Manager Cheryl Barnett

EDITORIAL OFFICES

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

DATAMATION (ISSN 0011-6963) Magazine is issued twice monthly on the 1st and 15th of every month by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington St., Newton, MA 02158-1630. William M. Platt, Chief Executive Officer; Terrence M. McDermott, President; Frank J. Sibley, Group Vice President; Jerry D. Neth, Vice President/Publishing Operations; J.J. Walsh, Financial Vice President/Magazine Division; Thomas J. Dellamaria, Vice President/Production and Manufacturing. Editorial and advertising offices, 249 W. 17th St., New York, NY 10011. Published at Woodstock, IL. Annual subscription rates: U.S. and possessions: \$60; Canada: \$85; Japan, Australia, New Zealand: \$155 air freight; Europe: \$135 air freight, \$250 air mail. All other nations: \$135 surface, \$250 air mail. Reduced rate for U.S. public and school libraries: \$40. Single copy: \$3 in U.S. Sole agent for subscriptions in Japan is Maruzen Co. Ltd., 3-10 Nihonbashi, 2-Chome, Chuo-ku, Tokyo 103, J; sole agent for all other foreign subscriptions is J.B. Tratsart Ltd., 154 A Greenford Rd., Harrow, Middlesex HA13QT, England, (01) 422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Circulation records are maintained at 44 Cook Street, Denver, CO 80206. Phone (303) 388-4511. Second-class postage paid at Denver, CO 80206 and at additional mailing office. DATAMATION copyright 1988 by Reed Publishing USA; Saul Goldweitz, Chairman; Ronald G. Segel, President and Chief Executive Officer; Robert L. Krakoff, Executive Vice President. All rights reserved. DATAMATION is a registered trademark of Cahners Publishing Co. Reprints of articles are available; contact Frank Pruzina (312) 635-8800. Microfilm copies of DATAMATION may be obtained from University Microfilms, A Xerox Company, 300 N. Zeeb Rd., Ann Arbor, MI 48106. Printed by Graftek Press Inc. **All inquiries and requests for change of address should be accompanied by mailing label from latest issue of magazine.** Allow two months for change to be made. POSTMASTER: send address changes to DATAMATION, 44 Cook St., Denver, CO 80206.

ABP



BPA

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.

Further, our Tymnet network is one of the two leading public data communications networks in the U.S. It continues to be a cornerstone in our ability to offer customers total systems integration solutions.

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



Closer to Genius

Introducing PowerHouse PC™, the most powerful 4GL for serious application development on a personal computer.

PowerHouse PC delivers more power than any other PC application development product. It gives you OS/2™ performance and integrated communications. And it gives you all of this — today.

PowerHouse now lets you prototype and build serious business applications on your PC in addition to HP, Digital and DG mid-range computers. The simplicity of one language across architectures gives you the flexibility of choosing the production environment that best suits your needs.

Use PowerHouse PC as a *development workstation* to develop applications for your mini, as a *host extension* to offload processing, or for *stand-alone* applications. Complete with a communications facility, PowerHouse PC makes the most of your resources by allowing you to share applications and data between architectures. What makes PowerHouse PC even smarter is that it runs under both *DOS and OS/2*.

When you're ready for serious application development on a personal computer, you're ready for PowerHouse PC.

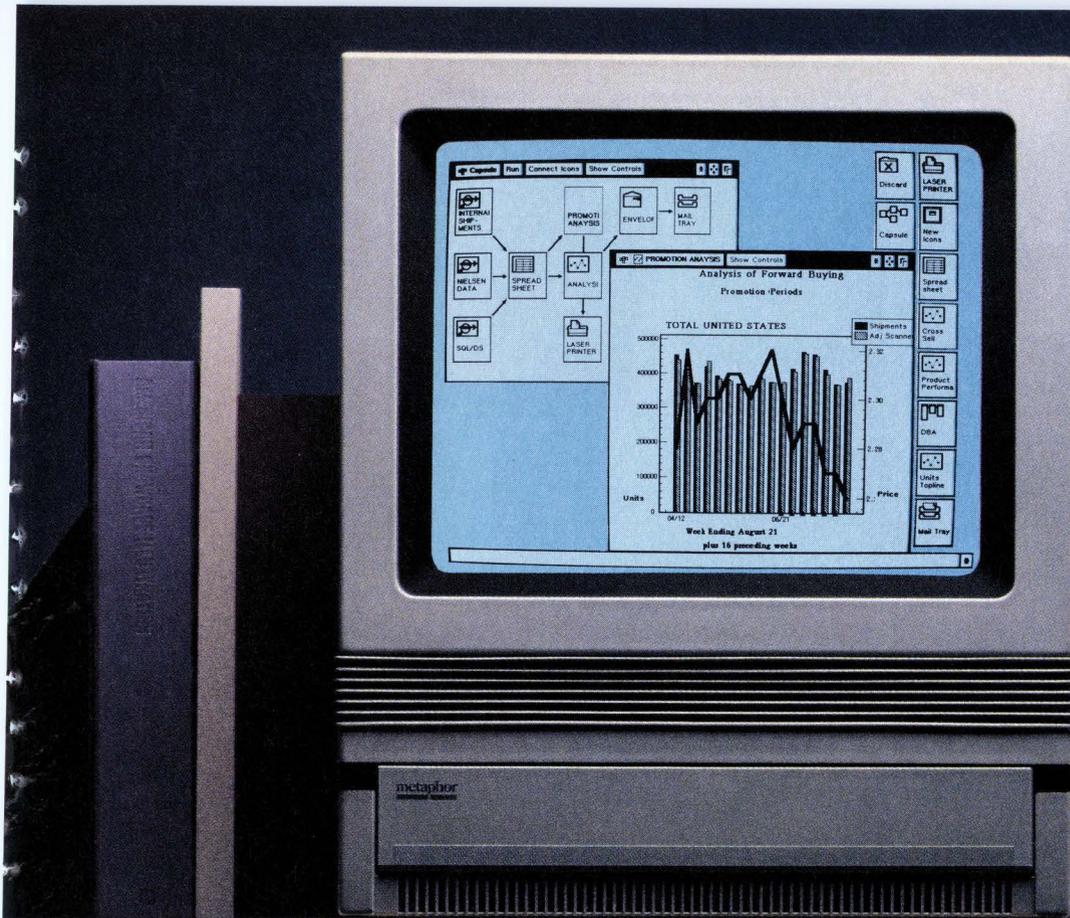
Call Cognos Direct, 1 800-4-COGNOS

COGNOS

OS/2 is a trademark of International Business Machines Corporation. The Cognos logo and PowerHouse are registered trademarks of Cognos Incorporated. PowerHouse PC is a Cognos trademark.

Cognos Corporation, 2 Corporate Place, 1-95, Peabody, MA, USA 01960, (800) 4-COGNOS. Cognos Incorporated, 3755 Riverside Drive, P.O. Box 9707, Ottawa, Ontario, Canada, K1G 3Z4, (613) 738-1440, Telex: 053-3836. Cognos Limited, Westerly Point, Market Street, Bracknell, Berkshire RG12 1QB, United Kingdom, National (0344) 486668, International +44 344 486668, Telex: 846337 Cognos G.

**The next generation of desktop computing
will let us merge data from different sources
into a useful flow of information.**



Metaphor. The next generation.

Your company undoubtedly has tremendous data resources. Metaphor's Data Interpretation System can help you turn them into a tremendous competitive advantage.

Metaphor's system is far more than an incredibly sophisticated, amazingly easy-to-use computer. It's a means of gaining a real edge in the battle for more business, through gains in professional productivity and enhanced business decision-making.

Metaphor is the only system that can give your key decision-makers direct access to multiple data bases. They will be able to readily transform raw data into meaningful information. And share the results with management and peers, quickly, easily. So decisions can be made in time to make a difference.

Metaphor's system makes a big difference for Information Systems professionals, too. Metaphor lets users build their own applications, so IS managers can turn their skills to more effectively managing the corporate information resource, rather than grinding out user reports and applications from a seemingly endless backlog of requests. And given Metaphor's proven understanding of end-user needs, IS gains a strong "support arm," too.

That's what customers at over 100 installations in the world's largest and most successful companies tell us. They've proved Metaphor's Data Interpretation System is a powerful business tool, giving them an enormous advantage over those who don't keep up with the latest technologies.

Start the competitive advantage flowing to your company now, with Metaphor. Write us at 1965 Charleston Road, Mountain View, CA 94043, or call us toll-free at 800-255-5803 today.

metaphor



Let's talk about relational data bases.
But first, find the clown with
the red nose, top hat and no balloons.

If you picked the first clown from the right on the top row, you didn't need the help of a relational data base system.

Of course, real-life business problems are considerably more complicated. That's why IBM, the leader in relational data base technology, offers a wide range of products to work with a full range of hardware, from workstations to midrange and mainframe computers.

IBM's data base products can help users in any department retrieve information about as easily as you solved the problem above. They also provide tools for programmers to do their job more efficiently. And that means improved productivity for everyone.

In fact, IBM's DB2 and SQL/DS offer referential integrity, which allows you to maintain data relationships without complex programming. And with application enabling tools such as IBM's Cross Systems Product, you can develop new programs with speed and simplicity. So even as your business needs change, your existing applications and data bases will remain sound investments.

Call 1-800-IBM-2468, ext. 44, for literature or to arrange for an IBM marketing representative—in the blue suit, yellow tie with a black briefcase—to contact you.

 The Bigger Picture

NBS SOUTHERN – TOTAL IMPACT ON NON-IMPACT PRINTING!



3815

FROM POSTSCRIPT® TO 80 PAGES PER MINUTE!

NBS Southern is the company that blankets the non-impact printing spectrum. From the PostScript-compatible, 15 page-per-minute model 3815, to the blazing 80 ppm speed of the Mercurion 1/80, NBS has a solution to your computer printing needs.

Model 3815 – Maximum Office Versatility

Available in PostScript, PC network, twin-axial, co-axial and ASCII versions, the 3815 is far more durable than most desktop laser printers and is the ideal solution

3840

Model 3840 – Complex Output at 40 ppm

This laser printer houses up to 150 resident bitmap fonts at 300 dpi, and processes complex forms and graphics at full rated speed. Its nominal duty cycle of 200,000 pages per month makes it a perfect fit for both host-attach and network printing applications.

Mercurion 1/80 – The Affordable High-speed Workhorse

Now you can match the output of *three* high-speed impact printers

MERCURION® 1/80

at only a fraction of the per page cost. Using an ion deposition process, the Mercurion 1/80 produces 80 letter-size pages per minute, with a rated monthly duty cycle of 500,000 pages. It accepts a variety of host interfaces and delivers high quality forms and text via 240 dot-per-inch resolution.

Decide which NBS non-impact printer is best for your needs; then contact us for detailed specs and prices. NBS Southern, Inc., 11451 South Belcher Road, Largo, Florida 34643. Telephone 813/541-2200; outside Florida 800/327-5602; FAX 813/546-8042.

NBS
Southern, Inc.
Circle 8 on Reader Card

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-

Look Ahead

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?

The lightning that struck the power line did not make your future bright. If the management lets you try again, protect your firm's data with products from Topaz.

Topaz provides power protection for computers of all types and sizes, from individual microcomputers to large mainframes.

Power problems caused by weather, overloaded utilities, and even old building wiring are easily solved by the correct application of Topaz products: Ultra-Isolator® Noise Suppressors with up to 40 million to 1 noise attenuation;

Power Conditioners in a wide variety of styles, models and sizes; and Uninterruptible Power Systems including the Powermaker® Micro UPS for your personal workstation.

The Topaz applications engineering staff understands your computer's power needs and will work with you to develop optimum security for your data. Security that includes the Topaz Product Performance Guarantee.

Call one of our applications engineers today and protect your data before lightning strikes again.

SOLUTIONS TO
POWER PROBLEMS

TOPAZ®

A Square D Company

9192 Topaz Way, San Diego, CA 92123-1165—(619) 279-0831

Circle 9 on Reader Card

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.*

Why do VMS and ULTRIX users buy the ORACLE® RDBMS more than twice as often as any other? Why is ORACLE so far ahead of Cullinet, Software AG and ADR on IBM Mainframes?

Because ORACLE offers the best set of 4th-generation application development tools.

Because ORACLE fully supports everything from loosely coupled VAXs to tightly coupled IBM mainframes, and also allows you to transparently share data among PCs, workstations and mainframes — even mainframes running DB2.

Because ORACLE runs on virtually every micro, mini and mainframe. Which means your ORACLE applications run everywhere.

Because ORACLE was the first implementation of SQL, the data management standard adopted by IBM, ANSI, ISO and the federal government. But ORACLE isn’t just SQL compatible. With such added functionality as *outer joins* and *CONNECT BY*, ORACLE is the most powerful SQL implementation for micros, minis or mainframes.

Because ORACLE has been the best-performing RDBMS on the VAX. **And you haven’t seen anything yet!**

Call today, to reserve a seat in the next ORACLE seminar in your area. Learn why database competition is no contest. Find out what ORACLE can do for you.



ORACLE®
COMPATIBILITY • PORTABILITY • CONNECTABILITY

Call 1-800-345-DBMS, ext. 107 today.

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 5
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
	Salt Lake City	Sep 20, Nov 9
UT	Norfolk (Federal)	Oct 4
VA	Richmond	Oct 6, Nov 1
VT	Burlington	Sep 28
WA	Seattle	Sep 14, Oct 20
	Spokane	Nov 3
WI	Madison	Oct 5
	Milwaukee	Oct 12, Nov 29

CANADIAN SEMINARS

To register for Canadian seminars, please call the office nearest you:
Calgary 403-265-2622, Ottawa 613-238-2381, Quebec 514-337-0755, Toronto 416-596-7750.

Calgary	Sep 15, Nov 17
Edmonton	Oct 6
Halifax	Oct 13
Kingston	Sep 16
London	Oct 20
Montreal	Sep 28, Oct 26, Nov 23
Ottawa	Sep 1, Oct 6, Nov 3
Quebec	Sep 7, Oct 5, Nov 2
Regina	Sep 22
Saskatoon	Nov 10
Toronto	Sep 13, Oct 11, Nov 8
Vancouver	Sep 8, Nov 10
Victoria	Nov 24
Winnipeg	Oct 20

Attn: National Seminar Coordinator
Oracle Corporation • 20 Davis Drive
Belmont, California 94002

My business card or letterhead is attached. Please enroll me in the FREE ORACLE seminar to be held

at: _____

on: _____

DATAMATION

Informix is the #1 For more than

If you're looking for the best database, just look at this data.

It's the best-seller.

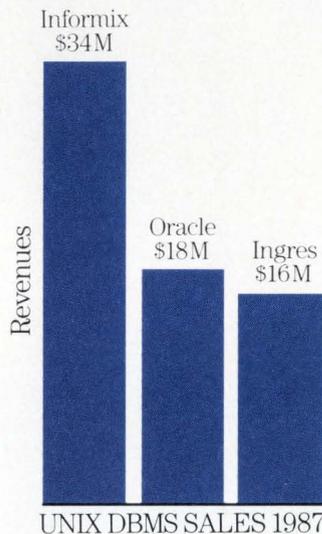
According to a recent Dataquest survey, Informix UNIX® DBMS products out-sold their closest competitors by almost 2 to 1. Moreover, INFORMIX-SQL and INFORMIX-4GL recently won *UNIX WORLD* magazine's coveted "Readers' Choice" awards in their respective categories. Better yet, the same readers named INFORMIX-SQL the best UNIX software, period.

Hardly surprising, when you consider everything Informix has going for it.

It's the easiest.

Because it's the only true 4GL.

Why do we get such a big slice of the UNIX DBMS market? Because our products



are easier to build applications with.

You see, INFORMIX-4GL is the only true COBOL-replacement caliber tool. While those other DBMS products masquerade as 4GLs (providing mere report writers and screen generators), INFORMIX-4GL gives you a complete language.

So you can forget about coding in C or COBOL. And count on being at least ten times more productive. Plus you can use our exclusive Interactive Debugger to view and debug your 4GL source code while the program runs. Delivering finished applications in record time.

It's the fastest.

INFORMIX-SQL and INFORMIX-4GL are fast. And when you run them with our

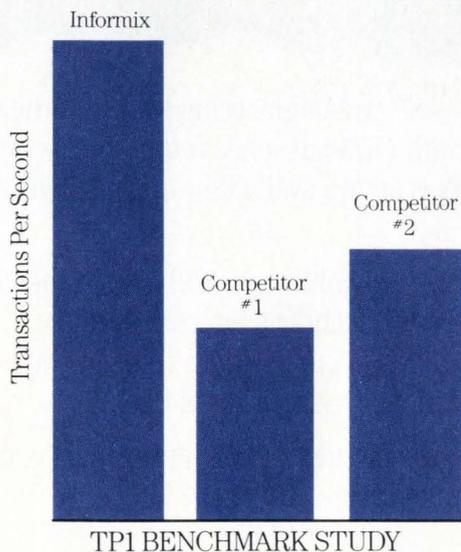


Database in UNIX. In one reason.

INFORMIX-TURBO database server they fly. In fact, in a recent TP1 (transaction processing) benchmark study, Informix ran a great deal faster than other leading DBMS products.

It's the most portable.

With Informix, you'll never have to rewrite your source code. Our Rapid Development System lets you compile your code without a C compiler or linker. So porting to other operating systems is a snap. And you can run your Informix application on over 200 machines from more than 85 companies. Twice as many machines as our nearest competitor.



Send for our free booklet,
"How To Choose An RDBMS"

Call or write today for complete product data, plus our free guide to selecting the RDBMS that's right for you. Informix Software, Inc., 4100 Bohannon Drive, Menlo Park, CA 94025. (415) 322-4100.

And we'll make you our #1 priority.



INFORMIX

#1 for good reason.

Unlock The Mysteries Of DB2 Performance.

Dynamic SQL Call Being Executed

```
INSERT INTO TDQM.TABLE821  
(PAGENO,TOTAL) VALUES (000,1)
```

OMEGAMON



1% DISPLAY DATABASES
(DSND06)

MVS
CICS



IMS
TSO



DFD
DDL
DML
DBD

To manage DB2 performance, you need more than information. You need solutions. OMEGAMON® for DB2 gives you both.

Exception Analysis warns you when key thresholds are exceeded. Before a stray thread turns your system to stone. Then powerful zooming features take you where no one else can. Deep into the passageways of DB2. Right down to the SQL call. And Recommendation Screens translate detailed data into realtime solutions.

Yet what's sophisticated on the inside is made simple on the outside with menus and help screens. OMEGAMON identifies the problem thread so your troubleshooting is as effortless as pressing a PF key.

Proprietary software engineering keeps overhead as low as 1% with minimal space requirements. And OMEGAMON is always available—even when DB2 is locked up.

Candle's always available, too. With round-the-clock customer service, technical education, and a commitment to stay current with IBM. So you won't ever be lost in the passageways of DB2.

To decipher the mystery of DB2 performance, call Terry Forbes today at (800) 541-8513.

!Candle®

Copyright © 1988 Candle Corporation. All rights reserved.

Circle 12 on Reader Card

News in Perspective

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 non-partisan IEEE taking a policy position. Things must be pretty bad for them to start screaming."

Finding the Framework

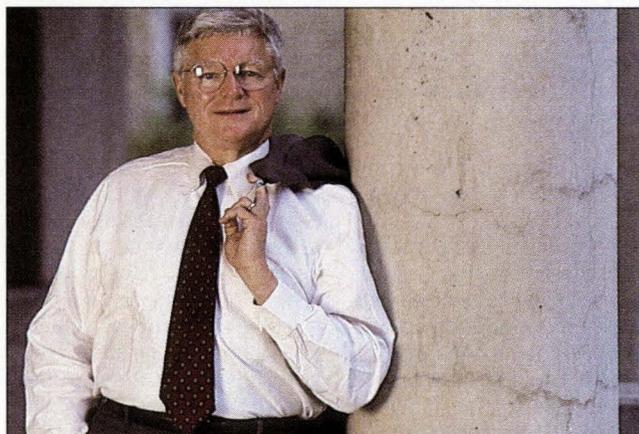
The something McAdams refers to is finding "an acceptable institutional framework in which government, industry, and academia can pursue these objectives to the long-run benefit of the nation as a whole." Were that to occur, the institutional framework would still be useless without a guarantee that 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

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



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

issues will we be able to ensure a strong U.S. base for innovation, productivity, and international competitiveness."

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.

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 solu-

tion: 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

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

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.

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." ■

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 di-

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

ing 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

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

verse 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

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.

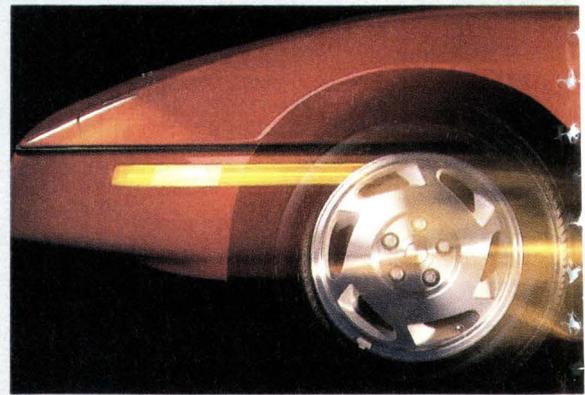
Knoble, currently test-

ing 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."

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

ing 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."

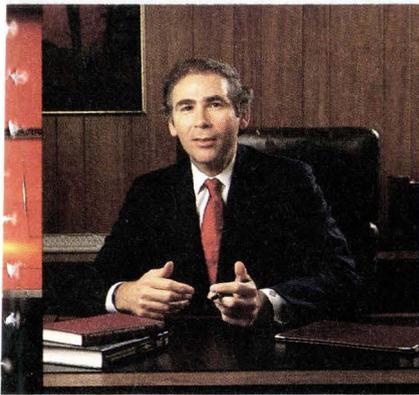
Digital
has
it
now.



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.

"With the VAX™ architecture, you can go up, down or sideways without needing to redo the programming. Right now, we're planning for our next phase of automation – computer cataloging. And after that? Well, there's no telling where we can go. But we're sure Digital will be there. With a level of service, responsiveness and commitment that's part of their whole package. A package that keeps NAPA/Wilmar moving in the right direction."

To find out more about how Digital can accelerate your business's success, write Digital Equipment Corporation, 200 Baker Avenue, West Concord, MA 01742. Or call your local Digital sales office.

digital™

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 co-operatives, 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.



CYANAMID'S KNOBLE: Graphic environments improve productivity.

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." ■

First we created the UNIX[®] System. Then we created the most inexpensive way to learn it.



The AT&T Videotape Library—definitive UNIX System training at a surprisingly affordable price.

Only one company brings you top quality UNIX System training at a price much lower than you'd expect to pay. The company that *created* the system. AT&T.

It's the AT&T Videotape Library. A complete series of videotapes that lets you study the UNIX System at your own pace. In your own office. And remains an invaluable reference tool for the entire staff.

With full color, high resolution graphics. Video blackboards. And a comprehensive workbook included with each course level.

You can choose from three levels of UNIX System training:

Basic, Intermediate, and Advanced. Plus Shell Programming and C Languages for programmers.

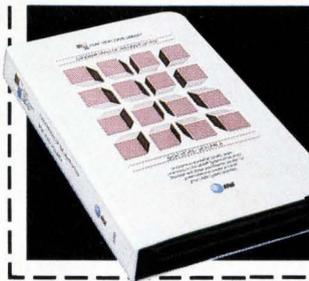
And only the AT&T Videotape Library is backed by a telephone support line—giving you direct access to expert AT&T instructors.

The AT&T Videotape Library. Definitive. Affordable. Call now for more information.

AT&T COMPUTER TRAINING.
Come right to the source.
1 800 247-1212, ext. 846.
Or send in the coupon below.

Registrar, AT&T Training, P.O. Box 45038, Jacksonville, FL 32232-9974

YES! I'd like to know more about AT&T's inexpensive way to learn the UNIX[®] System. Please send information about the AT&T Videotape Library.



Name (Please print) _____

Title _____ Phone () _____

Company _____

Address _____

City _____ State _____ Zip _____

DMV08158

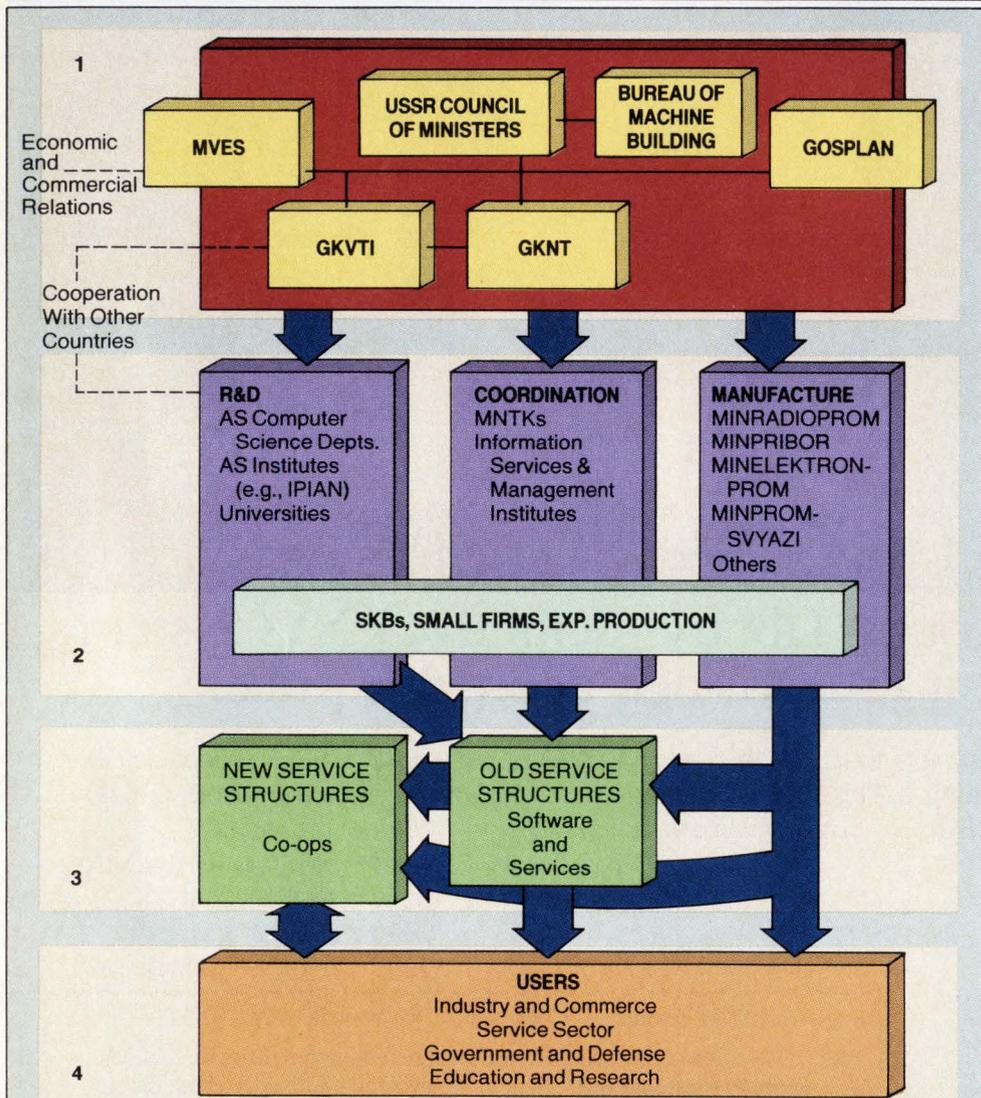
© 1988 AT&T



AT&T

The right choice.

USSR Information Technology Infrastructure



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.

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 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.



Mother Nature was really teaching you about data networks.

Back when you were changing so fast that "dressing up" was a crisis, you were learning something very important about data networks: growth is inevitable.

Your business grows... you add computers. Your network grows, applications sprout... you add computers. You open offices... you add computers. Your network grows.

But you can manage it *if*

you've got a network that winks at complexity and easily adapts to change. A network that accesses SNA[®] and DECnet[™] today *and* meets OSI and ISDN standards tomorrow. A Telematics network.

With a full range of hardware and software alternatives, we make modern networking easy for our multi-national customers who connect a mind-boggling assortment of computing resources *and*

for our smaller customers who love their independence... and our prices.

So, take the growing pains out of networking. Contact Telematics International in the U.S. at 1-800-NETWIDE or (305) 772-2117. In the U.K., call (0256) 467385.

TELEMATICS
COMPUTERS FOR COMMUNICATIONS

15th Annual

The "Computer Security Event of the Year"

Computer Security



Don Hutson Gerald Meyers Edward Yourdon Jake LaMotta

GENERAL SESSIONS

This year's lineup of General Session Speakers includes:

- **Don Hutson**, an outstanding and inspiring speaker, will address "A Formula for Success...with Less Stress" (spouses invited).
- **Gerald Meyers**, author of the best-selling book on crisis management, *When It Hits the Fan*.
- **Edward Yourdon**, of structured programming fame, and author of the recent book, *Nations at Risk*.
- **Jake LaMotta**, former world boxing champion and subject of the movie "Raging Bull."

SIXTY (60) WORKSHOPS

Conferees can attend 6 workshops over the three days. These 1½ hour sessions, led by experienced practitioners, cover the entire spectrum of computer security concerns.

THE "GRADUATE PROGRAM" FOR ADVANCED PRACTITIONERS

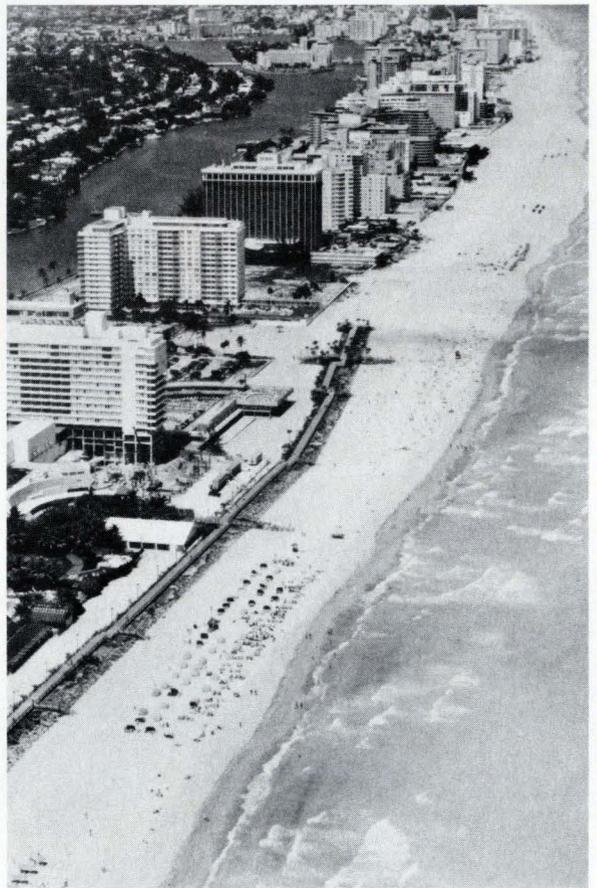
A special 2-day program designed to meet the needs of the advanced computer security professional with at least 5 years experience.

WORLD'S LARGEST EXHIBITION

On Monday and Tuesday (November 14 and 15) there will be the largest showing of security products ever assembled. This year, attendees will have two scheduled visits rather than the traditional one.

TOUR PROGRAM

This optional 2 half-day program gives family and friends a chance to see highlights of the Miami area...and it's made available at CSI's cost of \$55.



This Year's Program Highlights...

- **Live Demos**—of viruses, hacking, bulletin boards
- **Access Control Software Tracks**...workshops on CA-ACF2, RACF, and CA-Top Secret
- **All activities "under one roof"**—all workshops, general sessions, the Graduate Program, and the Exhibition.
- **Plenty of hotel rooms**—Over 1,000 at the Fontainebleau.
- **Economy**—we've negotiated hard to keep your costs way down. Hotel rates are exceptionally low. A BEST BUY: Fly Eastern Airlines and you'll receive a minimum discount of 50%...with no restrictions (i.e., no minimum stay or cancellation penalty).
- **Hospitality Hour**—Swap notes with your peers.
- **Individualized schedule**—Your personal agenda for the entire Conference.

What 1987 Conferees Said ...



"The CSI annual conference is a must for all individuals involved in computer security. It is the one place for maintaining computer security expertise, and staying on the leading edge." John T. Devall, Jr., System Security Administrator, Tenneco Oil Exploration

"An incredible opportunity to find solutions, give help, and reaffirm commitment; Almost exhausting; More useful knowledge than one person can assimilate." John A. Blackley, Data Security Administrator, Capital Holding Corp.

"As a first time attendee—I was overwhelmed—the info, ideas, organization, and quality speakers. I'm already looking forward to attending the next conference." Richard Panneck, Chief, Internal Security Unit, Minnesota Dept of Jobs & Training

"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

Conference & Exhibition

November 14-16, 1988 • Miami Beach

WORKSHOP PROGRAM

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



OPTIONAL SEMINARS

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

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

ABOUT COMPUTER SECURITY INSTITUTE

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

ACTION

For an immediate registration, call Dianne Monroe at (508) 393-2600, or write her at Computer Security Institute • 360 Church Street • Northborough, MA 01532.

"The CSI annual conference is an event which should be attended by all data security professionals. Excellent!" Andrea Richardson, Security Analyst, Canada Ministry of Natural Resources

"Outstanding. You did a fantastic job. This was my first CSI experience and it won't be my last." Kenneth Reed, Manager Data Security, Department of Motor Vehicles

"A sheer necessity!" Serge Monfils, Sr. Manager, EDP Security, Canada Post Corp.

"You have me convinced that this is the premier security conference in the world." Melvin T. Swanson, Manager, Data Security, Borden Inc.

"Terrific! This is my 3rd CSI conference, and I get more out of it each time I attend." James H. McClelland, AVP/Data Security Administrator, Sovran Bank/Maryland

"In terms of content, value and organization, the conference gets better each year." Nicholas M. Saxonis, Assistant Vice President, The New England

"As always I come away from the conference re-energized in my field. I have made several contacts that have proven invaluable." Pamela Palbitska, Security Consultant, CNA Insurance

"Still the fastest way to orient the new computer security professional; confirm direction for existing programs; become aware of future direction and strategies and broaden individual professional networks." Catherine W. Weyhausen, Senior Consultant, Data Security Services, AT&T



NETWORKS

Penn Research Challenges Need for Network Protocols

Scientist David J. Farber's latest project postulates that so-called memory networks operating at high speeds would deliver superior performance.

BY BRAD SCHULTZ

If a presently little known research project led by University of Pennsylvania professor David J. Farber pans out, it could raise serious questions about the viability of the network protocol design field.

The project holds the potential to eliminate IS managers' need to buy products that implement conformance to network protocols.

The fledgling research project aims at converting ultrahigh-speed (in excess of 400Mbps) computer networks into what are called memory networks. These networks, or MEMNETs, distribute memory, computation, and I/O functions. While functioning as MEMNET nodes, computers relate to each other as mere components of a giant virtual computer, the MEMNET per se.

Farber and his colleagues are trying to prove that users would get superior performance and more efficient resource utilization from computer network resources configured as a MEMNET than would otherwise be possible.

Removing Processing Overhead

The MEMNET project, the roots of which were planted three years ago while Farber was at the University of Delaware, is exploring "ways of removing the severe processing overhead

found in distributed operating systems," states Farber in papers made available to DATAMATION. "The approach MEMNET takes is to treat the network as a mechanism which allows a processor to access the collective memory space of the distributed system.

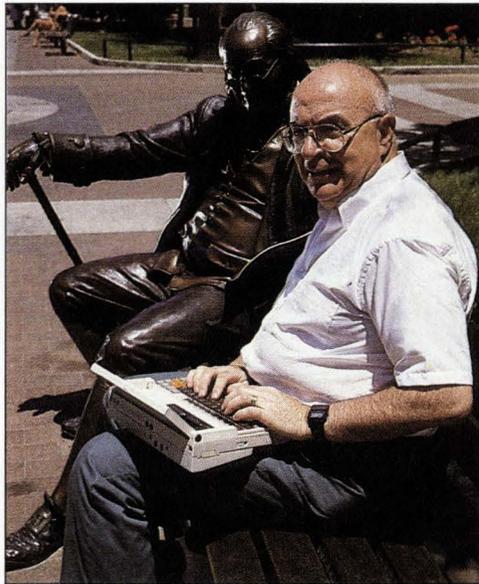
networking demands a radically new way of looking at the structure of computer systems, that merely tweaking our current protocols will not yield the expected benefits, just as tape unit controllers were incapable of efficiently handling the then-new disks of the 1960s."

Farber predicts that the proliferation of ultrahigh-speed links will be far more exciting to users than the proliferation of VLSI circuits has been. He should know. A seminal contributor to computing and networking technologies for decades, Farber is professor of computer and information science, and of electrical engineering, at the university in Philadelphia. He co-developed the first telephone electronic switching system, the SNOBOL language, the first eight-bit FORTRAN, the Program Design Language, what was probably the first distributed computer system, and a few early messaging systems.

Early Opinions of MEMNET

The potential of MEMNET to influence currently available network protocols and commercial implementation products is uncertain as yet, but there are a few people who have at least some preliminary opinions about MEMNET.

Steve Wolff, networking division director of the Na-



PENN'S FARBER: A radical new approach to computing.

"Thus, when a processor in a MEMNET environment needs to send data via the high-speed local network, it simply writes to memory addresses which are in the memory space of the recipient processor. Similarly, the recipient processor, when it chooses to examine data which has been 'sent' by another processor," uses its normal access mechanisms to read memory.

"What we are fundamentally pleading," Farber says, "is that ultra-high-speed

Although a list of candidates is unlikely to be published, DATAMATION understands that Academician Alfred Ailamazyan, presently director of the Academy's Programmed Systems Institute, will be throwing his fur hat into the ring. Ailamazyan is well-connected to Yevgeny Velikhov, Soviet leader Mikhail Gorbachev's advisor on high technology, and to Abel Aganbegian, Gorbachev's economic guru.

If, as now seems likely, the FYP for pcs will not be met, the new director will have little time to do anything.

Centralization Hinders IPIAN

Although IPIAN might be a suitable body to develop the strategy of distributed processing in the USSR, the fact that it is centralized in Moscow will hinder its ability to put that strategy into effect. Until the Soviet Union allows a widespread software industry and support infrastructure to develop, even the overproduction of hardware will fail to meet the demand.

"The cooperatives are going to make all the difference," says Gordon Feller, head of Integrated Strategies, an East-West trade consultancy in San Raphael, Calif. "But it will be some time."

Programmers and technicians have been quick to respond to the opportunity presented by these self-financing cooperatives (see "The Genesis of a Soviet Software Industry," June 1, international edition, p. 52-1).

Microsoft's Wedell offers this advice: "The greatest thing the new guy could do is to bring together the various pc strategies of Eastern European countries so that their pcs are compatible with those in the West." ■

David Hebditch is DATAMATION's Eastern European correspondent. He is based in England.

"The Data General difference: complete communications capability."

**Douglas A. Thom, Vice President
Packaging Division, Georgia-Pacific**

CEO® is a registered trademark of Data General Corporation.
IBM® is a registered trademark of International Business Machines.
VAX® is a registered trademark of Digital Equipment Corporation.

For Georgia-Pacific's corrugated box plants around the country, a Data General computer network is the communications lifeline.

Nothing contributes more to the success of a geographically dispersed operation than good communications and networking.

For Georgia-Pacific's Packaging Division, the key role is played by a network of Data General systems spread out over 30 plants and corporate headquarters in Atlanta. In addition to handling the constant flow of initial entry, cost estimates and scheduling for the plants' orders, the network enables any of the more than 1000 employees on it to instantly and directly communicate. Whether they're in the same plant, one across the country, or in corporate headquarters in Atlanta. And employees who travel extensively can access their own systems from any location.

"Data General takes care of all our computing and networking needs," says Packaging Division Vice President Douglas A. Thom. "Their CEO® office automation is excellent. Their products are based on communications standards like SNA and X.400, so our Data General network also ties into our various IBM® systems, and to a Digital VAX® network in another division. And our Data General network is easily maintained by a small group at headquarters; we've found we don't really need support people in the field."

To find out how the Data General difference in computers and networks can work for you, send in the coupon below. Or call: 1-800-DATAGEN. In Canada, call 416-823-7830.



Data General

3400 Computer Drive, Dept. ADV/GP, Westboro, MA 01580

Name _____
Company _____ Phone _____
Address _____
City _____ State _____ Zip _____

CALL 1-800-DATAGEN

Circle 17 on Reader Card

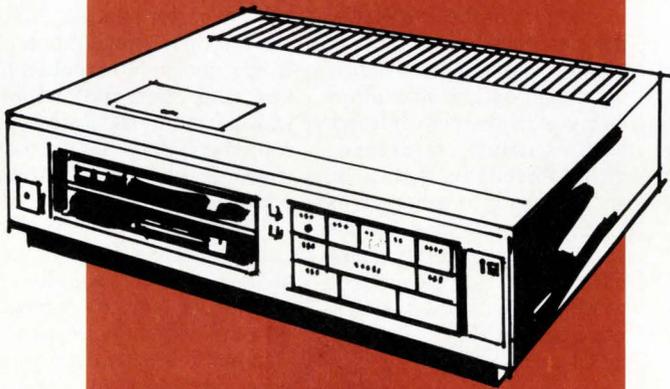
**CAST
YOUR
VOTE**

**BE A WINNER.
MAIL THE CARD AND
CAST YOUR VOTE TODAY.**

**AND WIN
VALUABLE
VIDEO
PRIZES.**

ANNOUNCING DATAMATION'S READER VOTE CONTEST.

GRAND PRIZE



**VHS VIDEO
CASSETTE RECORDER**

**4 FIRST
PRIZES**



**SONY
WATCHMAN™ TV**

Enter the *Datamation* Reader Vote Contest and you may win a valuable VHS video cassette recorder or Sony Watchman™ TV.

It's easy to enter. Just follow these three simple steps:

1. Select the 5 ads in the *AUGUST 15TH ISSUE* of *Datamation* that you think your fellow readers will choose as being the *most helpful* and *most informative*.
2. List your selections on the entry card provided in the *AUGUST 15TH ISSUE*.
3. Mail your entry card by September 19, 1988.

CONTEST RULES

1. List your top 5 ads in rank order on the entry card provided in the *AUGUST 15TH ISSUE* of *Datamation*. Indicate the name of the advertiser (company or organization) and the page number. Ads placed by Cahners Publishing Company, *Datamation* or other Cahners publications cannot be considered in this contest.
2. No more than one entry may be submitted by any one individual. Entry blank MUST be filled in completely or it will not be considered.
3. To qualify, you MUST be engaged in information processing, supervising or managing MIS/DP personnel, or setting standards for selection of information

processing or telecommunications hardware, software or services.

4. Contest void where prohibited or taxed by law. Liability for any taxes on prizes is the sole responsibility of the winners.
5. Entries that most closely match the rank selected by *Datamation* readers will be declared winners.
6. Entry cards must be postmarked before September 19, 1988.
7. In case of a tie, the earlier postmark will determine the winner. Decisions of the contest judges will be final.
8. In the event that a prize is not available, the publisher may substitute an alternative prize of equal value without prior notice.

DATAMATION

Cahners Publishing Company
A Division of Reed Publishing USA

tional Science Foundation (NSF), projects that a substantial portion of commercial information systems will gradually gain ultrahigh-speed links in the 1990s. Several years from now, he says, the nation overall (counting the commercial, public, and academic sectors) may have a half million users on gigabit-per-second links.

MEMNET Is Not the Only Way

Wolff declares that "MEMNET might be one way to do ultrahigh-speed networking, but it is certainly not the only way." Noting that electronic mail was an "afterthought" of ARPANET, the first packet switching network and sire of the Internet (the nationwide research network; see "The Evolution of ARPANET," Aug. 1, p. 71), Wolff says that "the current Internet has shown us that when you put networking facilities in place, things that you never dreamed of happening begin to happen. When we put a gigabit [per second] network down, things will begin to happen that we aren't even thinking about now."

Robert E. Kahn, president of the Corp. for National Research Initiatives (NRI), Reston, Va., a nonprofit R&D organization formed in 1986, also has a cautious view of MEMNET: "Dave Farber has a long history of coming up with interesting and creative ideas, and this is another one." Kahn is the former Defense Advanced Research Projects Agency official who led funding and management of some historic computer science research projects after co-designing ARPANET. "I've read some of the papers that he's written [about MEMNET], and he and I have talked about it.

"I think MEMNET is one of many approaches for dealing with ultrahigh-speed nets," Kahn continues. "I think it's an interesting approach because it puts the

issues of communication on a fairly well-understood plane—namely, mapping something from one memory location to another. It's a model of thinking about communication that is easy to get one's hands on. I think there may be other models of communication that will also be important to explore, but we don't know what they are yet."

Adds Vinton G. Cerf, vice president, NRI, who led development of the first inter-networking protocols and later created MCI Mail, "The MEMNET idea is symptomatic of a new trend in communica-

MEMNET IS ONE APPROACH TO HIGH-SPEED NETWORKS.

tions which capitalizes on multiport memory concepts. Dave Farber's paper provides both the motivation and an architectural glimpse of the communication style of the 1990s. This same notion may spell a complete rethinking of the protocol layering concept."

In years to come, the foremost test bed of ultrahigh-speed links is likely to be the Internet, the world's foremost network of research-oriented computer networks. That's fine with Farber, who helped create the Internet and its major subnetworks and continues to help direct them. Farber's team hopes to discover how big a MEMNET can be by turning successively larger slices of the Internet into MEMNETS.

Farber says that while applications and most sys-

tems software running on a conventional network's node computers would not need to undergo messy conversion or replacement as the network turns into a MEMNET, a virtual machine operating system would fit the concept especially well.

According to Farber, "If one looks at the design of chip-level interconnection for processors of the late 1990s, it is clear that, for a number of reasons, the connection fabric will be an optical fiber interfacing with the chip through light-emitting structures grown directly on the silicon and speaking to other chips via a serial data pipe. In this world, it is completely transparent to the processor whether other chips it is communicating with are 10 mm or 5,000 km away."

Details from Research Papers

Here's how Farber describes the reasoning behind MEMNET in the research papers and proposals made available to DATAMATION.

"One of the major contributions of Multics [one of the first timesharing operating systems] was to suggest and implement a system where the external storage media was viewed as just an extension of the processor's memory-addressing structure. In Multics, a file was a segment, and a segment was a file. Among the advantages of this were program simplicity and a remarkable decrease in I/O overhead on both the processor and the user."

In the early 1970s, during Farber's development of the Distributed Computer System (DCS) at the University of California, Irvine, "a similar step was taken in extending the interprocess communication of the message-based operating system for DCS across the then-new distributed token ring," Farber recalls. "In early planning of the DCS project, it was as-

sumed that messages from a process on one computer destined to processes on other machines would have to be routed and detected using kernel software in each of the processors.

"It became clear that this would entail an excessive overhead on the processors," says Farber. "One aim of DCS was to gain increased overall system performance by utilizing multiple minicomputers. It was decided to create a token ring controller which, transparent to the processor, routed and detected IPC messages destined for programs within its host."

Farber says the DCS token ring was equivalent to a shared-memory, single-bus multiprocessor. Its "impact on DCS system performance was marked. However, even here, the token ring controllers were treated by the low-level software as I/O control devices."

Farber left Cal-Irvine for the University of Delaware, where he launched a research program that began to look at the problem of "eliminating the above overhead in the design of distributed systems." He says "experience had shown that the management of the network interface as an I/O device still resulted in excessive processor overhead.

"Following the lead of history, it was proposed that a different paradigm be adopted and that somehow one would map inter-computer communications into a more efficient memory-like structure." This research program led to the MEMNET project, and design and construction of a prototype MEMNET as the doctoral dissertation of Farber's student, Gary Delp, at Delaware. MEMNET followed Farber to the University of Pennsylvania, where he joined the faculty this year. ■

Brad Schultz is a freelance journalist based in New York.

We've just cut five years off your relational DBMS conversion time.

To get the advanced capabilities of a relational database, you used to have to go through a lengthy, complicated, costly conversion.

Not anymore. Introducing the INGRES RMS Gateway—the first in a line of database links that let you apply relational DBMS power to older file management systems right now. Today. Without changing a thing.

The RMS Gateway makes RMS data appear as relational tables within an INGRES database. It lets you apply all the INGRES advantages—like easy user interfaces, industry-standard SQL, and powerful 4GL tools—while protecting your investment in data and applications.

Now you can generate all your decision-critical reports quickly, efficiently, and without disturbing other applications.

And you can keep on using all your RMS-based programs while you develop and implement new INGRES systems using the same data.

Best of all, the power of INGRES allows you to access RMS data across different hardware, networks, and operating systems—transparently—from anywhere in your organization. You can even combine INGRES and RMS data in any application.

What's more, an INGRES dBASE III Gateway is now available for data trapped in old PC files. And gateways to IBM's IMS, DB2 and SQL/DS are on the way.

No other relational database offers you these instant links to older data files—making INGRES the one relational DBMS you can put to work immediately. Which could help put you years ahead of the competition.

Get the INGRES advantage—call 1-800-4-INGRES for more information.

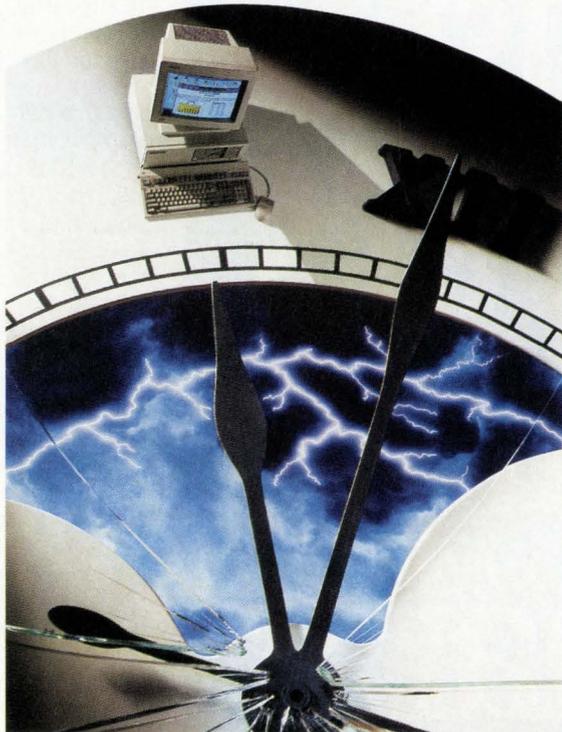
INGRES

RELATIONAL TECHNOLOGY

1080 Marina Village Parkway, Alameda, CA 94501

ARMS802DA

IT'S TIME FOR



Isn't it about time you halved your computing costs? And shouldn't your multi-vendor equipment actually be working together?

Isn't it high time you could use your entire information system at the touch of your PC; and had service and support second to none?

Then it's time you considered Hewlett-Packard.

It's time you halved your computing costs.

It's a simple idea.

By creating a computer that works on fewer parts and fewer instructions, it also works on fewer dollars.

We call this new approach to computer design HP Precision Architecture.

The chart below shows you just one example of how you can save up to 50% in cost-of-ownership.

This is not statistical "hocus pocus." This is a direct result of RISC-based Precision Architecture.



Our powerful Precision Architecture computers are available right now. So now's the time for you to start enjoying their economies.

It's time you had true multi-vendor connectivity.

We know you've made a multi-vendor investment.

If you connect with HP, you can expect the various parts of that investment to work like they were made for each other.

How do we do it? With a networking strategy called AdvanceNet that adheres to OSI standards as well as de facto

HEWLETT-PACKARD.

standards like SNA. So it protects your investment.

And with our networking products in over 70 of the top 100 *FORTUNE 500* companies, isn't it time you also connected with HP?

It's time you fully exploited your information system.

Just imagine being able to use your entire information system, through your desktop PC, almost as easily as if you were calling home. And so, make better, faster decisions based on the latest information.

With HP's NewWave environment, you will.

Because it's much more than just an easy-to-use graphic interface. It's a door to your entire system that lets you access, manipulate and share information across applications. From PCs to minicomputers to mainframes, to the furthest boundaries of your system.

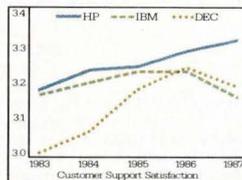
The HP NewWave environment. It effectively makes your favorite PC applications, even from different vendors, feel like a single one.

It's time you had service and support second to none.

We know that a computer system is not just a purchase—it's a commitment. That's why we're committed to giving you the best service and support in the industry.

Our record is based on an average across six key service and support categories in the well-known Datapro survey: maintenance effectiveness and responsiveness, troubleshooting, documentation, education and software support. The record? Number one for five straight years.

Now your time has come. For the kind of computing system that will make your company tick. For more information, call 1 800 752-0900, Dept. 751K.

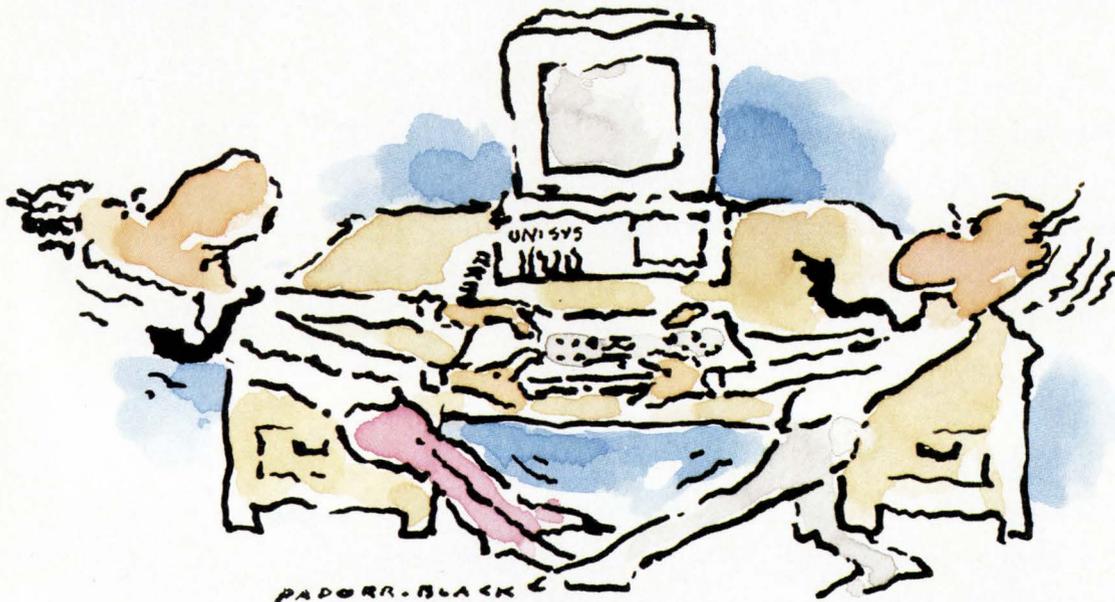


we never stop asking

"What if..."



“And I say it’s a multi-user computer, so let’s both use it!”



The Unisys PW² Personal Workstation Series 800 from Hall-Mark is powerful enough to handle your needs. . . as well as multiple users.

A sophisticated application may be too much for an ordinary desktop computer. That’s why there’s an advanced computer with the capacity to accommodate multiple users.

The Unisys PW² Personal Workstation Series 800 is powerful enough to give you the extra power, speed, memory and multi-user interface you need for CAD projects, local area networks, multi-user applications and multitasking. The Unisys PW² is even multi-lingual, running on MS-DOS, XENIX, and OS/2.

Work with Hall-Mark to design and install the Unisys PW² system—Series 800 multi-user or the fast Series 500 or Series 300—that brings out the best in your people. Because sometimes a sophisticated application is best accomplished by two people working together.

Giving you the power to succeed.



Hall-Mark Electronics Corp. • Dallas, Texas • Subsidiary of Tyler Corp.

Alabama
Huntsville (205) 837-8700
Arizona
Phoenix (602) 437-1200
California
Bay Area (408) 432-0900
Orange County (714) 669-4100
Sacramento (916) 722-8600
San Diego (619) 268-1201
San Fernando Valley (818) 716-3300
West Los Angeles (213) 217-8400

Colorado
Denver (303) 790-1662
Connecticut
Connecticut (203) 269-0100
Florida
Ft. Lauderdale (305) 971-9280
Orlando (305) 855-4020
Tampa Bay (813) 855-5773
Georgia
Atlanta (404) 447-8000
Illinois
Chicago (312) 860-3800

Indiana
Indianapolis (317) 872-8875
Kansas
Kansas City (913) 888-4747
Maryland
Baltimore (301) 988-9800
Massachusetts
Boston (617) 935-9777
Michigan
Detroit (313) 462-1205
Minnesota
Minneapolis (612) 941-2600

Missouri
St. Louis (314) 291-5350
New Jersey
Fairfield (201) 575-4415
New York
Long Island (516) 737-0600
Rochester (716) 244-9290
North Carolina
Raleigh (919) 872-0712
Ohio
Cleveland (216) 349-4632
Southern Ohio (614) 888-3313

Oklahoma
Tulsa (918) 251-1108
Pennsylvania
Philadelphia (215) 355-7300
Texas
Austin (512) 258-8848
Dallas (214) 553-4300
Houston (713) 781-6100
Utah
Salt Lake City (801) 972-1008
Wisconsin
Milwaukee (414) 797-7844

UNISYS
Authorized
Distributor

Unisys Personal Workstation² and PW² are trademarks of Unisys Corporation.
MS-DOS, XENIX, and OS/2 are trademarks of Microsoft Corporation.

© 1988 Hall-Mark Electronics Corp./400-4046

Behind the News

TERMINALS



Suffolk Law, New Studies Reinvalidate 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.

Behind the News

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.

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 arbitra-

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, over-

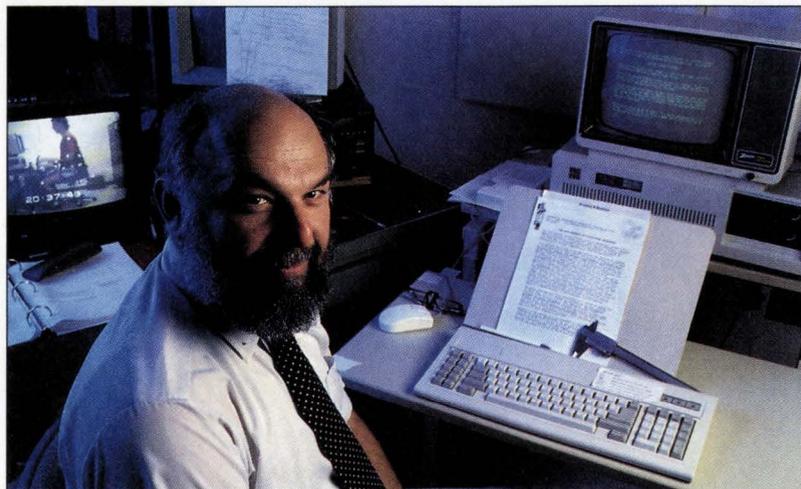
representing 3,600 companies with over 450,000 employees, is suing Suffolk for preempting New York State labor law.

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



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

tor 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

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 loquitur 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.

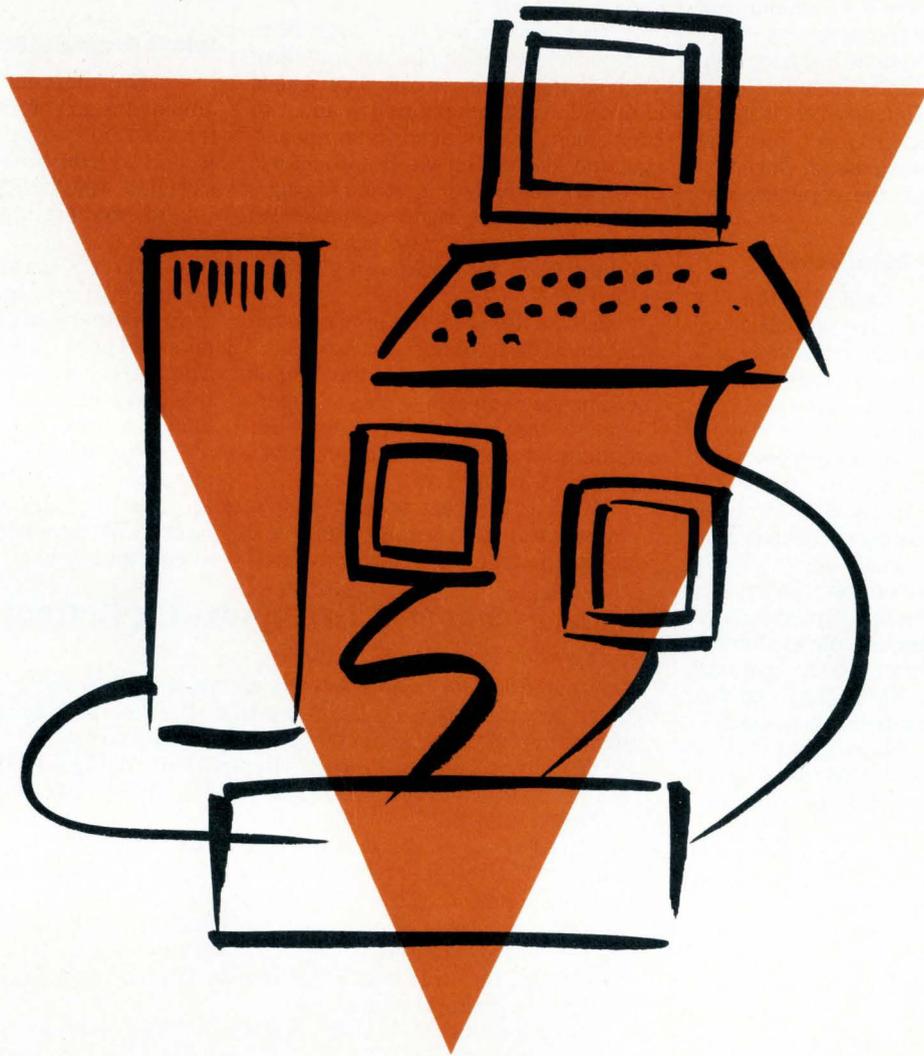
In 1975, STK, obviously aware of what was going on, anted up for what the authors call "an extensive redesign of all workstations, which gave each operator greater flexibility to vary working posture."

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).



ALCATEL CORTELCO*
Manufacturer of Telephones
and Key Systems

FRIDEN ALCATEL
Postage Meters, Mailing and
Shipping Systems

ALCATEL INFORMATION SYSTEMS**
Courier 3270-Compatible Computer Systems
and XTRA Microcomputer Systems

*Formerly Apparatus Division of ITT Telecommunications.

**Formerly Alcatel Courier and Alcatel XTRA Business Systems.

ALCATEL IS COMPUTERS

In fact, Alcatel is a synergy of leading companies working together to offer the systems and services your business needs to compete, prosper and grow.

Such companies as Alcatel Information Systems and Alcatel SERVCOM.

Alcatel Information Systems offers you an extensive line of powerful connectivity solutions for the intelligent workstation environment. Solutions that take into consideration the flexibility you want and the expandability you'll need as your business grows.

For high-performance productivity throughout the 3270 data network, Alcatel Information Systems offers the Courier line of communication controllers, multifunction displays and printers.

Easy access to information networks is realized through the Courier line of micro-to-mainframe links and connectivity products. In fact, the Courier Intelligent Workstation family is the first line of desktop workstations

to combine advanced IBM 3270 functionality, local area network connectivity, DEC VT220 compatibility and microcomputing power in a single unit solution.

The Alcatel XTRA product family of next-generation microcomputer systems addresses the needs of virtually any business environment. The XTRA/Professional Series supports single-user high-performance workstation applications, while the XTRA/Multiple-User Series provides power for multiuser, multitasking systems with products such as the XTRA/386 XL.

And all Alcatel Information Systems products are serviced by Alcatel SERVCOM, one of the leading independent computer service companies with over 160 service locations nationwide.

So take a close look at the integrated computer solutions Alcatel has to offer. When you do, it will be easy to see how we can improve the way your business does business.



For more information on the Alcatel companies, call 1-800-556-1234 (ext. 247) or in California 1-800-441-2345 (ext. 247); or write Alcatel Business Systems, 1623 Buckeye Drive, Milpitas, CA 95035.

ALCATEL PABX SYSTEMS***
Advanced PABX and
Key Systems

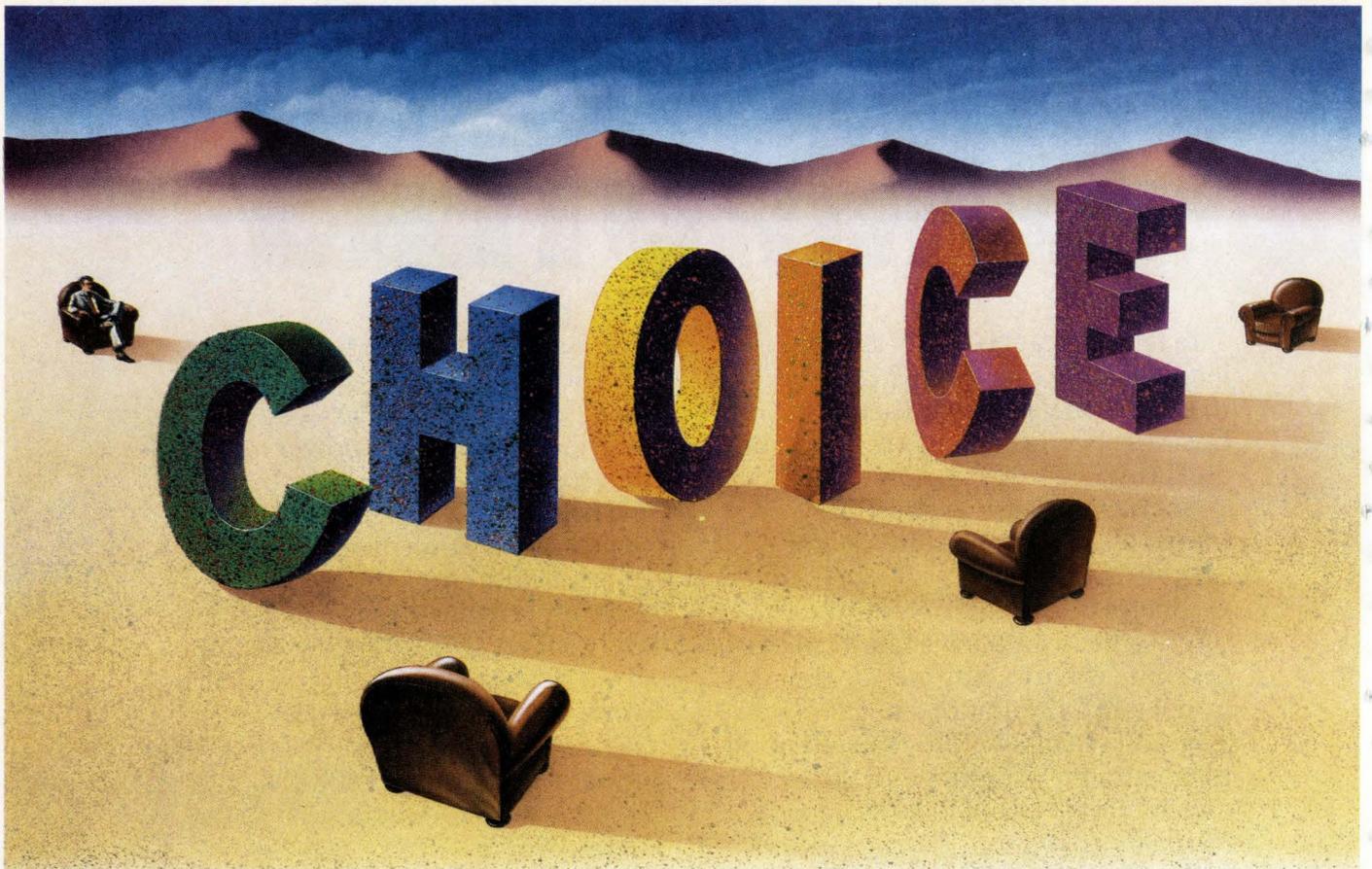
ALCATEL SERVCOM
Computer Maintenance and
Support Services

ALCATEL
CABLE SYSTEMS GROUP
Optical Fiber and Cable Systems

ALCATEL
NETWORK SYSTEMS/TRANSCOM
Transmission and Switching Products

***Formerly ITT Business Communications Corporation and Thomson CSF Operations.

Circle 21 on Reader Card



We have a lot to offer a few of you.

Does your company use IBM mainframe computers? If so, we can improve your bottom line.

Our mainframe computers run IBM software faster than IBM's.

All our products—computers, communications and storage systems—will deliver better returns on your data processing investments, in great part because we specialize.

We serve only the few of you who need the most advanced equipment.

Specialization has been our strategy since we started our company 18 years ago. We aimed to offer mainframe users what they previously didn't have: Choice.

And they responded.

Today, we're a \$1.5 billion company, with 7500 employees,

Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, CA 94088-3470

manufacturing plants in North America and Europe and sales/support facilities worldwide.

We rank first in our industry in service, technical and software support and ease of systems operation, according to an independent survey conducted by the Datapro Research Corporation.

This survey also reports that 97% of our customers said they'd recommend us to another user in their situation—the highest percentage in our industry.

So when your people recommend us, you know they're doing their jobs well.

Amdahl designs, develops and manufactures large-scale, high-performance computer and communications systems and disk storage products for corporations, governments, universities and research foundations throughout the world.

amdahl
The choice.

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 TPI article, which first ran in DATAMATION in 1985, that benchmarked the performance of DBMSs in on-line transaction processing environments. See "All TPIs 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.

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 omis-



sion 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:

Fatal Flaws In SQL

- 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:

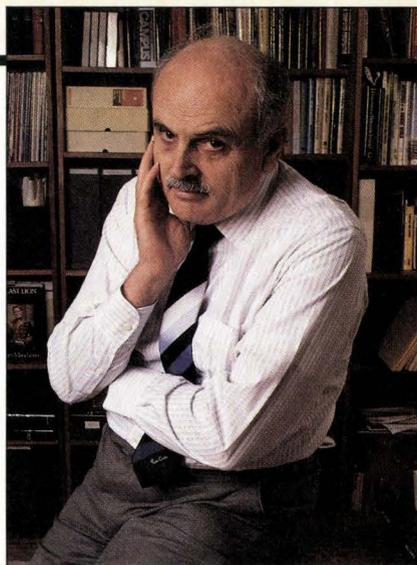
E1(E# ENAME) E2(E# QUAL) E3(E# AGE)

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



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

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.

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.

Optimizer 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:

Fatal Flaws In SQL

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 non-nested 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

¹E.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.

- ◆ **Spreadsheet**
- ◆ **Word Processing**
- ◆ **Communications**
- ◆ **Desktop Manager**

Trax
has it
now

Available for the mainframe and 9370:

- ◆ **ESS™** lets you build 3D spreadsheets as big as your mainframe. Familiar commands for PC spreadsheet users.
- ◆ **EdWord®** is a WYSIWYG word processor—it stands alone or can be integrated with ESS! Spreadsheet references in documents are automatically updated when the data changes.
- ◆ **TSF** lets mainframe users access any of the hundreds of dial-up online public databases and electronic mail systems.
- ◆ **TopNotch™** provides pop-up windows for creating memos, notes, and personal files; doing calculations; and scheduling appointments while in another application.

Trax specializes in easy-to-use end user software—call or write today for more information!

213-475-TRAX • Telex: 350048

**Tell me
more about
Trax!**

NAME

COMPANY

TITLE

PHONE

ADDRESS

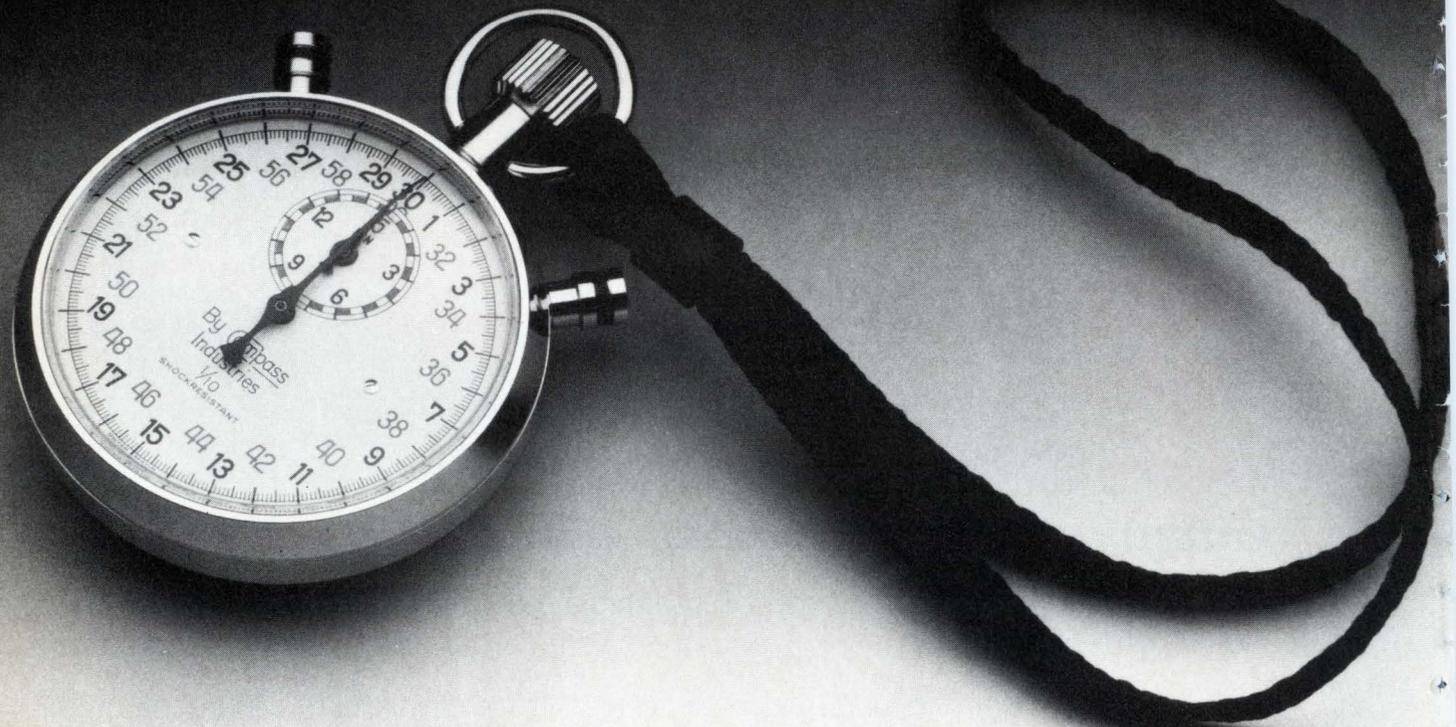
CITY • STATE • ZIP

DTM815

Trax Softworks, Inc.
10801 National Blvd.
Los Angeles, CA 90064

TraxSM

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



Ours only wins in three of them.

1. How fast does it install.

We have no competition in this category. LANLink 5X installs in about fifteen minutes, and it doesn't take a technician to do it. Since LANLink 5X uses standard parallel or RS-232 serial ports, installing a network means little more than connecting the cable and loading the software.

With hardware LANs, installation can easily take two days—one to set it up and one to tweak it. And it also takes someone who really knows what he's doing. That is, someone expensive.

2. How fast does it transmit.

Okay, this is the category we don't win; the hardware LANs are generally a little quicker. At least, they are under optimal conditions, which is how they rate themselves.

But LANLink 5X is pretty quick, too. At half a megabit per second, it's way out ahead of any other software LAN, and right at the heels of the hardware types. Which, of course, are far more expensive.

3. How fast does it maintain.

The real cost of a network is not so much the initial price as it is the continuing outlay for maintenance—adapting it to changing needs. That's something LANLink 5X does practically on its own.

Running under PC-MOS/386™ or PC-DOS, it turns your server PC into a multi-tasking controller, driving a truly expandable LAN that is easily and quickly upgradable.

A hardware LAN, on the other hand, becomes obsolete as new technology is introduced. And, to keep the network up and running as applications change, you need the attentions of a technician, on a continuing basis. A very well-paid technician.

4. How fast can you pay for it.

Now we've arrived at the bottom line, where LANLink 5X is toughest to beat. You can install a five-user LANLink network for about the same cost as the LAN board in a board-driven network. On top of that, factor in what you save on installation and maintenance time, and the difference is pretty dramatic.

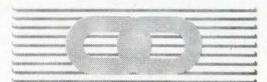
LANLink 5X is available immediately, and it comes with a money-back guarantee. Its price of \$595 includes a server and a satellite module plus the network operating system. Additional satellites are available for \$125.

For complete details on the fastest software-driven network available, call 800-451-LINK.

LANLink 5X. Because three out of four ain't bad.

3577 Parkway Lane, Norcross, GA 30092 (404) 448-5465 FAX (404) 263-6474

LANLINK 5X



THE SOFTWARE LINK

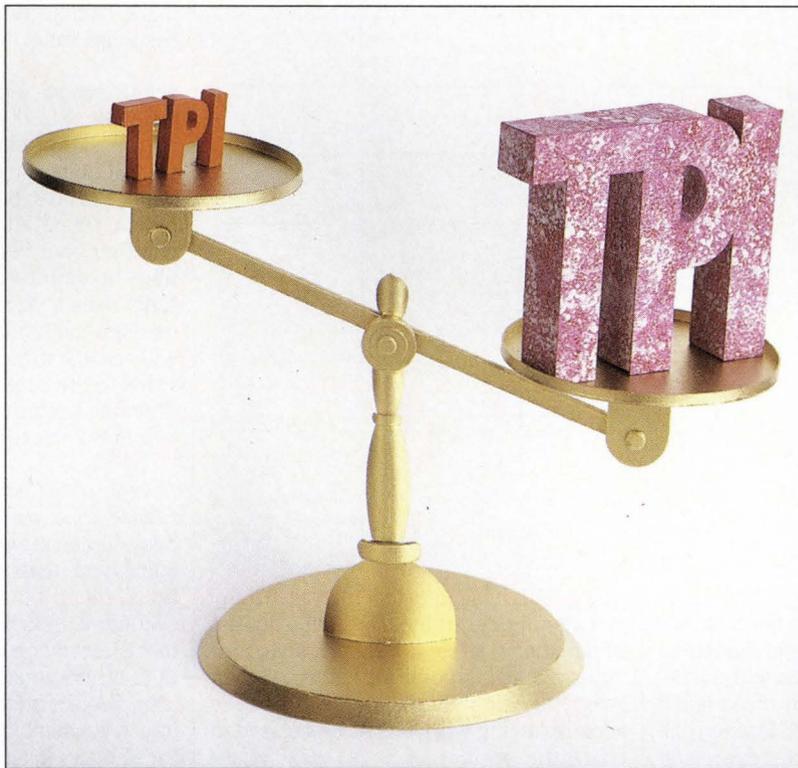
All TP1s Are Not Created Equal

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.

I BY STEVEN CANIANO

n 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

so-called "TP1s" can be considered equivalent.

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

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

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 defini-

tion 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

All TP1s Are Not Created Equal

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

Now there's room for everyone on the fast track.

Compaq introduces the best
of 80386 technology
for every computer user.



The 16-MHz
COMPAQ
DESKPRO 386



The new 16-MHz
COMPAQ
DESKPRO 386S



When we introduced the world to high-performance 80386 personal computing, we gave power-hungry PC users tools to run complex applications better. And faster.

Now millions of business users, from secretaries to CEO's, need that same kind of power to run more powerful, more productive software. Of course, power users need even more performance.

Introducing the COMPAQ DESKPRO 386s and



The 20-MHz
COMPAQ
DESKPRO 386/20



The new 25-MHz
COMPAQ
DESKPRO 386/25

design
that fits where
the competition can't.
Business users: the pass-
ing lane is now open.

The most powerful PC available.

The COMPAQ DESKPRO 386/25 is powered by a new 25-MHz Intel 386* microprocessor. Surrounded by COMPAQ Flexible Advanced Systems Architecture, it runs industry-standard software up to 60% faster than most 20-MHz 80386 PC's. It also taps powerful Windows/386, MS[®] OS/2, XENIX[®], UNIX[®] and other 80386 software and operating systems. Plus it delivers up to 1.2 gigabytes† of storage and up to 16 megabytes of memory.

Quite simply, it's the most powerful PC available.

For some fast facts on the world's highest-performing personal computers, call 1-800-231-0900, Operator 66. In Canada, 1-800-263-5868, Operator 66.

COMPAQ[®] and COMPAQ DESKPRO 386[®] are trademarks of Compaq Computer Corporation. Microsoft[®], MS[®] and XENIX[®] are trademarks of Microsoft Corporation. Microsoft[®] Windows/386 and Microsoft[®] Operating System/2 are products of Microsoft Corporation. Product names mentioned herein may be trademarks and/or registered trademarks of their respective companies. *Registered U.S. Patent and Trademark Office. COMPAQ DESKPRO 386/25 graphics ©1988 Accent Software, Inc. ©1988 Compaq Computer Corporation. All rights reserved.

*Hereafter referred to as 80386SX and 80386 respectively.

†With two optional new COMPAQ 300-/600-Megabyte Fixed Disk Drive Expansion Units.

COMPAQ

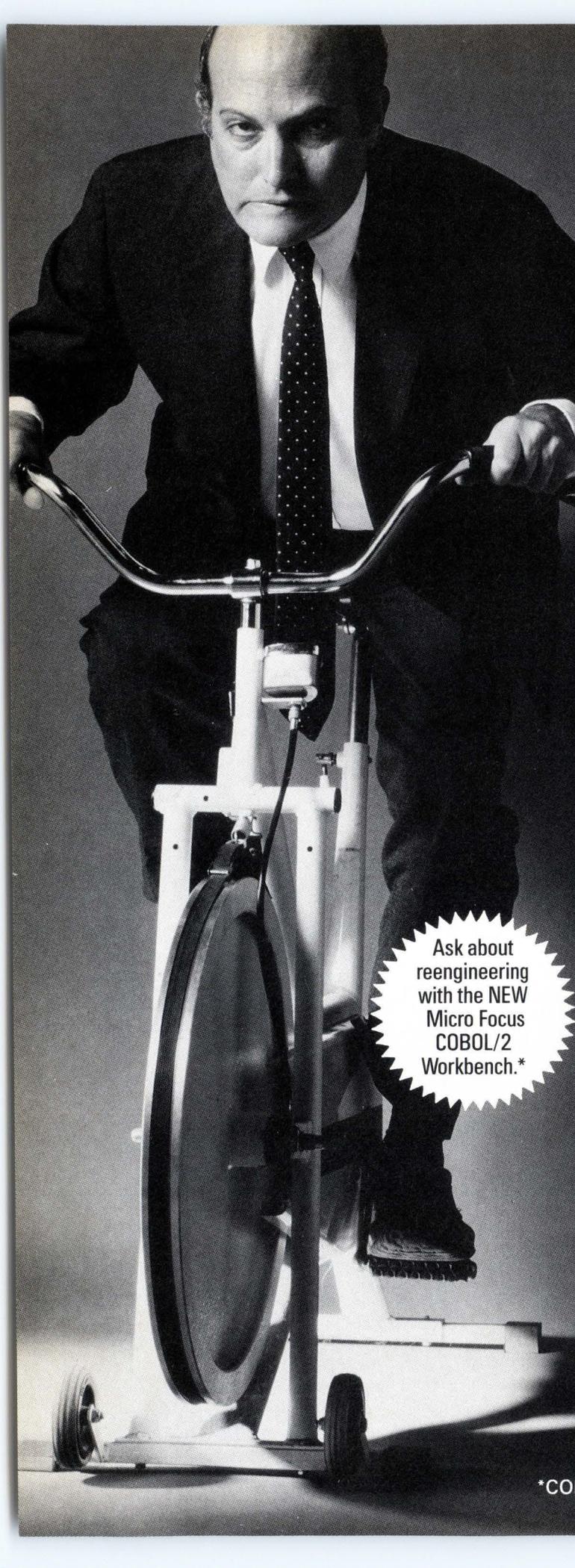
It simply works better.

COMPAQ
DESKPRO
386/25, two new entries
to the highest-performing
line of personal computers in the
world. These PC's do more than push 80386
technology forward; they *widen* it.

Affordable 80386 performance for anyone considering 80286 PC's.

Now breakthrough technology from Compaq brings the power and performance of 80386-based personal computing to millions of business PC users.

The first PC powered by the new Intel[®] 386SX* microprocessor, the new COMPAQ DESKPRO 386s runs your current software up to 60% faster than 10-MHz 80286 PC's. You can run 32-bit software 80286 PC's won't run at all. And you can work with multitasking software such as Microsoft[®] Windows/386 and Microsoft Operating System/2. Plus you can take advantage of its brilliant COMPAQ VGA graphics and a list of standard features, all in a sleek new

A black and white photograph of a middle-aged man in a dark suit, white shirt, and patterned tie, riding a stationary exercise bike. He has a serious expression and is looking towards the camera. The bike is a classic upright model with a large flywheel and a water bottle holder. The background is a plain, light-colored wall.

Development Cycle Going Nowhere?

Get PATHVU!

PATHVU gets you up to speed with low cost support of COBOL software management, planning, development and quality assurance.

Effective information management depends on effectively managing the software systems which access and manipulate information. PATHVU is the software management and reporting tool that enables you to make the transition from processing data to managing the corporate information asset.

PATHVU is a Software *Management* tool that aids in setting MIS goals, measures conformance to standards, identifies staffing requirements and evaluates third party software packages.

PATHVU is a Software *Planning* tool that makes it easier to estimate and control the high cost of maintaining systems.

PATHVU is a Software *Development* and Reengineering tool that developers use to evaluate the condition of present systems, speed debugging and document new and existing COBOL systems.

PATHVU is a Software *Quality Assurance* tool that evaluates COBOL maintainability, identifies risk inherent code structures, helps define installation standards, automates code walkthrough procedures and reduces overall risks.

PATHVU is backed up by other Reengineering CASE products from Catalyst, all designed to help MIS professionals cope with COBOL problems in IBM, Unisys or Honeywell-Bull environments. Products like RETROFIT, for automating the restructuring of COBOL code; DataTEC, for data definition analysis, standardization and migration; and ReACT, for help with Assembler to COBOL conversions.

For additional information on Catalyst's products, or consulting assistance, please call: 800-323-3059, or contact Director of Software Marketing, Catalyst, Peat Marwick Plaza, 303 E. Wacker Drive, Chicago, IL 60601.

Ask about reengineering with the NEW Micro Focus COBOL/2 Workbench.*

CATALYST

An Information Technology Firm of Peat Marwick

800-323-3059

KPMG Peat Marwick

*COBOL/2 Workbench is a trademark of Micro Focus Corporation.

Circle 28 on Reader Card

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.

D 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.

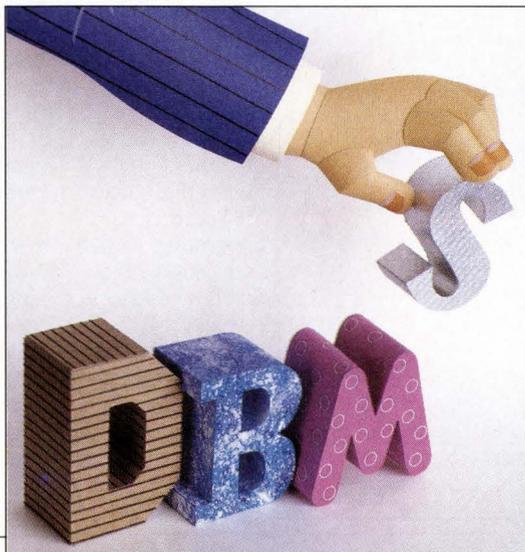
Three out of four IS managers plan to integrate their mainframe DBMSs and the database systems used on their organization's pcs and workstations—one of many findings in an exclusive DATAMATION survey, conducted in May. The survey drew 158 responses from 800 users who received questionnaires, a response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

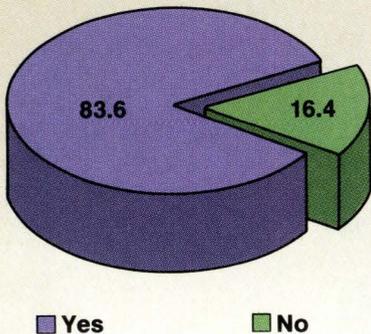
When queried on their buying plans, users are strongly in favor of Oracle Corp.'s DBMS products. Although just 2% of survey respondents currently use the company's products on their mainframes, of users surveyed, 31.3% plan to purchase Oracle database software for those machines. The results confirm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



The New Era of DBMS Integration

DBMS Diversity

Percentage of those with one or more types of DBMS running on mainframes.



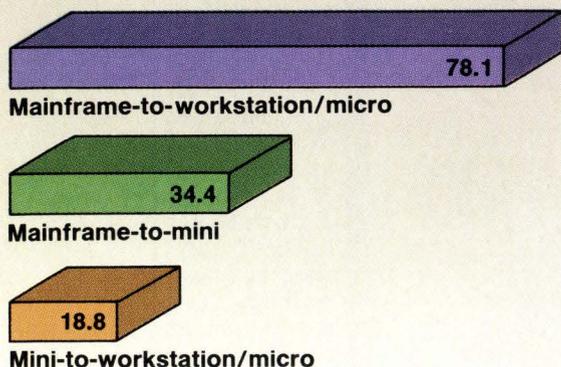
Source: DATAMATION

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.

Targeted Integration

The levels of planned integration.



Source: DATAMATION

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

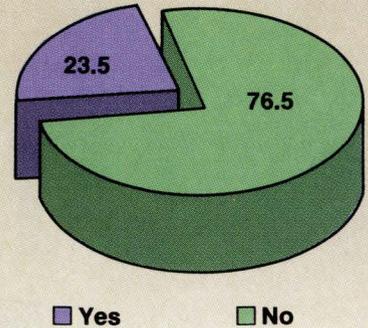
Only a small percentage of those participating in the survey—23.5%—say they have DBMSs running on their DEC VAXs, but 46.2% of these people indicate they plan to integrate it with their IBM systems. A nearly corresponding number—43.1%—say they have particular applications they want to integrate with their central DBMSs. The application mentioned most frequently is personnel, followed by financial services, account-

ing, materials requirements planning, marketing/sales, customer accounts, mortgages, order entry, and shipping.

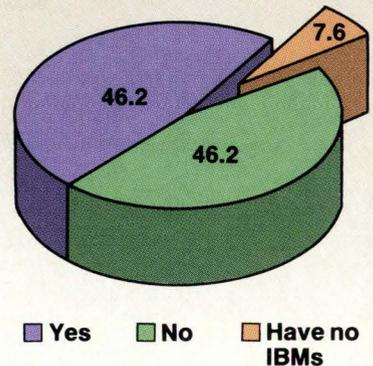
There are also a wide variety of other applications that users are interested in integrating with their central DBMSs. Some of these, as revealed by single mentions by survey respondents, are budgeting, blueprints, CAD/CAM, CASE, claims processing, geographic informa-

The Courtship of VAX

Percentage of those running a DBMS on a VAX...



...And those planning to integrate with IBM systems.



Source: DATAMATION

tion, 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. ■

Executive Issues

High-Tech Equipment Decisions

CFO

"I want to finance the acquisition at the lowest possible cost, with the least effect on the balance sheet and bottom line."

DP/Technical

"I just want a system that meets my needs, but also gives me the flexibility to cope with unanticipated changes in technology and capacity."

Tax

"With the elimination of ITC, I don't really care — other than the possible effect on AMT."

Legal

"I have reviewed the legal wording, and believe I've closed all the legal loopholes."

CEO

"I've listened to all of you, but I'm not willing to choose a product solely on the basis of price...and compromise service or flexibility...or the company's ability to grow."

In major high-tech acquisitions, decision-makers may act independently of each other, looking only at their respective areas of interest. However, when you look at the entire picture, the wisest procurement strategy becomes obvious: Leasing from Comdisco meets everyone's objectives and objections — no matter what their area of interest.

*Calculate Your Financial Risks.
Then Call Comdisco.*



Comdisco Inc.
6111 North River Road
Rosemont, Illinois 60018

(312) 698-3000

It takes quite a computer to design a computer.

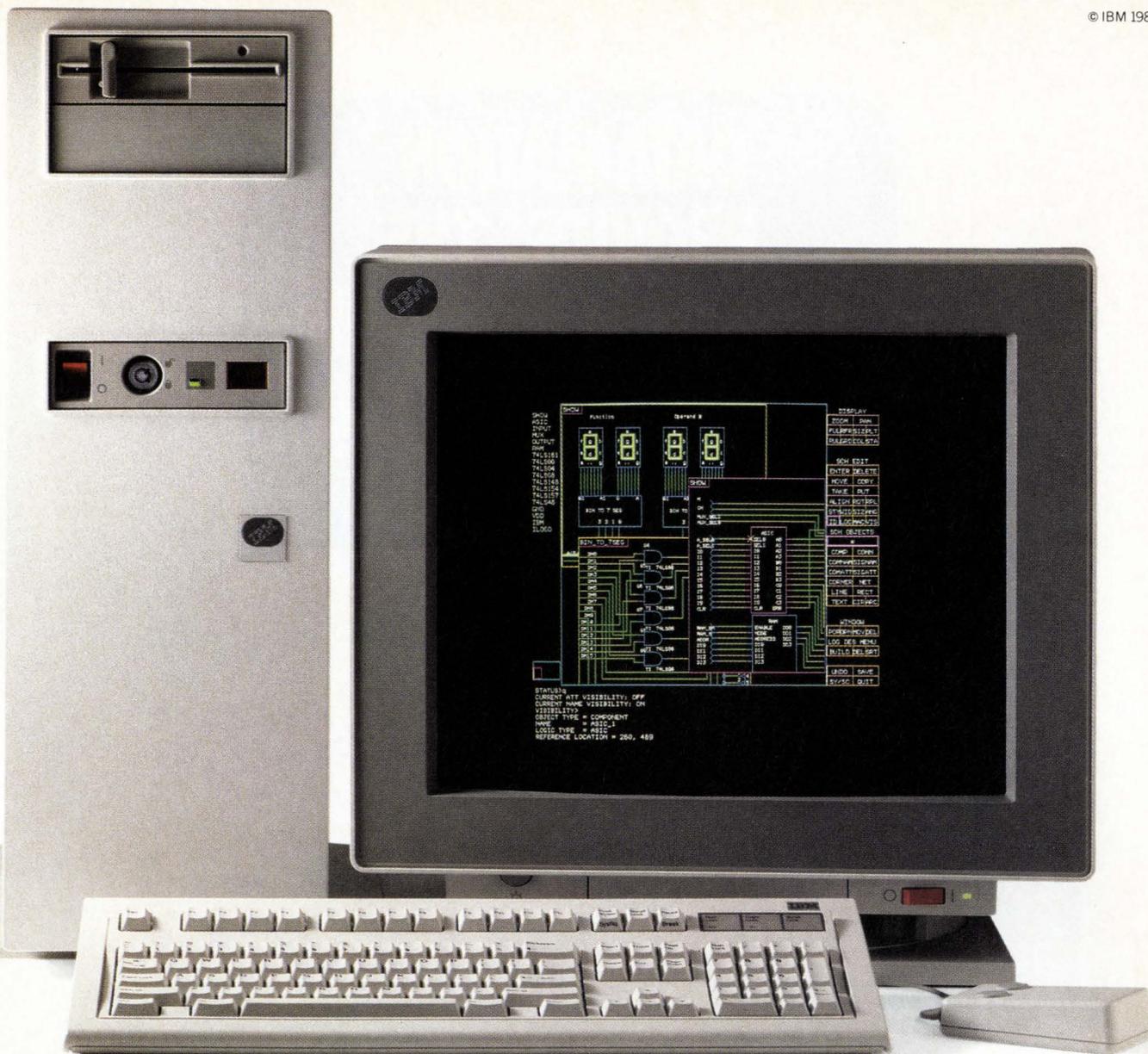
When IBM design engineers need a workstation to design the future, they turn to the IBM RT™ system for developing everything from circuits to software.

More and more commercial users are also recognizing that the RT's power, enhanced connectivity, extensive application library, outstanding graphics and low price make it the system-of-choice to build on. Medical practices, bridge builders and retail chains are among those that have already put the RT to work.

The IBM RT is a high-performance system based on Reduced Instruction Set Computer (RISC) technology, an innovation pioneered by IBM to execute most instructions in a single cycle. Designed with the UNIX™ environment in mind, the RT can run hundreds of existing programs and

IBM RT™ Specifications	
Users	1-32
System Memory	2MB-16MB
Operating System	AIX (native mode)
Languages	C, Advanced C, VS Pascal, Pascal, Basic, VS Fortran, Fortran 77, RM Cobol, Common LISP, Assembler
Data Base	Oracle,™ Ingres
Microprocessor	RISC processor, 170 or 100 nanoseconds, 20MHz Motorola 68881 Floating Point unit

RT and AIX are trademarks of the IBM Corporation.
UNIX is a trademark of AT&T Bell Laboratories.
Ethernet is a registered trademark of Xerox Inc.
NFS (Network File System) is a trademark of SUN Microsystems.
Oracle is a trademark of the Oracle Corporation.



take full advantage of future AIX™ and UNIX innovations.

To meet your complex communications requirements, the RT supports TCP/IP, ASCII, SNA, Ethernet,® Token-Ring and NFS™ networking configurations for homogeneous/heterogeneous distributed networks for up to 32 users per RT. And you can easily customize your RT system to your particular needs using languages and programming tools for commercial, scientific and expert system applications.

Add to this winning formula the RT's advanced memory management, data base management systems, floating point capabilities and IBM's unparalleled service and support. And you've got quite a computer, indeed.

To arrange for a call from an IBM marketing representative or an IBM industry remarketer, or for literature, call 1-800-IBM-2468, Ext. 41.

IBM The Bigger Picture

**DATAMATION
PROVIDES THE
VITAL BACKGROUND
FOR AN ABC 20/20
TV SEGMENT.**



Software Bugs: A Matter of Life and Liability

You read it first in DATAMATION when a major software glitch was linked to the deaths of patients. Once again, the editors of DATAMATION went beyond business as usual to get the full story and its precedent setting legal ramifications for producers of software and hardware.

In addition to keeping MIS professionals informed on the subject, the article also provided important background and a clear mapping of the borderline between technology and the law for the producers of an ABC 20/20 tv segment.

DATAMATION - The Leader in Information Technology Coverage

The Traveling Programmer's Popular Show

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.

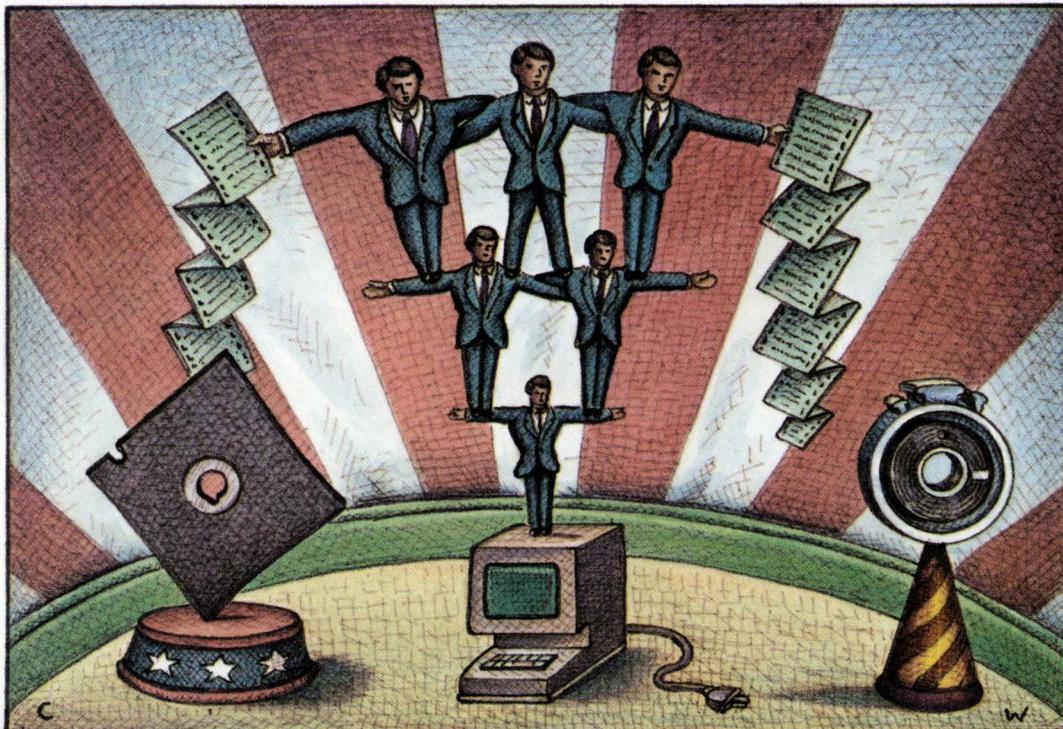
The Atlanta-based soft-drink vendor is not alone in its dependence on contract programmers. Computer Task Group, a Buffalo, N.Y., computer services vendor, claims that 84 members of the Fortune 100 are clients for its contract programming services. The jobs that CTG handled for about 30 of those companies 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 Mountain-side, 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



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
y 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

The Traveling Programmer

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.

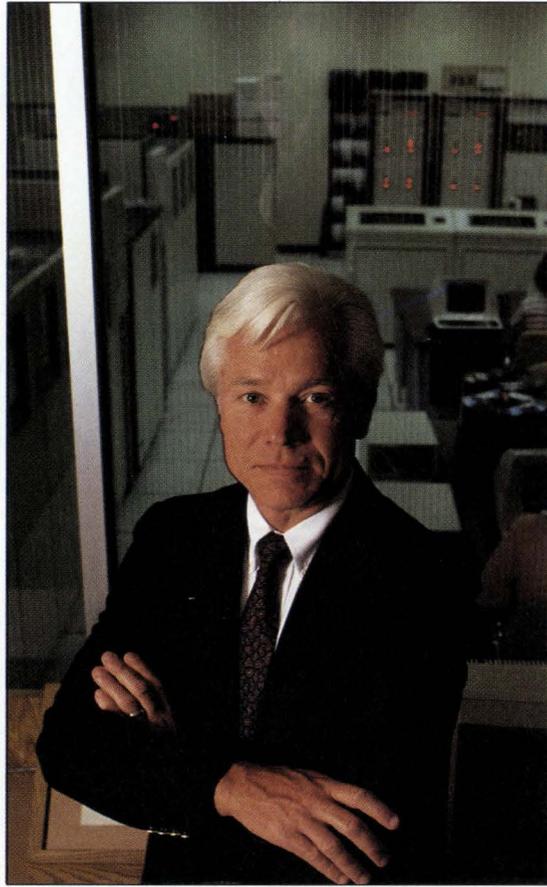
Services Vendors Shy from Label

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.

The Coca-Cola Co. uses this broad 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 De-

partment 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, Wechsler 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.

AGS Computers Inc.
1139 Spruce Dr.
Mountainside, NJ 07092
(201) 654-4321
CIRCLE 080

Arthur Andersen & Co.
69 W. Washington St.
Chicago, IL 60602
(312) 580-0069
CIRCLE 081

Bolt, Beranek & Newman
10 Fawcett St.
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
472 Wheelers Farms Rd.
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.
919 3rd Ave.
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
1410 NW Shore Blvd.
Tampa, FL 33607
(813) 876-9000
CIRCLE 092

Société Générale
Bvd. 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.

**There's one
company which
supports the
UNIX OS best:**

Unisys gives you as many hardware choices as you'd get with up to four ordinary vendors put together: 14 models to fit from desktop to data center, to serve one to 384 users, to meet your needs now and in the future.

The U5000 Series is built around the Motorola® 68020, with models running single and multiple processors from 16.6 to 25 MHz. It supports up to 128 users. 4 to 64 MB memory;

**UNIX AN
MICROS TO IV**

80 MB to 8.1 GB storage.

The U6000 Series is built on the Intel 80386 and runs UNIX™ and MS-DOS® applications concurrently. The U6000/50, the first in this line, handles 32 users. Max memory: 64 MB; max storage: 2.3 GB. Cartridge tape and floppy are standard.

The U7000 series comprises the most powerful UNIX systems we make.

Configurations handle up to 384 users with up to 32 MB memory; 16.4 GB storage. Cache memory and dual processors define the top model.

To make sure you get the true "universal" UNIX OS with Unisys, we've entered a special association with AT&T. Plus, we're committed to UNIX V.3, POSIX and close adherence to all existing X/OPEN standards.

Look into Unisys. We're a ten-billion-dollar computer company committed to making UNIX OS a powerful business tool. From training your people to helping you plan the whole system, Unisys gives you one of the broadest, best-fitting and best-supported ranges of UNIX solutions going.

For more information, call us at 1-800-547-8362, ext. 104.

BETTER INFORMATION.

BETTER DECISIONS.

UNISYS MAINFRAMES

UNISYS
The power of ²

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.

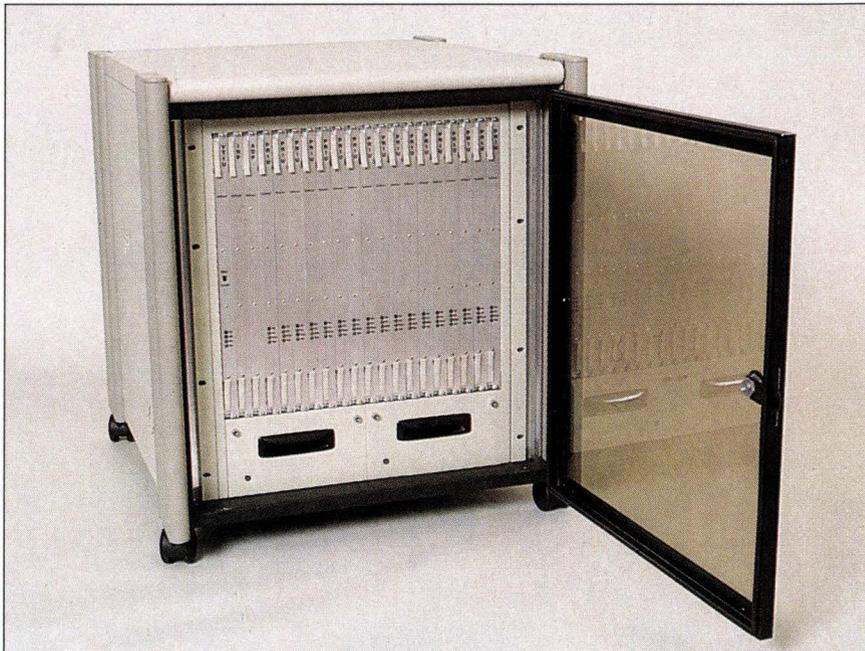
At the high end of the market, page printers—such as IBM's 3800 (which prints line by line, but is considered a page printer) and Xerox's 97XX models—have been replacing line printers in many shops for applications such as on-demand forms printing (see "The Printer Promise of SAA," Nov. 1, 1987, p. 58). 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-

New Products

BRIEFS

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

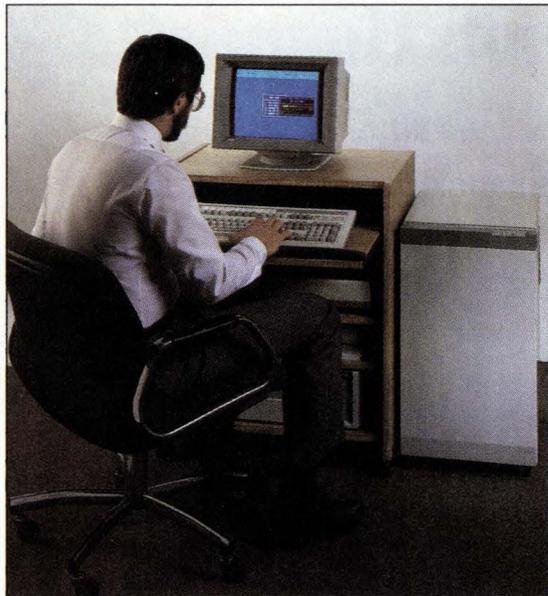
The ASK300, which contains a Unix applications development processor and a mass storage subsystem as well as the IAP, is designed for creating custom switching and applications software for oem versions of the IAP. It is available for \$56,000. TELEOS COMMUNICATIONS INC., Eatontown, N.J. CIRCLE 247

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 ven-



dor'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 accommodates up to four simultaneous host sessions. GATEWAY COMMUNICATIONS INC., Irvine, Calif. CIRCLE 250

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

New Products

TRENDS

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

Sylogy'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.

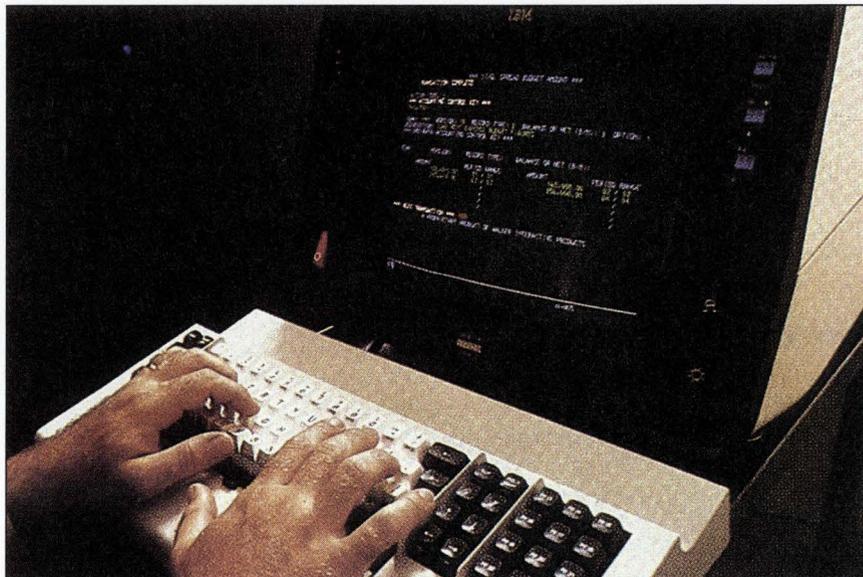
Walter Masterson, a New York-based independent software consultant and eight-year CICS veteran, has dealt with the lack of a sort verb until now by "going into the database and requesting different access paths." This "burdens the database," he says, and has been "a pain in the neck." Masterson, who is enthusiastic about Sylogy'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 Sylogy 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. Sylogy 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.

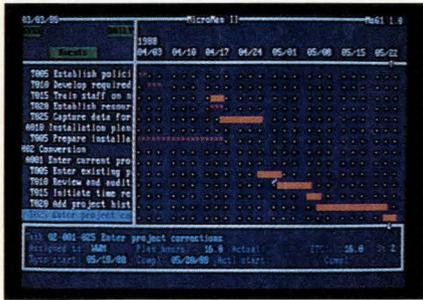
The Association of Business Publishers presented DATAMATION editors, Paul Tate, Willie Schatz, Parker Hodges and David Brousell with the 1987 Neal Award for "Excellence in Reporting," for two exclusive reports covering information systems in Russia (March 15) and China (September 1).

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 Enterprise-wide 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.

ADVERTISING SALES OFFICES

Publisher
Don Fagan
Associate Publisher
William Segallis
Production Manager
Eric Jorgensen

Room 1007
San Francisco, CA 94104
(415) 981-2594

Bob Hubbard
18818 Teller Avenue
Suite 170
Irvine, CA 92715
(714) 851-9422

Texas
Richard W. Sheehan
9330 LBJ Freeway
Suite 1060
Dallas, TX 75243
(214) 644-3683

Taiwan
Parson Lee
Acteam International
Marketing Corp.
6F, No. 43, Lane 13
Kwang-Fu South Road
Mailbox 18-91
Taipei, 10594,
Taiwan R.O.C.
Tel: (02) 760-6209
Telex: 29809 ACTEAM

Hong Kong
John Byrne & Associates
1613 Hutchison House
10 Harcourt Road
Newline, Central, Hong Kong
Tel: 5-265474
Telex: 61708
Fax: 5-8106781

Singapore
Peter Cheong
Asia Pacific Media House
P.T.E. Ltd.
Newline 100 Beach Road
#24-03 Shaw Tower
Singapore 0718
Tel: 291-5354
Telex: RS50026

EASTERN REGION

Eastern Regional
Sales Manager
Frances E. Bolger
249 W. 17th St.
New York, NY 10011
(212) 463-6552

Tom Carey
487 Devon Park Dr.
Suite 206
Wayne, PA 19087
(215) 293-1212

Northeast
Edward Rappaport
199 Wells Avenue
Newton, MA 02159
(617) 964-3730

Southeast
Larry Pullman
6520 Powers Ferry Road
Suite 395
Atlanta, GA 30339
(404) 955-6500

Middle Atlantic
Kathleen A. Murray
8 Stamford Forum
PO Box 10277
Stamford, CT 06904
(203) 328-2547

Midwest
John Stellwagen
1350 E. Touhy Avenue
Des Plaines, IL 60018
(312) 390-2967

WESTERN REGION

Western Regional
Sales Manager
Kaye Sharbrough
3031 Tisch Way
Suite 100
San Jose, CA 95128
(408) 243-8838
West
Janet Engelbrecht
582 Market St.

INTERNATIONAL

Cahners Publishing
Company
27 Paul Street
London, EC2A 4JU, England
Tel: 44 1 628-7030
Telex: 914911 TECPUB G
Fax: 44 1 839-6626

Managing Director-Europe
Edward Reuteler Jr.
U.K., Benelux
Jan Dawson
Tracey Lehane

Scandinavia
Martin Sutcliffe
France, Italy, Spain
Alasdair Melville

W. Germany, Austria,
Switzerland,
E. Europe
Uwe Kretzschmar

Israel
Roseline Lewin-Wainberg
Cahners Publishing
Company
68 Sokolov St.
Ramat Hasharon 47 235
Israel
Tel.: 03-49 12 69

Japan
Kaoru Hara
Dynaco Int'l Inc.
Suite 1003, Sun-Palace
Shinjuku
8-12-1 Nishishinjuku,
Shinjuku-ku
Tokyo, 160, Japan
Tel: (03) 366-8301
Telex: J2322609
Fax: 03-366-8302

DATAMATION CAREER OPPORTUNITIES

Roberta Renard
National Sales Manager
(201) 228-8602
Janet O. Penn
Eastern Sales Manager
(201) 228-8610
Maria Cubas
Production Assistant
(201) 228-8608
103 Eisenhower Parkway
Roseland, NJ 07068

Mary Beth West
12233 W. Olympic Blvd.,
Suite 236
Los Angeles, CA 90064
(213) 826-5818

INFORMATION CARD DECKS

Liz Mullen
Department Supervisor
1305 E. Touhy Ave.
Des Plaines, IL 60018
(312) 390-2762

CAHNERS MAGAZINE DIVISION

William M. Platt
Chief Executive Officer
Terrence M. McDermott
President
Frank Sibley
Group Vice President
Jerry D. Neth
Vice President
Publishing Operations
Tom Dellamaria
VP/Production & Manufacturing

Cahners Publishing Company
A Division of Reed Publishing USA

Specialized Business Magazines for Building & Construction, Manufacturing, Foodservice & Lodging, Electronics & Computers, Interior Design, Printing, Publishing, Industrial Research & Technology, Health Care, and Entertainment. Specialized Consumer Magazines: American Baby and Modern Bride.

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 em-

ployees, 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 manu-

facturing industries. The distribution of MIPS rate utilization by industry is shown in "Hardware Capacity Changes." 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.

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-

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.**

facturing industries. The distribution of MIPS rate utilization by industry is shown in "Hardware Capacity Changes."

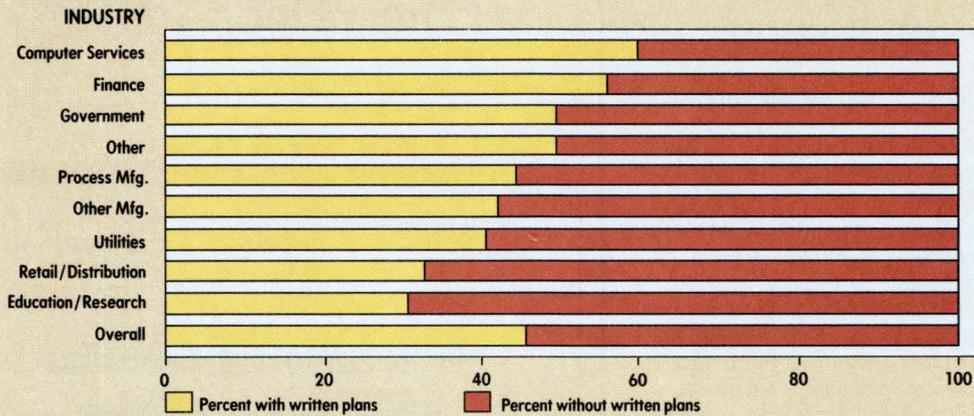
Over two thirds of respondents from midsize and larger firms are using increased MIPS to solve the problem of developing integrated systems, i.e., systems serving large numbers of end users, accessing common data.

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

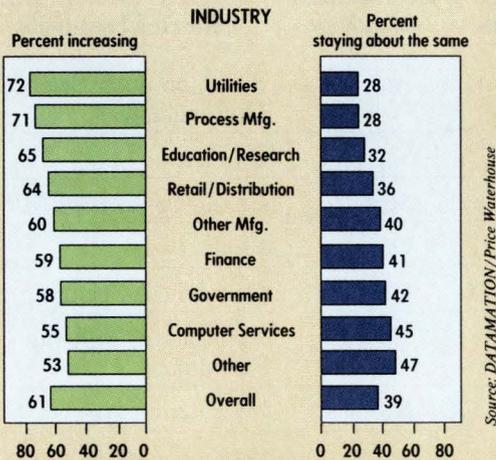
Trends for the Next 12 Months

Systems Development Planning Activities



Source: DATAMATION/Price Waterhouse

Hardware Capacity Changes (i.e., MIPS rate)



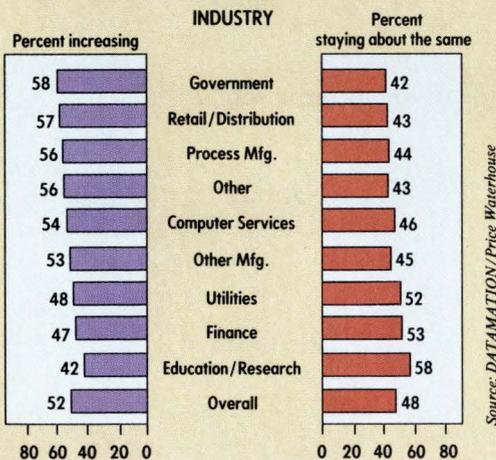
Source: DATAMATION/Price Waterhouse

Data Security Software Implementation Efforts



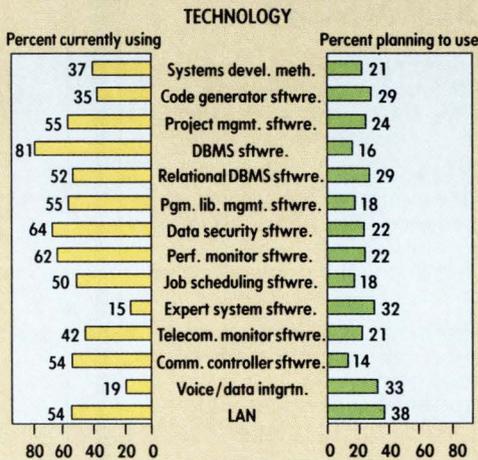
Source: DATAMATION/Price Waterhouse

Code Generator and 4GL Usage



Source: DATAMATION/Price Waterhouse

Current and Planned (next 12 months) Usage



Source: DATAMATION/Price Waterhouse

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 man-

agement 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 in-

creased 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).

ASIAN DEVELOPMENT BANK

The Asian Development Bank, a multilateral finance institution, with Headquarters in Manila, Philippines, invites applications for the following position:

COMPUTER SYSTEMS SPECIALIST

Qualifications

- Bachelor's Degree in Computer Science Engineering or Mathematics.
- Minimum of six years professional experience in data processing of which at least three should be in ADABAS data base applications/administration.
- Extensive knowledge of ADABAS and NATURAL internals with programming experience in Assembler.
- Technical experience in MVS/CICS/TSO.
- Technical Support experience in problem determination and debugging in any large mainframe IBM environment.
- Knowledge of data administration, system development methodology, electronic mail system, and text retrieval system preferable.

Remuneration

A competitive salary paid in U.S. Dollars, normally free of tax, and an excellent benefits package.

Interested persons may send their curriculum vitae in English to the following:

**REF. No. 8809-E
HUMAN RESOURCES DIVISION
ASIAN DEVELOPMENT BANK
P.O. BOX 789, MANILA
PHILIPPINES**

Enquiries may be sent by telex (Numbers 63587 ADB PN; 40571 ADB PM; 23103 ADB PH) or Facsimile Number (632) 741-7961 or by phoning International Tel. Number (632) 711-3851.

Auto-Cad Designer/ Draftsperson

Pilot Woodworking, a dynamic, growing entrepreneurial contract furniture manufacturer located in Carlstadt, New Jersey, and a subsidiary of Chartwell Group Ltd., is seeking several skilled Auto-Cad Designers.

Successful candidates should have one to five years knowledge/experience with Auto-Cad, Sun Microsystems-based system would be a plus, as would knowledge of architectural woodworking or custom furniture design.

We offer an attractive starting salary and an excellent benefits package including profit sharing and employee stock purchase plan along with an environment that will foster your personal and professional growth.

Please forward resume with salary history/requirement to: Mr. Geoffrey A. Nelson, Director of Human Resources, Pilot Woodworking Inc., a Chartwell Group Company, 105 Amor Avenue, Carlstadt, NJ 07072. An equal opportunity employer.



**Chartwell
Group Ltd.**

Career Opportunities

DATAMATION

1988 Editorial Calendar and Planning Guide

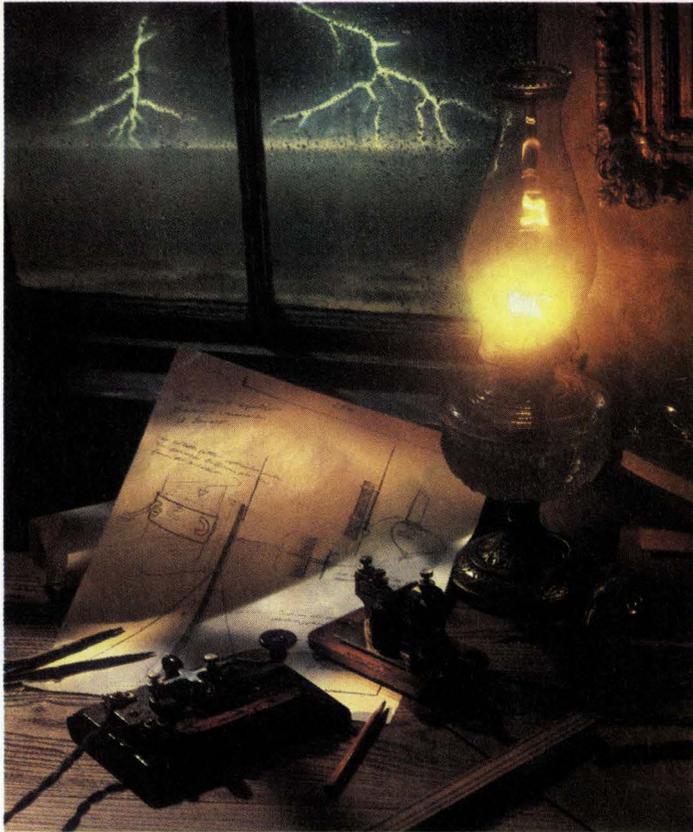
Issue Date	Recruitment Deadline	Editorial Emphasis
Sept. 15	Aug. 24	Best Computer Science Universities
Oct. 1	Sept. 14	Salaries
Oct. 15	Sept. 26	Changing Roles of MIS
Nov. 1	Oct. 12	Productivity
Nov. 15	Oct. 26	Mini-Micro Spending
Dec. 1	Nov. 10	Applications Software Spending
Dec. 15	Nov. 28	Information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

Call today for information:

National
Roberta Renerd
(201) 228-8602

East Coast
Janet O. Penn
(201) 228-8610

West Coast
Mary Beth West
(714) 851-9422



After proving radio waves could travel short distances, Marconi wondered, "What if..."

At Hewlett-Packard, we never stop asking, "What if..."

In 1894, 20-year-old Guglielmo Marconi transmitted a Morse-coded message a distance of two kilometers via wireless telegraph. Five years later, he tried using tall shoreline masts to send a wireless signal across the English Channel. And succeeded.

Marconi's enterprising ventures nearly a century ago opened a new door to the possibilities of global mass communication. This kind of visionary curiosity—the ability to look far beyond what *is* toward what *could be*—is a driving force at Hewlett-Packard today.

At our Cupertino site, we're further developing HP's revolutionary RISC architecture, UNIX*-based systems and networking product lines. And we're innovating new solutions

to meet the future needs of an ever-changing marketplace. If you have the skills and initiative to fortify our leadership position, advance your career in one of the following positions:

SOFTWARE DEVELOPMENT ENGINEERS

- OS with kernel level knowledge
- File systems, commands, compilers, and standard libraries
- I/O subsystem
- User interface/usability
- Trusted systems/computer security
- Systems administration
- DARPA, OSI, and/or SNA protocols
- Networking architecture, protocol design performance analysis
- High availability

DATABASE SYSTEMS S/W DEVELOPMENT

- SQL
- Online transaction processing
- High availability
- Extensions for CAD/CAM and office database

SOFTWARE TESTING

- Test strategies, plans and suites
- S/W quality assurance
- System level S/S testing and integration
- OSI, MAP/TOP, and MHS

MARKETING

- Customer requirements analysis
- Competitive analysis
- Technical knowledge of OS and/or datacomm

Join us as we transform possibilities into new realities. To learn more, send your resume to: Professional Staffing, Hewlett-Packard Company, 19447 Pruneridge Avenue, MS: 42U4, Dept. SR-23, Cupertino, CA 95014. Hewlett-Packard is an Equal Opportunity Employer/Affirmative Action Employer

*UNIX is a trademark of AT&T.

we never stop asking

"What if..."



"YOU CAN'T DO THAT"

Build a large scale mainframe computer that will outperform the competition's leading model?

"IMPOSSIBLE!" they said.

But Amdahl did it back in the early 1970s. And today we are a leader in the development, manufacturing, marketing and support of general purpose and scientific computer systems, storage products, communications systems and software.

In less than two decades we have grown from 5 to more than 8,000 "can do" employees around the globe. Our success is a result of teamwork, innovation and commitment to achieve the impossible. If you are ready for challenge, creativity and growth, explore your opportunities with Amdahl in one of the following areas:

SYSTEM SOFTWARE DIVISION

In 1986 Amdahl introduced UTS*, the only native **UNIX® operating system running on 370 architecture, which we developed using AT&T System V. Now we have multiple software products under development which run on 370 architecture, and we have plans for many more, including advance data communications products, commercial On-Line Transaction Processing (OLTP), Network Management, and Trusted Systems. These efforts represent new market opportunities for Amdahl, and new career opportunities for software product management professionals.

Product Management—Communications & UNIX OS

YOU CAN take P&L responsibility for new software products. From developing the product requirements and the product statement to impacting the marketing plans and the sales strategy, you will drive your products to completion by leading all corporate organizations in product development. For one position you must have a strong technical orientation in large networks (over 500 terminals) including VTAM, SNA or X.25, TCP/IP; for the other position your technical background must emphasize UNIX operating system planning. For either position you must have a proven track record in completing projects. Any 370 experience is a plus. Bachelors degree (or equivalent) required, MBA preferred.

Strategic Alliances—Third Party Software

YOU CAN take responsibility for Amdahl's relationship with Third Party software vendors. You will define our need, survey available technology, negotiate contracts and take ownership of relations with our strategic allies. Your background must show a solid track record in Third Party software, contract negotiation, UNIX and/or 370 architecture, and the ability to make executive-level presentations.

Product Manager—Trusted Systems

YOU CAN direct Amdahl's entrance into the Trusted Information Systems arena. You will represent Amdahl to the National Computer Security Center and negotiate Amdahl's UTS Operating System products through the NCSC certification process. In addition, you will organize Amdahl's internal resources to support the NCSC processes. You must have at least 5 years of management experience, a conceptual understanding of the Orange Book, a track record working with Government agencies, and knowledge of computer system hardware architecture for this highly visible position. A Bachelors degree (or equivalent) is required, an MSCS is preferred.

Product Marketing—OLTP

YOU CAN define marketplaces for Amdahl's software technology. You will interact with customers to define requirements for our software and hardware products, then based on those customer requirements, you will define the overall business opportunities for Amdahl's present and future software products. You must have experience in commercial On-Line Transaction Processing (OLTP), UNIX and/or Tandem, VAX/VMS, 370 architectures, and in developing customer requirements and business opportunities.

YOU CAN join in the excitement of creating the computer systems of the future, while enjoying the benefits and competitive salary you would expect from an industry leader.

YOU CAN contact Doug Jones at (800) 538-8460, extension 6906, or send your resume to him at Amdahl Corporation, Employment Department 8-3, P.O. Box 3470, M/S 300, Sunnyvale, California 94088-3470. Principals only, please.

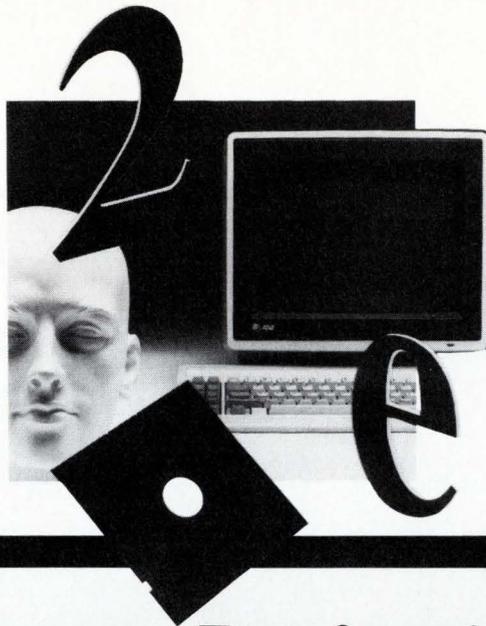
Amdahl Corporation is proud to be an equal opportunity employer through affirmative action.

*UTS is a registered trademark of Amdahl Corporation.
**UNIX® is a registered trademark of AT&T Bell Labs.

YOU CAN AT
amdahl

CENTRAL NEW JERSEY AND CINCINNATI, OHIO OPPORTUNITIES

*CSC:
the human
mind in
concert*



*with
the
sciences*

Computer Professionals

The tools of the Human Mind are fuel for the Information Age. Nowhere will you find the combined resource that is created when human imagination and technology are balanced and utilized, than at Computer Sciences Corporation. For over a quarter of a century, with over 18,000 employees in more than 300 locations worldwide, we have put the advancements of people, computers and communications to work providing information systems services to business, government, and industry.

CSC's Communications Industry Services Division designs, implements and manages computer-based systems on a project basis. To meet the challenges that lie ahead, we use our collective capabilities to provide a variety of contract services for our clients in the areas of software applications development, office automation, network provisioning and billing. Excellent opportunities exist for qualified professionals to join us at our New Jersey and Ohio facilities.

COBOL/IMS PROGRAMMER ANALYSTS

Successful candidates will possess up to three years of COBOL programming experience with proficiency in IMS (DB or DC) in an IBM environment. Responsibilities will include design, development, testing, and programming. Previous experience with customer service/billing applications, collection cash process, system specification writing and functional/integration testing are pluses. Good interpersonal skills as well as the ability to work effectively and efficiently in a group setting are necessary.

COBOL/IMS OR DB2 PROGRAMMER ANALYSTS

We have recently been awarded a major contract in the Cincinnati area. As a result, we're seeking the following professionals to maintain the highest standard of technical excellence. Programmer/Analysts with three to six years experience comprised of applications development, new system design, and programming in a COBOL/IMS or DB2 environment. Preferred candidates will be proficient in COBOL, IMS, DB2, CICS (command), TSO or ROSCOE, OS/MVS, JCL (and utilities), and LIBRARIAN or PANVALET. Previous experience with formal systems development methodology, structured analysis and design, design and code walkthroughs, PCs and CASE tools would be beneficial. Good oral and written communication skills are necessary.

CSC offers the salaries, the benefits (including a 401 (k) plan), and the career paths to match your skills, your talents, and your goals. If you're an over achiever intent on reaching your fullest potential in a challenging and supportive environment, CSC is the place for you. Interested and qualified candidates please call **D.M. Burdick** toll free at **1-800-345-9419**. Or in New Jersey call **(201) 981-9119**. Or send your resume along with salary history in confidence to: **D.M. Burdick, Computer Sciences Corporation, Communications Industry Services, 371 Hoes Lane, Piscataway, NJ 08854**. Equal Opportunity Employer.

Use your Personal Computer to reach us anytime day or night on our **OPPORTUNITY NETWORK**. Dial **(201) 981-9325** and log in as "guest".



Computer Sciences Corporation

CP&L: Where The Right Environments Come Together

Immediate Opportunities In Applications Development

Consider what you want from your career and then picture an ideal lifestyle. If you could have the right environment for both, your next career move would be an easy one. With CAROLINA POWER & LIGHT COMPANY, a major force in Southeastern power generation and distribution, the personal and professional environments come together to provide an excellent base for long-term satisfaction.

Let's examine our state-of-the-art technological environment first. Along with wide use of personal computers, we're operating two IBM 3090-200's, one IBM 3083J, one Amdahl 5860, and one Amdahl 5870. The CICS on-line environment has been growing at the rate of 40% per year. Recently we have expanded to a new Data Center. We're operating under MVS/XA and VM/CMS utilizing an SNA/SDLC network consisting of over 3,000 terminals and printers. Our programming languages are COBOL and DATACOM's IDEAL. We have a growing Information Center environment and are aggressively pursuing end-user computing and office automation technologies.

Now, about personal lifestyle. With CP&L in the beautiful Carolinas, your leisure time can take place in the mountains or on the seashore—or in many great areas in between. Year-round, we enjoy a mild but seasonal climate and a wide variety of recreational and cultural events. The area has a moderate cost-of-living, excellent schools and fine housing.

We have recently completed a large strategic planning study and have a significant backlog of technical and application development projects. We are in transition from a largely maintenance mode to an aggressive development mode. We are seeking talented individuals for the following:

SYSTEMS ANALYSTS & DB ANALYSTS

5-plus years experience in a development environment versus a maintenance environment. Highly desired experience would include: Structured analysis techniques; Relational Data Modeling; DATACOM/DB; On-line real-time systems; Arthur Andersen's Method/1; Prototyping; Application Generators.

PROGRAMMERS

1-5 years structured coding experience in a development environment versus a maintenance environment. Highly desired experience would include: DATACOM; COBOL; IDEAL; CICS.

CP&L offers competitive salaries, excellent benefits, and opportunities to advance. If interested in becoming part of our important team of professionals, send resume with salary requirements to: **Susie Brown, Recruitment Representative, Dept. DM815, CAROLINA POWER & LIGHT COMPANY, P.O. Box 1551, Raleigh, NC 27602.** An Equal Opportunity/Affirmative Action Employer.

CP&L

Carolina Power & Light Company
Energy In Operation

Set your sights on new horizons.



Unsurpassed technological challenges and career growth opportunities are in sight with General Dynamics Data Systems Division. We develop highly innovative software to meet the technical and data processing requirements of General Dynamics Corporation. Our professionals enjoy the challenges of achieving their fullest professional potential while applying their talents toward career advancement.

Our Western Center is located in San Diego, which is as well-known for its many popular cultural and entertainment centers as it is for its beautiful bays and beaches. All provide enjoyment for the entire family year-

round. The diverse communities which surround downtown are easily accessible due to a well-planned freeway system, and allow a choice of affordable lifestyles in different settings.

If you're interested in all we have to offer, set your sights on one of the following positions.

Avionics Systems Software

- Guidance, Navigation & Control
- Advanced Sensors & Image Processing
- Real-time, Hardware-in-the-Loop Simulation
- Software Development, Tools & Environments

Digital Imagery Exploitation Systems Software

- Microprocessor distributed system development
- Large-scale Data Bases
- Photogrammetric and geopositioning technologies
- Interactive real-time graphics

Software Test Engineers

- Design, develop, integrate and document test systems for hardware/software systems
- Verify conformance to design requirements
- Develop test procedures, conduct test activities, analyze test data and prepare test reports.

Command & Control Systems Software

- Battle Management/C³I
- Mission Planning/Automated Routing
- Strike Planning
- Neural Networks

Each position requires experience in embedded software, Ada, FORTRAN and C in a VMS/VAX environment. Only candidates who meet the minimum requirements are urged to apply.

Please send your resume to: General Dynamics Data Systems Division, Western Center, Drawer 185, c/o MDK Confidential Reply Services, 401 West "A" Street, Suite 1150, San Diego, CA 92101. And expand your world again.

GENERAL DYNAMICS

Data Systems Division

Equal Opportunity Employer



INFORMATION SYSTEMS OPPORTUNITIES

The Avondale Division of Hewlett-Packard has Information Systems openings for programmer/analysts and manufacturing systems administrators.

You would be responsible for the implementation and support of complex information systems in a manufacturing/marketing organization. Programmer/analysis focus on software design, installation, and COBOL and/or 4GL programming in an HP3000 environment. Systems administrators emphasize the user interface to manufacturing information systems which includes training, reporting and process documentation,

The successful candidates must have a BS in a technical field which includes systems education and/or related manufacturing experience, possibly with personal computer applications. An advanced degree in MIS, CS, or MBA is preferred.

These positions offer attractive salaries commensurate with your experience and comprehensive benefits, including profit sharing and flexible work hours. Avondale is located 30 miles southwest of Philadelphia. Please indicate which position you are applying for and send your resume to S. Allen, HEWLETT-PACKARD CO. Box 900, Avondale, Pa. 19311. An Equal Opportunity Employer dedicated to Affirmative Action.



HEWLETT
PACKARD



PROJECT-ORIENTED CONSULTING!



WHAT IS IT?



It's NOT Contract Programming!

A Contract Programming Shop is basically a temporary help service, supplying programmers to fill short term labor needs. Contract programmers generally get involved only in the late stages of system development, doing what they already know, over and over. And unfortunately, many contract programmers are effectively out of work between assignments. Contract programming is honest work, but it's NOT SEI's work.

It's NOT Just Management Consulting!

Management Consultants, on the other hand, often get involved only in the earliest stages of system planning and rarely take a direct hand in building the systems that they plan. Our opinion is that this has an unfortunate tendency toward Blue Sky. And, of course, management consultants often miss out on the fun of seeing the systems they plan come to life. Management consulting is a respectable profession, but it's NOT SEI's profession.



So, What IS Project-Oriented Consulting?

Project-Oriented Consulting stands squarely between the extremes represented by Contract Programming and Management Consulting, combining the best features of both worlds. At SEI, our clients look to us for RESULTS — not just plans or code. Yes, we do planning, and our business sense is second to none. Yes, we do implementation, and our technical credentials are nationally recognized.

But more important, we do ALL of those things, and all the steps between. We use technology to solve business problems. We use our business experience to solve them effectively and sensibly.



Interested?

If this sounds like the kind of work YOU should be doing, send a resume and salary history to:

SEI Information Technology
Attn: David Monroe, Recruiting Coordinator
450 East Ohio Street
Chicago, Illinois 60611

SEI information
technology
THE BUSINESS OF TECHNOLOGY

S O F T W A R E
S P E C I A L I S T S

Now is the time

Challenging opportunities exist for experienced Technical Professionals in our Customer Support Center in Colorado Springs.

We are looking for professionals who have superb communication skills—who thrive in a customer support setting—to consult with our customers on a one-to-one basis. You should be able to work as an active team member while researching and structuring innovative solutions to complex software problems.

We are looking for qualified applicants with a degree in Computer Science and/or the equivalent experience specific to the following disciplines:

VAX/VMS* **Support**

You must have 2 or more years experience with VMS as

a system manager or from a strong user level support role.

Network Support

You must have 2 or more years experience with one of the following Digital Networks and Communications products:

- DECnet,* VAX* and/or DECnet RSX*
- Ethernet Technology
- Ethernet Terminal Servers
- DECserver 100/200*

For immediate consideration, please send your resume to:
Ms. Barbara Cusack, Dept.
0815 8807, Digital Equipment Corporation, 305 Rockrimmon Blvd. South, Colorado Springs, CO 80919.

We are an affirmative action employer.

*Trademarks of Digital Equipment Corporation

Be part of the story. . . now.

digitalTM

Data Processing Consulting

**GREAT
CONSULTANTS
ARE MADE
NOT BORN!**

**HERE'S HOW
WE DO IT!**



**SEI builds experts.
We build them by:**

- Having them work alongside senior SEI consultants, nationally recognized authorities in such areas as Data Base Management, Distributed Processing, Industrial Automation and Robotics, Networking, Communications, and Hardware and System Software Development.
- Assigning them to demanding, challenging projects that cover the range of planning and development activities for system and application software on mainframes, minis, and micros. SEI builds the basic product delivery systems through which our clients conduct their businesses.
- Providing opportunities to represent SEI on technical and standards committees that set directions for the industry.



**Talent is Required,
Of Course!**

There are some important abilities you need to start with. SEI's consultants are characterized by general good sense, good technical backgrounds, and an attitude that the next challenge could be even better than the current one.

We look for people who work hard, are eager to learn, are serious about their careers, and who enjoy the variety and challenge of Project-Oriented Consulting. (For more about Project-Oriented Consulting, see our message on the previous page.)

Interested?

If YOU'VE got what it takes to become a STAR, send a resume and salary history to:



SEI Information Technology
Attn: David Monroe, Recruiting Coordinator
450 East Ohio Street
Chicago, Illinois 60611

**SEI information
technology**

THE BUSINESS OF TECHNOLOGY

-An Equal Opportunity Employer M/F-

(Continued on Next Page)

Datamation Databank

Professional Profile

Announcing a new placement service for data processing professionals!

Datamation feels an obligation to help its readers advance their careers. So, Datamation has affiliated itself with Placement Services, Ltd. to form the **Datamation Databank**. What are the advantages of this new service?

- Your qualifications and career goals are entered into PSL's computer system. And the computer never forgets. When your type of job comes up, it remembers you're qualified.
- It's absolutely free. There are no charges,

fees or obligations to you as a Datamation reader.

- Service is nationwide. You'll be considered for openings across the U.S. by PSL and their affiliated offices.
- Your identity is protected. Your resume is carefully screened to be sure it will not be sent to your company or parent organization.
- Your background and career objectives will periodically be reviewed with you by a

PSL professional placement person to ensure current information.

We hope you're happy in your current position. At the same time, chances are there is an ideal job you'd prefer if you knew about it.

That's why it makes sense for you to register with the **Datamation Databank**. To do so, just mail the completed form below (with a copy of your resume) to **Placement Services, Ltd., Inc.**

IDENTITY

Name _____ Parent Company _____
 Home Address: _____ Your division or subsidiary: _____
 City _____ State: _____ Zip: _____ Location (City, State) _____
 Home Phone (include area code): _____ Business Phone if O.K. to use: _____

PRESENT OR MOST RECENT EMPLOYER

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 <input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy			<input type="checkbox"/> I own my home. How long? _____ I rent my home/apt. <input type="checkbox"/>		
<input type="checkbox"/> Employed <input type="checkbox"/> Self-Employed <input type="checkbox"/> Unemployed		<input type="checkbox"/> Married <input type="checkbox"/> Single		Height _____ Weight _____		
Level of Security Clearance		<input type="checkbox"/> U.S. Citizen <input type="checkbox"/> Non-U.S. Citizen		My identity may be released to: <input type="checkbox"/> Any employer <input type="checkbox"/> All but present employer		
<input type="checkbox"/> WILL RELOCATE <input type="checkbox"/> WILL NOT RELOCATE <input type="checkbox"/> OTHER _____						

Datamation Databank

A DIVISION OF PLACEMENT SERVICES LTD., INC.

265 S. Main Street, Akron, OH 44308 216/762-0279

Data Processing Consulting

LET'S TALK BUSINESS!

\$33,000 - \$65,000 to Start!



If our message on the last two pages has intrigued you, you may be a person we need, at one of our offices across the country. Here's what we're currently looking for:

SEI/Chicago is seeking system software and application programmers, with 2-6 years experience in:

- Unix and C applications and internals
- IBM mainframe COBOL (CICS or IMS a plus)

SEI/Los Angeles is seeking programmer/analysts, with 2-6 years of experience in any of:

- IBM mainframe Cobol (CICS or IMS a plus)
- Networking: Ethernet, GM MAP, X.25
- Unix and C applications

SEI/Phoenix is seeking applications and system software programmers, with 2-6 years of experience in:

- Networking: Ethernet, GM MAP, X.25

SEI/New York is seeking application designers and programmers, with 2-4 years of experience in:

- Mainframe systems and applications, especially information delivery systems
- Publishing/fulfillment experience of particular value



Interested?

SEI offers permanent positions, top salaries, excellent benefits, and unlimited opportunity for growth and development. Send a resume and salary history to:

SEI Information Technology
Attn: David Monroe, Recruiting Coordinator
450 East Ohio Street
Chicago, Illinois 60611

SEI information technology

THE BUSINESS OF TECHNOLOGY

—An Equal Opportunity Employer M/F—

Unix is a trademark of AT&T Bell Laboratories

ARABIAN AMERICAN OIL COMPANY

The Arabian American Oil Company continues the high standards of an industry leader. We are seeking highly qualified professionals to join us in Saudi Arabia.

If you're an upstream computer analyst in any of the following areas, and possess a related BS degree along with 5+ years' experience, you should consider us.

**COMPUTER PROGRAMMING
COMPUTER TRAINING
COMPUTER HARDWARE
PETROLEUM ENGINEERING SYSTEMS
EXPLORATION APPLICATION SYSTEMS
COMPUTER END USER
COMPUTER OPERATIONS**

With the Arabian American Oil Company, you will discover large-scale technology that will challenge you professionally. For confidential consideration, please send your resume to: **ASC, Employment, Dept. 06E-019-8, P.O. Box 4530, Houston, Texas 77210-4530.**

COMPUTER SERVICES MANAGER

Milwaukee Library System. Requires: exper. with Concurrent Computer or Perkin-Elmer mini-computer technology, real time transaction processing, and very large database mgt.; 4 yrs. C, COBOL and Asembler programming; BS in computer science or related; 4 yrs. EDP exper. including 2 yrs. of systems analysis; 2 yrs. of supervisory experience; and residency in City within 6 mos. Familiarity with Reliance operating systs. desirable. Salary range: \$35K to 50s. SEND RESUME or contact for more info: Sharon Rogers, (414) 278-2029, City of Milwaukee, Personnel Box CSM, Room 706, City Hall, 200 E. Wells St., Milwaukee, WI 53202-3554. An Affirmative Action Employer.

Advertisers' Index

Circle	Page	Circle	Page	Circle	Page
21	Alcatel Business Systems 42-43	19	Hewlett-Packard 36-37	9	Topaz, Inc. 13
22	Amdahl Corp. 44	—	IBM Corp./Relational Data Base 8-9	23	Trax Software, Inc. 49
30	Ameritech*** 62	—	IBM Corp./RT-PC 60-61		
—	AT&T Technologies 25	11	Informix Software, Inc. 16-17	29	Unisys Corp. 66-67
2	Boole & Babbage C3	79	Manchester Equipment Co., Inc.*** 48a	3	Wyse Technology C4
		6	Metaphor Computer Systems 6-7		
12	Candle Corp. 18				
28	Catalyst 56	8	NBS Southern 10		
4	Cincom Systems, Inc. 1	—	Oracle Corp. 15		
5	Cognos, Inc. 5				
26	Comdisco, Inc. 59	18	Relational Technology 35		
—	Compaq Computer Corp. 54-55	—	SAS Institute, Inc. C2		
13	Computer Security Institute 28-29	24	Software Link 50		
17	Data General Corp. 31				
—	Digital Equipment Corp. 22-23	15	Telematics 27		
31	GTE North*** 71				
20	HallMark/Workstations 38				

RECRUITMENT ADVERTISING 76-88

Amdahl
Aramco
Asian Development Bank
Carolina Power & Light Co.
Chartwell Group
City of Milwaukee
Computer Sciences Corp.
Digital Equipment Corp.
General Dynamics Data Systems
Glaxo, Inc.
Hewlett-Packard, Information
Technology Division
Hewlett-Packard, Avondale Division
SEI Information Technology

***Regional Advertiser