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AUGUST 1990

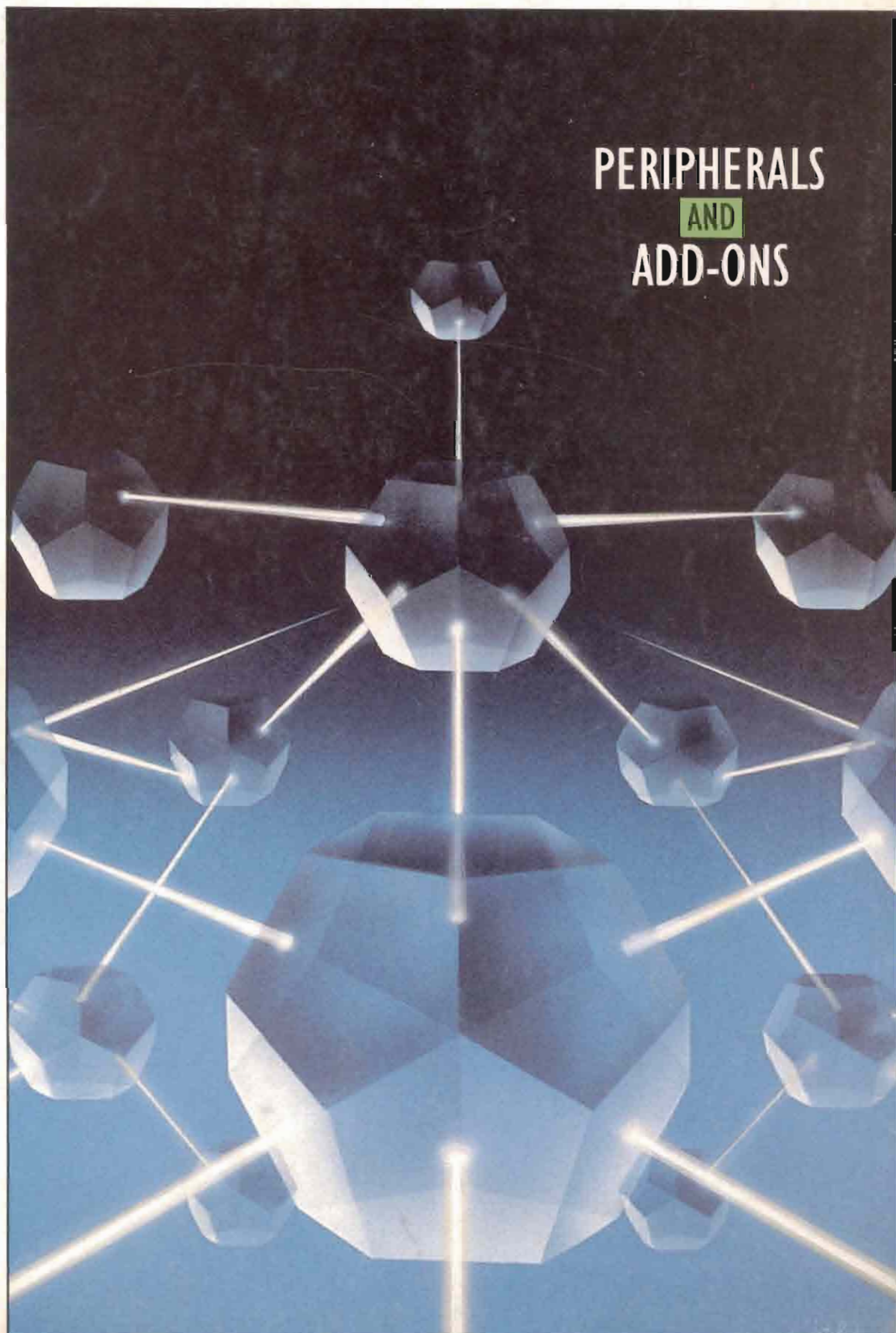
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C

ONTENTS

AUGUST 1990

VOL. 4, NO. 8

28 **FOCUS: Printing Particulars** *by Peggy King*

PCL Printers Bring New Capabilities And Applications To The HP 3000.

40 **FOCUS: Backplane Connections** *by Bill Sharp*

HP Hopes EISA Will Keep Customers Happy—For Now.

50 **FOCUS: When Disc Drives Die** *by Jim Rogers*

Take Precautions Before A System Crashes.

58 **Service Level Agreements** *by Doug McBride*

Be Aware Of Your Increased Demand For System Resources.

68 **Client-Server Computing** *by Larry Kemp*

Strategies For Building Applications For The Client-Server Environment.

C O L U M N S

FROM THE LAB:

TurboIMAGE BOOST

by Joel Martin

Bradmark's SUPERDEX Breathes New Life Into Your TurboIMAGE Systems 80

Connecting Links

by Miles B. Kehoe

Traveling Software's LapLink Provides A Solution For File Transfer 86

Minisis

by John P. Burke

Brant Computer's 4GL For Managing Text-Based Information 92

PC TIPS: Trick Windows

by Miles B. Kehoe

Get Windows And MS-DOS To Work With Your Printers 96

UNIX: User Correspondence

by Andy Feibus

Instructions For Sending E-Mail 100

NETWORKING: Do You Want TCP/IP?

by Gordon McLachlan

TCP/IP Really Doesn't Fit The OSI Model, But It Works 102

RDBMS: Missing Information

by Fabian Pascal

The Relational Approach Alerts Users To Problems 106

D E P A R T M E N T S

Editorial 8

Industry Watch 10

News & Trends 14

Product Watch 22

Advertiser Information 97

New Products 110

Product Showcase 116

Software Directory 119

Career Opportunities 119

Advertisers Index/Calendar 120



EDITORIAL:

Keep It Simple...p. 8

On The Cover:

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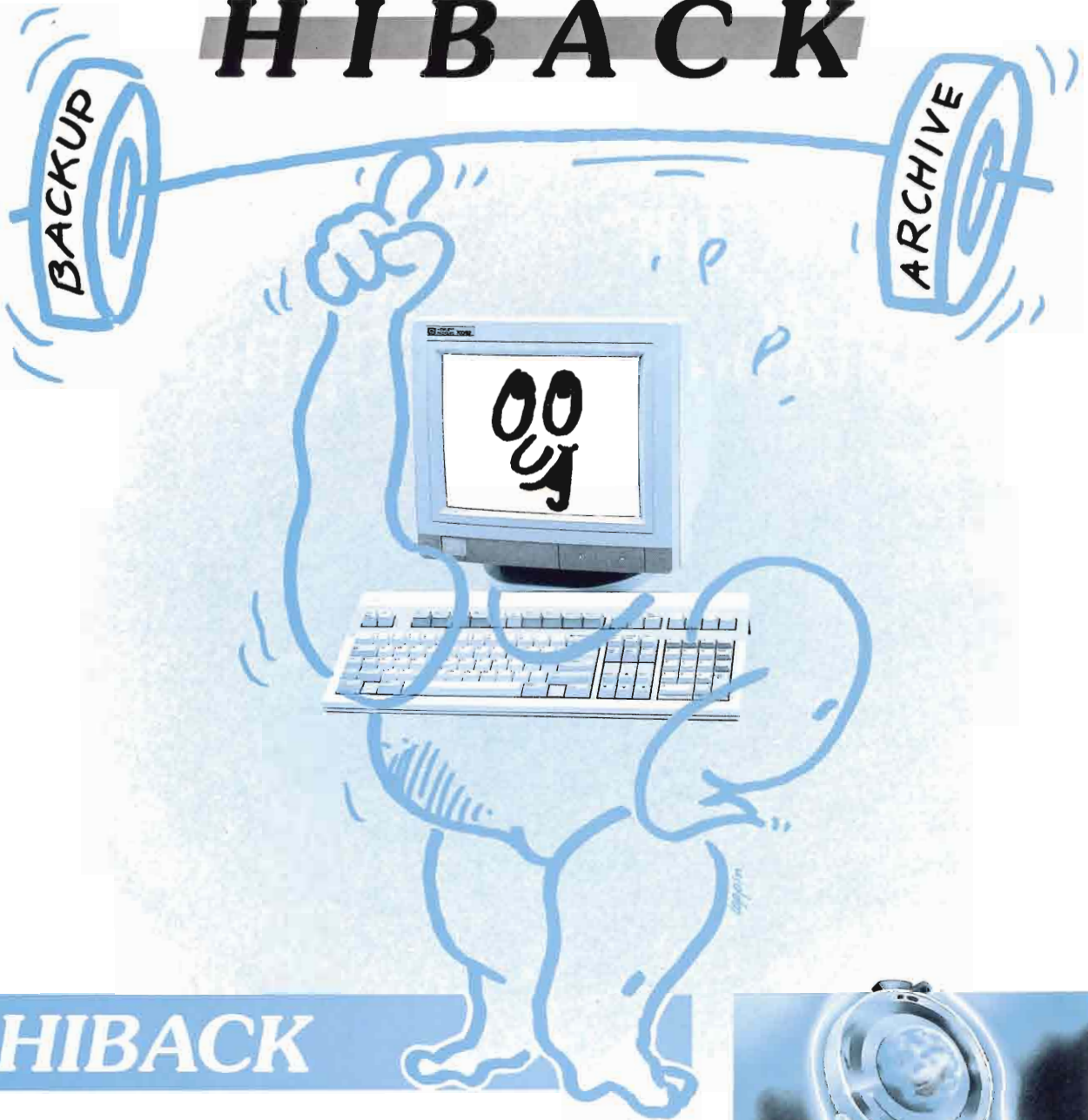
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Keep It Simple

One major computer manufacturer thinks its networking is “simply elegant.” For good reason — the strongest feature of its networking products is their ease of use. Keeping something simple doesn’t happen by accident. It requires a lot of planning and hard work.

Putting a telescope in space seems like a great idea. In orbit 350 miles above the earth, the view is unencumbered by our atmosphere. But I wonder whether or not this project got out of control. The Hubble space telescope is so complex that the space shuttle had to stand by to make sure the telescope deployed its solar panels and antennae. Astronauts were ready to make a spacewalk if necessary.

The solar panels finally extended, after much coaxing, but one of the two high-bandwidth antennae still wasn’t functional one week after launch. The opening of the lens cover caused enough vibration to shut down most systems. We didn’t get the first pictures for another week because of other problems. Even though the initial problems have been overcome, it will be about eight months before we get astronomical-quality pictures. And all this cost \$1.5 billion.

Compare that to the 300-inch telescope being built for an earthbound installation. It will cost about 80 percent less than the Hubble and promises to make many of its own contributions to astronomy.

Did the Hubble, which cost three times the original estimate, really have to be so complicated? Could the systems be simpler and therefore cheaper and more reliable? Should we have built a RISC telescope?

The U.S. government estimates that building a spaceplane that could fly from New York to Tokyo in two hours would be so expensive that we probably can never do it. But I’ve heard of a way to get it built. Burt Rutan, designer of the Voyager airplane that flew around the world unrefueled, has suggested that we offer a \$3 billion prize to the first person who builds a plane that fulfills the two-hour New York-to-Tokyo mission. The prize will guarantee that the job will be done simply and with no extras. Rutan contends that NASA can’t do it because of its organizational chart, which is too complicated. He also claims that the government couldn’t have accomplished what private enterprise did in creating the Voyager.

There are also computer-related complexity problems. A friend who runs a large successful business tells me that he’s sure his computer could (maybe should) be replaced by 40 people wearing green eyeshades and using quill pens. His systems are so complex that they have trouble delivering even the simplest

reports in a timely manner. Simple, well-designed systems work, while complicated, kludged ones don’t.

In 1972 I was the lead programmer in a project to mimic the decision-making of a medical specialist in diagnosing kidney disorders. I worked with a medical student and an experienced programmer. Eighteen years later the code is understandable, except for the clever portion written by the experienced programmer. That portion is complicated and unnecessarily hard to read and maintain.

IBM’s AS/400s can’t network simply with IBM’s R6000 UNIX computer. It can be done but not with standard Ethernet and TCP/IP. Interestingly, the R6000 networks easily with VAXs and HP workstations. Not surprisingly, IBM isn’t shouting about the connectivity among its midrange offerings. Unless it can be done elegantly and with ease, it probably isn’t worth doing.

In the best case, making things simple keeps them easy to attain and maintain. In the worst case, making things complicated keeps them from working at all. You could argue that the Hubble works only because of the extra \$1 billion put into making the extra complexity work. But if the Hubble was a private commercial project, it would have been cancelled because it was too expensive. Alternate, earthbound, solutions would have been found.

When someone tells you it can’t be done, ask him what *can* be done. Then remind him of something a father once told his son: “Can’t never did anything.” Maybe if we can’t do it one way, we ought to look for another way, not just add more complexity.



PS: After I wrote this editorial, NASA officials in late June reported that the Hubble Space Telescope’s 94-inch diameter main mirror was unable to focus properly affecting the use of the telescope’s two cameras. Repairs, which will cost millions of dollars, will have to wait until a 1993 service call.

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An MIS department nightmare, right?

The company's rapid growth over the past five years has created many unforeseen needs for new equipment and software. In fact, there has never been time to base purchase decisions on RFPs (request for proposals). Any vendor who deals with L.A. Gear had better be ready to ship big orders ASAP. It's not unusual for MIS Director Howard Seligman and Sam Schorr, director of Systems Development, to order 100 PCs and expect them to arrive within a week, or call for a 386 file server to be delivered within two days. And they put through orders for top-of-the-line Series 980/100s with upgrades to the multiprocessing Series 980/200s more quickly than many shops can get approval for a new disk drive.

Five years ago, L.A. Gear bought a Series 37. In 1988, a Series 70 was added. A few months later another Series 70 was ordered. When the last Series 70 was ordered, the company said the HP rep worried that they would be "overconfigured" and tried to talk them into buying a smaller machine. By the time the second Series 70 was installed, L.A. Gear had more than doubled its revenues.

While the MIS department waited for its two Series 950s to arrive in early 1989, L.A. Gear nearly tripled its revenues to \$220 million. Four or five months later when the second pair of Series 950s was installed, L.A. Gear was a \$600 million company. According to Seligman, the company expects to meet or exceed the billion dollar mark before the end of

1990. Naturally they plan to upgrade all four of its HP-PA CPUs to 980s by September with upgrades to the multiprocessing Series 980/200 to follow as soon as HP begins shipping them next year. Meanwhile, two of the 950s have been upgraded to 955s and the others became 960s.

Today, the Series 37 that started it all is a development machine that a contractor uses at home.

T*he advantage of being one of HP's largest customers is that HP has to pay attention to your special needs...*

The advantage of being one of HP's largest customers is that HP *has* to pay attention to your special needs in order to keep your business. And, L.A. Gear expects HP to be attentive to its special needs. According to the L.A. Gear MIS department, "We don't want factory visits, slide show presentations, and a sneak preview of new products; we have an agenda, not a wish list."

Obviously, problems will arise with a company that explodes as fast as L.A. Gear. The main problem that has led to meetings between L.A. Gear's management and the upper management of HP's Networked Systems Sector has been HP's "minicomputer mentality" at a time when L.A. Gear has mainframe needs.

Because there aren't enough good high-end performance tools, says Schorr, "the 960 still acts like a Series 70 because HP is still trying to tune a 60-user mini-computer rather than a mainframe-class system." Rather than switch from HP because of these performance problems, Seligman and Schorr have worked closely with Wim Roelandts, vice president and general manager of the Computer Systems Group.

According to Schorr, "Wim and his people have been 100 percent supportive of attempts to build the relationship. They understand how we want to work and are truly interested in working with us."

L.A. Gear wants HP to be more open to third-party vendors who can supply performance products. The MIS department believes that its problems with high-end systems that behave like midrange result from HP's having waited too long to create performance tools for MPE XL and from the company's attempts to limit third-party developers' access to the internals of MPE XL. Work on performance tools didn't start soon enough because MPE XL was undergoing changes. As a result, HP shipped high-end systems before it provided the tools needed to make them perform well enough to support the number of users they were designed for.

Another factor that contributed to the lack of tools was HP's insistence that third parties access system internals via an architected interface (AIF) to MPE XL. By limiting access to internals, HP gave itself a headstart over third parties who are working on high-end performance tools. Although selected developers have worked with the AIF since last fall, the long-delayed architected interface didn't become generally available to developers

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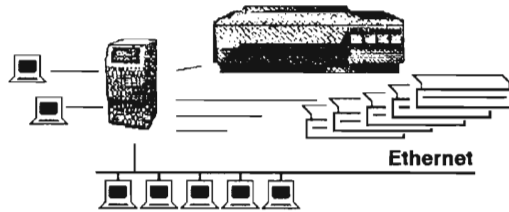
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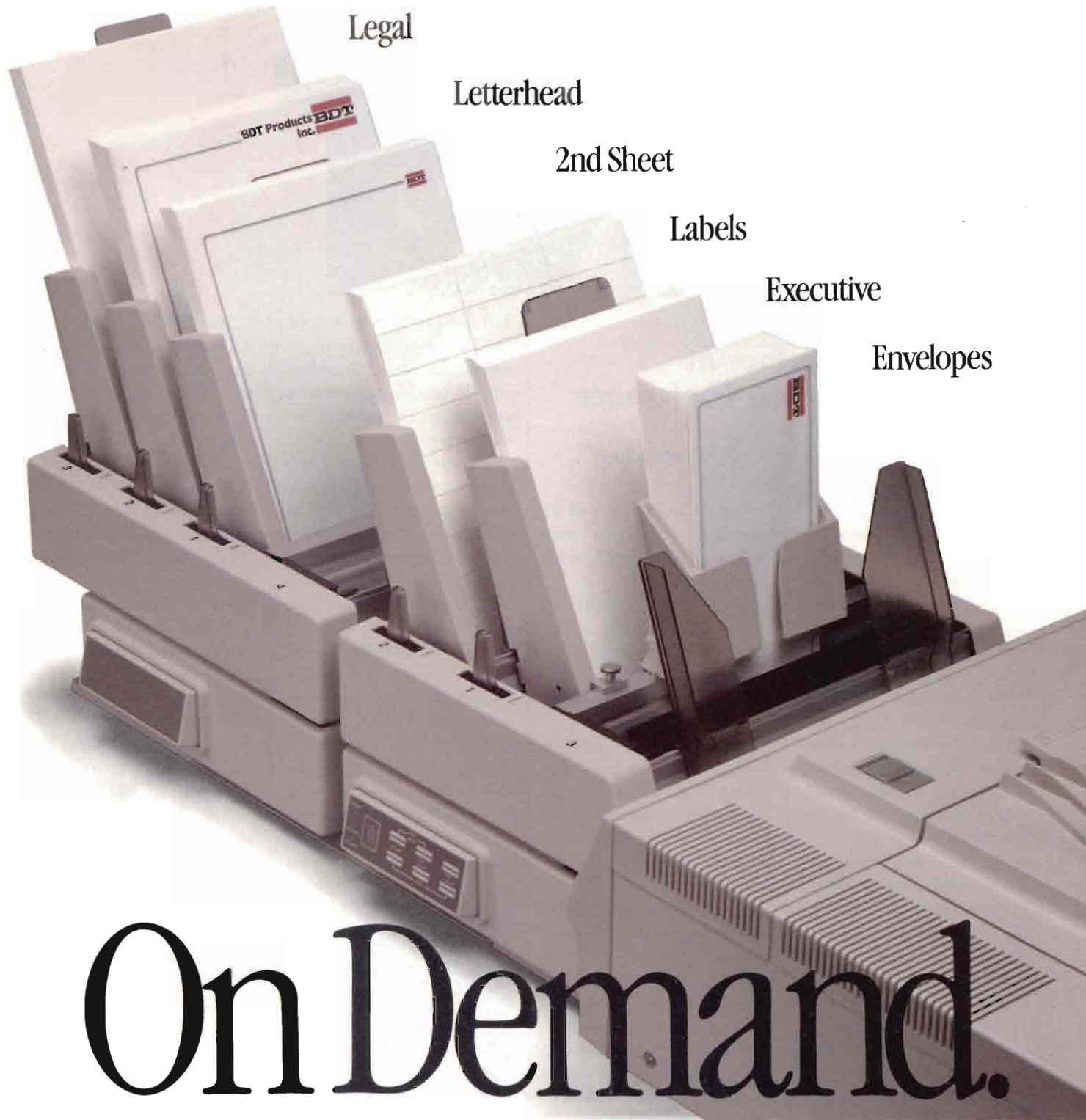
until this summer, after HP introduced its own performance optimization tools.

According to Schorr, third-party developers with a deep understanding of HP systems could have provided the tools that L.A. Gear needed to tune its Precision Architecture systems sooner than HP has. Seligman and Schorr let HP know they were unhappy about the lawsuit HP filed against Strategic Systems. Strategic's product, Probe XL, had been a useful tool for MPE XL in the absence of similar tools from HP, but because of the legal ramifications, L.A. Gear won't be able to use Probe when upgrading its operation system to version 2.1 of MPE XL.

L.A. Gear also encouraged HP to allow Quest Software (Newport Beach, CA) to work with the architected interface at the early stages of the AIF project because L.A. Gear's MIS department depends on Quest for their software development needs. Quest's access to the AIF has allowed HP to begin developing a system management console that provides a network-wide view of performance with emphasis on application-level problems. (HP's OpenView System Manager focuses on system level problems.) Quest expects to deliver a version of this product by September 1990.

L.A. Gear expects a lot of cooperation from its software, hardware and networking partners, but its partners also benefit in the long run. By working closely with selected vendors to get the products and tools its MIS department needs to run its rapidly expanding business operations, L.A. Gear has helped its suppliers meet the needs of other high-end customers as well.

In exchange for its loyalty to a few carefully chosen vendors, L.A. Gear expects special services, not just a standard product. When the special enhancements and services become incorporated into the vendor's product, the vendor becomes better equipped to sell to other large customers. HP and Quest have had to put on running shoes to keep pace with L.A. Gear, but the workout they're getting will help them run with faster crowds.



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CFI Demonstrates Procedural Interface At Design Automation Conference

30 CAD Tools Run On Five Workstations

The CAD Framework Initiative (CFI) demonstrated a working model of its procedural interface at the recent Design Automation Conference held in Orlando, FL.

Some 22 hardware and software vendors supplied 30 CAD tools that ran on five workstations from HP, Apollo, DEC, SUN and IBM. The goal of CFI, a coalition of EDA vendors, was to demonstrate progress made in multivendor distributed computing.

According to a CFI report, the demonstration at DAC is an "attempt to demonstrate tangible progress and evaluate the technical feasibility of the procedural interface (PI) approach to tool integration.

The demonstration showed some 20 vendors CAD tools operating together in a single design environment using a prototype of a CFI-defined PI. The PI allows multivendor design tools to pass netlist data to one another directly in real time. Participating companies have developed interface software either from their netlist "producer" tool (e.g., schematic editor or EDIF reader)

to the PI, or from the PI to their netlist "consumer" tool (e.g., a logic simulator or IC layout generator).

The results of the project will be used to further refine the PI. Revision and subsequent publication of the draft guidelines is expected to be complete late this year.

DAC highlights: Cadence Design Systems Inc. and Cadre Technologies Inc. announced an agreement to jointly market hardware-software co-design solutions for builders of electronics systems. Under the agreement, Cadence and Cadre will provide integration between their respective technologies to enable hardware and software engineering to work together from the system level, throughout the entire product development process. The companies will market to customers in all segments of the electronics industry.

DEC announced a new version of its PowerFrame design management framework software that supports Apollo and Sun workstations. The new PowerFrame version supports Apollo 3000/

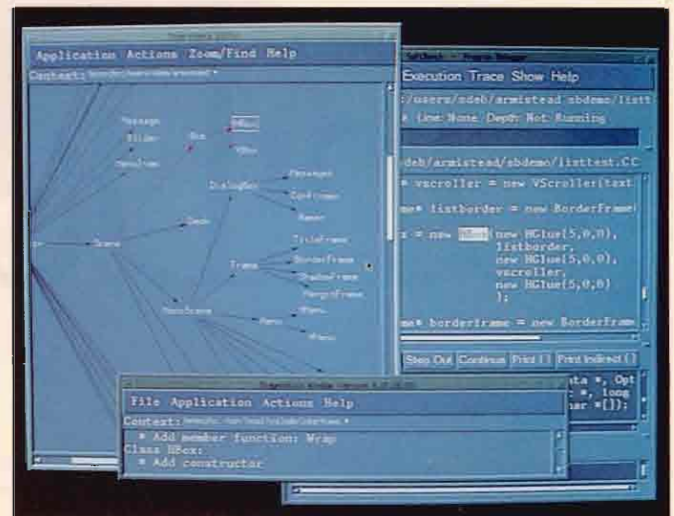
4000, Sun-3, Sun-4 and SPARCstation platforms in addition to DEC's DECstation and VAXstation workstations and DECsystem and VAXsystem servers.

Hewlett-Packard announced three products that extend the capabilities of its HP CASEdge computer-aided software engineering family in object-oriented programming, software-test verification and metrics.

HP C++/SoftBench provides an integrated, extensible environment for program development and tool integration in C++ and C languages. Its graphical capabilities simplify browsing and debugging tasks and expedite building, editing and analyzing C++ source code.

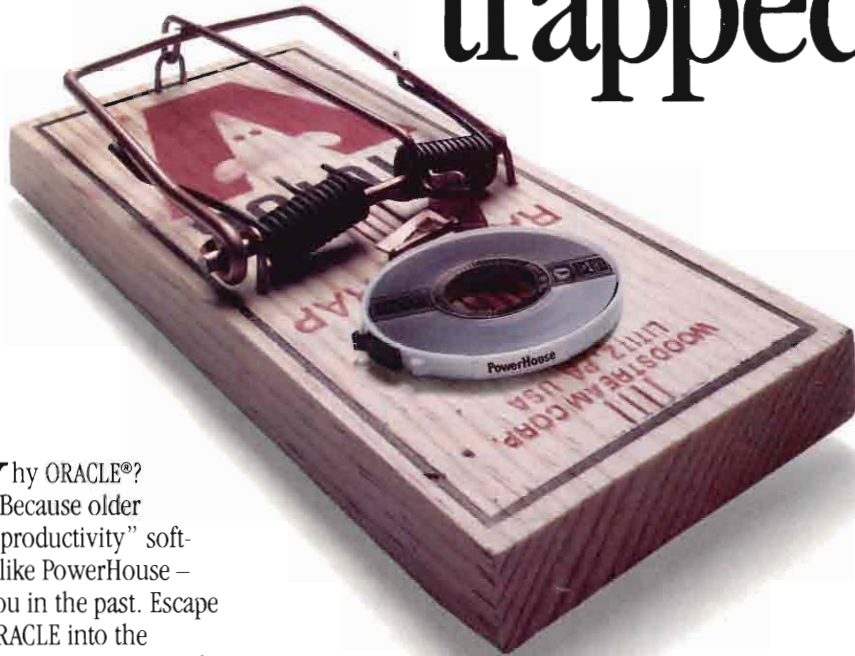
The HP Branch Validator is a method-independent tool designed for ease of use in software-test verification, thus reducing product time to market. The third new product, HP software-metrics program, will allow HP field consultants to help software managers gain control over their products and improve development and maintenance processes.

i-Logic introduced a product that allows designers of hardware systems to automatically generate VHDL from graphical models. According to the company, the Express VHDL approach is more efficient than writing textual VHDL because its graphical languages make it easy to express and communicate



HP C++/SoftBench provides an integrated, extensible environment for program development and tool integration in C++ and C languages.

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	Tucson	Aug 7f Aug 7
CA	La Jolla	Aug 2c Aug 2
	Los Angeles	Jul 31f Jul 31
		Jul 31f Aug 21f Aug 21
	Newport Beach	Jul 17f Jul 17
		Aug 16c Aug 16
	Riverside	Jul 12f Jul 12
	Sacramento	Jul 26f Jul 26
	San Diego	Jul 17f Jul 17
		Jul 19f Jul 19
	San Francisco	Jul 12c Jul 12
		Aug 9f Aug 9f
	Santa Clara	Jul 18 Jul 18f
		Aug 17c Aug 17f
CO	Denver	Jul 19f Jul 19
CT	Stamford	Jul 24f Jul 24
DC	Washington	Jul 24c Jul 24
		Aug 7 Aug 7
FL	Jacksonville	Jul 19f Jul 19
	Melborne	Aug 16c Aug 16
	Miami	Aug 14 Aug 14f
	Tampa	Jul 13f Jul 13
GA	Atlanta	Jul 10f Jul 10
IA	Des Moines	Aug 16c Aug 16
ID	Boise	Jul 26
IL	Chicago	Jul 17c Jul 17
		Aug 2f Aug 2f Aug 21f Aug 21f
IN	Ft. Wayne	Jul 19f Jul 19
	Indianapolis	Aug 1c Aug 1
KS	Wichita	Jul 10c Jul 10
KY	Louisville	Aug 23f Aug 23
LA	New Orleans	Aug 2c Aug 2
MA	Burlington	Jul 27f Jul 27
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MI	Dearborn	Aug 21f Aug 21
MIN	Minneapolis	Jul 10c Jul 10
MO	Kansas City	Aug 2f Aug 2
		Aug 14
	St. Louis	Jul 19f Jul 19 Aug 16
NJ	Iselin	Jul 10f Jul 10
		Aug 7c Aug 7
NM	Albuquerque	Jul 26f Jul 26
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NY	Buffalo	Jul 24f Jul 24
	New York	Jul 11f Jul 11
		Jul 25c Jul 25c Jul 25 Jul 25
		Aug 15 Aug 15f Aug 29 Aug 29f
	Syracuse	Jul 26f Jul 26
OH	Cincinnati	Jul 12
	Cleveland	Jul 5f Jul 5
	Columbus	Aug 16f Aug 16
OK	Oklahoma City	Jul 17c
		Jul 17 Jul 18f
	Tulsa	Jul 18 Jul 19f
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	Harrisburg	Jul 19f Jul 19
	Malvern	Aug 21f Aug 21
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RJ	Providence	Jul 12f Jul 12
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TN	Memphis	Jul 17 Aug 23
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	Dallas	Jul 10c Jul 10 Jul 11f
	Ft. Worth	Jul 24
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		Jul 19f Aug 21f
	San Antonio	Aug 3c
		Aug 3 Aug 16f
UT	Salt Lake City	Jul 17f Jul 17
		Aug 23c Aug 23
VA	Norfolk	Jul 31c Jul 31
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		Aug 23f Aug 23f
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the behavioral aspects of a system.

Cadre displayed a new line of software analysis tools at the show, including the SFA1000 for performance analysis; the SAW2000 for software debug and performance analysis on 8- and 16-bit microprocessors, and the 32-bit, high-performance micro-

processors.

"These products respond to a clear market need for low-cost, high-quality logic and software analyzer with multiple levels of capabilities based on microprocessor speed," said Bill Sundermeier, Cadre's software test product manager. —Tom Halligan, Managing Editor

HP CASEdge/Open Systems Program

HP also announced at DAC its CASEdge/Open Systems licensing program. Under the program, HP will license HP Softbench and HP Encapsulator core technologies as part of an overall move to respond to customer needs in CASE.

The licensing program will allow customers to support heterogeneous computing environments and allow licensees working with HP to deliver their solutions and tools to a larger market. It will also make it easier for customers and vendors to provide a range of customized software-engineering environments.

Potential licensees of HP Softbench and HP Encapsulator software programs include: hardware-system vendors, CASE-tool providers, value-added resellers and system integrators — all of whom are interested in improved time to market and offering tailored-engineering environments. End users who want to customize their own environments also will be able to license these core HP technologies.

HP Strengthens Position As RISC Supplier

Hitachi To Design, Manufacture And Sell Chips Based On HP's PA-RISC Technology

Hitachi Ltd. has announced that it will develop, manufacture and market RISC microprocessor chips based on HP's PA-RISC technology. Hitachi and HP also will jointly introduce development tools for the chip marketplace and will share PA-RISC design information.

This announcement follows a separate agreement last July in which Hitachi and HP agreed to jointly develop a new higher-speed RISC chip set to be used in computer systems produced by both companies.



The HP 3000 Series 920 is designed for small- to medium-sized businesses.

HP 3000 Series 920 Lowers Midrange Entry Level

Compact Unit Includes Integrated Disc Drive, DAT

With the introduction of a \$28,000 system and server, HP added a lower price point to its midrange for Precision Architecture. Nevertheless, the MPE XL product line has yet to include a low-end system comparable to the Series 808 or 815 available for HP-UX. The Series 920 and Server 920 are designed for small to medium-sized businesses, branch offices and departments of large companies. Both come in integrated desk-side units that include a disc drive and a DAT cassette drive.

The Series 920 is targeted for those who use terminals for online transaction processing (OLTP), whereas the Server 920 is designed for use with PCs across a network. The Server 920 comes with VPLUS/Windows, PC networking software and HP NewWave System Services.

The introduction of the

Series 920 coincided with two other introductions — a new benchmark and a new version of the MPE XL operating system. When HP released the 4.95 transactions per second performance measurement for the Series 920, the company became the first to use TPC-A benchmark figures instead of a mips rating for positioning the performance of its systems.

Series 920 and Server 920 ship with version 2.1 of MPE XL, which allows customers to take advantage of 15 new products and product enhancements. Newly supported networking products include network management for HP-to-HP, IBM-to-IBM and HP-to-IBM with one network backbone, data exchange with IBM systems over an X.25 network, and network services over IBM SNA networks. —Peggy King, West Coast Editor

Massive Storage

2.5GBytes Mass Storage in a single, compact cartridge about the size of a deck of cards for HP 3000, 1000, and 9000 computers



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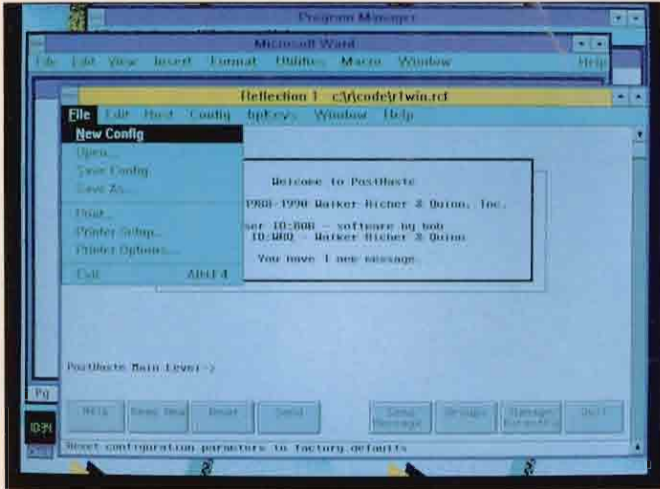
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WRQ's Reflection 1 terminal emulator works within a windowed environment and supports multitasking.

WRQ Introduces Reflection For Windows

Terminal Emulator Works In A Window Under Microsoft Windows 3.0

In early October, Walker, Richer & Quinn (Seattle, WA) is scheduled to release a version of its Reflection 1 terminal emulator that works within a windowed environment and supports multitasking. Interex attendees can preview the product in a booth that WRQ has designed especially for Reflection for Windows demonstrations.

With Reflection for Windows a user can have multiple applications running simultaneously on the screen instead of having to use a "hot key" to switch between applications. Inactive applications remain on the screen as icons. Users can expand and shrink the size of windows, and the text inside the window will adjust accordingly.

Reflection for Windows runs under Microsoft Windows 3.0, but its performance under NewWave has not yet been tested. In future releases,

users will be able to buy versions of Reflection for Windows that work with NewWave and MS Windows 3.0. Reflection 1 for Windows supports full windows implementations for applications designed for the HP2392A or 700/92 display terminal and applications for the HP 700/94 in both block and character mode.

To get good performance using Reflection for Windows, WRQ recommends a PC with at least 640 KB of memory and an 80268, 80386 or 80486 microprocessor. If the machine is a 286, the 80286 processor should have a clock speed of at least 20 MHz. The single copy list price of Reflection 1 for Windows is \$399. WRQ also will offer product updates to existing Reflection users and product trade-ins to AdvanceLink users. —Peggy King, *West Coast Editor*

HP Sockets Integrates Software For Heterogeneous Factory Environments

Supportable Interfaces To Connect Islands Of Automation

Users of HP's Materials Management software who attended the 1990 MPD User's Conference in Tampa, FL got a sneak preview of HP Software Integration Sockets (code-named Sapphire) when HP's Industrial Applications Center (IAC) introduced its newest product.

HP Sockets provides tools for creating supportable interfaces between computers and production equipment from various vendors. Features include high-performance communication between software processes, data translation and record reformatting for message transfer, and connection management for applications that communicate with one

another.

Designed to integrate new and existing software applications in a network of heterogeneous computers, HP Sockets can be used with little or no modifications to the applications themselves. The software is modular and consists of the following components: data transporter, data translator/manipulator, system manager, command processor and access routines. HP NS (Network Services) and a C compiler are also required when HP Sockets is used to integrate applications. HP Sockets for HP-UX is now available and an MPE XL version of the product will be introduced in 1991. —Peggy King, *West Coast Editor*

McDonnell Douglas, HP Sign \$75 Million VAR Agreement

MDC To Resell HP's Motorola, 9000s With UNIGRAPHICS

McDonnell Douglas and HP have signed a three-year \$75 million VAR agreement, allowing McDonnell Douglas to resell HP's Motorola and its family of RISC-based 9000 workstations with MDC's UNIGRAPHICS software.

The MDC/HP team successfully penetrated many of the major automotive, aerospace and manufacturing cor-

porations that were using mainframes for CAD applications. Their success is attributed to the ability to shorten design cycles and get products to market faster.

Contact McDonnell Douglas, 325 McDonnell Blvd., Hazelwood, MO 63042; (314) 232-5924

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CIRCLE 162 ON THE AD CARD

For Your Information...

■ Robert Maxwell, chairman and chief executive of Maxwell Communication Corporation plc and Macmillan Inc. announced recently the acquisition of RightSoft Inc. by Macmillan Computer Publishing, a division of Macmillan. The consideration was approximately \$5 million.

■ Carolian Systems has announced the re-acquisition from HP of the sale, support and marketing rights to its high availability product, Shadow (previously known as Silhouette/3000). HP's rights as a sole distributor of Shadow ceased March 1.

■ Former Wang Senior Vice President and General Manager, Harold P. (Bob) Ano, has assumed the position of Senior Vice President, Marketing at EMC Corp. (Hop-

kinton, MA).

■ James River Dixie (Fort Smith, AR), manufacturer of paper plates and cups, has contracted Eagle Consulting & Development Corp. (Kinneton, NJ) to implement the automatic one-step receiving system into itsd HP MRPII Manufacturing system.

■ The name of the Technologies Division of Martin-sound Inc. (Alhambra, CA) has been changed to MAR-TECH. MARTECH offers Megamemories products for Series 9000 systems.

■ Alsys has published *Executive Briefing on Ada*, a booklet written by Ada experts on how software engineers and program managers can benefit from using the Ada programming language.

Racal InterLan Announces Network Products Agreement

Oracle To Resell Racal InterLan TCP/IP-Based Products

Racal InterLan Inc. has joined Oracle Corp's Third-Party Networks Product Program. Under the agreement, Oracle Corporation will resell Racal InterLan networking products.

Under terms of the non-exclusive agreement Oracle will resell Racal InterLan software and hardware products based on TCP/IP, an industry standard communications protocol. Racal InterLan will provide its NP629 TCP Gate-

way for Novell Netware, which allows personal computers on a Novell LAN to share data with heterogeneous TCP/IP hosts. Oracle also will offer the NP622 and NP622A TCP/IP software and protocol processors for UNIX-based systems running Interactive System's 386/ix or AT&T's UNIX System V Release 3.2. All those Racal InterLan products support Oracle's SQL*Net client/server protocol.

X/Open Reveals Results Of Luxembourg Xtra '90

Participants Rate Top Issues, Set Priorities For Open Systems Development

X/Open Company Ltd. sponsored Xtra '90, during which eight work groups focusing on critical issues for the future of open systems. Although each group was to focus on a specific area of concern, participants found that similar concerns were raised in each group. The top ten requirements were grouped into these four general categories:

User Interface—The need for similar appearance of applications based on a consistent look and feel and a unified Application Programming Interface (API).

Systems Administration—The ability to administer dis-

tributed heterogeneous systems in a consistent fashion.

Distributed Systems—The ability to get access to distributed databases and other information sources from within an open architecture.

Open Systems Leadership—The need for information and services to support the migration and extension of existing applications and systems, plus the tools to facilitate the development of new applications.

X/Open is analyzing the problems and will present the results as the Open Systems Directive Overview in November. —Peggy King, West Coast Editor

Apollo Platforms Support Embedded Microprocessor Development Tools

HP Looks To Offer Embedded And Native Development Tools In One Environment

HP has announced that several of its hardware and software development tools for embedded microprocessor systems will be supported on its Apollo platforms. HP has tools for more than 60 processors from several vendors.

Computer hosts currently supported by the HP development tools include the HP 9000 Series 300 workstation and IBM-compatible PCs. HP's

software and hardware tools for embedded Motorola 68000, 68HC000 and Intel 80186, 80188, 80C186, 80C188 designs now are available on the Apollo platforms. These include the Series 2500, 3500 and 4500 running the Domain/OS 10.2 operating system.

Support for the Apollo platforms is an initial step in HP's effort to become the first manufacturer to offer embedded- and native-development tools in one environment.

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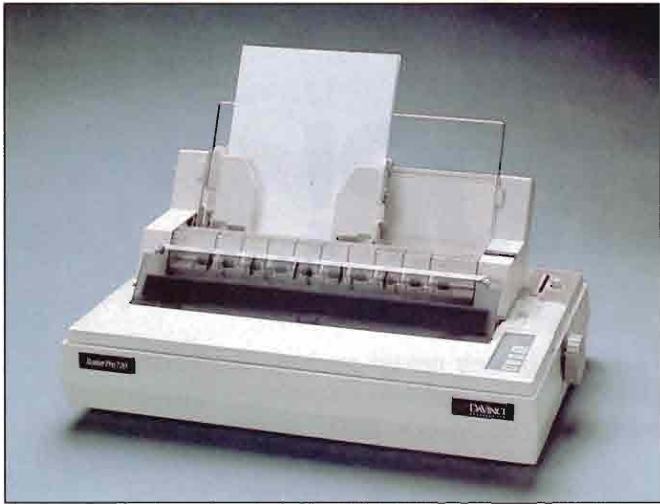
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CIRCLE 249 ON READER CARD

Plotting Without The Pen



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RasterPro 720
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If dried plotter pens and lengthy, time-consuming plots slow your engineering staff's efforts, consider the RasterPro 720 penless plotter from Da Vinci Graphics.

The RasterPro 720 uses a 24-pin dot-matrix print/plot head to create plots and printed material. In plot mode, it emulates the HP 7475A plotter and the special symbol set of the 7550A. In print mode, it emulates a host of printers, including IBM's Graphics Printer and Proprinter XL and Epson's FX-80 and JX-80.

Rather than using ink pens as the recording media, the RasterPro 720 uses replaceable ribbon cassettes. The four-color fabric ribbon cassette (yellow, red, blue and black) can produce 14 colors. A black fabric ribbon cassette is available for monochrome plots.

The architecture of the RasterPro 720 enables it to perform the jobs of a high-resolution, archive-quality plotter, a check plotter for

producing quick 180 or 360 degree monochrome or color drafts and a near-letter-quality printer.

The RasterPro 720 is 4.7 inches high, 22.8 inches wide and 13.6 inches deep. It uses Motorola's 68000 microprocessor as its CPU and comes standard with 500 KB of RAM upgradable to 2 MB for large plots. Communication with a host is through a Centronix parallel interface or an RS-232C serial interface.

In plot mode, the RasterPro 720 supports the Hewlett-Packard Graphics Language (HP-GL) command set and A, B, A4 and A3 paper sizes. It plots unidirectionally and bidirectionally at 720 dots per inch (dpi) and has a draft mode selection for quick check plots. You can also plot in line widths of 0.25, 0.50, 0.75 and 1.30mm.

In print mode, speeds range from 60 characters per second (cps) at 10 characters per inch (cpi) in letter quality to 240 cps at 10 cpi in high-speed draft. Character sets supported include IBM Graphics Printer with international characters and the IBM Proprinter character set.

Font types available include Courier, Prestige Elite, Draft, High-Speed Draft and Compressed. You can select from a variety of standard or proportional character spacings or program your own character spacing in 1/180-inch increments.

The RasterPro 720 plots a drawing in two stages. First it reads the HP-GL code from your PC and processes it by rasterizing the vector coordi-

nates. During this time, no plotting takes place. Once the entire file is read and processed, the plotter plots the drawing.

The RasterPro 720 comes with a power cord, user's manual, paper guide panel and guide extenders, and a color ribbon.

The user's guide is divided into two main sections. The Quick Start section helps get your RasterPro 720 up and running immediately. The second section provides information on setting up your plotter, using the control panel, paper loading, plot mode and print mode setup, maintenance and troubleshooting. The user's guide also has an extensive appendix that describes plot and print mode specifications, interface considerations, HP-GL plot commands, and plot mode and print mode fonts.

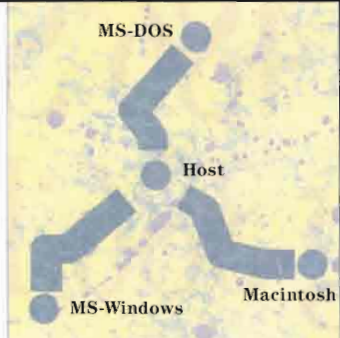
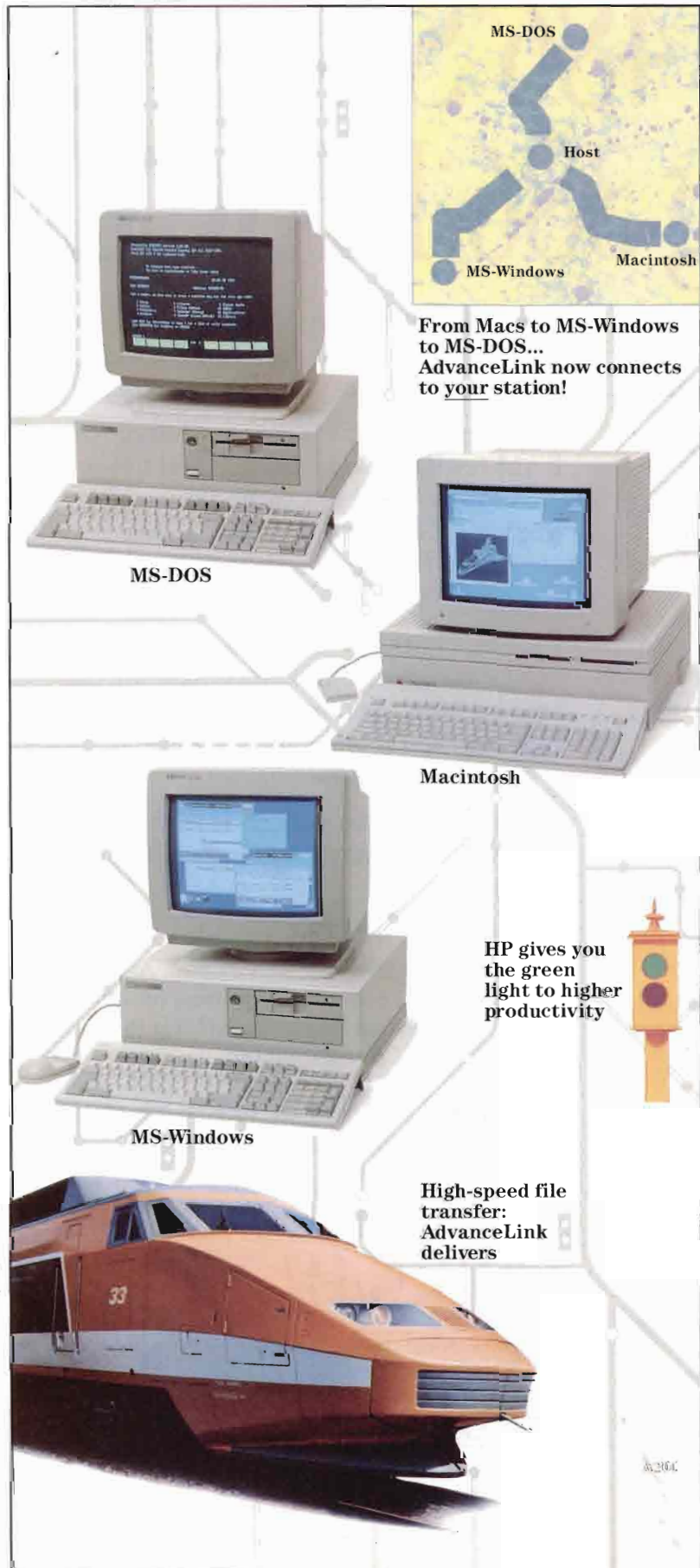
The RasterPro 720 penless plotter is ideal for electrical and electronic engineering, CAD, VLSI circuit design, construction engineering, architecture and geographic information systems. Its convenient desktop size and fast throughput make it a welcome addition to most engineering environments.

The RasterPro 720 is priced at \$3,495. —George T. Frueh, Technical Editor

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CIRCLE 338 ON READER CARD

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ITEMS:
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 FIRST-NAME, X30
 LAST-NAME, X30
 COMPANY, X30
 ADDRESS, X30
 LAST-PAID-DATE, K1
 BALANCE, I2

CAPACITY: 25243

dBASE
 Excel
 R:BASE QUATRO

	A	B	C
	Number	Name	Expiration Date
3	11,384	Frank Alaopa	
4	18,769	Jean Amoux	
5	10,386	Sean Connery	
6	11,411	Paul Dauer	
7	10,866	Kirby Dick	

Office Extend
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 Access To HP
 3000 Data

Getting your HP 3000 and PCs to talk with each other is one thing — getting them to *work* together is something else. Fransen/King Ltd.'s Office Extend TaskMaster is software for the HP 3000 that forms an "intelligent bridge" between PC applications and your existing HP 3000-based information retrieval, report writer and data access systems.

Office Extend TaskMaster's job is to bring HP 3000 data directly into PC applications. For example, with Office Extend TaskMaster running on your HP 3000, you can /FileRetrieve from IMAGE databases directly into a Lotus worksheet, include the output from a QUIZ report in a WordPerfect document, use QUERY/3000 to generate

Excel compatible data and automatically unload IMAGE information directly into dBASE, R:Base and other PC database systems.

Office Extend TaskMaster is application independent. It isn't tied to any specific HP 3000 or PC application. MPE files generated by a host application running on the HP 3000 can be transferred automatically to any PC application.

Although invisible to both PC and HP programs, Office Extend TaskMaster runs on behalf of the PC program to control an HP 3000 host program. The output from the controlled host program is returned to the PC program as a file.

Any PC application that can read a PC file can receive and process HP 3000 data using Office Extend TaskMaster. To access live HP 3000 data, the PC user requests a "file" from an Office Extend HostDisk volume. This file request is identified by the HP 3000 as a request to execute a predefined "task" such as extracting data from the host database or generating a particular report. Once the HP 3000 process has created an MPE file with the desired data, Office Extend TaskMaster passes this data back to the requesting PC.

When executing a particular task, Office Extend TaskMaster can interact with the PC user to gather additional information. For example, a task could be created to provide accounts receivable information to the PC user. This

task could prompt the user with questions such as "Days past due?" and "Balances greater than?" These prompts would then "pop-up" during task execution without disturbing the PC application.

Office Extend TaskMaster can use your existing HP 3000 data extraction and reporting tools and your custom HP 3000 applications to produce data files for PC users.

Command language documentation and the sample command files supplied with Office Extend TaskMaster allow you to create the tasks needed by your PC users. Office Extend TaskMaster Scripts have been designed to work with DataExpress from IMACS, ASKPLUS from Cognogel and QUIZ/3000 from Cognos.

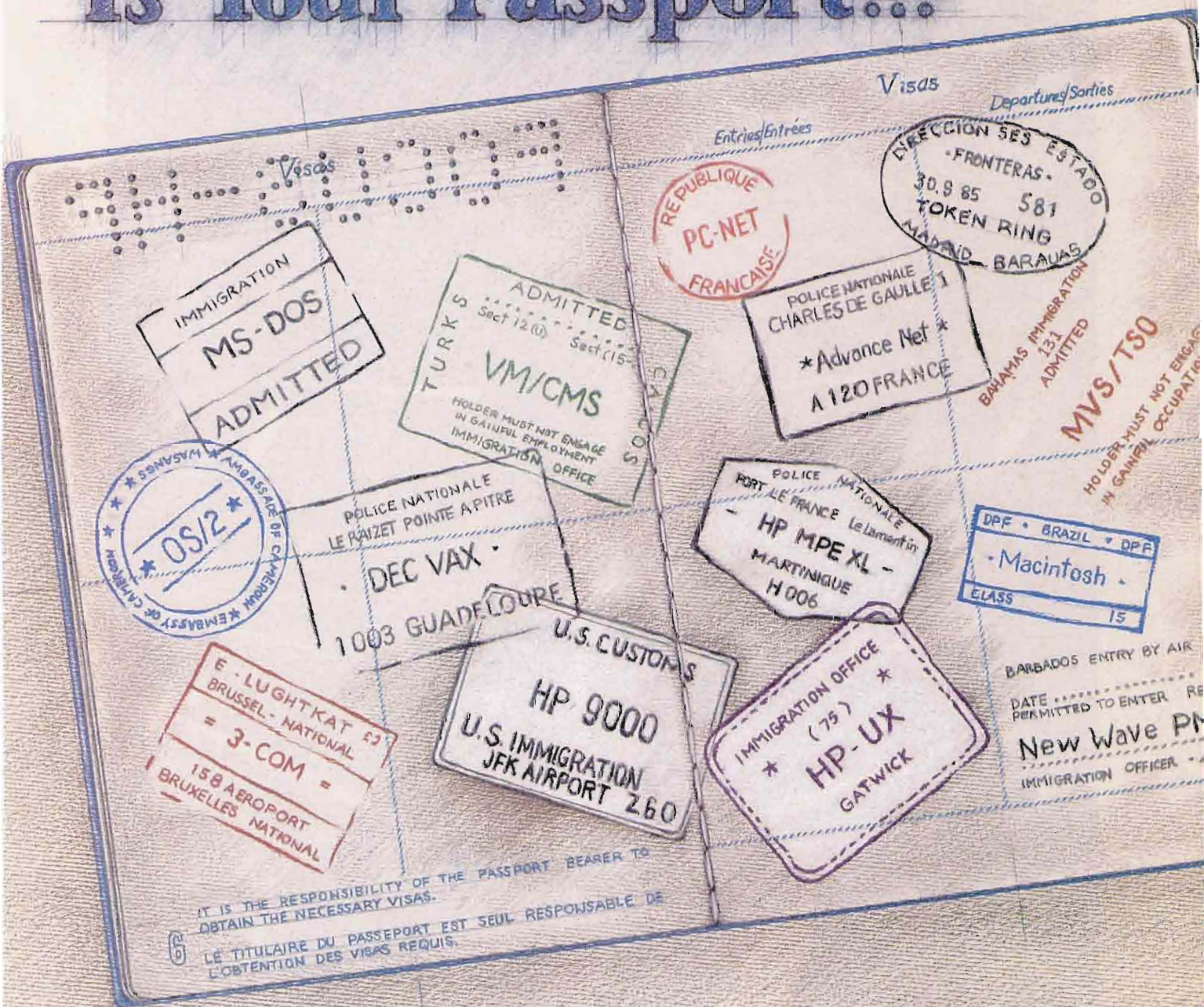
With Office Extend TaskMaster, your data processing staff is not required to learn to program PC applications, and the entire HP 3000 (logon to database structure/reporting package) is invisible to the PC user.

Office Extend TaskMaster is priced from \$2,500 to \$10,000. — *George T. Frueh, Technical Editor*

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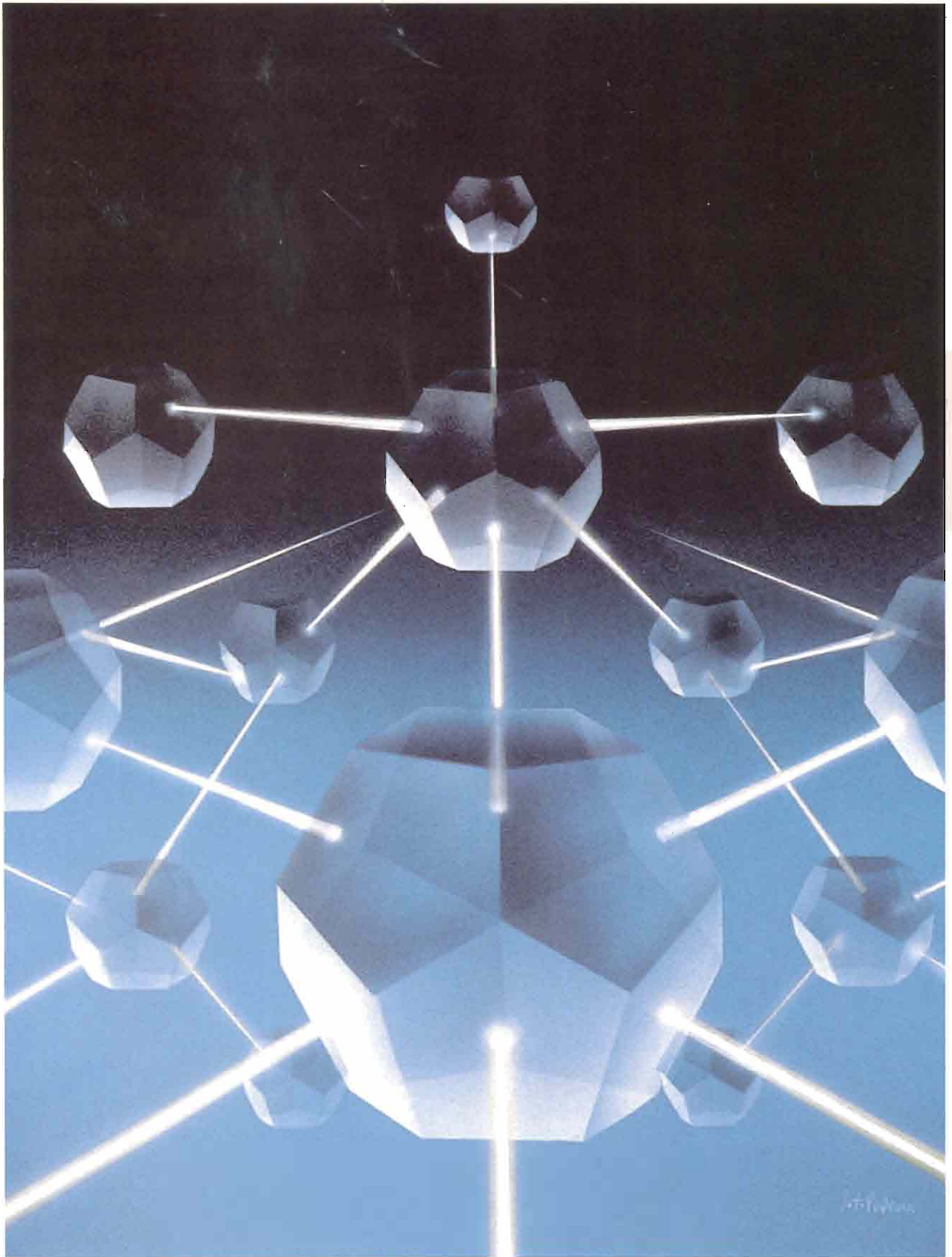
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CIRCLE 247 ON READER CARD



PRINTING

PARTICULARS

PCL Printers Bring New Capabilities And Applications To The HP 3000

[BY PEGGY KING]

Your company probably has at least one HP LaserJet or LaserJet-compatible printer. Your first LaserJet was probably hooked up to a PC just like HP's Boise Division intended it to be. But if your company has an electronic forms package for the HP 3000, you've probably already discovered that your LaserJets can work just as well with your HP 3000 as they do with a PC.

Unless you use sophisticated PC- or workstation-based desktop publishing software for typeset-quality documents, there's no reason to shell out thousands of dollars more to get a PostScript printer. LaserJets probably are capable of doing every type of printing you have ever dreamed of doing on an HP 3000 — and more.

When HP introduced its first LaserJet in 1984, many companies finally shifted from typewriters to PCs for their business correspondence. Electronic forms became a reality when HP introduced the LaserJet Plus, in 1985, which supported downloadable fonts and line draw commands. Recently, these forms packages have been enhanced to allow you to merge data from your applications so that you can fill in the forms at the same time they are printed.

Now, hardly a week goes by without the introduction of new software designed to work with LaserJets and compatibles, new font cartridges and custom font design services for customers with laser printers. Examples of such electronic forms packages are StarJet from APPIC USA Inc., LaserSoft from Business Systems International (BSI), Formation from OPT, Fantasia from Proactive Systems and JetForm Merge from Indigo Software.

If you still need to justify replacing that aging impact printer with one or more laser print-

ers, here are suggestions for new ways to use a laser printer attached to an HP 3000 to increase productivity and/or save money.

■ **Business Correspondence Using Word Processor Output:** With R.S.V.P. from Walker Richer & Quinn or MiniSoft 2392, you can redirect output from a PC word processing package to an HP 3000 attached to a LaserJet printer. This allows employees who don't have their own printers to queue print jobs to a central printer.

■ **Bar Codes:** Some laser printers have resident barcode fonts and others (including HP LaserJets) have font cartridges for various kinds of barcodes. LaserSoft/3000 from BSI provides soft fonts including a downloadable 3-of-9 barcode font.

■ **Reduction Printing:** Fantasia from Proactive, LaserSoft/Jet-Setter from BSI, and Laser Toolkit from OPT all offer compression printing. You can save paper by printing in a smaller font and putting two or more logical pages on one physical page.

■ **More Readable Reports:** Shelby Robert, general manager at Proactive Systems recommends using an HP 3000 forms package such as Fantasia to print price lists or other reports with proportional fonts and special emphasis not possible from line printer output. "When you highlight data by varying the typeface, you're turning data into information," said Robert.

■ **Faster Business Graphics:** When you use raster (dot-by-dot) graphics, laser printers don't run at their rated speed. If you scan

Use an HP 3000 forms package to print price lists or other reports with proportional fonts and special emphasis not possible from line printer output.

a frequently used graphic to create a font, you can then download this font. The "form" created is held in the printer's memory so that your laser printer performs at its usual speed.

■ **Signatures And Logos:** BSI's LaserSoft Service Center (Los Angeles, CA) and Innovative Type Inc. (Boston, MA) are two companies that will create custom logos from digitized signatures or copies of a logo. (Your printer dealer may know of other companies in your area). These companies provide digitized graphics in soft form as downloadable fonts or as hardware plug-ins (font cartridges or IC font cards). According to BSI's President, Richard Armitage, the advantage of having your signature digitized on a credit card-sized IC font card such as the kind used in many LaserJet-compatible printers (but not in HP LaserJets) is that you can carry your signature card with you to prevent unauthorized use.

■ **Plotter Output:** The HP LaserJet III and some compatibles come with resident HP-GL graphics capabilities to emulate an HP 7475A plotter. Other printers have separately priced HP-GL emulation cartridges. Aside from being able to do "B"-sized drawings, another reason to have HP-GL emulation is the ability to combine text and graphics in one file.

■ **Check Printing:** BSI has recently introduced its own MICR font and received accreditation from the MICR Institute to print bank checks. Because check printing requires the use of magnetic ink, this application is available only on printers with Ricoh engines because the Ricoh engine toner is the only one that currently works with magnetic ink.

■ **Incoming Faxes On Plain Paper:** JetFax from Hybrid Fax Inc. (Menlo Park, CA) attaches to a LaserJet or compatible and allows faxes to be printed directly to the printer, or it stores up to 60 pages in its memory if the printer is busy. The units are modular, and it's possible to connect up to three of them to one printer for high-volume applications.

■ **Proof Copies Of Files To Be Typeset:** When the LaserJet III was announced in February, HP also announced that PCL 5 in-

[STATUS CHECKING]

Status checking is a feedback mechanism that lets you know if a printer is off line. The risk of using a printer without status checking is that data will be lost if the printer gets turned off while it's printing. Also, the HP 3000 won't know to quit sending data if the printer runs out of paper. But, if the printer is nearby, you can keep an eye on its paper level and make sure it's on when you send a job to it.

If you want status checking, the official HP way, hang on to your older LaserJetPlus or Series II, or spend \$400 to buy the card that works with your Series IID or Series III.

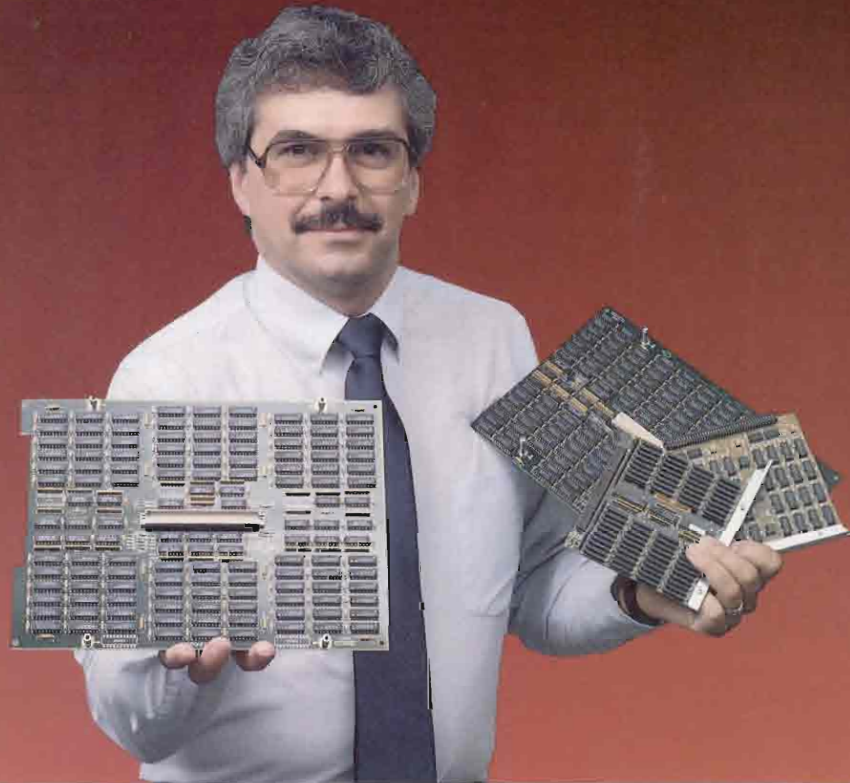
Or you can get status checking via other means:

■ There are serial to parallel converter products like the Serial to Parallel Converter II from Black Box Corp. (Pittsburgh, PA) that let you run the printer as a parallel device and leave the status checking to the converter rather than the printer.

■ According to Bruce Toback of OPT (Rancho Cucamonga, CA), you can configure a spooled LaserJet as a foreign device by giving it a terminal type of 18 or 22 and get XON/XOFF handshaking.

■ You can use a printer server like the SimpLAN ServerJet from ASP Computer Products Inc. (Sunnyvale, CA) to hook up one LaserJet to multiple computers (including the HP 3000 and other minis). SimpLAN provides three types of handshakes (DTR/Busy, Robust XON and XON/XOFF). —Peggy King

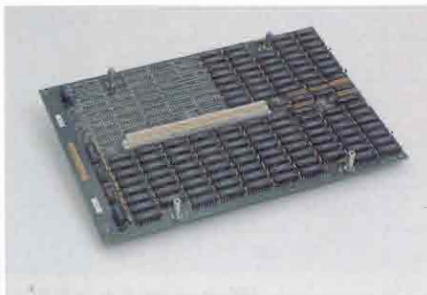
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CIRCLE 151 ON READER CARD

TABLE

Company	Printer Model	PPM	PCL Emulation Level	Engine Manufacturer	HPGL Capability	Standard/Maximum Memory	List Price
AEG Olympia	Laserstar 6e	6	LaserJet Series II	Ricoh	available for \$299	512kb/5MB	\$1,999
Desktop Systems	Desktop Laser Beam	6	LaserJet Series II	TEC	no	512kb/4.5MB	\$1,995
Epson	EPL-6000	6	LaserJet Series II	TEC	no	512kb/4.5MB	\$1,499
Facit	P6060	6	LaserJet Series II	TEC	no	512kb/4.5MB	\$1,599
Fujitsu	RX7100 S/II	5	LaserJet Series II	Fujitsu	with \$149 cartridge	640kb/4.6MB	\$1,495
HP	LaserJet IIP	4	LaserJet Series II	Canon	no	512kb/4.5MB	\$1,495
IBM	LaserPrinterE	5	LaserJet Series II	IBM	yes	512kb/4MB	\$1,495
Mannesmann-Tally	MT 905 and MT 906	6	LaserJet Series II	TEC	no	512kb/4.5MB	\$1,495 for MT 905; \$1,995 for MT 906
NCR	NCR 6435	6	LaserJet Series II	TEC	\$280 cartridge	512kb/4.5MB	\$2,395
Okidata	Okilaser 400	4	LaserJet Series II	Okidata	no	512kb/2.5MB	\$1,395
Qume	CrystalPrint Series II	6	LaserJet Series II	Casio	with \$139 cartridge	512kb/1.5MB	\$1,499
Spear	Desktop Laser Printer	6	LaserJet Series II	TEC	no	512kb/4.5MB	\$1,355
Texas Instruments	MicroLaser	6	LaserJet Series II	Sharp	no	512kb/4.5MB	\$1,799
Toshiba	PageLaser 6	6	LaserJet Series II	Toshiba	no	512kb/4.5MB	\$1,549

Desktop Printers.

TABLE

2

Company	Printer Model	PPM	PCL Emulation Level	Engine Manufacturer	HPGL Capability	Standard/Maximum Memory	List Price
Brother	HL-8e	8	LaserJet Series II	Canon	yes	1MB/3MB	\$2,895
Data Products	LZR 1230	12	LaserJet Plus	Toshiba	no	512 kb/2MB	\$3,695
Fujitsu	RX7200	12	LaserJet Plus	Fujitsu	available on an IC card for \$149	640kb/4.6MB	\$3,995
HP	Series IID	8	LaserJet Series II	Canon	on optional cartridge	640kb/4.6MB	\$3,495
HP	LaserJet Series III	8	LaserJet Series II	Canon	built in to PCL 5	1MB/5MB	\$2,395
IBM	LaserPrinter 4019	10	LaserJet Series II	IBM	yes	512kb/4MB	\$2,395
Kyocera	F-800A	8	LaserJet Series II	Kyocera	no	512kb/4.5MB	\$2,395
Kyocera	F-1000A	10	LaserJet Series II	Kyocera	no	512kb/1.5kb	\$2,895
NEC	Silentwriter II 260	8	LaserJet Series II	Canon	no	1MB/5MB	\$2,695
Office Automation Systems Inc.	LaserPro LP90/8	8	LaserJet Series II	TEC	yes	1MB/5MB	\$2,350
Okidata	Okilaser 800	8	LaserJet Series II	Okidata	no	512kb/4.5MB	\$1,795
Panasonic	KXP 4420	8	LaserJet Series II	Panasonic	no	512kb/4.5MB	\$1,695
Star Micronics	Laserprinter 8	8	LaserJet Plus	Canon	no	1MB/2MB	\$2,649

Workgroup Laser Printers.

corporates Intellifont font-scaling technology from AGFA Compugraphics (Wilmington, MA). Typesetters that accept PCL 5 input are expected soon. If you're getting documents typeset, you can print proof copies on your laser to get an idea of how they will look when they are printed on a high-resolution typesetter. Because PCL 5 clones aren't available yet, you'll need a LaserJet III if you plan to use PCL files for typesetter input.

LaserJets And PCL

WHEN HP INTRODUCED the LaserJet, the company not only launched its best-selling product line, but it also created an industry. Today, approximately 85 percent of laser and "laser-like" printers speak a dialect of Printer Command Language (PCL). The first PCL had no downloadable fonts or scalable typefaces until the introduction of the LaserJet Plus in September 1985. By 1987, the LaserJet Plus became the IBM-PC of the printer world.

Dozens of printer manufacturers have cloned the popular printers by writing software emulations that duplicated the escape sequences (large macros) used to program printer commands. Expect to see the first Series III clones before the end

When HP introduced the LaserJet, the company launched its best-selling product line...

of the year. Also look for HP to offer an upgrade kit for changing the Series IIP (introduced September 1989) or Series IID (introduced January 1988) from PCL 4 to PCL 5.

Not all PCL clones are laser printers in the strictest sense. Originally, the term referred to printers that produced images with a laser engine consisting of a photosensitive drum, a diode laser and a spinning mirror—the same technology that a copier uses. Now, the term is used loosely and refers to any non-impact printer that uses laser printer software and firmware even if the print engine uses a series of light-emitting diodes like the new Okidata printers, a liquid crystal shutter (LCS) engine like

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TABLE 3

Company	Printer Model	PPM	PCL Emulation Level	Engine Manufacturer	HPGL Capability	Standard/Maximum Memory	List Price
Fujitsu	RX7300E	18	LaserJet Plus	Fujitsu	with \$149 IC card	2.5	\$7,150
Kyocera	F-1800A and F-3000A	18	LaserJet Series II	Kyocera	no	1MB/5MB	F-1800A \$4,995 F-3000A \$6,995
Talaris	1590 Printstation	15	LaserJet Series II	Ricoh	optional at \$1,250	3.5MB/5.5MB	\$8,290

Departmental Printers.

Qume's CrystalPrint Series II or an ion deposition process like Talaris uses in its 30 and 50 ppm system printers.

LaserJet Support With HP 3000s

UNTIL RECENTLY, HP'S policy was that LaserJets, other than the high-end LaserJet 2000, were PC printers and were not supportable when used with the HP 3000. HP has started to acknowledge that LaserJets designed for use with PCs also work with HP 3000s, and all LaserJets but the Series IIP now are regarded as supportable devices when used within HP guidelines. The LaserJet Plus and the Series II have status checking when used on serial ports of the HP 3000. However, this feature was not included in the LaserJet Series IID, the Series IIP and Series III.

Last year HP introduced a status checking card that works with the Series IID and the Series III, but not with the Series IIP. This I/O card sells for \$400. It puts back the XON/XOFF "handshake" to the HP 3000 that was not included with the newer printers. With this card you're protected from losing data when the power goes off.

At the recent European Users Group in Nice, France, HP

distributed a policy statement concerning support for serial printers and HP LaserJets. All LaserJet printers can be hooked up serially, but HP's policy divides supportable printers into three classes, serial printers (an HP term for line printers that print by character), LaserJets from "Classic" through Series III and the faster LaserJet 2000. HP distinguishes between line printers and the LaserJet printers because the laser printers are page printers that require more CPU overhead.

HP's policy on the maximum supportable number of LaserJet printers connected to the HP 3000 via serial ports is:

- Micros and Series 42 — 2 LaserJets vs. 8 line printers.
- Series 70 and Series 922 — 5 LaserJets vs. 16 line printers.
- Series 949 — 15 LaserJets vs. 48 line printers.
- Series 950, 955 and 960 — 20 LaserJets vs. 64 line printers.

If you connect your LaserJets serially, HP will support only one on any system below a Series 70, two on a Series 70 or Series 922, five on a Series 949, and seven on a Series 960.

HP explains that it determined the supported maximums based on "the worst-case scenario of all printers being spooled simultaneously" because the worst case could result in "temporary performance degradation, undetected spool data loss or potential system crash." If you aren't worried about having your system crash because all your printers are spooling at the same

TABLE 4

Company	Printer Model	PPM	PCL Emulation Level	Engine Manufacturer	HPGL Emulation	Standard/Maximum Memory	List Price
ATI	6026	26	LaserJet 2000	Toshiba	yes	4MB/8MB	\$24,995
ATI	6050	50	LaserJet 2000	Fujitsu	yes	4MB/8MB	\$105,995
HP	LaserJet 2000	20	LaserJet 2000	Canon	no	1.5MB/5.5MB	\$25,700
Office Automation Systems Inc.	LP 90/22	22	LaserJet Series II	Minolta	yes	2MB/6MB	\$17,995
Printronix	L2324 Report Expediter	24	LaserJet Plus	Kentek	no	4MB	\$15,500
Talaris	3093 and 5093	30 (3093), 50 (5093)	LaserJet Series II	Olympus (Delphax)	\$1,250	5.5MB	\$22,990 for 3093, \$31,490 for 5093

System Printers.

time, you can always go beyond HP's supported maximums at your own risk.

Laser Printer Variety

LASER AND LASER-STYLE PRINTERS fall into four general size and price categories: desktop, workgroup, departmental and system.

■ **Desktop printers** (4 to 6 ppm; Table 1): Most desktop printers are priced under \$2,000, have a small footprint and weigh less than 40 pounds. The 22 pound LaserJet IIP, one of the smallest and least expensive, is also the slowest at 4 ppm. These printers work best as a personal printer or for a small business.

■ **Workgroup Printers** (8 to 10 ppm; Table 2): Workgroup printers weigh more, have higher duty cycles (the number of pages per month they can support) and can serve about 10 to 12 people. All of the 8 ppm LaserJets (the "Classic" LaserJet, the Plus, Series II, Series IID and Series III) are in this category.

Because there are so many clones of the low-end lasers, pricing for desktop and workgroup printers is extremely competitive. The LaserJet Series III lists at \$2,395, \$1,100 less than the Classic LaserJet sold for in 1984 and \$300 less than the less capable Series II it replaced.

As lasers become less expensive, the data processing department can leave more of the printing to end users.

■ **Departmental Printers** (Table 3): Departmental printers need to be faster and more rugged than workgroup printers to support duty cycles of between 20,000 and 100,000 pages per month. The LaserJet 2000, a 20 ppm introduced in March 1987, is HP's only departmental laser printer. If it had been designed with the HP 3000 customer in mind, HP could've offered an optional HP-IB interface for the LaserJet 2000, something that no other printer in this class offers. Because it didn't, your choice for connecting any of these printers is whether to use a serial port or to make a parallel connection by means of a Centronics-to-HP-IB converter box. Either way, the LaserJet 2000 supports status checking.

The serial connection may work well if you use your Cen-

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[LASERJET CONNECTION]

Does your site have HP 3000s or HP 9000s connected to an Ethernet LAN that runs over TCP/IP? If so, IMC Data Manager's Ethernet Printer Server E-1000 (to be introduced at NetWorld in Dallas this September) will offer a way to connect your systems to LaserJets and provide up to 18 users per cable with shared access to these printers and plotters. The Ethernet Printer Server works with thin Ethernet or with other types of cabling via transceivers. The network drivers support both AT&T (System V) and Berkley BSD protocols.

The base unit, which sells for \$2,995, has eight RS-232 ports and two high speed Centronics ports. An add-on board that provides eight additional serial ports sells for \$300. Three types of connections are supported:

- The two high-speed Centronics ports connected locally (up to 10 feet from the unit) provide data transfer rates of 33 KBps so that LaserJet 2000s and other high-speed printers can print at rated speed. These local parallel connections are also recommended for

HP-GL plotters and for LaserJets used graphics-intensive applications.

- Up to 16 serial RS-232 ports connect to computers and plotters.
- Any of the RS-232 ports can be converted to Centronics with a device that plugs into a computer's serial port to convert the connection to a standard Centronics interface. IMC sells these converters for \$49.95 each.

All of the RS-232 connections, whether serial or parallel, can be connected up to 1,000 feet from the unit and operate at data transfer rates of 10 KBps.

IMC Data Manager displayed the Ethernet Printer Server at Interex in Boston this month.

IMC Data Manager
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Sunnyvale, CA 94089
CIRCLE 262 ON READER CARD

tronics printer mainly for text. If you're using a lot of bit-mapped graphics for forms generation, plotter drawings or logos, or if you use downloadable fonts, you'll find that "high speed" printers slow down considerably. Although the LaserJet

2000 is among the faster departmental printers, it won't perform at rated speed with graphics unless it's connected to a parallel HP-IB port on the HP 3000. Apex Technology (Tucson, AZ) sells the T1000 Turbolink interface for \$2,150. This converter



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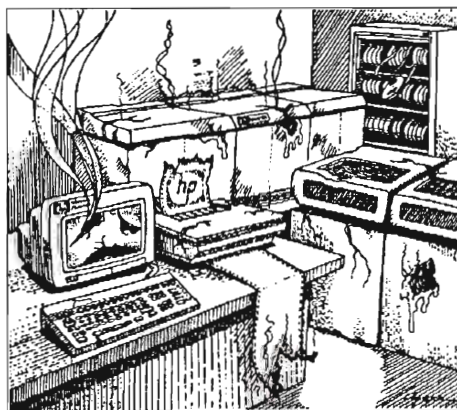
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box allows data transfers at rates up to 125 pages per minute.

■ **System Printers** (Table 4): The low end of the laser product line has advanced tremendously but the high end has stood still. Cost of the non-PCL compatible HP 2680 is unchanged since its introduction in 1981 (\$95,000 and \$100,000 depending on options). Maintenance charges are also high. If your HP 2680 has a duty cycle of 200,000 sheets a month, the current monthly maintenance charge is \$1,430 (about the list price of a 6 ppm desktop laser printer).

Because the HP 2680 is the only laser printer designed for the HP 3000, it has an HP-IB interface and no converter box is needed. If you have this 45 ppm relic as your system printer and want begin using PCL printers in order to take advantage of their advanced features, JetLink 2.0 from OPT can convert HP 2680 environment files so that you don't lose the forms you've already created.

Despite rumors of its demise, the 2680 is still sold and supported, but that doesn't mean that it's your only or even your best choice for a high-end printer. Output from the 2680 has 180 dpi resolution instead of the 300 dpi of PCL printers, and because it has an HP 3000 Series 30 built into it, the unit takes up plenty of computer room space as a processor.

According to Printer Integration Product Manager Curt Dowdy, HP has not yet formulated a strategy for providing a higher performance printer for high-end systems. Dowdy mentioned that a high-performance PCL printer was under consid-

eration and that his group has mailed a survey to the installed base. When results are in, they will evaluate the high-end strategy. If you don't want to wait years for a PCL-compatible replacement for the 2680, see Table 4 for a selection of printers in the 26 to 50 ppm range. They cost less, produce higher resolution output, and take up less space. None of them has an HP-IB parallel interface, but the price/performance benefits of the newer technology far exceed the cost of a converter box.

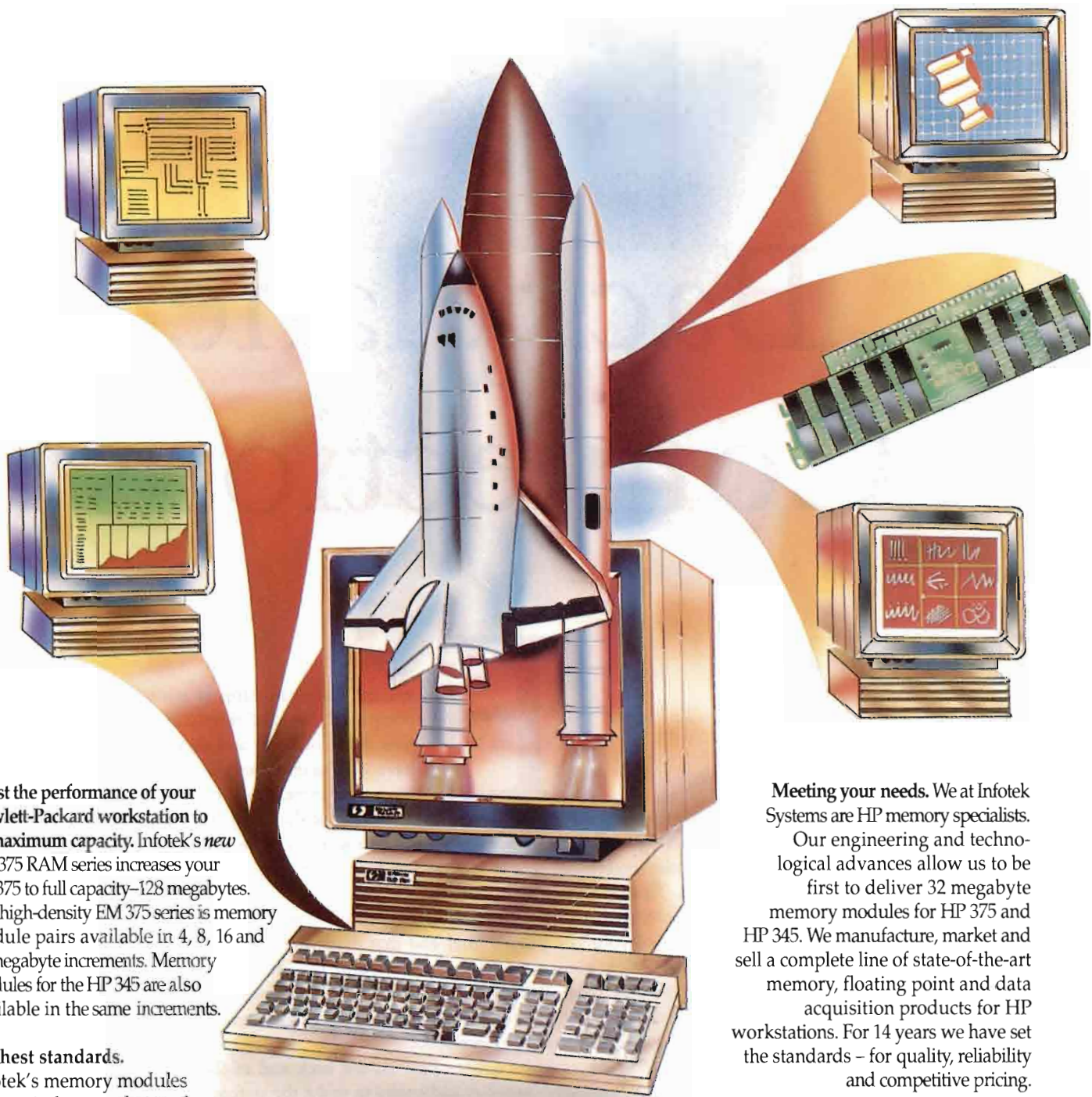
No matter whether you're looking for a small inexpensive printer to replace an old ThinkJet or a superfast model to print listings from your new Series 922, you may never have to load tractor feeds and sort green and white fanfold listing again. As lasers become less expensive and more accessible to end users, the data processing department can leave more of the printing to end users, who can be counted upon to find new uses for the advanced features of PCL 5 and any future enhancements.

Look at Tables 1 through 4 to get an idea of what's available in your budget range, but set some money aside for the memory upgrades that you'll want to have on hand. Soon after you purchase a new laser printer and begin to use new, memory-intensive applications, you may notice that the printer speed slows down considerably. An extra megabyte or two should bring it back to its rated speed.

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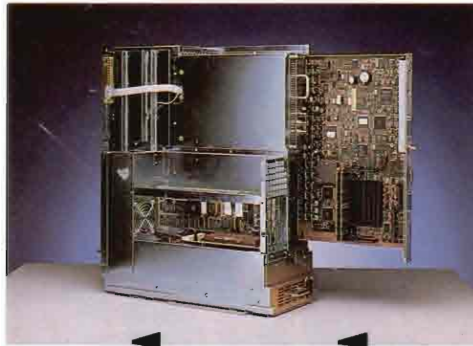
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HP Hopes EISA Will Keep Customers Happy — For Now



Backplane Connections

[By Bill Sharp]

Ever get bored looking at your computer? Most of them are a nice shade of beige and they all have very tasteful, sculpted contours and increasingly compact footprints. Probably the only interesting thing about looking at the computer each day is whatever you've got on the screen. However, if you want to make your view of that computer more interesting, spin it around and look at the back end. Now, *this* is another world. This is I/O and backplanes.

I/O refers to input/output, or how data gets in and out of your computer. I/O refers to the structure of your computer's hind end that determines how your HP 9000 or Apollo workstation communicates with the world outside its own little boxy self. Probably the only connector on the back end of your computer that isn't I/O, is the power cord. Most of these connectors are specialized, and have become increasingly more so as workstations have developed.

Most of us became familiar with the connections on the back end of the computer either by putting the computer together and trying to make the system run, or more exciting, by trying to move it to a different location with all the cables and wires disconnected and tangled in a heap. For a simple system, this isn't a big deal. Here are some of the common standard connections that you'll find when you spin your computer around.

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■ **Keyboard connectors** are often non-standard, but clearly labelled on the back of the computer.

■ **Parallel/Centronics:** Parallel is a standard port used for connecting your computer to output devices such as local printers or plotters. Departmental printers or plotters work from a network node.

■ **RS232:** The RS232 connection has a number of different uses, including connection to a modem or remote terminal access. RS232 often is used for human interface devices such as a trackball or mouse.

■ **HP-HIL:** An HP proprietary interface to make it easier to use more complex human interface devices and still keep the RS232 port available. HIL supports mouse and trackball devices, as well as button boxes, joysticks and other "pointer" devices.

■ **Local area network (LAN)** connections on the back of your workstation come in two types. These should be labelled either Thinlan or AUI. Thinlan feeds directly to LAN cabling, while AUI requires a media adapter unit (MAU). AUI is more common. Earlier HP workstations gave users a choice of either. Recent HP workstations provide both connections from the factory. By providing both, HP simplifies manufacturing processes, reduces its cost and increases system flexibility.

■ **Small computer systems interface (SCSI)** is a phrase you typically don't see. What you see and hear is SCSI (pronounced "scuzzy"), which sounds like a disease. SCSI isn't fatal, but rather the de facto industry standard port for getting information stored on magnetic media into and out of minis where it started, and workstations and PCs as well. SCSI is the connection of choice

for external disc drives, floppy drives, digital and audio, 8 mm tape and CD ROM. Workstation vendors HP/Apollo, DEC, Sun and IBM all support SCSI, at least as an option.

■ **IEEE 488/HP-IB** has long been a standard port for HP systems, as it was developed by HP for use in controlling the instrument products that were HP's primary business for decades. IEEE later adopted HP-IB as its IEEE 488 standard. Earlier HP systems used HP-IB for disc drive connections, but SCSI is now almost as fast. HP-IB/488 still is an important high-speed link for instrument control, even for some PC systems. But HP's customer mix is changing, and many no longer use the workstations for instrument control. HP-IB may soon become an option rather than a standard feature of HP workstation I/O.

Hopefully, you've been seated at your desk with your workstation spun around, and you've placed a check mark by each of the ports as I've named them. If you have, you've noticed that there's still a sizeable chunk back there with no check marks. Depending on how you use your workstation, that area may look blank, or it may have I/O cards and cables coming out of it. These I/O cards are the special connections that allow you to tie new applications into your computer, uses that might have still been pipe dreams when you bought the system.

Even though many connectors come straight from the factory ready to send and receive bits and bytes, the needs of some users won't be met with standard fare. For this reason, the rearward regions of your system include an area known as the backplane.

T A B L E

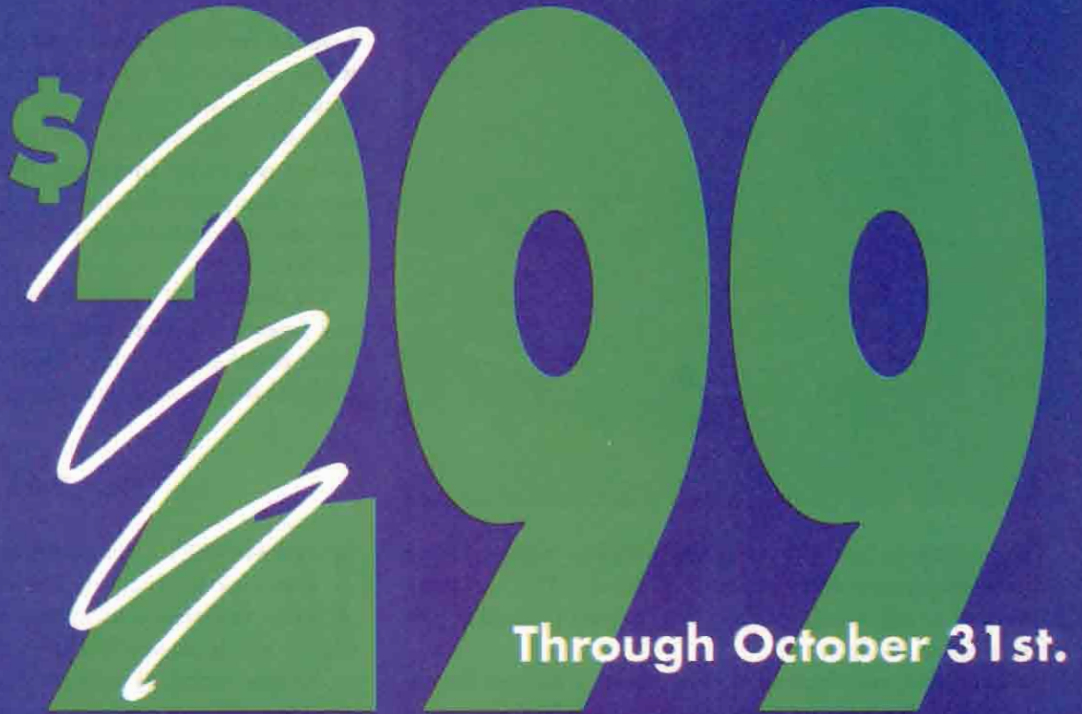
Bus Type	TURBOchannel	VME	Futurebus+	SBus	NuBus	EISA	MCA
Sponsor	Digital	Motorola VIDA	IEEE Computer Society	Sun	TI/Apple	EISA Consortium	IBM
Performance:							
Architectural DMA (MB/sec)	100	40	100-3GB	100	37.5	33	40
Acheived DMA (MB/sec)	93	*	*	~27	~35	~30	~13
Characteristics:							
Interface Signal pins	44	106	91-343	82	51	153	136
Power per slot (Watts)	26	*	*	10.7	10	45	12.6
Primary board area (sq.cm.)	168	373	373	123	332	371	250
Maximum physical address (GB)	16	4	>2.2(10^6)TB	0.256	4	4	4
License to option vendors	Yes	Yes	Yes	Yes	Yes	Yes	Yes
License to system vendors	Yes	Yes	Yes	Yes	Yes	Yes	Restrictive

*Determined by card cage design and implementation.

Source: DEC, WorkGroup Technologies Inc.

Comparative Bus Performance.

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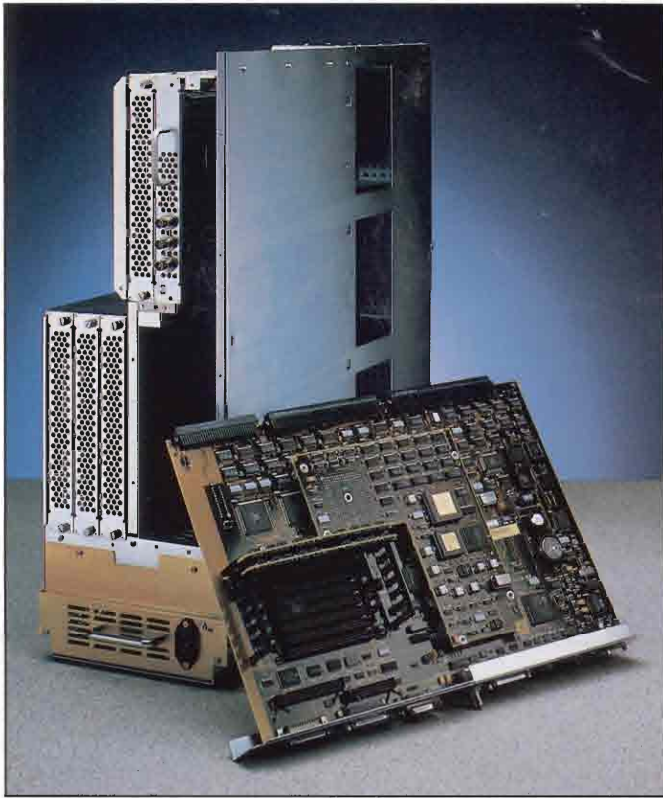
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The DIO-II bus remains one of the backplane technology choices for the Apollo 9000 Models 400s/433s.



Depending on how you use it, the backplane might get your data someplace a lot faster or more effectively. The backplane allows you to add capabilities later that weren't planned as part of the original product.

When I sent this article to *HP Professional*, it traveled from a city north of Boston to a town north of Philadelphia using a modem line connection to a VAX system. This article went out of my nice, little PC onto the modem via the RS232 port, just as it probably would on your workstation. Not content to simply send it once, I also copied the article onto an external 5 1/4-inch disc drive and sent that disc as backup. But my PC didn't come from the factory with that external drive. I added that later using an add-on card that fit nicely into a slot in the PC's backplane.

Backplane modifications allow you to choose from a selection of capabilities that numbers in the hundreds or even thousands, depending on the particular backplane your system uses. While the I/O connectors on your workstation or PC system are fairly standard, the backplane isn't. Backplanes vary considerably from one workstation to another. PCs are ahead in this department, with fewer, more standard designs.

Here's some of the backplanes currently being shipped:

- PCs use a 16-bit backplane called PC/AT (developed by IBM) or Industry Standard Architecture (ISA) by most other folks. Just to keep us both confused, lots of people refer to it not by the letters I-S-A, but by pronouncing them as if ISA were a word (sounds like "eye-sa," or maybe eyesore). Many happy users

have this backplane, a trifle old and slow, but a standard.

- The majority of HP workstations use a 16-bit proprietary backplane called DIO-II.

- Apollo workstations use the ISA 16-bit backplane, same as PCs.

- VME is a 16-bit backplane used commonly for data collection, image processing and high-speed data processing. VME is available on some HP systems, and from Silicon Graphics, DEC and Sun.

Of these, VME and DIO will go away, replaced by newer and faster backplanes fairly quickly. ISA will be around for a while because of the sheer number of ISA cards, and also because the follow-on product, EISA, accepts the same 16-bit cards.

New Backplanes

IN A MARKET AS competitive as that of workstations, vendors look for every opportunity to get an advantage. Because workstation backplanes aren't yet tied down and limited by standards, vendors are tempted to find a better, faster or cheaper backplane solution that will make their new products tempting to prospective customers.

New workstation backplanes include:

- IBM's PS/2 has a backplane called microchannel architecture, or MCA. Industry types don't seem to take it very seriously, perhaps because of restrictive licensing. True, the PS/2 may not be a workstation for most users, but that didn't stop the ISA backplane. MCA is a contender, if a weak one. Speed claims for MCA range from 80 to 100 MB/sec. A DEC comparative test showed actual performance of about 13 MB/sec (see *Table 1*).

- S-bus, introduced by Sun with SPARCstation-1, is intended to be faster and lower in cost than VME for Sun customers. Sun is licensing S-bus and promoting it as a "workstation standard." This is a 32-bit backplane. Sun expects the backplane to provide 100 MB/sec. The same DEC test series noted above showed actual S-bus performance at approximately 27 MB/sec (see *Table 1*).

- Turbochannel, recently introduced by DEC, came out with the DECstation 5000 RISC workstation. Like the S-bus, Turbochannel supports 32 bits, and DEC touts it as an open, developing standard. DEC claims 100 MB/sec, and the test data, which comes from DEC, shows 93 MB/sec (see *Table 1*).

- Extended Industry Standard Architecture (EISA, pronounced



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DECstation 2100/3100	SPARC 330 SPARC 370	9000/350 DN4000	IBM
MicroVAX II/III/IV	SPARC 490	9000/370 DN4500	RISCSys 6000
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 industry standard that allows
 workstation backplanes
 to settle down.

“EE-sah,” don’t get confused), is just what the name says, an extension of the ISA scheme. EISA is intended to be to 32-bit backplanes what ISA was to 16-bit backplanes—the overwhelming standard, with thousands of cards available. HP supports this scheme and makes it available as an option on the HP 9000 Series 400 workstations. A number of vendors have announced support for EISA. The EISA consortium claims 33 MB/sec, and the test data shows 30 MB/sec.

■ With some luck, Futurebus+ will be the industry standard that allows workstation backplanes to settle down. Most vendors say they’ll support this backplane from the IEEE Computer Society, that might make all existing backplanes obsolete. Futurebus+ will provide a scalable architecture to address from 32 to 256 bits at a time. I/O transfer rates have been quoted at up to 1.7 GBs for the 128-bit implementation. However, Futurebus is two to five years away, depending on who you ask.

“For most companies, the backplane doesn’t even come into the strategy,” says Erik Keller, program director for integrated manufacturing with the Gartner Group.

“If you buy one of these and one of those, then you just support several backplanes. Even if you’re networking one or two, it probably isn’t much of a problem. For the majority of customers, the backplane is a non-issue.”

Does that mean you? Let’s check. Chuck Barney, analyst with WorkGroup Technologies (Hampton, NH), says the users who may need new, higher-performance backplanes include those with applications requiring:

- High-speed data transfer.
- High-performance graphics applications.
- Imaging applications.
- Multimedia applications.

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■ Applications requiring rapid movement of very large files.

If you don't make use of high-end applications such as these, chances are you can relax, spin your computer back around and go back to some real work. However, if you think you need more backplane performance, let's look in more detail at the HP/Apollo workstation backplane of choice for the near term, EISA.

Why, when DEC and Sun are claiming to have new backplanes available with speeds of up to 100 MB/sec, does HP seem very happy to be offering EISA, which HP says has a speed perhaps a third of what its rivals might offer?

"There's a lot of debate about backplane speed," says Steve Johnson, product manager for EISA and peripherals on HP 9000 products. "Looking today, SCSI-1 is 4 to 6 MB/sec, SCSI-2 is 10 MB/sec, and DIO-II is 6 MB/sec. Even FDDI (Fiber Distributed Data Interface—fiberoptics) is about 12.6 MB/sec." These speeds are considerably less than the EISA speed of 30 to 33 MB/sec.

While he admits that EISA may not meet the speed requirements for some niche applications, Johnson says the vast majority of users will see great benefits from the new backplane. Because EISA will be used on both PCs and workstations, HP can produce parts in volume, reducing costs for customers. In addition, Apollo ISA cards can be moved to new EISA card

cages with no changes. Finally, because EISA will use cards that you can fairly easily move over to workstation card cages from the PC arena, HP expects the number of available I/O cards to rise more rapidly than for other new backplane choices.

"There are 200 manufacturers who have announced their intent to make EISA products," says Johnson. "There are already about 75 cards on the market that adhere to the standard."

Will HP's superb graphics capabilities suffer? Not much. While it's true that backplane graphics capabilities affect the speed of some graphics applications, HP is planning to announce soon that most of the system graphics communications will be moved to an internal, high-speed bus, just like that used for memory and processor data in recent designs.

Competing companies are betting that the need for speed will pull leading-edge customers to new backplanes long before Futurebus+ is ready for market, giving them a competitive advantage. HP is betting that EISA, with less speed but much wider acceptance in the marketplace and lower costs, will keep customers happy while they wait for a new, faster standard.

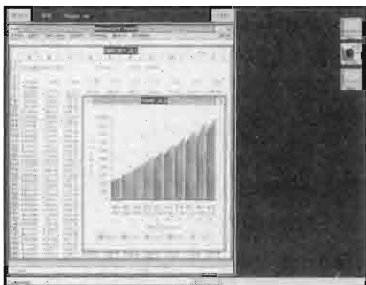
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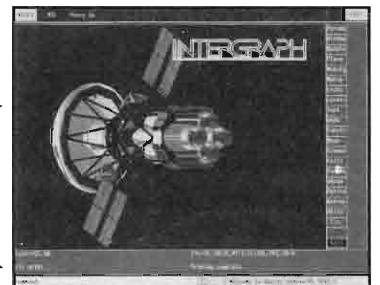
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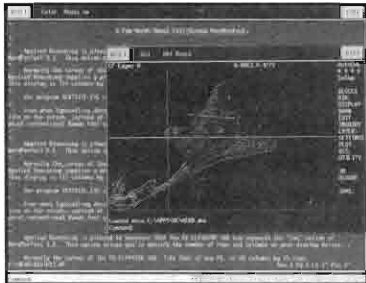
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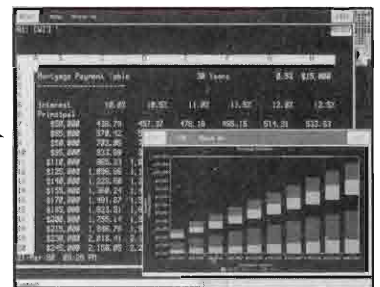


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When DISC DRIVES Die

Take Precautions Before A System Crashes

It's 4:45 p.m., your HP 3000 had a system failure and HP support has verified you have a "crashed" disc drive. They also warned you to get your last backup tapes ready for a RELOAD. As you think of your users and their reaction to losing a day's work, you start to fill out your vacation request.

With a little preventive maintenance you can recover most, if not all of your critical data, depending on the type of disc crash. The first thing to do is to have the latest copy of your system configuration. There are two ways to generate this. First is by using SYSINFO, an HP unsupported utility, usually found in the SYS, TELESUP or SUPPORT accounts. To run this utility do the following:

```

RUN SYSINFO.<GROUP.ACCOUNT>
QUIT LP
ALL
EXIT

```

Next, replace the <GROUP.ACCOUNT> portion with the group and account in which your version resides.

The second way to generate the system configuration is with SYSDJUMP, a MPE supplied command on every HP 3000.

If you've run the system utility VINIT and condensed your disc drives, then your backup list-

ing isn't current anymore. VINIT moves the location of files on your disc drives and a PARTBACKUP won't recognize the file as having been modified. This also applies to some applications of the ALTFILE command in MPEX that change file locations on disc drives. To get a current listing, you can do another system backup, use the MPE X command LISTF @.@.@,4 or use any other utility that prints filename, disc drive, and Octal location of file.

In terms of the latest current daily backup listing and tapes, the same cautions as previously stated concerning FULLBACKUP's apply. Any files on the listing will have accurate locations, but other files that were moved and not modified may not be listed.

One necessity is a DUS (Diagnostic Utility Subsystem) tape. You can get a DUS tape from one of the following sources. You can create this tape on your system using procedures listed in the SADUTIL section of your system utilities manual or call your customer engineer and have him send you the latest version of the DUS tape for your version of MPE.

It's very important that you have an operating version of RECOVER2.PUB.SYS or RECOVER5.PUB.SYS. You don't need both of these programs, it depends on which version of MPE you're running. To test, just run the

[BY JIM ROGERS]



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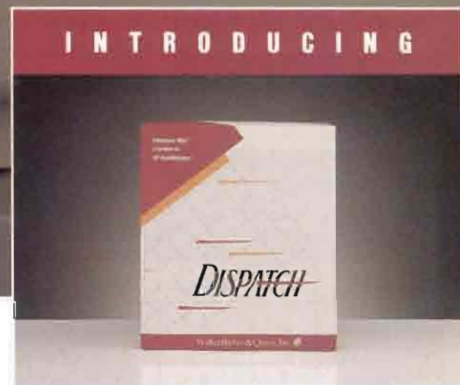
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program and respond to any queries with a <RETURN>. If it works, you're in good shape, if not, call your HP customer engineer and have it sent.

While it isn't absolutely required, a database management tool will help make recoveries and everyday life much easier than the system supplied DBLOAD, DBUTIL, etc., utilities.

A list of the "Files to Recover at all Costs" would be helpful. It doesn't have to be fancy, just a list of your most important files on the system. These could be database files, KSAM files, flat files, source code, or anything else that might have changed since the last backup and be painful to try to recover or redo.

Make sure that the System Toggle switches for DUMP, LOAD and START are set correctly *before* a system crash.

When To Use These Procedures

THESE PROCEDURES ARE to be used only in a situation where a disc drive has crashed, and Hewlett-Packard Telesup, or any other disc drive manufacturer support has verified that a disc hardware failure has occurred. In some cases of disc drives "crashing," the information may still be intact and just needs a part replaced to bring the system back without a RELOAD. Ask your service representative during the initial system phone call what the likelihood is of having to do a reload.

You want to do this because to recover information using SADUTIL and the RECOVER utilities will take time. And in some instances, it will have to be done *before* you have the disc drive repaired. In most cases, customer engineers won't wait while you recover your data.

This means that if you have three disc drives and only one fails, then the other two still have good information that you can recover. While this sounds wonderful, if most of your "Files to recover at all costs" are on that one "dead" drive, you might be better off just doing a RELOAD after the drive has been fixed. Also, if you stand to lose very little data or data that could be easily recreated, then don't bother. But, if your system crashes after 10 hours of heavy usage by multiple departments and you're looking at two days just to find out what was lost, what the heck.

One more caution: Not many HP personnel are intimate with SADUTIL, RECOVER2, RECOVER5, or data recovery concepts. You're mainly on your own. But in a totally crashed situation you don't have much to lose other than time, and could potentially recover much of your data.

Loading And Recovering Data

AT THIS POINT, YOUR system should be down from a system halt. Just to make sure the system is gracefully down, hit the <CTRL> and keys at the same time. You should get a response of "->". Now, type in "HALT". This will ensure that the system is truly halted. Now you're ready to load the DUS tape. Mount the DUS tape on the tape drive without a write ring. When it's online, then type "LOAD" at the system console. At this point the system will read the DUS tape and display "DIAGNOSTIC/UTILITY SYSTEM". Make sure that the tape drive is online before you type load. Now type in "SADUTIL" to load the SADUTIL software. It's important that all SADUTIL commands be in uppercase. The following is a sample of a SADUTIL dialog, any user entries also are enclosed in <> (i.e., to type in 1, it looks like <1>, and a return key looks like <RETURN>). SADUTIL should respond with the following dialog:

```
PRIVATE VOLUME SET? <Y><RETURN>
LIST LOGICAL DEVICES? <Y><RETURN>
```

Now it will show you no devices because nothing is configured.

```
DISC CONFIGURATION CHANGES? <Y><RETURN>
```

Now you need your SYSINFO or SYSDUMP listing. Do the following steps for each disc drive on your system, use *Table 1* to look up drive type and subtype.

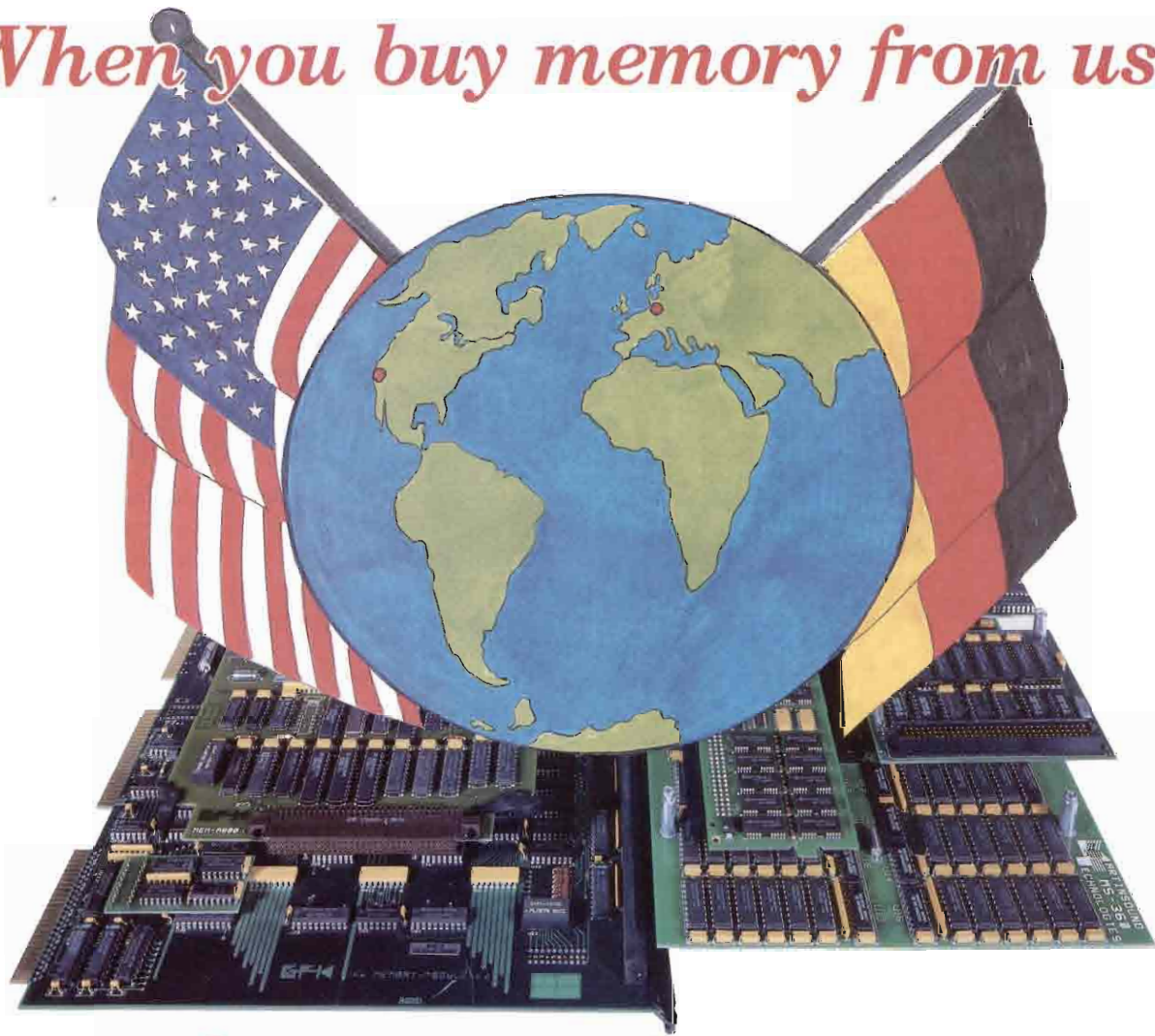
```
LOGICAL DEVICE? <1><RETURN>
DRT? <B9><RETURN>
UNIT? <0><RETURN>
TYPE? <3><RETURN>
SUB-TYPE? <B><RETURN>
```

TABLE 1.

Device	Type	Subtype	Serial	Description
HP 7920A/S	0	8	*	Moving head disc
HP 7925A/S	0	9	*	Moving head disc
HP 7933A	3	8	*	Moving head disc
HP 7935H	3	8	*	Moving head disc
HP 7906A	0	10	*	Removable cartridge only
		11		Fixed platter only
		12		Entire drive
HP 9895	2	0	*	Flexible disc unit (single)
		1	*	Flexible disc unit (double)
HP 9140A	3	0	*	Cartridge tape unit
HP 9144A	3	3	*	Cartridge tape unit
HP 7911A	3	1		Winchester disc
HP 7912A	3	2		Winchester disc
HP 7914A	3	4		Winchester disc
HP 7945A	3	5	*	Winchester disc
HP 7970E	24	0	*	Magnetic tape drive
HP 7974A	24	3	*	800/1600 BPI magnetic tape drive
HP 7976A	24	1	*	1600/6250 BPI magnetic tape drive
HP 7978A	24	2	*	1600/6250 BPI magnetic tape drive

SADUTIL device types and subtypes.

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TABLE 2.

PDSK	Prints an octal or ASCII dump of any given area of a specified disc volume.
PDTT	Prints the defective track table of a specified disc volume.
PFIL	Prints descriptions of files contained in the system file directory.
PVOL	Prints information contained in volume label of a specified disc volume.
EDIT	Modifies the contents of a disc volume.
FIND	Searches a system disc for file labels.
SAVE	Retrieves files from disc and copies them to magnetic tape.
COPY	Copies the contents of one disc pack to another.
OUTM	Sets the output mode of print functions to printer output or console output.
CLID	Searches for the highest coldload ID, increments by one and establishes it as the new coldload ID. It also searches all SYSDOMAIN discs, and initiates the device configuration dialog for additional devices.
CONF	Initiates the device configuration dialog for additional devices.
HELP	Offers an explanation of all SADUTIL commands.
STOP	Terminates the SADUTIL program.

SADUTIL commands.

SADUTIL will ask for “LOGICAL DEVICE?” until you hit <RETURN>. Configure all of your drives and then type <RETURN>.

```
SERIAL DEVICE CHANGES? <Y><RETURN>
```

Now you have to configure at least one tape drive. Use Table 1 to look up drive type and subtype.

```
DRT? <72><RETURN>
UNIT? <0><RETURN>
TYPE? <24><RETURN>
SUB-TYPE? <1><RETURN>
LIST SERIAL DEVICE? <Y><RETURN>
ENTER FUNCTION?
```

Now you’re ready to retrieve some information. First rewind your DUS tape and take it off the tape drive, then mount a blank tape with a write ring on the previously configured tape drive. Don’t continue until the tape drive is online or you’ll get a SERIAL DEVICE 0 NOT READY message five to 10 times before it aborts.

Now you need your FULLBACKUP or PARTBACKUP listing. Use the SAVE command to retrieve information from the disc drive to the tape drive. In some instances you can use the full filename to retrieve a file, i.e., SYSSTART.PUB.SYS, but in many others you must use the disc number, octal address, i.e., 1,%53489760. Look up the filenames you want to retrieve and highlight their names and octal addresses. Replace my “FILENAME” example with your individual full filename, and my “1,%99999999” with your disc drive number, octal address for that file. Now on to the saving of information. See Table 2 for further SADUTIL command reference.

```
ENTER FUNCTION? <SAVE><RETURN>
READY SERIAL DEVICE FOR WRITE
FILE NAME (OR LDEV #,%SECTOR ADDRESS)?
<FILENAME><RETURN>
DATE? <RETURN>
```

At this point you can use either the previous line or the next example— *not both*, or you’ll retrieve the file two times.

```
FILE NAME (OR LDEV #,%SECTOR ADDRESS)?
<1,%99999999><RETURN>
```

At this point SADUTIL responds with the following message no matter which way you retrieved your file, replacing “SYSSTART.PUB.SYS” with your filename.

```
SYSSTART, PUB, SYS CONTENTS OF LABEL.
DO YOU WISH TO RETRIEVE THIS FILE (Y/N)?
```

If this is the file you requested, then respond with a <Y><RETURN>, if it isn’t, respond <N><RETURN> and try again using the octal address and then full filename if that doesn’t work. If you still can’t get the file after these tries, then either your disc directory is corrupt and/or the file has been moved since that listing was created. This shouldn’t happen very often. Retrieve all of the files you want to tape, and then respond with a <RETURN> when SADUTIL asks for the next filename to retrieve.

```
ENTER FUNCTION? <STOP><RETURN>
```

Now we’re back to the DUS operating system. Rewind your tape and take it off line, taking out the write ring. Now bring the system down; a <CTRL>, which will produce “-” and a <HALT> will do this nicely. Now have your disc drive problem fixed by your customer engineer.

General Reload Procedures

AT THIS POINT, your disc drive should be fixed and ready to go. In my experience the following steps have been the easiest way to RELOAD a system. First, place your latest PARTBACKUP tape online on the tape drive. Use this tape instead of the FULLBACKUP tape just in case your configuration has been changed since the last FULLBACKUP. Next, type <LOAD>, use the <RELOAD> option, and then use the <ACCOUNTS> option. This will reload your system files and the accounting structure only on your system. When the system time and date have been input and you’ve logged on as MANAGER.SYS, then continue.

Type <FILE TAPEIN;DEV=TAPE> and then type

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```
<RESTORE*TAPEIN;@.@.@;SHOW=OFFLINE;
OLDDATE;CREATE;FILES=20000>
```

Finally, mount your latest FULLBACKUP on the tape drive, and reply to the request for tape drive number. When you've restored all your files from these tapes, then type

```
<RESTORE*TAPEIN;@.@.@;SHOW=OFFLINE;
OLDDATE;CREATE;FILES=20000>
```

again, using the latest PARTBACKUP tapes. Check the printouts produced to see if any files that should've been restored weren't, fix the problem and restore them. Log on again to reset any UDCs that didn't previously exist. Remember that any system startup procedures that normally might have taken place haven't been completed (i.e., "STREAMS 10"). Do these by hand, or do a "WARMSTART" or "COOLSTART".

Some of the reasonings for the restore above are: Use the SHOW=OFFLINE option so you can see any files that weren't restored and what the reason was. Use the OLDDATE option to put the previous dates back on all files. Use the CREATE option just in case some files exist that have nonexistent users. Use the FILES=20000 option so that you don't get half way through your restore of @.@.@ and the tape drive IO aborts mysteriously. Then, continue to the RECOVER section.

Running The RECOVER Utilities

THERE ARE SOME myths about RECOVER2.PUB.SYS, or RECOVER5.PUB.SYS. Namely the HP manual seems to be wrong in some regards. The manual tells you to log on as MANAGER.SYS, then RUN RECOVER5.PUB.SYS, and then give it the filenames you want to restore, usually "@.@.@". Wrong answer. If you try these instructions you'll get a file error: NON EXISTENT PERMANENT FILE (FSERR 52) for each and every file you requested to be recovered. This just isn't acceptable. So, to get around this, you can do it one of two ways.

First, purge any files that you're going to restore. This can be difficult if the one file you want to purge has a filecode of PRIV, which means it's a database file. You only can purge it with SM capabilities, or a utility such as MPEX's PURGE command, or any other utility that will purge files. Now, when you run RECOVER5.PUB.SYS, it works perfectly.

The second method is to log on into the group the file is to be restored to, making sure to give that user and account SM and PM capabilities first, and then run RECOVER5.PUB.SYS. Now it works fine for only the files in that group. To show you more in depth how to run RECOVER2 or RECOVER5. Do one of those solutions first, and then run either RECOVER2.PUB.SYS, or RECOVER5.PUB.SYS. At which time the program will respond as follows, again your responses are enclosed with a <>.

Check your system utilities manual for any other error you

```
RECOVER5 G.XX.XX (C) HEWLETT-PACKARD CO., 198X
ENTER FILESETS TO RECOVER
TERMINATE LIST WITH A NULL LINE
<@.@.@>
MORE?? <RETURN>
WISH TO KEEP EXISTING COPIES OF FILES? (Y/N) <N>
IS THERE ANOTHER RECOVERY TAPE? (Y/N)

END OF PROGRAM
```

might come upon in the RECOVER2 or RECOVER5 section. Now you must do a FULLBACKUP.

If one or more of the files you recovered were database files and you couldn't get all of the files for that database, then you must check that database before continuing. You can do this using a variety of tools. The tool I'm most familiar is ADAGER. After such a situation, it's recommended to run a PATHFIX that will rebuild all chains. Do this for all datasets, and then run an AUTOCHECK to check for childless Auto-Master items.

Other tools, such as DBGENERAL, have similar commands to do the same functions. You can't assume that this database is OK before you check it, even if some of your programs run. They may run, but they may start giving garbage because of misaligned chains. And, if they do PUTs, DELETEs or UPDATEs, you could have some unrecoverable percussions. In theory, the DBUNLOAD and DBLOAD program should work, but hasn't been fully investigated at the time of this article.

Tips And Tricks

I N MY EXPERIENCES WITH crashed disc drives there were some discrepancies between the manuals and the situation I encountered. The first is that the SADUTIL manual states: SADUTIL is a stand-alone program - no it isn't. If the disc drive that's corrupt is LDEV 1, the system disc, then SADUTIL will work perfectly until it gets to the point of writing to the serial device, namely your tape drive. If LDEV 1 is corrupt, SADUTIL won't store to tape.

You can get around this, but not recover data from LDEV 1 by having LDEV 1 fixed, disconnect any other disc drives from the system. Do a RELOAD, ACCOUNTS, bring the system down, hook up the other disc drives and then run SADUTIL on the other disc drives recovering all of their information. Then do another RELOAD, ACCOUNTS, because the first one didn't find all the disc drives, and continue on. When you do the first RELOAD, ACCOUNTS do not restore any files. And lastly, be careful doing VINIT, CONDense's. This is a very good way to optimize your discs, but it moves your data and doesn't tell MPE about it fully. The system directory is changed, but not the file modification addresses, which means you don't restore them again until a FULLBACKUP unless you actually modify them.—
Jim Rogers is corporate MIS manager for Nobart Inc., Chicago, IL.

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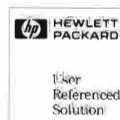
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To be successful, most businesses must grow to meet increasing market needs for their products or services. Today, this means the company's data processing organization must grow along with the business or, at some point, the company no longer will be able to handle the additional demand on administrative or operational functions supported by DP.

Consequently, for the data processing organization to be successful, it must plan for growth in parallel with the projected growth of the company.

Historically, DP organizations have grown in a reactive fashion; that is, they grew based upon the increasing demands of the users of their services. Now, with the use of computer systems being accepted as a pervasive technology within business, data processing organizations must grow proactively with the company. They must be prepared to bring new capacity and services online in a fashion and timeframe that doesn't negatively impact the company. Many DP organizations that have been successfully staying abreast of their company's increasing demand for computing resources have done so with Service Level Agreements.

Service Level Agreements (SLAs) are written contracts between end users who represent the business aspects of the company, and the company's data processing or management information systems group (MIS). The purpose of the SLA is to specify, in mutually agreeable

metrics, what the various end user groups can expect from MIS in terms of system response, quantities of work processed and system availability. SLAs also specify what MIS can expect from end users in terms of system usage and cooperation in maintaining and refining the service levels over time.

By implementing SLAs, MIS is charged with maintaining specific, measurable service levels for users. This carries forward to the concept of proactive system performance and capacity management. To continue to meet the terms of the SLAs, MIS needs to monitor system usage characteristics, and to project future needs in order to budget for additional systems capacity when the time comes.

The important thing to remember is that effective performance and capacity management cannot be accomplished without the use of tools that support information requirements directly related to those tasks.

Information Requirements

Before MIS goes running off to talk to users about establishing SLAs, they need to know the current DP environment in terms of available hardware and software, what the current demands are on the hardware/software resource set, what the remaining capacity is of the resource set, and they need to know the current service levels.

Users representing the various major applications supported by MIS should then be queried as to what their expectations are for DP service. Typically, users will be able to negotiate with end users as to what can be provided given the resources available and understand when additional resources may be required to meet increasing user demand.

Once this information has been captured and understood within the context of the data processing organization, users representing the various major applications supported by MIS should



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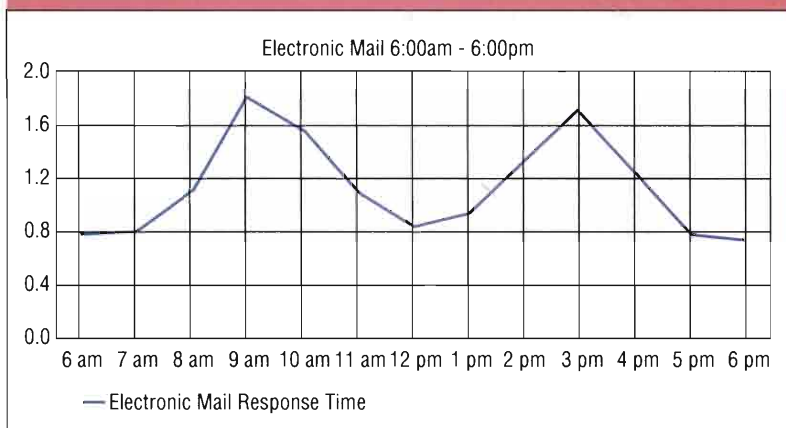
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FIGURE



Application Response Time.

be queried as to what their expectations are for DP service. Typically, users will be able to respond with qualitative, rather than quantitative, answers regarding their current and desired perceptions of service levels. Rather than saying “95th percentile response times should be less than or equal to X,” they’ll respond with, “I need to be able to keep my data entry people focused on their work, and I need to be able to handle my current claim load without falling behind.”

It’s MIS’ responsibility to take this qualitative information and quantify it in order to relate to actual computer resource consumption. This will comprise a starting point from which actual SLAs can be developed. By working with users to determine what their minimum service levels are, as well as determining how the user’s demand on DP resources will change as the company grows, MIS can be prepared to predict when additional resources will be needed to continue to meet the users demands. Alternatively, MIS will be able to predict when service levels will no longer be met and what the resulting service levels will be without the acquisition of additional resources.

The Need For Tools

There must be a catch here somewhere, or MIS departments would’ve been

doing it all along. You’re right — there is a catch.

It’s impossible to do any of this (except ask users what they perceive and need, of course) without a way of monitoring system resource usage. More than data concerning how the system resources are being used at the present moment, you also need history. And, you need it displayed in a variety of ways, or at least you must be able to get to the data so you can look at it any way you want.

Software tools are usually available

that can give you that information. Programs called “Monitors” are available that run on your computer systems at all times and collect system resource consumption data on a continuous basis. Other tools are available that can look at that data and report on certain performance metrics such as response times and transaction rates.

Software tools for computer resource consumption monitoring and reporting can be viewed as being in one of four different categories. Each of these categories plays a different role in helping the DP organization control and understand what’s happening in their systems:

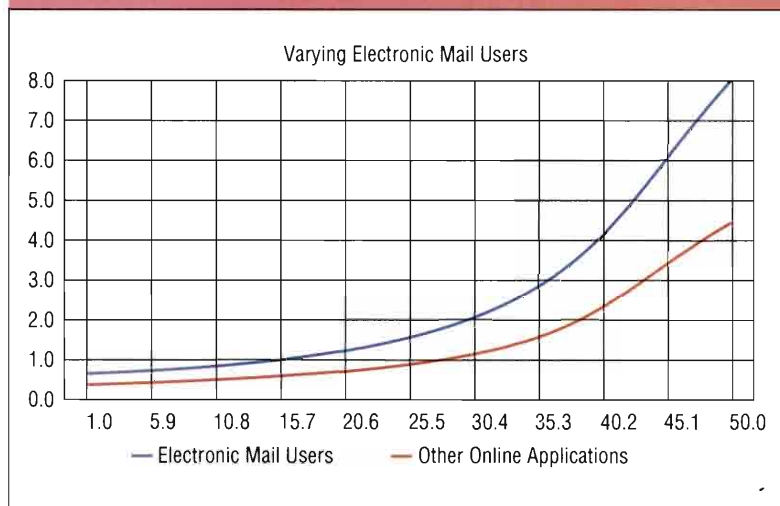
- **Diagnostic** tools are typically used to determine what’s happening on your system “now.” They give a list of what programs are running and how they are using system resources in “real time.”

- **The System Management** class of tools usually include the “monitors” previously mentioned that log system resource consumption data continuously. Companion tools are available that allow certain types of analysis to be performed on that data, from simple displays of archived information to sophisticated modeling tools that can do predictive analysis.

- **Application Optimization (AO)** tools typically are used to “tune” applications

FIGURE

2



Analytic Model Projection.

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in order to use system resources most effectively. Sometimes the tools are used reactively once it has been determined that a particular application is consuming excessive amounts of some tuneable system resource.

■ **Capacity Planning** tools use modeling techniques to predict the effect of adding additional resource demands on the

■ The overall, or "global" system resource consumption picture, often referred to as the "system workload."

■ Data on each of the major application workloads run on the system, which correspond to groups of users with which the SLA is to be negotiated (accounting,

electronic mail, manufacturing, etc.).

■ Resources consumed by other application workloads not of interest for SLA purposes.

Once this data has been captured (typically by a "monitor" and system management display tools as described

Now that we have tools to understand how our system is being used, we can use them to help establish and manage SLAs.

system. The loads typically are looked upon as an increase in "intensity" (more users doing the same thing that is being done now), or a new application or "workload" is put on the machine that has its own particular resource consumption characteristics.

Use Tools To Establish SLAs

Now that we have tools to understand how our system is being used, we can begin to use them to help establish and manage SLAs. As I mentioned previously, we need to establish a model of current system resource consumption. This is necessary because it "bounds" what MIS will be able to do in terms of meeting service levels specified by users. These bounds are based upon the amount of computing resource available to handle growth specified by the user. Without knowing what the user's current performance numbers are (response times, throughputs, etc.) and what's left to use, MIS can hardly agree to guarantee service levels.

The data required for MIS to negotiate SLAs can be broken into three components:

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above) and displayed in a fashion acceptable for negotiation, MIS and the representative body of users for the major application area can sit down and negotiate the agreement. Current performance levels and transaction rates can be presented to the user and validated against reality.

MIS needs to evaluate the possibilities of whether or not the requested service levels can be met for the timeframe under discussion. Many of the system management types of tools can give preliminary answers based upon historical and current resource consumption, along with some simple rules of thumb.

Once a realistic set of demands has been established and a stable hardware environment is in place to adequately handle the expected demand, the SLA can be prepared, since MIS is now in a position to contractually provide service. An SLA should contain many of the following provisions in order to be effective.

- Identification of the parties to the agreement.
- Description of the service to be provided.
- Specification of the volume of demand for service over time.
- Definition of the timeliness requirements for the service.
- Discussion of the accuracy requirements (percentiles).
- Specification of availability of service.
- Definition of reliability of service.
- Any limitations to provision of the service (exceptions).
- Quantify the compensation for providing the service.
- Describe the measurement procedures to be used to establish data for the above.
- Set a date for renegotiation of the service to review past history and implement new service levels if necessary.

Monitoring And Projecting System Performance

Now that the SLA is in place, MIS must implement procedures to determine if service levels are being met.

Additionally, MIS needs to be able to

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forecast when the service levels no longer can be met because of growth or other external factors. Frequent monitoring of the metric of interest (response times, batch completions, etc.) with comparisons to the desired service levels are obviously needed to make sure service levels are met. For instance, weekly graphs could be prepared of specific application

a.m. and 2:30 p.m. to 3:45 p.m.), we are not meeting this service objective for the electronic mail application. Using our system management tools, we should be able to go to the log file created by the monitor and hone in on those time periods to see why. What we see from us-

ing the tools could just be an indication that we are starting to exceed the ability of our hardware to meet our service levels, or there may have been other applications running during that time period that impacted electronic mail's ability to get needed system resources.

What we see from using the tools could be an indication that we are starting to exceed the ability of our hardware...

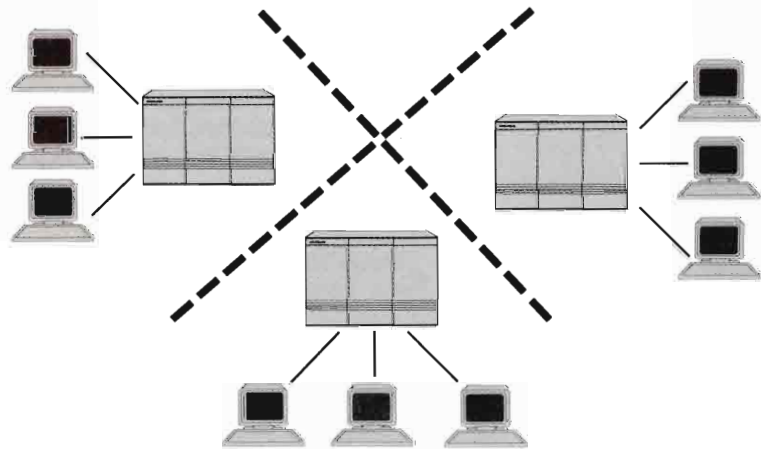
response times to determine if that service level is being met.

The tool of choice for this requirement is typically the system management tool that's designed specifically with this function in mind. The monitor tool continuously collects data that's used to prepare the graphs. The display tool aids in graphing the data, or in making the data available to be graphed in a form acceptable to the task at hand.

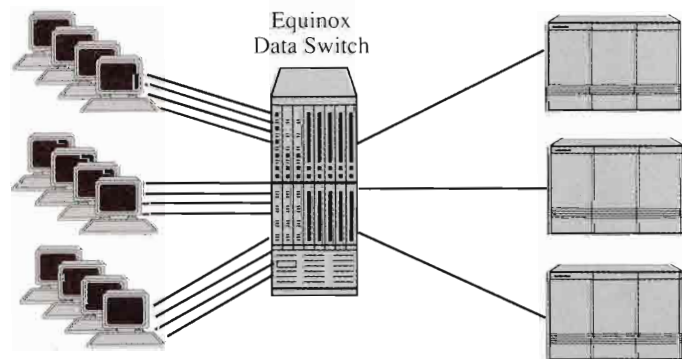
Figure 1 is an example graph of a hypothetical electronic mail response times based on hourly averages. If the monitored response times go over the agreed upon service level, the system management tools also should be able to provide higher resolution data to determine why the metrics were out of scope and an indication as to what particular process/user in the application environment is causing the anomaly.

Using Figure 1 as an example, let's hypothesize that we've set 1.5 seconds as our nominal service level. We see at peak times during the day (8:30 a.m. to 10:30

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If this trend continued and our system management tool could not pinpoint a particular problem, a diagnostic tool can be used to aid in reaching a solution. Remember, a diagnostic tool typically opens a "window" to system resource consumption in real time. Because logging is not a concern, much higher resolution data is displayed and typically will provide an indication as to the behavior of a particular application. Using the previous example, we could be prepared to run our diagnostic tool during the indicated peak periods to see what's going on in the system to cause the recorded response time peaks. Again, there may be no real problem, just an increase in intensity across applications supported on the system under study, resulting in higher than desirable response times and lower than desirable throughputs.

Forecasting resource demand based upon projected growth is the job for capacity planning tools. These tools usually are based upon modeling techniques that assume the capacity planner understands the characteristics of the workloads that are being forecast, as well as the resource demands of other, more static workloads on the system.

General purpose modeling tools are available that the sophisticated user can use to generate these scenarios. Consulting services can be purchased from HP or other vendors that can address specific capacity planning issues in the organization if the modeling expertise is not available in MIS to answer these questions.

Figure 2 is an example of a projection based upon an analytic modeling Capacity Planning consulting service offered by HP, showing how the electronic mail application's response time will vary if the following scenario were posed:

"I currently support up to 25 electronic mail users on my HP 3000 Model xxx, with service levels of 1.5 seconds nominal required. How would the response times of electronic mail vary as the number of users is increased from 25 to 50? Also, how would the aggregate response times of all other online applications on the system be affected as the number of electronic mail users in-

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crease?" (Remember, other applications have service levels as well.)

As you may note in *Figure 2*, the X axis shows the number of users ranging from 1 to 50, which allows the system manager the ability to verify the accuracy of the projection by comparing modeled results with known data. The answer to this question indicates service levels would be violated if any additional elec-

By setting goals and establishing agreements, you lay the groundwork for the rationalization of proper DP planning, budgeting and control.

tronic mail users are added. Depending upon service levels set for other applications on the system, the effects on aggregate response time of adding additional mail users also may be of concern.

The ability to accurately forecast application service levels based upon different scenarios is a powerful and necessary capability to control system resources. With this capability, known business demands can be projected and budgeting cycles started in sufficient time to ensure service levels will be met if new hardware resources are needed.

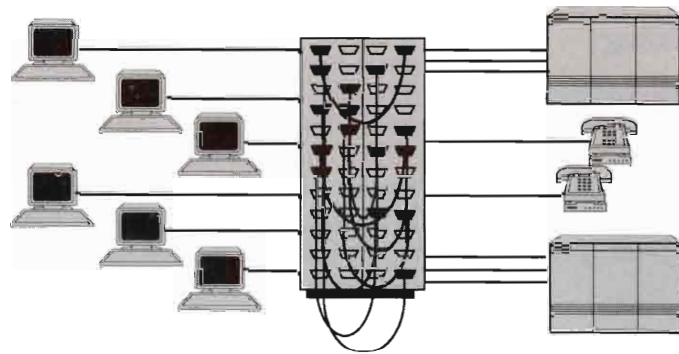
Simpler modeling tools also exist that base their projections primarily on past history. These solutions are typically based upon linear regression models whose data comes from metrics collected by the monitor program. In environments where the application load on the system is static except for increased intensity (more users), this type of solution can project resource consumption with enough accuracy to do capacity planning and budget for additional computing resources before service levels are violated.

Reactive management of your computer resources isn't a necessity of life unless you make it so. By setting goals and establishing agreements with your users as to the level of service you must provide to make them successful, you lay the groundwork for the rationalization of

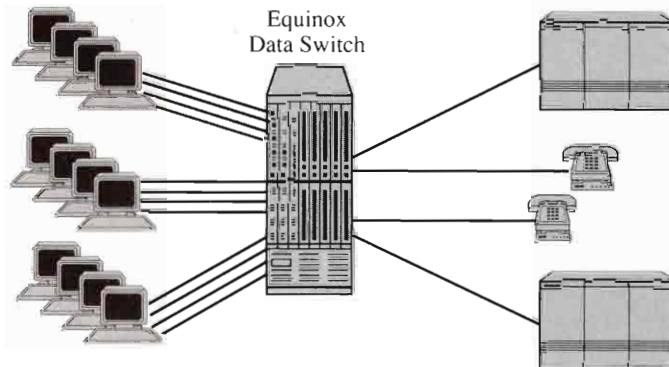
proper DP planning, budgeting, and control.—*Doug McBride is employed at HP's Performance Technology Center, Roseville, CA.*

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C

CLIENT-SERVER COMPUTING

Strategies For Building Applications For The Client-Server Environment

The talk of the industry today is client-server computing (CSC), the use of the PC as an integral part of corporate information systems. The industry's intent is to refocus the PC from strictly personal use into a system tool. While computing presently is performed on either a shared mainframe or on a PC, the goal is to create applications that use the power of the PC and the host working together.

Years ago we might have looked at this concept as distributed computing, where multiple systems work together to produce a single result. But client-server computing goes one step further in dedicating a processor to each user. The power of dedicated PCs allows a revolutionary step forward in the level of service delivered to the user.

In the big picture, the client-server user can have the power of local processing combined with the shared database access offered by a mainframe host. That is, the user gets the best of both worlds. Virtually nobody disagrees with the concept of client-server computing. The hardware for it exists. The next question is, how do you implement client-server applications?

Client-server computing can use the power of existing PCs. This is the most popular reason that I hear. While corporate mainframes consistently run out of power and need upgrades, hundreds and sometimes thousands of mips of computing power sit idle on users' desks.

Most organizations already own PCs, so why not use them? If you accept this as your central argument, then you ought to be consistent. You lose credibility if your implementation requires upgrading all of your conventional 286 machines into 2MB/386 systems.

Client-server computing is cheaper, because much of the computation is performed on relatively low-cost PCs. There's no doubt that mips on the PC cost less than mips on mainframes. Also, the cost of adding individual PCs has much

less impact than the cost of a mainframe upgrade.

I'm personally skeptical of this claim. There's no evidence to date that client-server applications have significantly less impact on a mainframe host (or shared server) than strictly host-based applications.

Depending upon application implementation, the decrease in host processing for the user interface may be compensated for increased communications processing. Also, most client-server implementations include a network that boosts the overall cost of the system.

Client-server computing is more efficient for the user. The use of a PC for the user interface allows client-server applications to have the same look and feel as other PC applications. It allows use of pop-up windows, character mode editing and so forth. None of these is practical in a strictly host-based environment.

This is the area where I see client-server computing having the greatest impact. Users *do* prefer the PC interface and fast response times over the slower terminal or terminal emulation interfaces.

Client-server computing allows controlled access to corporate databases. In this environment, data for personal computing is defined by client-server applications.

The premise of this argument is that users *are* going to use corporate data in PC applications. The access may be via ad hoc tools (such as HP's Information Access), or it may be by simply looking on screens and manually copying the data. But, users *will* get corporate data into spreadsheets, graphs, and the like. The corporate problem is ensuring that the user obtains the correct data. If the information systems group provides that type of information as part of a client-server application, then at least some quality control is taking place.

The idea of client-server computing has been around for several years. Like any new concept, the early implementations were steps toward



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Larry Kemp

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- Characteristics of data items
- Characteristics of datasets
- Paths
- Schema

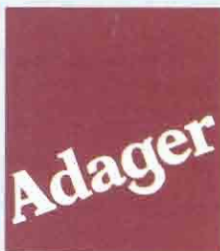
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- Cremate databases (first erase and then purge all datasets)
- Rename databases

Restructuring

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- Fields to datasets
- Datasets to databases
- Paths between masters and details
- The sort feature to paths
- Delete: Data items from databases
- Fields from datasets
- Datasets from databases
- Paths between masters and details
- The sort feature from paths
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client-server computing, rather than full implementations. Nonetheless, the early steps have been quite successful.

Early Implementations

The first step in getting PCs into corporate computing was terminal emulation. That is, adding a software product such as WRQ/Reflection or HP/Advancelink to a PC that allows it to act as a terminal. While terminal emulation could hardly be called client-server computing, it was the first step toward the integration of PCs into a shared mainframe environment. Also, the available emulation packages allowed transferring of prepared data from the host onto the PC, allowing at least a primitive sharing of information between host-based and PC-based applications.

Next, was the creation of tools that would perform ad hoc extraction of data from host databases, reformatting into PC application file formats and downloading

to the PC. Examples of these products include HP/Information Access and IMACS/Data Express. These tools allow direct use of host data by PC-based applications. For instance, you can select data from a corporate database, declare that the output should be for Lotus 1-2-3, and then name the output file on the PC. The result is a file that's usable in a spreadsheet immediately.

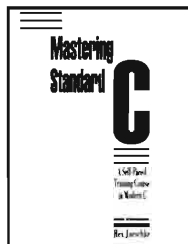
These tools provide a simplified, menu-driven interface, allowing them to be given to users directly. The ease of installation and near lack of corporate information systems support requirements has made these tools quite successful.

Although ad hoc access is useful, it still isn't a direct entry into client-server computing. It allows independent use of corporate data by the PC, but it still doesn't let the host and PC to work together in the processing of data. So, it doesn't allow the implementation of core information systems applications.

The first real entry into client-server computing was the introduction of products that allow applications written on the PC to access host databases just as if the applications were written on the host. The HP/Cooperative Services and WRQ/PPL products are examples. These products allow you to write a program on the PC that transparently accesses TurboImage databases on an HP 3000 host.

For large-scale applications, the data communications processing overhead can make this technique impractical. For instance, if a transaction requires scanning an average of 100 records in searching for a particular value, then 100 records will be transferred to the PC during the course of the transaction. Alternatively, the 100 records could be scanned on the host, with only the selected one sent to the PC. This would reduce the communications requirements for this transaction by a factor of 100.

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Both HP/Cooperative Services and WRQ/PPL implement a process-to-process messaging facility to allow use of a host-based process that performs this type of processing. This is the essence of client-server computing: Some processing is done on the PC and some on the host. Making a successful implementation lies in making a structured design for which processing happens where.

Addressing The Problems

The true implementations of client-server applications confront a number of real and not so real problems.

Integrity rules for access to host based (shared data) must be respected. Applications, or more generically, database designs, dictate procedures that must be followed when accessing data. For instance, customer numbers must exist for orders that are entered. Or, if a shipment of a part is to be authorized, the process must assure that it's working with the current inventory level. These examples illustrate application constraints that ensure the integrity of a database.

The result of these rules is that user generated applications cannot be allowed to directly modify shared corporate data, and in the strictest sense, perhaps shouldn't even be allowed to view data in non-controlled fashion.

In even more degenerate cases, we might worry about: Does a user generated program do what he thinks it does? Or, is it accessing the right data elements?

The end result is that if a corporate information systems group has the responsibility for maintaining a corporate database, then it also must have the control to assure its integrity. The only way that can happen is for that group to specify how access happens.

Communication between the client and the server is a bottleneck. Bottlenecks cause delays in response times, and bottlenecks use up system and server resources. Communications bottlenecks occur in three forms. First, the transfer of data over a communications link takes time. This is true whether the link is a high-speed LAN or a lower-speed serial link. The amount of time is directly propor-

tional to the amount of data transferred.

Second, network transfers use up network processing time. Processing time is used up on both the client and the server. While we may not care about the client overhead, we do care about the server because it's a shared resource. Network processing time is most proportional to the total amount of data transferred in a transaction.

The third type of overhead is setup time, or the processing time required to start a communications transfer. For instance, one transfer of 1,000 bytes will have less overhead than 10 transfers of 100 bytes. Setup overhead is proportional to the number of communication requests.

The key to minimizing communications overhead is to transfer results of transactions, rather than detail data. Ideally, a client transaction makes one transfer to the host, and receives one transfer back. In general, a small amount of host processing (as with most short transactions) is preferable to a large amount of communications processing.

Client applications must be controlled.

Versions of programs must be matched throughout the system and must be synchronized. So, if a new version goes out to one client, it must go out to all clients. This was never a problem for the host-based world, but it's a serious problem for the client-server world because a centralized information systems group has no control over the proliferation of software on personal computers.

This problem has a simple solution. Either upon establishment of a PC-to-host connection or upon transaction initiation, a match of version numbers is performed. If the version numbers mismatch, then a downloading of new object code is performed.

There's a deeper problem, and that regards security. In the mainframe implementation, all software is written, installed and running in a controlled environment. In the new environment, software executes on independent client systems. Because the corporate information systems group has no control over PC software, care must be taken to ensure that "hacker" software on the client sys-

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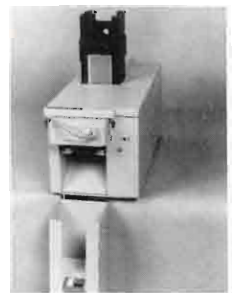
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tems can't "break in" to the server system. This means, for instance, that critical functions (e.g., price calculations) must be performed on the server, rather than on the client.

One way to implement a system is to keep the constraints in mind, and simply start writing an application. That might be called the ad hoc technique, or perhaps WYSIWIGY (what you see is what I gave you). My preference adds a little more structure and defines what should be done where. I'll describe two approaches: the defined Transaction Processor approach, and the Relational Database Server approach.

Transaction Processing

Some mainframe applications define a system to consist of a set of identifiable transaction types. For example, INV01 might be the transaction type for an inventory inquiry, while INV02 might be

an inventory adjustment. One definition of an application then is the set of programs that perform each of those transaction types. The definition of transaction types can be applied to the client-server environment as well.

The definition of a transaction consists of three components: a transaction identifier, a definition of the input data for the transaction, and the definition of output data for a transaction. This definition forms the interface between PC processing and host processing. In the best case, a PC-to-host transaction will be the same as the user-to-PC transaction, although this doesn't always need to be the case.

The question of what constitutes a transaction isn't trivial. Should "Validate an Account Number" be a transaction? Or, should "Validate this page of Account Numbers" be a transaction? Or, should it be "Return Information on this

Customer and Return an Error if the Account Number is Invalid"? There are arguments for each. The last choice is certainly best from the system point of view, but it may not be optimal from the user perspective. It's also a matter of preference. The PC user might say that he wants the error message before leaving the field containing account number, but the mainframe user might say that he doesn't look at the screen until the last field is filled out.

The overall system design consists of three general classes of processes. First, there are programs that exist on the PC called the "client programs." There should be one of these for each user transaction. Second, there must be a set of transaction processing programs on the host; one for each client-server defined transaction. These would be called "server programs." Third, there is a requirement for a general purpose "trans-

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action processing server" program on the host. This program routes messages between the clients and servers.

The client programs themselves perform all user interface functions. There's certainly no standard set today as to what the tools of choice are for PC applications. Should client programs be written

in C? Or COBOL? Or maybe a 4GL? There's room for lots of opinion here, and perhaps several years from now we'll know the correct answer. For now, my choice would be one of the safer options, one of the third generation languages combined with the least constricting toolset for terminal interaction.

The client programs package user input into transactions and send those transactions over to the host for processing. The transaction package itself should consist of an identifying header, preceded by transaction specific data. The header contains a return code from the host, which indicates either that the transaction was successful or if not, why the transaction failed. The client programs wait for responses from the host.

There's a need on the host for a specialized program called a transaction processing server. The bad news is you need to write it. The good news is it shouldn't take long to write. The server program receives messages from its cooperating client program, and then depending upon the transaction type, routes the message to the appropriate server program. The most efficient method of invoking the client program depends upon the client system environment, but on the HP 3000, there's no question that the subprogram mechanism is the most efficient means. Other functions of the transaction processing program may be to enforce security, revision levels and log performance data.

The client programs perform actual processing of each transaction. The client program performs all database access and processing and sends back only completion information. It sends back exactly one message. So for instance, if a transaction returns a 10 line items to a screen, then one message containing 10 line items is sent. This minimizes the data communications processing overhead.

There are some variations in the implementations of the transaction-processor to client programs. Although the simplest, and generally most efficient, mechanism is to group all of the client programs and the transaction processor together into one process (or program, under MPE), an alternative is to have a set of independently running processes that communicate via interprocess communications. Although the overhead for extra processes and communications is expensive in terms of processor time, this technique may use less memory and does allow simple flexibility if transactions may span a network (because the client pro-

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ess may be on some other node in a network).

In general, my opinion is that simpler is better, and the combined transaction processor and client program technique is the preferred one.

To summarize then, begin by defining both user-to-client and client-to-server transactions. Define the client-to-server transactions by name and format of data being passed. Next, define and implement the transaction processing programs on the host that implement the client-to-server transactions. Last, create the user interface programs on the client systems, which pass data to the server systems for processing.

There are some very nice side effects to the transaction processor approach. The separation of user interface versus procedural processing allows flexibility in maintenance and enhancement. If a new type of PC becomes available, then a new client program can be created that co-exists with existing PC software. If you think about it, the benefits are far reaching.

Relational Database Servers

A similar, but slightly different approach is being taken by the relational database vendors. Their approach addresses the same problem set but takes advantage of inherent features of the SQL database. Database server technology is really only feasible for relational databases. In general the cost of a network transaction will be greater than the cost of a conventional database access. The reason for this is that conventional database routines access individual records.

By contrast, programs that access relational (SQL) databases have the ability to access groups of records, or even summaries of groups of records. For instance, a single SQL access returns all orders against a given part. Or, a single SQL access retrieves the total value of all orders for a given customer. In response to a single query, an SQL server returns the complete response to a client.

Some of the relational database implementations offer "referential integrity" specification. These specifications allow the database administrator to create rules

that must be followed when accessing the database. This allows an external specification of the logic requirements for accessing the data. This, in effect, solves the problem of database consistency in a server environment.

In effect, the SQL language allows a high-level specification of transactions that are sent to the host, and the SQL database software provides the server part of the software. It is *not* necessary then, to write *any* software for the server. In fact, relational database programs written for the client-server environment look identical to programs written for the mainframe environment. The relational database vendors take the process an additional step forward in providing 4GL to speed up the development process. There should be no doubt that this technique will achieve results first.

The relational database server isn't without drawbacks, however. There's the issue of server performance. Relational database performance in a server environment *won't* be the same as relational database performance on a single system. In conventional environments, the procedures for solving relational queries are compiled, so at execution time the query simply is fetched and executed. In a server environment, queries are undefined until execution time, so parsing and optimization happens at every query request. Contrasted against the custom written transaction processor type implementation, the relational database server will require several times more computing power at the server end.

The relational database server also doesn't solve the problem of control of user applications. Provisions still must be made to synchronize revisions, and ensure that a hacker doesn't substitute his own programs in place of the intended applications.

Related Issues

There are several indirectly related issues that apply more to the implementation of the system than to the creation of client-server application creation.

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(when PC servers and perhaps applications too have evolved), maybe the answer is yes.

Practically speaking, PC servers simply don't offer the batch processing power of mainframes today. Lest we think batch processing is passe, today more than half the processing done on minicomputer/mainframes is batch; a remarkable fact considering that most such systems were purchased for the interactive computing capability. The fact is that accountants, financial analysts and users require batch processing. Billing, for instance, is likely to remain a batch process for some time to come.

Are products like HP/Cooperative Services and WRQ/PPL necessary to create client-server applications? Yes and no, depending upon your implementation. These products perform two functions: First, they perform session establishment on the host. This is a trivial function that is easily coded into a program. Second, they handle data communications over a variety of networks. If you're using a LAN, they handle network protocol. So, if you're using serial connections, then you probably can get by without these products. Otherwise, they can provide network connections.

What about performance monitoring? Performance monitoring in a Transaction Processor environment is absolutely trivial. All transactions pass through the same pathway, so instrumenting performance is simple. Overall, system monitoring (e.g., central processor utilization, etc.) is the same as in any system.—*Larry Kemp is a systems consultant for Hewlett-Packard in Bellevue, WA.*

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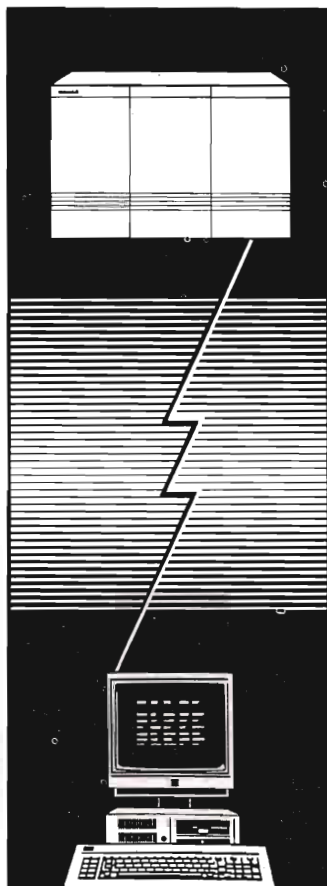
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TurboIMAGE is a robust, if perhaps limited, DBMS, which has a reputation for high reliability. There also are several good third-party tools available to assist you in the restructuring of a TurboIMAGE database and the development

of systems built around TurboIMAGE.

Many of us have a tremendous investment of both time and money in the development of systems built around TurboIMAGE. But there are some types of simple user requests that TurboIMAGE is ill-equipped to handle without the development of bizarre data structures and difficult to maintain supporting programs.

Our systems, for instance, can't support a retrieval of all customers working for HP unless we have explicitly defined the employee-to-employer relationship. And the procedure for establishing that linkage always is followed by the data entry staff. Any misspelling or alternative spelling of Hewlett-Packard (e.g., Hewlett-Packard Europe), is likely to mean that the customer's record won't be re-



Joel Martin



June 14, 1990

George Forsythe
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Dear George,

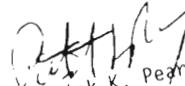
I am writing to you concerning your Product "Security Plus". I am a System Manager for a Hewlett Packard 3000/series 935 System with 110 on-line users. This was a turn-key system purchased thru [redacted] for use in the direct marketing area. Early on in our use of [redacted], I identified a weakness in their (and [redacted]'s) security. Through Interex, I learned of 2 security programs on the market for the HP. Security Plus and [redacted]. I immediately sent for demonstration packages of each.

Security Plus and [redacted] are comparable in price, but NOT in performance or ease of use. Security Plus was the program I chose and would recommend to any other Hewlett Packard user to assist in the supervision of their system. I was impressed with the installation of Security Plus, the Sales (Deena Speed) and Technical support (Edward Finch III). Unified Software Personnel are TOPS in their field. During any crisis that arose in my use (or abuse) of Security Plus, Deena and Ed were always available to assist and correct my problems.

[redacted] is an extremely difficult system to understand. All of their menus, user restrictions, program restrictions and system messages are in Editor flat files. Security Plus uses the HP Block mode with "user friendly" screens and function keys to maintain their system. It was much easier to develop and train our operators on the use of Security Plus.

One little known benefit of our association with Unified Software Systems that I did not know prior to the purchase was their bundling of "utility" software at no additional cost. My original plans were to purchase the Security Plus Package from Unified Software Industries, and the popular [redacted] program from [redacted] (for an additional \$ 3,499.00). CMD/3000, one of Security Plus's utility programs fulfills all of my needs. It copies, moves and purges multiple file-sets as well as determining percentages of file utilization. I saved \$ 3,499.00.

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trieved with those of other HP employees. Providing this supplemental TurboIMAGE functionality at great speed is what SUPERDEX is all about.

TurboIMAGE Supplement

Think of SUPERDEX as a performance supplement for TurboIMAGE. It can increase the speed with which TurboIMAGE performs searches of large volumes of data and increase your flexibility in defining TurboIMAGE searches. The key to this product is the establishment and maintenance of B-tree indices by your programs that write, update or delete data and traversing those same B-trees by your programs that read data. SUPERDEX doesn't support the indexing of non-TurboIMAGE/IMAGE files, such as float files or KSAM files.

SUPERDEX adds support for eight types of data retrievals that aren't directly supported by TurboIMAGE. Partial key retrievals allow you to specify part of the key value and the use of a metacharacter, e.g., HEWLETT@ will retrieve all records starting with Hewlett, including Hewlett-Packard Europe and Hewlett, William. Your SUPERDEX key doesn't need to be a TurboIMAGE key.

Keyword retrievals provide indexing of all words within character type fields, so that you can find all of the parts that are gaskets without the part description having to start with the word gasket.

Concatenated key retrievals allow you to link two data items and treat them as a single data item for purposes of retrieval, e.g., treat city and state as one item so that you can retrieve customers in Boston, MA, without serially reading all city records and testing the state data item for each city record that matches Boston.

Other retrieval features include grouped retrievals, multivalued retrievals, range retrievals, multifield and finally multiset/multidatabase retrievals. SUPERDEX also supports successive refinement of retrieval so that if your search of all customers in Boston, MA, returns hundreds of records, you can narrow the criteria further without a complete re-search of your data.

The SUPERDEX updating and retrieval mechanisms are compatible with all third-generation languages (COBOL, PASCAL, FORTRAN, etc.), the Powerhouse products by Cognos Corp. (QUICK, QUIZ and QTP), HP's TRANSACT, QUERY and other languages and tools. The interface to the Powerhouse products must be purchased separately. Included with SUPERDEX is SUPERDEX/ENQUIRE, a reporting tool for the development of online data inquiries that take advantage of the indexing.

Installation

Creation of the SUPERDEX account and restoration of the SUPERDEX files was easy and proceeded without a hitch. The demonstration software is easy to use and nicely done. You should be able to go through the entire demo in 30 minutes. The demonstration software uses COBOL with V/Plus screens, and the documentation includes a copy of the database structure along with the source code for the COBOL demonstration programs.

Each of the major retrieval types is available from the demonstration, and you're encouraged to try variations on each retrieval. Inspection of the source code in the documentation suggests that modifying the programs to take advantage of SUPERDEX would be a relatively simple task.

One aspect of the demonstration that I found to be a bit too programmer-like was the use of brackets and boolean operators in the relational access demo. For instance, retrieving all customers whose names start with FRANK, but not with FRANKEN, requires a specification of [FRANK@][FRANKEN@]!&. Even the addition of a space between the] and [will alter the command as interpreted by SUPERDEX. If you write your own programs, you can create the preceding SUPERDEX search value from something more reasonable, such as FRANK@ ANDNOT FRANKEN@.

The ENQUIRE software is easy to use. Although it supports SUPERDEX and the output of several types of files for downloading to PCs, its features are too limited for the development of a complex system.

The demonstration documentation briefly covers building the SUPERDEX index structures and ENQUIRE search profiles.

SUPERDEX With Powerhouse

In addition to the SUPERDEX demonstration software and documentation, there's a separate manual and separate programs to demonstrate the use of SUPERDEX with Powerhouse. There's a separate user manual for the Powerhouse Interface as well. Both Powerhouse manuals share much of the text with their SUPERDEX brethren.

I was unable to run the QUICK demo because the QKGO version doesn't match our relatively old version of QUICK. The QUIZ demo ran flawlessly, but SUPERDEX imposes a restriction on the QUIZ user that some might not find desirable. The QUIZ programs to be run must not be compiled, either with QUIZ or any other compiler, because SUPERDEX requires users of a QUIZ comment line to set-up the SUPERDEX linkage.

The Test

I created a copy of our test database of customers on our Micro 3000 XE (running MPE V) and set about putting SUPERDEX through its paces. The demonstration programs really held my hand, but when left to my own devices, I quickly fell down.

The SIMAINT program that's used to build the indices is very terse, so you need a good understanding of what types of indices you want to build before you proceed. I neglected to add the /K suffix to my path name and SIMAINT didn't accept my entry of EXIT to indicate that I had made an error. Continued attempts to EXIT brought me further through the dialogue until SIMAINT starting building the index records.

A word of advice: Work on a small test database before trying to add indices on a large database. A review of some samples in the documentation got me on the right course, but a gap in the Powerhouse Interface User Manual left me wondering how to delete the undesired

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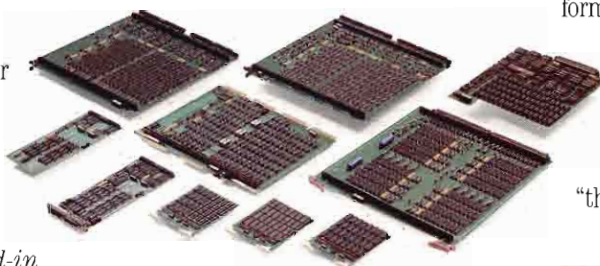
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path I had just created. The section missing from the Powerhouse Interface manual was included in the SUPERDEX User Manual.

New SUPERDEX users would benefit greatly from some examples of preparing a database for each type of retrieval and the exact syntax to use.

The SIMAINT program convention of using a path name suffix to indicate the type of path to be added or an action on a path, such as deleting or reorganizing of a path, does not enhance the ease of use of building or maintaining indices. This strikes me as very non-relational, in an interface sense, wherein the suffix can serve as either a modifier or an operator. The SIMAINT program would be friendlier to the novice if it were more menu driven and offered more assistance. It also would help to have a listing facility for reporting to the line printer pertinent index information, e.g., the names of all SUPERDEX paths, the items indexed for each path, and so on.

In spite of my minor criticisms, once you have a grip on SIMAINT's idiosyncrasies and have spent some time struggling with the manual, you won't have much trouble establishing SUPERDEX paths. Just remember to start with a test database.

On my second attempt, I successfully keyworded the first address line of our customer address set and grouped the second and third address lines with the keyworded first line. This automatically keywords the second and third lines.

Any program that's to update a dataset that's been SUPERDEXed must reference the SUPERDEX segmented library (SL or XL). So, I set up QUERY to run with LIB_P. Updating the dataset using QUERY (with LIB=P) works in exactly the same way as updating before the addition of SUPERDEX indices. I didn't notice any difference in response time between updating without indices and updating to support indices.

To retrieve information from my newly indexed database, I used QUIZ. As with QUERY, QUIZ must be run with LIB=P. To do this, add the SUPERDEX segmented library to the COGNOS ac-

count or copy QUIZ into the SUPERDEX account.

There are a few idiosyncrasies when using QUIZ under SUPERDEX. QUIZ is run under the SIQUIZ program, so you must add DS capability to QUIZ itself, a very minor item. The QUIZ interface doesn't require any changes to your Cognos dictionary, but only uncompiled QUIZ statements can use SUPERDEX retrieval. Your existing QUIZ code continues to work, but takes advantage of SUPERDEX without slight modification.

My first effort to use QUIZ resulted in a QUIZ NOT FOUND message, but use of the PROCLOC parameter fixed that problem. The use of the defaults shouldn't have required PROCLOC, according to the documentation. Once I had crossed that hurdle I was able to perform keyworded, partial key and grouped key retrievals with the same speed and flexibility advantages as shown in the demonstration.

SUPERDEX is relatively easy to use once you understand its idiosyncrasies. Writing COBOL programs to take advantage of SUPERDEX indexing should be no problem if you've written a program that performs TurboIMAGE re-

trievals using DBFIND and DBGET. At the systems level great care must be taken to ensure that the only programs that update the indexed datasets do so by using the SUPERDEX segmented library, or else the SUPERDEX keys will quickly be out of step with the data.

At the user level, care must be taken to ensure that the search values are typed correctly. A stray blank character between brackets can result in a very different retrieval than desired, and an unbracketed search value has a very different meaning than the exact same value within the brackets. The use of the same prompt character for SIQUIZ as is used for QUIZ also can be confusing if more than one search is performed within the same run of the program.

Documentation

The SUPERDEX documentation is nicely presented but could be more substantial. None of the manuals had indices, which is ironic for a product that does TurboIMAGE indexing. My copy of the Powerhouse Interface User Manual was missing the "Maintenance and Utilities" section. I presume the same information appears in the section of the same name in the SUPERDEX User Manual. The manuals would benefit from checklists for installation of SUPERDEX, use of SUPERDEX in an existing application and testing/troubleshooting of SUPERDEX searches. I'm not sure how you would know if the indices were out of sync with the supporting data. As noted earlier, the absence of lengthy real-world examples hurts the documentation most of all. The documentation that has been written, though, is very nicely done.

If your HP 3000 is running out of gas for reporting and inquiries and you're frustrated by the few options available for performing TurboIMAGE searches, take a look at SUPERDEX. It has a few idiosyncrasies and the documentation could be improved, but for a relatively low investment, it can breathe new life into your TurboIMAGE systems. ■

SUPERDEX Version 2.5

PLATFORMS: HP 3000 running MPE V or MPE XL.

PRICE: \$3,500 (SUPERDEX I, first copy, Micro 3000) through \$22,500 (SUPERDEX II with Powerhouse Interface, first copy, HP 3000 Series 960) plus 15 percent annual maintenance. Right to copy and run-time versions are available at a reduced price. 90-day warranty

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Traveling Software's LapLink Provides A Solution For File Transfer



Connecting Links

When I buy software, I always complete the owner registration card. My intent is purely financial; I figure the time invested in helping a marketing department collect information about me is likely to be worthwhile when updates become available. Usually I don't make many comments on the card because I've just purchased the product and don't have experience that would warrant intelligent remarks. I've always thought most companies do very little beyond entering the owner's name and address into a database. In fact, I've never received a letter from a company in response to my comments, until now.

I recently added a second IBM PC-AT clone to my collection of systems, so

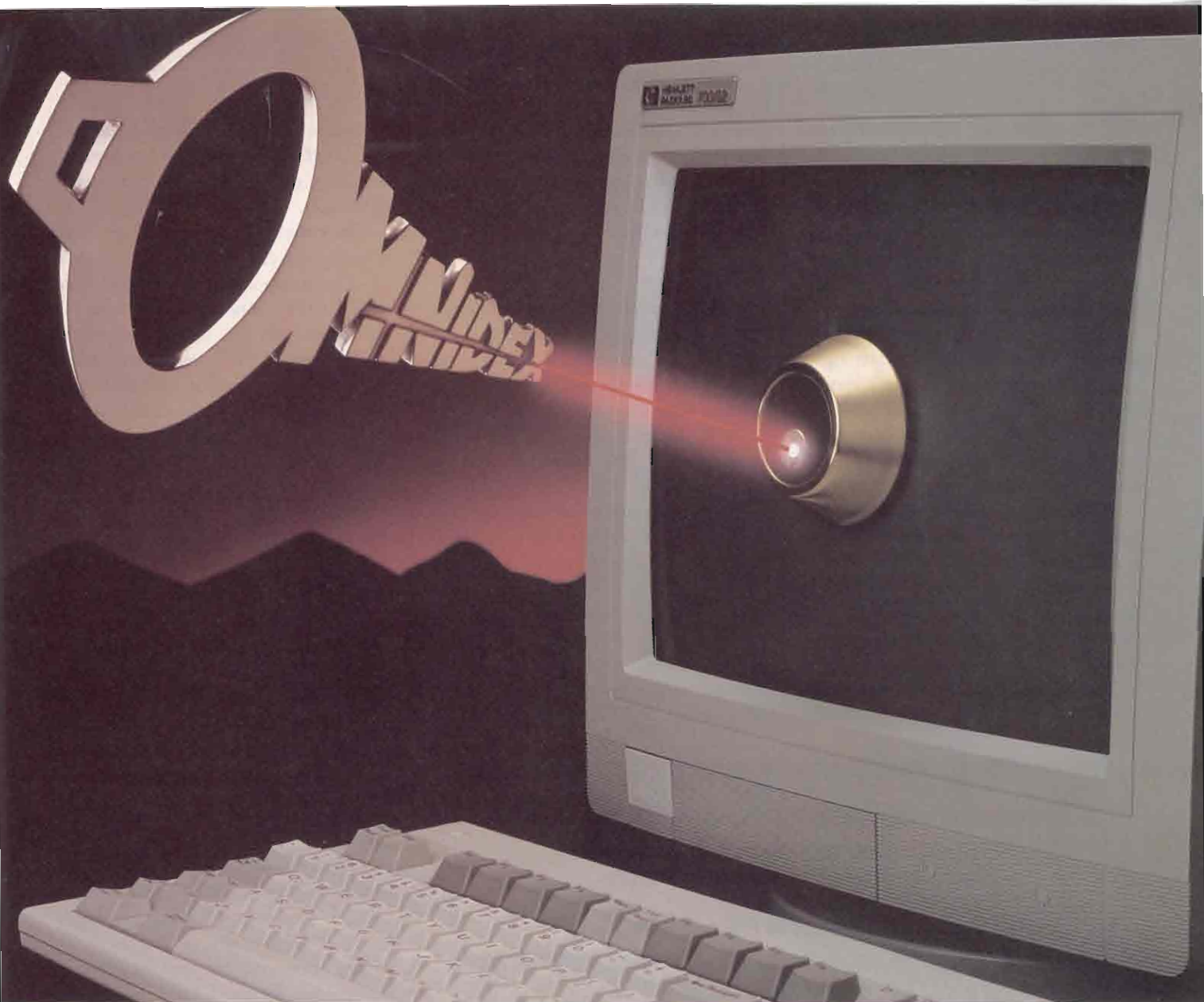
when I needed a file transfer program to copy files between my PCs, I bought a copy of LapLink III from Traveling Software (Bothell, WA). I've used a product called LapLink Mac for several months to transfer files between my Macintosh and my Vectra. Two weeks after I returned the registration card, I received a full-page letter from a technical support engineer addressing the comments and requests I had made. I was impressed.

The Product

As the name implies, the original intent of the software was to allow quick and reliable transfer of files between a laptop IBM PC compatible and your desktop PC. In fact, it's as good as any software I've



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seen for transferring files between two IBM PC compatible systems, and better than most.

Included with the product are two copies of the LapLink software and a custom six-headed cable to allow connections between virtually any two PCs. It arrives with 3 1/2-inch and 5 1/4-inch media. No matter what type of PCs you want to connect, you can start right away. The software requires a system with 256 KB of memory and MS-DOS 2.11 or higher. Because the software can use either serial or parallel ports, you should have one free on each system.

Although its primary purpose is copying files between systems, it really does much more. LapLink also includes the ability to perform complete file management on both systems, including viewing, naming and deleting files on either system.

It provides a full, menu-based interface with a split screen. The local PC file

system is displayed in the left window, and the remote drive is displayed in the right window. Using the keyboard at one system, you can perform any file function on either PC.

Installation

Installing LapLink is as easy as copying files from a floppy disk to a subdirectory on your hard drive. You'll want to create a batch file to start LapLink from within any directory or edit your AUTOEXEC.BAT file so that LapLink is in the PATH. The manual is clear on what is required.

Perhaps the nicest feature of LapLink is its ability to perform a remote installation on the second system. You have to type two MS-DOS commands at the remote system to initialize the serial port as the console. However, once you've done this, LapLink can handle the remainder of the remote installation. For two systems in the same room this isn't

necessary. But, when the systems are connected via modem, this can prevent any delay or expense in getting started right away.

Once the files are installed on both systems, you can start LapLink on each PC. The set-up required is easy. Specify which port is connected to the other PC and what baud rate should be used if you're using a serial connection. After that, the two copies of LapLink automatically should make the connection.

By the way, the special cable supplied with LapLink III allows you to communicate between the two PCs at over 115,200 baud with a serial connection. If you choose to use the parallel connection, you can get an effective transfer rate of over 500,000 baud.

You can set a number of options. The viewing options the file display windows will be sorted by file name or type, size, time and date of last modification or in directory order. You also can fully customize your screen colors.

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Using LapLink

As soon as the programs communicate, a split-screen menu is displayed at each PC. The left window shows files and directories on the local system. The right window shows the files and directories for the remote system.

The commands for LapLink are displayed across the lower line of the screen. The commands let you perform virtually any file maintenance operations for either system. All LapLink commands are displayed on the last line of the screen in a list. You can use the space bar to step through the menu options or press the letter associated with the first character of each command. You select which window is the active, or highlighted, system using the keyboard arrow keys. To scroll through the directory entry within a window, use the up and down arrow keys. All commands operate on files in the highlighted, or source window.

File Management

The file management functions are among the easiest to use and can actually be used on the local system with no

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remote connection. However, once the connection is established, LapLink III really shines.

You can view files on either the local or remote system simply by highlighting the file name and pressing V for View. Then, browse through the file even if it's in binary format. The other file management functions work identically. Simply highlight a filename and erase or rename it.

By making both windows local, you can use LapLink III as a purely local file manager. However, when you see how well it works to other PCs, you'll want to use its full functionality. LapLink III also features a tree mode that allows you to see a graphical representation of your files.

Moving Files

The primary feature that makes LapLink a successful product is its flexibility and reliability for copying files. The easiest copy operation involves a single file from one system or window to the other system or window. Like the file management functions, highlight the file to be copied and press C for Copy. The speed will amaze you.

If you want to select several files, do so either by specifying the MS-DOS wildcard specification or setting a *tag* on a file one at a time or in a group. Then, to copy the selected files, press C again for Copy. This time all the selected files are sent. If one of the selected names is a directory, all files and subdirectories within that directory are copied as well. This recursive copying can be disabled through a menu item if you don't want to copy subdirectories.

A feature that not many file transfer programs have is the ability to preset options for your copying operations. You can specify that only those files that have been changed should be copied, or only those files that already exist on the destination system. You also can have LapLink III confirm any operation that will overwrite an existing file. Or, you can set it so that even read-only files will be changed. You can copy hidden files,

and LapLink retains their hidden attributes at the destination.

Finally, you can copy files based on the time and date range of the files themselves, with a full complement of boolean operators. For example, you can copy all files with dates between January 1 and January 31, all files created or updated today, and files whose creation dates are greater than, equal to, or less than, any other date. On all of these operations, LapLink III has a Turbo mode that steals clock cycles and transfers files even faster, although you'll probably find this works best in parallel mode.

LapLink III also features a batch capability that allows you to define macros for operations you perform often, such as backing up your hard drive or copying a particular directory to your portable.

Once you create the batch files, you can either execute them interactively from within LapLink III, or you can start LapLink and give a batch name at the MS-DOS command prompt. And LapLink automatically performs the operations. Creating, editing and testing batch files is easy with the editor included in LapLink III.

Shared Volumes

Traveling Software supplies a very useful device driver that allows one PC to access the disk drives of a remote PC as if they were local. For example, suppose your Vectra has two logical volumes as drives C and D. If you have another Vectra with two additional hard disk drives, you can connect the two using the LapLink device driver and cable. When you do, drive C on the remote Vectra appears as drive E on your local system, and drive D on the remote is drive F on your local.

You can use any MS-DOS command or virtually any MS-DOS application and directly access files on the remote PC without any need to copy them. You can use the printer on the other system as a local printer in MS-DOS and normal MS-DOS applications. It's better than a network in dual-system environments!

There are some incompatibilities between file systems in different releases of

MS-DOS. For example, you can't use a hard disk formatted under MS-DOS 2.11 as the server and use MS-DOS 3 or above on the primary or lead system.

Still, no other program provides this capability as far as I know, and if it's what you need, it can be just one more reason to use LapLink. Of course, while the computers are connected in this manner, you don't really need LapLink to copy files because standard MS-DOS will do it.

Improving The Best

Even the best program can be improved, and LapLink III is no exception. For example, to move around the menu with the space bar seems odd. More programs use the arrow keys or at least a Tab and Back-Tab. Of course, you can always use the first letter of the command you want. But, if you browse through the commands with the space bar, then realize you passed the command you want, there's no way to back up other than use the first letter of the command or space through the entire menu again.

LapLink III is one of those programs I must have in my office and at home. If you ever need to copy files between Vectras in your office, it might be the solution for you. ■

LAPLINK III

PLATFORMS: IBM PC compatible, requires 256 K RAM, MS-DOS 2.11 or higher

PRICE: \$149.95

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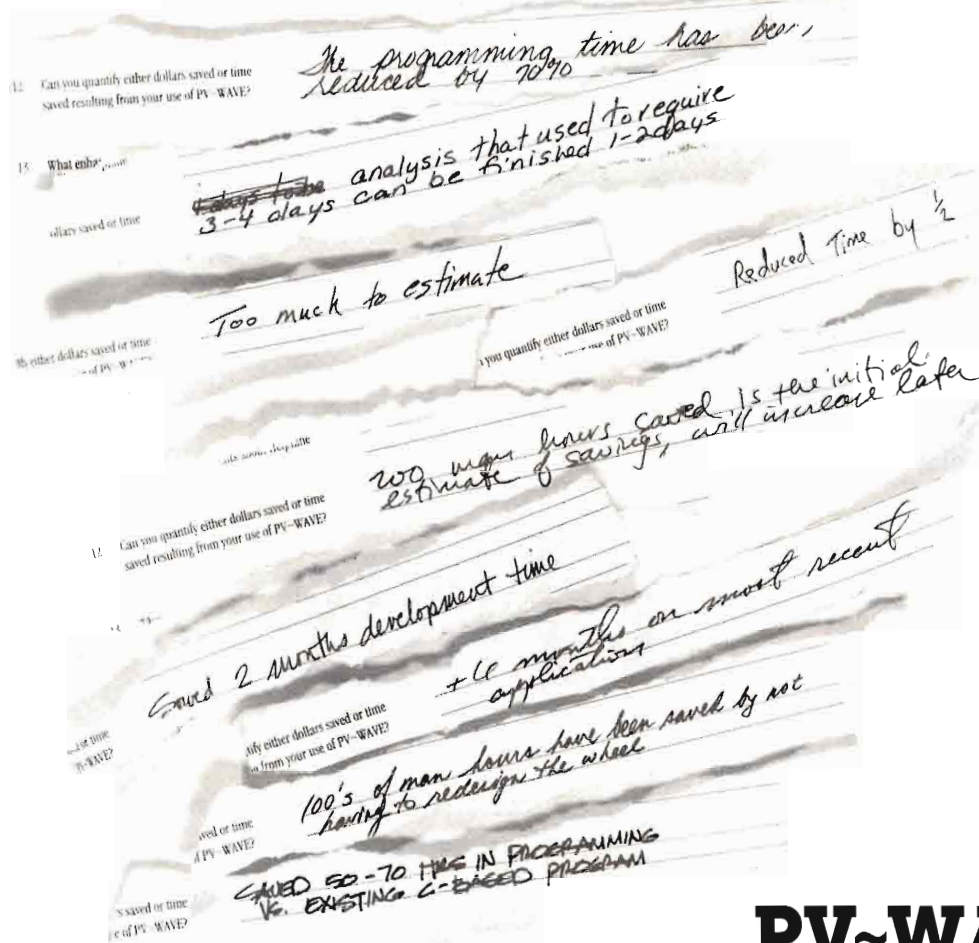
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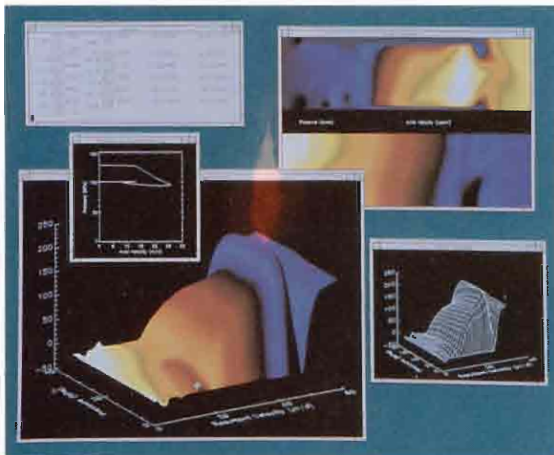
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MINISIS

Brant Computer's 4GL For Managing Text-Based Information

More than 10 years ago, I was on a committee to evaluate and recommend an in-house computer system. The HP 3000 won easily over other so called "mid-range" systems from IBM, UNIVAC, Burroughs, DEC, etc. Why? In a word, IMAGE. I've been writing application systems using IMAGE for 15 years, and I love it. I know SQL will probably relegate IMAGE to the back of the closet, but SQL is cold and mathematical. IMAGE isn't.

So, if IMAGE is so good, why would anyone spend years developing an infor-

mation management system that runs exclusively on the HP 3000 when IMAGE has been "free" for over a decade, and HP has been actively pushing SQL for several years?


For some applications, IMAGE (or SQL) is the square peg that we keep trying to shove into the round hole.

MINISIS, a complete information management system, marketed by Brant Computer Services Ltd. (Ottawa, Ontario), was designed for these round hole applications because it handles variable-



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MINISIS is not a replacement for IMAGE (or SQL), but a complementary system. It's not for high-volume transaction processing. It's for relatively static information applications where retrievals from variable-length free-form text fields are the norm.

length fields, subfields, repeating fields as well as full text indexing.

Developed by the International Development Research Centre (IDRC), MINISIS is a true 4GL. It includes a data dictionary, an input processor, a security module, and a query and report processor. MINISIS runs on any HP 3000 system. Most applications can be implemented in MINISIS without resorting to any programming, although ample hooks are available for the adventuresome.

MINISIS is not a replacement for IMAGE (or SQL), but a complementary system. It's not for high-volume transaction processing. It's for relatively static information applications where retrievals from variable-length free-form text fields are the norm.

The typical MINISIS application is a library "card" catalog system with title, author, publication, abstract, etc., all indexed and available for rapid free-form searches.

Set-Up

MINISIS comes on a 2,400-foot, 1600-bpi tape that includes the MINISIS system (the MINISIS account) and the MINISIS contributed library (the MINLIB account). Installing MINISIS requires little more than setting up the account structure and restoring the files. Like IMAGE, SQL or any other DBMS, to use the system, you must first define the database(s) for your application.

As a test, I created a data model similar to the one in the training manual. It was

a card index of all articles appearing in the trade press that referenced the HP 3000. I actually keep such an index in a PC DBMS, so the test data model was realistic.

Module Makeup

MINISIS consists of more than 20 independent modules linked by a menu handler. The modules can be classified into two groups: end user and database administrator (DBA). The end user modules are typically those used on a daily basis, e.g., UPDATE, QUERY and PRINT.

UPDATE is used to enter new or modify existing entries using VPLUS screens or field-by-field character mode prompts. Validity checking, automatic date/time stamping, default value substitution and automatic indexing are among the features. A particularly useful feature of UPDATE involves validation against an authority file. Suppose you have an authority file of all publications. While keying in article information, you discover a publication that you haven't placed in the authority file. When entering this invalid publication, MINISIS automatically displays all valid entries, and if you have the right security profile, you can add this new entry to the authority file. Nice.

The QUERY module is unlike the QUERY shipped by HP with IMAGE. You can select entries based on the contents of given fields using either text or index searching. The Boolean operators AND, OR, EOR and NOT are sup-

ported, as are partial, truncated keys. QUERY also supports comparison operators (EQUAL, LESS THAN, etc.), adjacency searching, a browse function and presence/absence searching.

With PRINT you can create formatted reports to suit almost any need and direct them to almost any peripheral device. PRINT can operate directly on the database or work off of data already selected by QUERY, sorted by INDEX or manipulated by COMPUTE.

There are numerous DBA modules, but the most important for our discussion is the Data Dictionary Maintenance module, DATADICT.

When setting up an application, most of the work takes place in DATADICT. DATADICT is used to define or modify the characteristics of a data model: files, records, fields, etc. It also is used to erase or purge databases, copy definitions, define projections and joins (yes, MINISIS has many relational characteristics), and establish security.

About 12 other modules are provided primarily for the DBA to perform various utility/maintenance functions.

Special Features

MINISIS supports the definition of multiple views, called submodels, within a data model and five levels of data secu-

MINISIS

SYSTEM REQUIREMENTS: HP 3000 running MPE V or MPE XL.

PRICING: Ranges \$12,500 to \$56,500 depending on number of users.

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city. Multiuser access is supported, as is transaction logging for restart/recovery and audit trails. A full thesaurus capability in multiple languages is provided, as well as COM and catalog card production, MARC/UNIMARC interface, SDI (not Star Wars!) CARDEX capability, and support for ISC standard 2709 tape format.

Documentation

The documentation includes a Database Manager's Guide, User Guide, Application Programmer's Guide and Training Manual.

Learning MINISIS on your own isn't for the faint of heart, although the training manual provides a good step-by-step implementation of a typical library catalog system. Experienced DBMS users should be able to learn MINISIS from the manuals, but it will take time and effort. Remember, this is an extremely powerful and full-featured system — don't expect to learn it in a day or two. Novice computer and DBMS users should arrange for formal training.

Overall Impressions

MINISIS handled my test data beautifully, much better than either my IMAGE or PC implementations. The biggest difficulty was because of the richness of the MINISIS system. There are so many options and features available that it can be intimidating to a new user. Fortunately, if you follow the "when in doubt, use the default" dictum, more often than not, you'll be OK. Typing help at most prompts yields a list of allowable commands and the correct syntax.

Books have been written about IMAGE and SQL, so I can hardly do all the features of MINISIS justice in only 1,500 words. Suffice it to say that I am impressed with MINISIS and like it for the management of structured text information. It's a proven, complete solution system for applications that in the past might have been implemented on index cards. The key to most jobs is having the right tools. MINISIS is the right tool for your structured text management applications. Give it a look.

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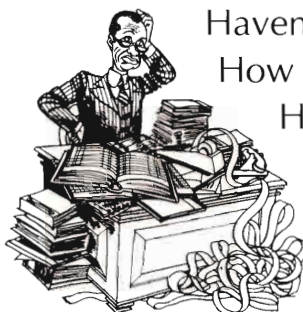
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PC TIPS

Miles B. Kehoe

Trick Windows

The program information file section [pif] of WIN.INI is used to store memory information for executable programs that can use the default values for PIF parameters. It also includes information on where Windows can swap your application to disk if it needs more memory. Part of a typical [pif] section is listed in *Figure 1*.

The swapdisk and swappsize parameters are used to determine which disk drive Windows should use as a swap device and how large the swap file should be.

If you use the default value of ? for *swapdisk*, Windows will put its swap file in the root directory of the first hard disk it finds on your system. This is usually Drive C:. Because of its impact on performance, don't specify a floppy disk drive as the swap device.

If you have expanded memory available, you can direct Windows to use it first by including the line:

```
swapdisk=? /e
```

If you want Windows to use a drive other than C: as the swap disk, specify that drive name in either the WIN.INI file or set the environment variable TEMP in your AUTOEXEC.BAT file. To specify a different disk, the entry in your WIN.INI file should be:

```
:swapdisk=e:
```

(You can optionally specify that expanded memory should be used first).

To define the environment variable instead, include the following line in your AUTOEXEC.BAT:

```
SET TEMP=E:\
```

If you use this method, leave the default swapdisk value in the defaults file. You could choose to append the /e to the default entry if appropriate for your system.

Setting swapdisk=0 disables swapping but isn't usually recommended because it slows your system performance.

The swappsize parameter lets you spec-

ify the size of the temporary file that will be created on the swapdisk device. If you use the default value of zero, Windows will allocate about 2 KB more than the first program you load. If you use this technique, be sure your largest Windows application is the first one you use (or the first entry in the load= or run= parameter in the [windows] section discussed in the previous column).

If you want the swappsize larger than the default, specify the number of bytes in the WIN.INI file. Remember to allow about 2 KB more than your application needs so Windows can store some environment information along with the program. Because the clock is often one of the first programs and because it's so small, you may decide to use a larger value.

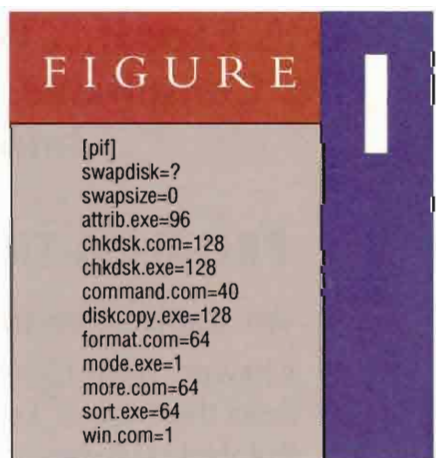
PIF Sizes

The remaining entries in the [pif] section are of the format:

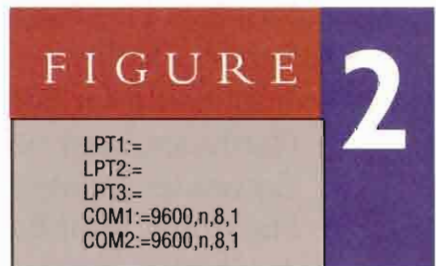
```
<program.name>=<size>
```

The <program.name> specifies the program name to execute and the parameter <size> is the number of bytes of memory that should be allocated for the application. By specifying a program in this section, you can avoid creating the PIF file and still have a non-Windows program run in a window. The default values Windows uses for programs listed in the [pif] section are:

- Program Title: The <program.name> file name without the extension.
- Initial Directory: The current working directory.
- Parameters: None.
- Memory Required: The value given in <size>.
- Memory Desired: Same as above.



Default [PIF] Section in WIN.INI.



Default [PORTS] Section in WIN.INI.



A Typical [DEVICES] Section of WIN.INI.

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■ Directly Modifies: None.

Because of these options, not all applications are able to be run this way. When in doubt, give it a try.

Internationalization

The options in the Internationalization [intl] section allow you to customize Windows for use in non-U.S. environments where currency, numeric defaults and other usage options may differ. The typical WIN.INI file has only a single line by default:

```
[intl] dialog=yes
```

This tells Windows to include the International options menu option in the control panel program, CONTROLEXE. This is important so that you can access the options at all. If you don't want your users ever to change these options, you can set dialog to no in the WIN.INI file.

The other options are best set in the CONTROLEXE, but the valid keywords and their meanings are shown in Table 1.

Ports

The [ports] section in the WIN.INI file provides the link between the Windows

device drivers and the physically devices you've connected to your system. These are normally edited using the CONTROL program. By performing some manual edits, you can gain speed in some circumstances.

A typical [ports] section of WIN.INI is listed in Figure 2.

As you can see, Windows allows for both parallel (LPT) printers and for Serial (COM) devices. To use such features as the automatic dialer in the Windows CARDFILE program, the serial port to which your modem is attached must be properly configured in the WIN.INI file. Of course, the same is true if you're using any Windows terminal emulation program such as Advancelink or the Windows TERMINAL program.

If you want to direct the output of any print operation to a file rather than to the actual device, you must add a line in WIN.INI to specify that filename in the [ports] section. Such an entry might be:

```
OUTPUT.LST=
```

This line, entered after the COM2 entry above, will cause Windows to display an entry called OUTPUT.LST as a

TABLE

Keyword	Meaning
iCountry	MS-DOS Country Code
iDate	0 for mm/dd/yy 1 for dd/mm/yy 2 for yy/mm/dd
iCurrency	0 for leading currency symbol with no separation 1 for trailing currency symbol with no separation 2 for leading currency symbol with one character space 3 for trailing currency symbol with one character space
iDigits	Number of significant decimal digits in currency
iTime	0 for 12 hour clock 1 for 24 hour clock (also military time)
iLzero	0 for no leading zeros 1 for leading zeros
s1159	Trailing string from 00:00 to 11:59 (i.e., AM)
s2359	Trailing string from 12:00 to 23:59 (i.e., PM)
sCurrency	Currency symbol string (i.e., \$)
sThousand	Thousands separator string (i.e., ,)
sDecimal	Decimal point string (i.e., .)
sDate	Date separator string (i.e., /)
sTime	Time separator string (i.e., :)
sList	List separator string (i.e., ,)
dialog	"yes" or "no"

Valid keywords and their meanings for the [intl] section of WIN.INI.

selection in the Connections section of the CONTROL program. If you select OUTPUT.LST as the printer, virtually all Windows programs will send output to the file named OUTPUT.LST in the current directory.

Unfortunately, this process is tricking Windows: there's no method to send output to a different file other than to edit WIN.INI to specify a different file, exit and restart Windows, and send subsequent output to a different file.

You could, of course, list multiple files in the [ports] section, but Windows version 2.X allows a maximum of eight lines in this section of WIN.INI. By the time you include the real devices you have, only a few possible entries are available. Nonetheless, it's a way to direct output to a file if you must.

You also may be faced with a problem if you're using a Postscript cartridge in your HP LaserJet printer. Sometimes you may want one program to consider it a Postscript device, and other times you may want to treat it as an HP-PCL device. In fact, you also may want to treat your printer as a text-only device for faster output of ASCII text files.

Fortunately, Windows allows you to associate two or more drivers with the same physical device, but you have to make some changes in the [ports] section of the WIN.INI file. For example, suppose you did have three possible modes for your HP LaserJet printer: Postscript using a special cartridge, HP-PCL, and a text mode where the printer will use only its built-in standard font. You could add three lines to the [ports] section as follows:

```
LPT1.PPS=  
LPT1.HP=  
LPT1.TXT=
```

By using these entries in conjunction with the device drivers described in the next section of WIN.INI, you associate LPT1.PPS with the Postscript device driver; LPT1.HP with the HP-PCL driver for HP printers; and the LPT1.TXT with no specific driver.

When you select one of these Connections in the Windows CONTROL program, Windows directs the appropri-

ate output to what it considers a text file because there's no colon (:) in the device name.

This occurs because the syntax we use is identical to what we used earlier. Thus, we're taking advantage of the fact that all Windows printer drivers must use MS-DOS to output characters to any printer.

MS-DOS, even without Windows, has device names for each physical port.

Sadly, Windows 2.X allows a maximum of eight entries in the [ports] section...

If a file is named LPT1 with any file extension, MS-DOS will direct the output to the LPT1: port. So, when MS-DOS attempts to open LPT1.PPS, it actually sends the output to port LPT1: regardless of the file extension.

Sadly, Windows 2.X allows a maximum of eight entries in the [ports] section, so you may have to choose carefully among your options. The good news is that this technique works well in Windows 3.0, and there is no limit to the number of lines that you can specify.

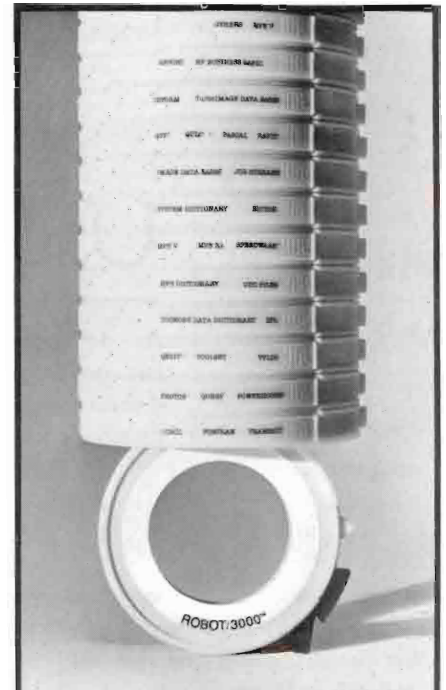
Devices

In conjunction with the [ports] section of WIN.INI, there's a section called [devices] that allows you to specify certain printer drivers with a particular printer name. Normally, you'll do this either when you install Windows or by using the CONTROL program to install a new printer driver from a floppy disk.

The [devices] section on my system, with an HP Laserjet printer and a PacificPage Postscript cartridge, is given in Figure 3.

By configuring your [devices] in this manner, you can choose the way Windows will treat your printer at different times.—Miles B. Kehoe is an online support manager for Verity Inc., Mountain View, CA

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User Correspondence

UNIX

Andy Feibus

As described last month, an e-mail message may be sent by

using the command:

```
$ mail user
```

and then entering the message to be sent (terminated by **^D**). However, if you use this method, you'll find that you can't send the contents of a file or edit the message before you send it.

E-mail messages are generated from standard input (stdin). Because of this feature, the results of a shell command may be piped into the **mail** command for transmission to another user. For example:

```
$ echo "The current date is `date`" | mail user
```

The contents of a file may also be passed as the message. For example:

```
$ mail user < /etc/profile
```

You'll notice when you attempt these examples (by substituting your login name for **user**), a subject isn't shown in the header summary displayed when you attempt to read your e-mail. To include a subject line, use the **-s** option for **mail**. For example:

```
$ echo "Current Date: `date`" | mail -s "The Current Date" user
```

When this e-mail message is sent, the subject is "The Current Date." The subject string must be enclosed in quotes if it contains any spaces. The **-s** option also may be included when using **<** to obtain the message from the contents of a file.

When you use the **mail user** form of the command, the program places you into input mode, where you can enter the message to send to **user**.

When forming a **mail** message for transmission, the *message* is stored in a message buffer until you are ready to send it. While entering text into the buffer, several tilde commands are available to permit you to edit and review the message. A tilde command, so named because the command always begins with the tilde (~) character, must begin in column 1 of the message. If you enter anything on the line and then back up to column 1 before entering the tilde com-

mand, the command is not interpreted; the tilde command must be the first characters on a new line.

Tilde commands are immediately interpreted and performed by the **mail** program. Some possible tilde commands are described in *Table 1*.

The **~r** command displays the number of lines/characters inserted into the message buffer from the specified file.

The **~v** command places the user into the visual editor of choice (how to choose will be discussed next month; by default, **vi** is used). Once you're done editing with **vi**, use the **ZZ** or **:wq** editor command to save the changes you

TABLE

Command	Definition
~r filename	Read the contents of filename into the message buffer.
~v	Place the contents into a temporary file and permit the user to edit this file.
~c user...	Add the list of users to the carbon copy (Cc) list to also receive the message. Also, -b is available to specify blind copy (Bc) lists.
~p	Review the message.
~q	Quit from entering this message. If the message contains at least one character, the message is saved to the <i>dead letter</i> file (dead.letter) in your HOME directory.
~s string	Set the subject line to the specified string.
~x	Same as ~q , except that the message is not saved in the dead letter file.
~! command	Execute the shell command and return.
~<! command	Execute the shell command, inserting the results of the command (standard output or stdout) into the message buffer.
~.	Same as ^D — end of the message.
~?	List all tilde commands available.
~h	Permits you to edit the subject line, carbon copy list, blind copy list, and TO list. If field is displayed with an initial value, you may edit the field as though you had just entered it.

Tilde Commands.

made and return you to input mode. On return to input mode, the program displays the word (**continue**) and any new text you enter immediately follows the contents of the edited message buffer.

The **~s** command overrides the subject line specified in the **-s** option.

Pressing your interrupt character while in input mode does the same thing as performing **~q**. Your interrupt character is defined by your terminal's **stty** settings (specifically, the **intr** character; refer to the documentation for **stty** in Section C of the *UNIX Reference Manuals* for more information). If you want interrupts (either **^C** or **BREAK**) to be ignored, invoke **mail** with the **-i** option; this option is provided to overcome the problems of using **mail** from a remote terminal connected by a noisy modem line.

The carbon copy list permits you to specify a list of users who are also to receive the message. All recipients of this message are informed that the users on the carbon copy list have been sent the message. In addition, a blind copy list is available (via the **~b** command) to specify a list of users who are to receive the message. However, recipients of the message are *not* informed that the users on the blind copy list have been sent the message.

Once the message buffer contains the message you want to send and all recipients have been specified, enter **^D** or **~** to send the message to the selected recipients.

Sometimes you might want to send an e-mail message containing an object file or program. The e-mail facility is designed to handle only printable ASCII characters. To overcome this problem, the programs **uencode** and **udecode** have been included with some versions of UNIX. **Uencode** converts a binary file into an ASCII file format suitable for mail; **udecode** converts this file back to binary.—*Andy Feibus is president of Processware Inc., Atlanta, GA.*

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NETWORKING

Gordon McLachlan

Do You Want TCP/IP?

We travel to Washington, D.C., the home of the Department of Defense, purveyors of an assortment of rocket-powered turtles that subdue rampaging monsters. The one we want is TCP/IP. TCP/IP stands for the Transmission Control Protocol and the Internet Protocol. TCP/IP's goal was to allow terminals and host computers on separate and different networks to communicate.

TCP/IP spans the ISO/OSI reference model's Network, Transport and Session layers. In common usage, TCP/IP also refers to a whole suite of related standards and quasi-standards that do all kinds of stuff, and cover the whole OSI model.

The IP is equivalent to the OSI Network layer, but it's largely concerned with connecting different networks together, or internetworking. This is an area in which the ISO standards are inexcusably deficient.

The TCP corresponds approximately to the OSI Transport and Session layer protocols, which are responsible for maintaining connections between hosts and the end-to-end delivery of data packets. At the Transport layer, TCP and the ISO Class 4 Transport Protocol are functionally equivalent.

Along with the internetworking capabilities of the core protocols, TCP/IP comes attached at the hip with a set of facilities called ARPA Services. Named for the Advanced Research Projects Agency, which funnels money into research to find novel new ways of blowing things up, the ARPA Services include Telnet, which is a terminal pass-through facility, the File Transfer Protocol (FTP), and the Simple Mail Transfer Protocol (SMTP).

Telnet allows character-oriented terminals to connect to, and work with, any TCP/IP host. Imagine that. The FTP, not

surprisingly, lets you transfer files between TCP/IP hosts. It's not exactly cooperative processing, but at least you can move your data. SMTP provides simple store-and-forward messaging between users.

Where did TCP/IP come from? It's no accident that TCP/IP came out of the Defense Department, or that so many vendors have embraced it. The DoD's bureaucratic zeal, love for specifications and loads of grant and procurement moolah made it a guaranteed success.

TCP/IP got its start about 12 years ago, when the DoD realized it had a networking problem, and that commercial standards weren't going to be available for a real long time. Despite the fact that the ISO/OSI effort already was underway, the government started its own standards program. Any vendor wanting to sell a network to the DoD, and any researcher wanting to latch on to the teats of the cash-cow had to get compatible. When the government started filling the procurement trough, ears were perked throughout the barnyard, and the research community gathered around, squealing and grunting contentedly.

The big commercial systems vendors ignored the hubbub around the trough. They figured that the farmer would bring their dinner to them, like always. Unfortunately, while they jockeyed for position in the barn, they were undone in the barnyard.

Notice that TCP/IP and UNIX are often mentioned together. A standard network and a standard operating system. Talk about a vendor's worst nightmare. When AT&T was regulated and wasn't allowed to compete in the computer industry, it created the abomination known as UNIX as its revenge. Unable by law to sell it, they gave it away. Even better, it wasn't portable as object-code, so they gave away the source code.

In the halls of academia, and in the

realm of the engineers, whose inhabitants have no respect for ease-of-use or adequate vendor profit-margins, UNIX flourished. To add insult to injury, these were the same people who then were asked to come up with TCP/IP. Heh, heh, heh.

Suddenly, TCP/IP was, and OSI wasn't. All of the various high-flying "layered network architectures" were outmaneuvered by ugly old TCP/IP. Deciding they couldn't afford to wait for room service, our benefactors in the computer industry have sidled up to the trough. Let's join them for a pig's-eye view. Our vendors' indifference to TCP/IP isn't based totally on greed and UNIX aversion. To put it charitably, TCP/IP is inelegant. Up close, it's downright ugly. In all their glorious plumage, the more extravagant network architectures are much more appealing, both functionally and aesthetically.

Now, the question of the decade. Do you want it? First, consider the effect on your quest for standards. If you squash it, stuff it into a box and sit on the lid, you can pretend that TCP/IP adheres to the OSI model, but the argument is academic. TCP/IP isn't ISO standard, and it really doesn't fit the OSI model.

On the plus side, TCP/IP supports IEEE 802 LAN and CCITT X.25-related wide-area network ISO standards. Beyond this, the government swears that it's migrating to an ISO standards base, so there's good potential for an orderly migration. Then again, these are the people with three pages of standards for military Worcestershire sauce and \$650 toilet seats, so don't bet the whole farm.

All things considered, TCP/IP is a stop-gap solution. It isn't as good as the real standards promise to be, but it seems to be the solution of the moment. Despite its current incompatibility with the wonderful world of OSI, TCP/IP seems to be everybody's darling, at least in the

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Director of Marketing
Indigo Software Ltd.

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Barry Gillespie explains it this way, "We tried various HP publications and dropped them all except for HP Professional. HP Professional is the only one that gives us a really decent response."

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good old U.S. of A. Why is that? It works.

The OSI model is like a 35-year-old student pursuing a third Ph.D. TCP/IP has a job. No room for advancement, but at least it earns a living.

How well does it work? Good enough for now. At its core, the IP and TCP are good mechanisms for moving messages between systems. Any good UNIX implementation is one that hasn't had too much value added to it by an overzealous vendor, and can use TCP/IP to communicate with other systems and networks.

Because of its widespread use, there are also several implementations for non-UNIX systems, such as the HP 3000, DEC VAX, the ubiquitous MS-DOS machines, and even the venerable Big Blue iron.

There's also plenty of hardware that can take your Ethernet or IBM Token-Ring network and connect it to a TCP/IP internet, and X.25 and TCP/IP get along just fine, if you don't mind a little packet overhead.

TCP/IP suffers many of the same failings as UNIX. It is a design rooted in the days before workstations, when the dumb CRT was as radical as ninja turtles. TCP/IP services are simplistic, and in the grand UNIX tradition, their limitations are typically addressed by grafting some college-kid's code on top of the whole mess. The technical term is kludge.

Telnet is "character-oriented." That means dumb terminal. All of the whiz-bang terminals you like to use are probably block-mode terminals. Need an HP-compatible terminal or an IBM 3270-type device? Get a kludge.

To overcome the limitations of simple file-transfer, various vendors have added support for Sun Microsystems Network File System (NFS) to TCP/IP. To beef up SMTP, others, like HP, have added their own e-mail products into TCP/IP.

Yes, TCP/IP works, but to get it to work well, you may have to stray even further from the standards path. Don't get me wrong, I'm not suggesting for a moment that you don't want TCP/IP. Just watch your trailing nether regions closely. If you just need the basics, you should be able to get all the pieces to work together pretty well. There are just

a few trouble spots to watch out for.

As is typical, watch out for the enhancements. Specialized terminal support can drive you crazy. NFS support may be available on some implementations, but not on others. Limit your exposure by limiting the number of TCP/IP vendors and versions you use.

To maximize the effectiveness of your network, you need to match the capabilities of your host TCP/IP software. If you need bells and whistles make sure you get the same noisemakers on all your different platforms. Another issue is cost. Along with all of your existing LAN and X.25 gear, you're going to need IP routers, gateways and lots of software. That means lots of money. If you want a chuckle, call IBM and ask them how much it will cost to put TCP/IP on your 30xx, or ask HP how much it will cost to equip your mini for the job.

Additionally, TCP/IP users often find that the packet overhead associated with TCP/IP over X.25 — which is the official way of doing things — can bury their X.25 facilities. Consider the cost/performance issues carefully.

Yet another hassle, which is by no means restricted to TCP/IP, is network management. Any heterogeneous network is a support nightmare. TCP/IP has a quasi-standard Simple Network Management Protocol that's used to control the TCP/IP portion of your network, but integrating it with your LAN management system (if you have one) or with X.25, is anything but simple.

Finally, consider obsolescence. If we're lucky, ISO standards will come to pass and we'll get to throw out all of that TCP/IP stuff. This is called systems life-cycle planning. Getting that rocket-turtle to go back to where it came from might be a problem.

Do you want TCP/IP? If you've got the short-term need and the bucks, you want it. *Guar-an-teeed*. The alternative is more waiting, and that is no alternative. —Gordon McLachlan is a independent consultant specializing in networking, based in Canton, MI.

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RDBMS

Fabian Pascal

Missing Information

Missing information is a fundamental problem in logic and mathematics, and it affects the users of any DBMS. Traditional database products have simply eschewed it, letting users cope with the consequences on their own. The relational approach, however, which is grounded in mathematics and logic, has brought the issue to the surface.

Although there currently isn't a general solution to the problems caused by missing data, the relational model is at least making these problems explicit, alerting users to consequences that are not always obvious, but frequently serious.

Databases And Reality

Databases are computerized collections of selected facts about a certain segment of reality that is of interest to users. Our sample database records simple facts about departments, employees, projects and so on in the real world (see *Figure 1*).

For example, one fact about an employee is:

"Smith [has a salary of 19,180]"

So expressed in natural language, statements of simple facts contain expressions (enclosed in square brackets) are *predicates*. The truth value of predicates, and the relationships between the facts they represent are governed by a branch of logic called *predicate logic*.

Facts are recorded in the database as column values in table rows. Thus, the above predicate is represented in the database by the value 19,180 in the SALARY column in Smith's EMPLOYEES row.

In reality, a fact is either true (T), or false (F). But what we record in the da-

tabase is affected by our *knowledge* of the facts, and frequently, information is not perfect. Thus, the salary of Smith may be unknown and, therefore, we must record that a fact is *unknown* (U) in the database. This simple move from two-valued logic, (2VL) T/F, to three-valued logic, (3VL) T/F/U, causes serious complications.

If we don't know the fact, what value

guages, and it must be replicated in many applications. Chances are that mistakes are going to occur, and important decisions will be based on incorrect information. I know cases where missing budget amounts were represented by negative numbers and whole series of critical calculations were performed as if those negative values were valid amounts.

Third, and the most serious problem,

EMP#	ENAME	DEPT#	HIRED	SALARY	COMM
100	Spencer	E21	6/19/80	26150	
150	Adamson	D11	2/12/72		25280
160	Pianka	D11	10/11/77	22250	
310	Setright	E11	9/12/64	24180	
250	Smith	D21	10/30/69	19180	
260	Johnson	D21	9/11/75		17250

Figure 1.

PROJ#	ACT#	EMP#	START	TIME
AD3112	70	250	??/??/??	???
AD3112	70	250	??/??/??	???

Figure 2.

EMPLOYEES Table.

should we record in the database for "unknown"? Traditional database products allow users to substitute arbitrary values for missing ones. Thus, for numeric data such as SALARY, 0, some unlikely high value, or a negative number can be used. Blanks or literal text such as "DK" or "unknown" can be used for character data.

First, this kind of representation is inaccurate. A salary of 0, 999999999 or -1 is *not* the same as an unknown salary.

Second, different values must be substituted for numeric and character data, and even for different character data. The same types of data may end up with different types of missing values, causing inconsistencies. Then, in each query or application, we specifically must instruct the system (which has no knowledge of their meaning) how to treat all these special values in different situations in order to get correct results.

This requires extensive and complex code, especially with procedural lan-

is that a missing value is *not a value* and, therefore, missing values can't be manipulated in the same ways as regular ones.

Simple Arithmetic

Take, for example, the four basic arithmetic operations. If we had a number X, to which we wanted to apply them, we would get the following results:

X + X = 2X	X - X = 0	X * X = X*2	X : X = 1
X + U = U	X - U = U	X * U = U	X : U = U
U + X = U	U - X = U	U * X = U	U : X = U
U + U = U	U - U = U	U * U = U	U : U = U

where U stands for unknown. Clearly, this is different than what we get when the values are known and, what's more, not all the results are intuitive. For example, U-U is *not* 0 and U:U is *not* 1.

When we negate facts we also get some counterintuitive results if data is unknown. For example, adding employees with salary >= 28,000 to those with

salary *not* \geq 28,000 we don't get the total number of employees if there are unknown salaries.

Some database operations compare column values to a constant, for example:

```
"Find employees with salary  $\geq$  28,000"
```

If some salaries are unknown, should the DBMS include them in the answer, or not?

If missing values are recorded as 0 or -1, they will be excluded. But does this make the answer correct? No, because

Anybody with statistical experience knows that unknown data can't automatically be included or excluded when functions are calculated.

the fact that we don't know those salaries doesn't automatically mean that they are not \geq 28,000, which the exclusion implies. But for the same reason, including them in the result wouldn't necessarily be correct either!

In fact, those salaries *may* or *may not* be \geq 28,000. We simply can't get true or false answers when we compare known to unknown values, and unless the DBMS is specifically instructed by us to make specific assumptions about missing values, it will generate misleading results.

Functions

Suppose we want to know the average or total salary. Again, when in traditional products unknown salaries are recorded as 0 or -1, we will end up with incorrect results without special exception code in queries or applications.

There are many such functions (statistical, financial, etc.). Anybody with statistical experience knows, for example,

that unknown data can't *automatically* be included or excluded when functions are calculated. It depends.

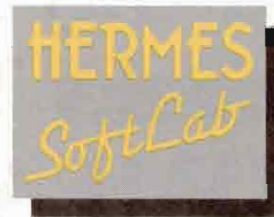
Sorting And Grouping

When we want the answer sorted in a certain way, how should the DBMS or-

der unknown values relative to known values, or to one another? If we use arbitrary values to represent them, the order of values in answers will be arbitrary, too. And what about indexing?

Suppose we want the average departmental salary by department ID. If some

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DEPT#s in EMPLOYEES are missing (i.e., assignment unknown), how should the DBMS treat them? It could collect them into one group, or keep them separate. But either way *may* or *may not be* correct.

Note, again, that setting these assignments to a string of four blanks (as in tra-

ditional databases) will cause the DBMS to group them together, but that's arbitrary and doesn't solve the problem.

Relational Features

Additional complications emerge when tables and table operations in relational

databases are considered. Take, for example, the two rows in *Figure 2*.

Should they be considered equal? No, because we don't know if they are or not. In fact, primary keys are actually protected by Entity Integrity rules from containing duplicate values for this very reason.

Some table operations involve comparing values in columns from the same or different table(s). Equi-joins, for example, apply the = comparison operator to match such values. But we already have seen that there are problems when some of these values are unknown. What should the DBMS do in such cases?

Table operations benefit from the closure property of tables by being *nestable* in an arbitrary order: The results of certain combinations of table operations don't depend on the order in which the operations are executed. DBMS optimizers take advantage of this by choosing the sequence which maximizes performance. Without going into details, such result independence is no longer possible when tables contain missing data. Consequently, databases become very difficult to design and use.

These are only a few of the difficulties caused by unknown values, and, as we shall see, there are many types of missing data, each with their own problems.

Both predicate logic and relational algebra, which form the foundation of the relational approach, were developed with the assumption of perfect information. Database practice, however, can't avoid missing data. Ignoring it altogether, as traditional products do, isn't the solution. Relational theory must be properly extended before DBMS's can handle missing information.

As it turns out, this is easier said than done. Tune in next month to see why, and for some practical advice. — *Fabian Pascal is president of micro-paSQaL, Washington, D.C.*

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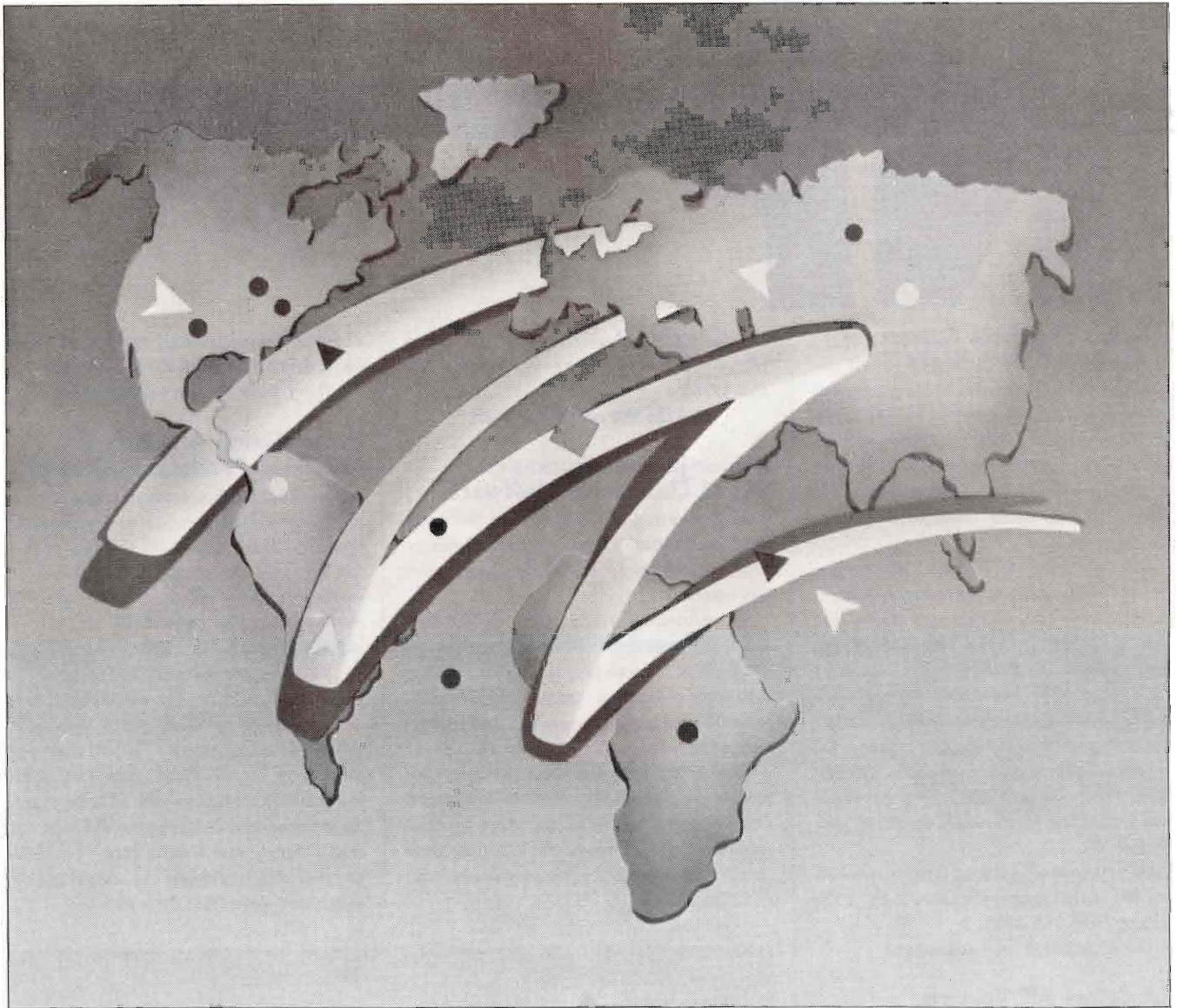


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NetWorld 90 Dallas has moved to a site almost as large as Texas — the Dallas Convention Center. More than 400 exhibitors will showcase the latest technology that links your information systems together, from LANs in the corner office to strategic networks that span the globe. NetWorld 90 Dallas needs no further introduction; the show has become the industry's hottest high technology event, according to exhibitors and attendees alike!

Professionals do need to make the right connections in order to succeed in business, and

planning makes the difference in finding the solutions for your business needs.

Mark your calendar now to attend the world's most extensive event on computer connectivity, product technology and education. The highly regarded NetWorld seminar series begins on Monday, September 10, with the NetWorld product and services exposition opening on the 11th and continuing to the 13th. For your full attendee program guide or information on exhibiting in NetWorld, please call 1-800-444-EXPO.

CIRCLE 267 ON READER CARD

Carolian Enhances Galcon To Control LAN Bridges

Carolian Systems International has announced two new features of Galcon, its operations automation and control solution. Galcon's new features include the ability to control LAN bridges from a central location and the ability to monitor computer room environments.

Galcon's ability to control LAN bridges gives MIS immediate access to any system on a LAN, even if the bridge connecting two LAN segments is down. By connecting Galcon directly to strategic LAN bridges in a network, MIS can communicate with specific LAN segments, regardless of whether connecting LAN segments have failed.

Galcon allows for console access to HP 3000s, HP 9000s and DEC VAX platforms from a terminal or PC-based graphical user interface.

Contact Carolian Systems, 3397 American Dr., #5, Mississauga, Ontario, L4V 1T8, Canada; (800) 263-8787.

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KLA Offers AIF Version Of Software Products

KLA & Associates has announced the AIF version of its software products, KLA/Express and KLA/Command. Version 5.00.E incorporates the new Architected Interface routines available on version 2.1 of MPE XL and is totally backward compatible with earlier versions of the MPE XL and MPE V operating systems.

The new version also offers many new features including "free form" logic when setting up the screens; enhanced logging and reporting capabilities with user defined extracts for detailed information; faster scanning and logging intervals; number of entries per screen expanded from 35 to 100; automatic switching of configuration files, without user intervention, based on time and date; priority adjustments based on CPU consumption; and "smart" screens for establishing predefined defaults based on CPU series and size.

Contact KLA & Associates, Inc., P.O. Box 14854, Clearwater, FL 34629-4854; (813) 784-5976.

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Collier-Jackson Upgrades World Class Series Software

Collier-Jackson, a CompuServe Software Products Division Company, has announced new capabilities to its World Class Series Software.

New features include a clipboard window to cut and paste data between transactions and applications. There's also an Express window for direct navigation between applications, access to user-named transaction, and holding current transactions for future recall.

There are user-definable screens that include field renaming, the ability to move fields to any location on the screen and to resize and remove fields. New pop-up desk accessories include a personal calendar and calculator.

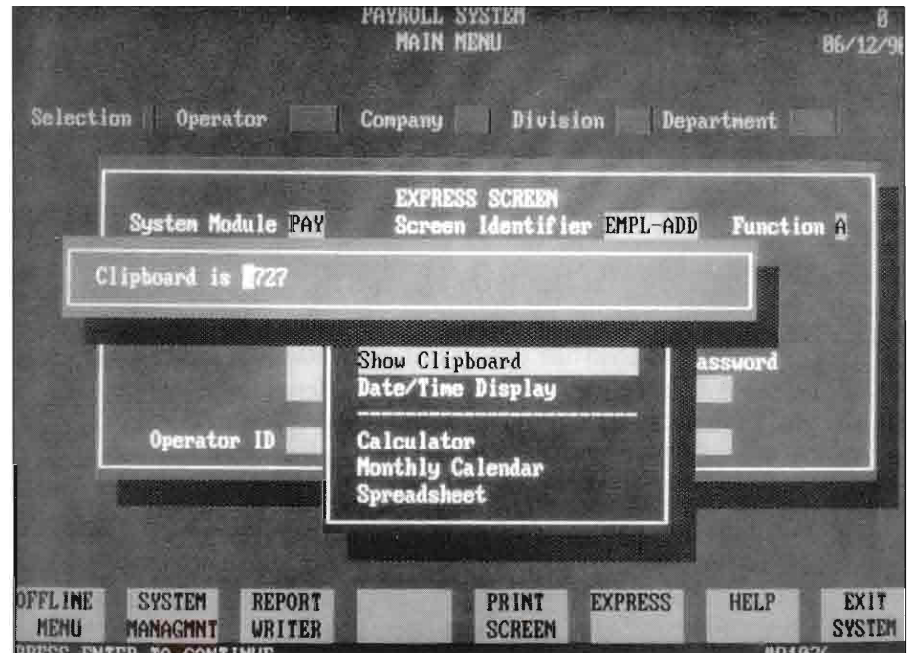
Contact Collier-Jackson, 3707 West Cherry St., Tampa, FL 33607; (813) 872-9990.

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Presentation Graphics 5.5 Enhances Production Graphics

Arens Applied Electromagnetics Inc. has introduced Release 5.5 of Presentation Graphics (PG), its business graphics package for the HP 3000. PG is a stand-alone minicomputer-based business graphics package that runs under MPE or MPE XL in native mode.

This release adds enhancements for production graphics. The command line has been enhanced to allow you to specify the visual file name, device, paper size, port, number of copies of the chart, and various information about data files. These features allow the user to design on visual file that can read different data files or parts of data files to create different charts. All textual and data values can come from these files.



Collier-Jackson offers a new screen manager with windowing capabilities and user-defined screens.



The HP 256X series of line printers is supported in two resolutions, 70x72 dpi and 140x144 dpi.

Contact Aren Applied Electromagnetics Inc., P.O. Box 329, Gaithersburg, MD 20877; (800) 882-4428.

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Fixed Asset Module Tracks Companies Assets

Access Data has introduced Access Data Fixed Asset software module to enhance HP 3000 customer's accounting systems.

Part of the FMAS/3000 Financial Management System, this Fixed Asset module features acquisition, depreciation and disposition capabilities and a multischedule feature that supports multiple acquisition conventions. It allows users to design report mechanisms, and it offers a security system for critical items and a supporting ledger.

Contact Access Data, 302 S. Royal Oaks Blvd., Franklin, TN 37064; (615) 791-4000.

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Newport Digital Offers Accelerator Cards For HP 9000

Newport Digital Corp. has announced the TURBO-33, TURBO-25 and TURBO-16 accelerator cards for the HP 9000 Series computers. The TURBO cards are designed for the HP 216, 217, 220, 226, 236, 237, 310 and 320 workstations.

The TURBO cards contain a Motorola 68020 processor, an optional Motorola 68882 math coprocessor and from 1 to 4 MB of 80 nanosecond dynamic RAM memory. The cards operate at 33 MHz, 25 MHz or 16 MHz. An internal 32 bit data bus provides for high speed data transfers between the processors and the memory. The TURBO cards require one slot in the HP computer.

The accelerator cards are designed to work with the HP BASIC and PASCAL operating systems.

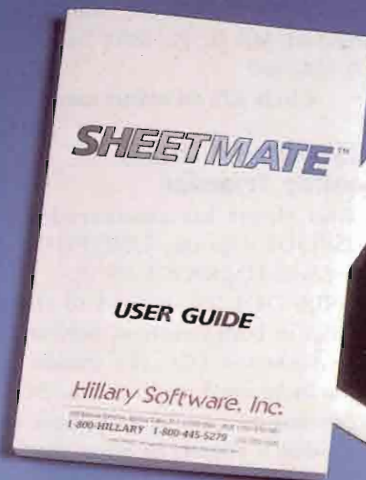
Contact Newport Digital Corp., 14731 Franklin Ave., Ste. A, Tustin, CA 92680; (714) 730-3644.

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EDI Solutions Releases Software Integration Tools

EDI Solutions, a provider of electronic data interchange (EDI) translation software has released version 2.0 of the EDImap Application Interface System.

EDImap allows EDI Solutions' EDItran translation software users to create tailored mapping solutions and an integration of EDI data with any application. EDImap produces "maps," linking a user's EDI translation and application software.

As a PC-based system EDImap provides pop-up windows, plus a built-in help system and prompts.

Pricing ranges from \$2,000 to \$4,000.

Contact EDI Solutions Inc., Minnesota Center, 7760 France Ave. South, Suite 140, Minneapolis, MN 55435; (612) 831-9000.

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Sola Expands SideKick UPS Line

Sola, A Unit of General Signal has released a microprocessor-based, intelligent Uninterruptible Power Supply, the SideKick Plus. Designed to guard critical systems from blackouts, brownouts, surges, spikes and sags, it also provides isolation for superior noise attenuation and surge suppression. The SideKick Plus is available in 1300 VA and 1800 VA with each power level available in two models a 60 Hz, 120 volt model for U.S. use and a 50/60 Hz model for overseas use.

All SideKick Plus UPSs are equipped with front panel status indicators and alarms that indicate power output available/not available and utility power failure as well as visual and audible alarms indicating no battery, no phase lock, overtemperature and inverter overload. Contact Sola, A Unit Of General Signal, 1717 Busse Rd., Elk Grove Village, IL 60007-566; (708) 439-2800.

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New Brochure Describes Benefits Of Sub-LAN

Digital Products has introduced a brochure describing a full range of office connectivity issues and solutions utilizing the NetCommander sub-LAN approach for long-term architectural compatibility.

"NetCommander: The Low Cost LAN Alternative" examines the issues associated with choosing a solution for office connectivity and describes the benefits of a sub-LAN. Consideration is given to support costs, printer and peripheral sharing, file

transfer/sharing; mini, mainframe and LAN gateways, productivity and long-term architectural compatibility.

Contact Digital Products Inc., 108 Water St., Watertown, MA 02172; (800) 243-2333 or (617) 924-1680.

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UNISPOOL 3.4 Offers Spoolfile Transfer

Holland House has announced a new UNISPOOL Option, UNISPOOL/PC released with UNISPOOL 3.4.

UNISPOOL/PC is used to transfer spoolfiles in both directions between HP 3000 systems and PCs. The transfer takes place in background mode, and the PC user can continue running PC applications while the spoolfile is printing or being transferred to the HP 3000.

UNISPOOL/PC is supported on Starlan10/Thinlan and serial connections. On Starlan10 connections UNISPOOL/PC runs in conjunction with other communication products such as Reflection and Advancelink. UNISPOOL/PC also provides a graphic user interface to UNISPOOL.

Contact Holland House, P.O. Box 1749, Beeville, TX 78102; (512) 287-3417.

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Bonafide Education Offers Powerhouse Video Tape

Bonafide Education has released a Powerhouse version differences tape. The tape highlights all new and changed features for releases 5.06/5.09 of Powerhouse. The tape includes coverage of programming of Dynamic Function Keys, Multiple Command Processing, the new Push verb, Precommands, Postcommands, Revise, and conditional compilation of QUICK code. Also covered in the tape are new features as they relate to QUIZ and QTP.

This tape has been supplied to the current customer base free of charge and is also available to non-customers at a price of \$149. Contact Bonafide Education, 184 B Broadway, Ste. 307, Saugus, MA 01906-1029; (617) 556-8488.

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SortRAM/3000 Speeds Up Sorts On HP 3000s

Kelly Computer has announced SortRAM/3000, the first in a series of performance solutions for MPE V systems. SortRAM/3000 is a RAMDISC combined with

software to automatically speed up sorts. It automatically improves sort performance of interactive and batch applications.

SortRAM/3000 consists of a Kelly RAMDISC and software that automatically directs I/O intensive files like SORTSCR and temporary files to the RAMDISC. No operator or user intervention is required. It's self-managed, transparent to applications and users and requires no programming changes. Contact Kelly Computer Systems, 1101 San Antonio Rd., Mountain View, CA 94043; (415) 960-1010.

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Utilities Enhance Interface To Application System And MPE

TPS Business Systems has released MAUI Vision and MAUI Vision Plus to enhance the user's interface to application systems and the MPE operating system.

MAUI Vision allows you to intercept a file, normally destined for the line printer, view that report at the terminal in its original or an end-user specified format and print part, or all, of the report at a specified line printer. You can move up, down, right or left as well as jump directly to any position within the report.

MAUI Vision Plus incorporates all the features of MAUI Vision and gives report management functionality via menu, windows and security technology. Reports automatically are assigned to a menu that can be secured to particular end-users, and multiple reports can be viewed simultaneously via MAUI's windowing technology. For added report protection each menu item can be password secured and access controlled. Contact TPS Business Systems, Suite 1100, 333 11th Ave. SW, Calgary, Alberta, Canada T2R 1L9; (403) 269-4242.

Circle 390 on reader card

Zubair Interfaces Ships Memory Expansion

Zubair Interfaces has started shipment of the Z-RAM/340, a 4 MB memory expansion for the HP 9000/340. You can put in multiple cards and increase the 340 memory from 4 to 8 to a maximum of 12 MB using Z-RAM/340.

Zubair has also started to ship the Z-RAM/8 MB upgrade memory board for the HP 9000 200/310/320 series machines. This is a 8 MB memory expansion board and uses 1 megabit RAM ZIP chips for board space saving and reliability.

Contact Zubair Interfaces, 5243 B. Paramount Blvd., Lakewood, CA 90712; (213) 408-6715.

Circle 385 on reader card

PC/FOCUS 5.5 Includes Direct/CONNECT

Information Builders Inc. (IBI) has announced PC/FOCUS release 5.5, which includes Direct/CONNECT for PC-to-mainframe cooperative processing. Direct/CONNECT provides PC applications real-time access to all mainframe databases, including FOCUS, DB2, SQL/DS, IMS, IDMS and VSAM.

The release also offers a new user interface, enhanced transaction processing language and an add-on LAN option that includes a full-function DBMS server for DOS-based LANs.

PC/FOCUS 5.5 is available for any IBM-compatible PC. A hard disc, DOS 2.0 or later and 640K RAM are required. List price is \$1,295.

Contact Information Builders Inc., 1250 Broadway, New York, NY 10001; (212) 736-4433.

Circle 383 on reader card

IEM Offers SCSI Interfaces On Mass Storage Products

IEM Inc. has announced its entry in the SCSI peripherals market by offering SCSI interfaces on most of its mass storage product lines.

The MOD-53655, Erasable Magneto-Optical Disk drive combines the online accessibility of a hard disk, the convenience and portability of a flexible disk, and the storage capacities of optical technology.

The ET-4830S is a 2 GB tape system that offers higher capacities and lower storage cost.

IEM also announced four Winchester hard drives: 5040S 40 MB, 5018S 180 MB, 5033S 330 MB and 5067S 660 MB.

Because IEM's peripherals are using the industry standard SCSI (ANSI X3.131-1986), this equipment will work with Apollo and other workstations that support SCSI. Contact IEM Inc., P.O. Box 8915, Fort Collins, CO 80525;(303) 223-0071.

Circle 391 on reader card

NRC Ships FUSION For 9000 BASIC

Network Research Corp. (NRC) is now shipping its FUSION Network Software for HP 9000 BASIC-language workstations.

HP contracted NRC to port its FUSION

Network Software to the 9000 series BASIC and PASCAL workstations. FUSION Network Software offers the standard TCP/IP utilities: File Transfer Protocol (FTP) allows users to transfer files back and forth to any remote host on the network. TELNET, also known as "virtual terminal," allows a user to log in to any remote host on the network.

FUSION also comes bundled with server, network status monitor, programming libraries and HP 2392 and VT-100 terminal emulation. Price is \$995.

Contact NRC, 2380 N. Rose Ave., Oxnard, CA 93030; (805) 485-2700.

Circle 382 on reader card

First 32-MB Memory Module Available For HP 375

Infotek Systems now offers a 32-MB memory module for the HP 375 computer. The EM375+32 uses 4 megabit chips with ECC logic. The EM375+32, a 32-MB pair of memory modules; EM375+8, an 8-MB pair of memory modules; and EM375+4, a 4-MB pair of memory modules, are ECC (Error Checking and Correcting) and are fully compatible with HP's RAM.

Infotek Systems EM375+32 is the only memory module offered for the HP 375 that uses 4 megabit chips with ECC logic. The introduction of the EM375 modules complete Infotek Systems' line of add-in memory products for all of the HP 9000 Series Motorola-based workstations.

Contact Infotek Systems, 1045 S. East St., Anaheim, CA 92805; (714) 956-9300 or (800) 227-0218.

Circle 365 on reader card

Quant Systems Releases Version 1.23 Of DBPaint

Quant Systems has released version 1.23 of DBPaint, which translates HP 3000 IMAGE schema or root files into a graphical representation of the database.

The updated version allows for multiple page printing of IMAGE database drawings, which is very useful when printing large database drawings. The new version also includes an option that automatically prints field names, with field types and lengths, after printing the database drawing.

DBPaint database drawings include the identification of primary, secondary and sorted paths. Loading factors of the datasets are calculated and displayed. Zooming in on any portion of the picture, adding text to the picture, and printing to a plotter or printer

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are some of the many options included. Contact Quant Systems America, 1140 Hibiscus Way, Livermore, CA 94550; (415) 455-0406.

Circle 380 on reader card

James Associates Ships SpreadSage Software

James Associates has announced SpreadSage, a 255 by 16383 cell spreadsheet program with extensive graphic options, presentation quality printing and rapid recalculation for HP 9000 BASIC workstations.

Data from BDAT or ASCII files, or from instruments connected to an HP 9000 controller can be entered directly into the spreadsheet. High quality printing and plotting of the spreadsheet and graphs generated from it allows you to make the most of whatever output devices you have on your system. Individual cells in the spreadsheet can be printed or plotted in normal, bold, italic or bold-italic fonts, in color and with borders on any or all sides of the cell.

Contact James Associates, 7329 Meadow Ct., Boulder, CO 80301; (303) 530-9014.

Circle 378 on reader card

VersaSoft Adds Three Platforms For dBase III+

VersaSoft Corp. has added three platforms for its dBASE III+ workalike software. Developers previously running dBASE applications from PC DOS now can expand into the HP 9000, Apple AUX and DEC ULTRIX platforms.

dBMAN V permits dBASE applications to run with no change on over 37 different platforms including PC DOS, LANs, UNIX, XENIX, AIX, SUN Atari ST, Commodore Amiga, mainframes and more.

dBMAN V offers more than 130 new and enhanced commands and functions over dBASE III+, including, windows, four different styles of menus, user-defined functions, multidimensional arrays and a relational "band" style report writer.

Contact VersaSoft Corp., 4340 Almaden Expressway, Ste. 110, San Jose, CA 95118; (408) 723-9044.

Circle 377 on reader card

Enhancements Added To Gold Key's LN02 Emulation

Gold Key Electronics has introduced enhancements to its LN03 emulation for the HP LaserJet family of printers including

support for the new Series III. Automatic support for European paper (A4) has been added.

The LN03 emulation supports DEC applications on HP LaserJet printers. It support Digital fonts and character sets, Sixel Graphics, DECVEC line drawing and the LN03 command set.

The emulation is automatically activated only when needed. This allows the HP LaserJet to maintain two simultaneous identities (LN03 and HP) while being shared by as many as six systems (VAXs, VTs, IBM PCs, etc.).

Contact Gold Key Electronics, 18 Lamy Dr., P.O. Box 186, Goffstown, NH 03045; (604) 625-8518.

Circle 376 on reader card

Nashua Emphasizes Conservation

Nashua Corp. has introduced a line of remanufactured CX and SX toner cartridges for HP, Canon and compatible laser printers that are an environmentally-sound alternative to new cartridges.

Nashua disassembles each cartridge, inspects it, installs a new long-life drum, replaces worn-out parts, fills it with 250 grams of Nashua brand toner (25 percent more toner than the original cartridge) and seals it to manufacturer's standards.

Contact Nashua Office Products, 44 Franklin St., Nashua, NH 03061; (603) 880-2323.

Circle 375 on reader card

Canonizer Improves Data Modeling Quality

Six Sigma CASE Inc. has announced the Canonizer that automatically normalizes a database design, cutting days, weeks or months out of the development cycle, depending on the size of the database.

Normalizing to the third normal form, the Canonizer creates an ANSI standard SQL script for use with such database management systems as Informix, Oracle, Ingres, Unify, Sybase and others. The software engineering tool also provides a data dictionary containing definitions for every item in a database.

The Canonizer provides a spreadsheet-like interface with menu-driven commands, automatically scrolling windows and online help. Designers can view displays of relations between data items, and are offered full edit capabilities of databases, views, data items and relationships.

The Canonizer runs on UNIX-based

operating systems using character-based serial terminals. Compatible hardware platforms include HP, Sun, DEC VAX, 3B2, NCR Tower, IBM PC, 386 systems and more.

Retail price is \$795.

Contact Six Sigma CASE Inc., 14405 SE 36th St., Ste. 210, Bellevue, WA 98006-1515; (800) 827-4462.

Circle 372 on reader card

TCP/IP Networks Connect To LXE Wireless Terminals

New LXE RF Terminal Systems allow computer users with TCP/IP networks to painlessly add a wireless RF terminal network for warehouse or factory floor applications. The systems can be ordered with a new Controller Board that permits host TCP/IP networks to incorporate the advantages of mobile, real-time communications without cabling costs, time delays or software changes.

Mobile handheld or forklift mounted terminals now can communicate to one or more different host computers. Compatible Ethernet networks include HP, DEC, Sun, Honeywell, Unisys, NCR and any UNIX-based system.

Communication between LXE wireless terminal networks and other networks is by an industry standard TCP/IP Telnet protocol that eliminates the need to develop special communications software links with different operating systems.

Contact LXE, 303 Research Dr., Norcross, GA 30092; (404) 447-4224.

Circle 371 on reader card

SEDASIS Announces The Intelligent Buffer

SEDASIS has introduced SED3900: The Intelligent Buffer. It offers three choices of interface, in input as in output: series (RS-232), parallel (CENTRONICS) and HP-IB (IEEE).

Three buffer memory capacities are available. The choice of 1 MB is upgradable to 2 and 4 MB and the choice of 2 MB is upgradable to 4 MB. This memory capacity enables the recording of large CAO/CAO files.

The SED3900 offers a multiple copy mode. This procedure doesn't allow the buffer to empty itself after a data transfer. It's then possible to recopy the same file several

times to a peripheral (a printer).

The new buffer is compatible with HP 9000, 3000 and 1000 workstations. Contact Sedasis, Le Vendome-12, Rue du Centre, 93167 Noisy Le Grand Cedex, France; (33) 1 45 92 3650.

Circle 373 on reader card

Eagle Introduces Portable RF Locator System

Eagle Consulting & Development Corporation (ECD) has released its RF EXPRESS—MM/3000 Locator System.

ECD is the developer of Radio Frequency (RF) Express for Hewlett-Packard computer systems. RF Express allows integration of 100 percent portable, 100 percent online handheld terminals with laser scanners into HP computer systems. ECD's newest addition allows RF terminals to locate material from within any transaction. Location of material is as easy as entering combinations of lot, location, warehouse and quantity.

Contact Eagle Consulting & Development Corporation, 170 Kinnelon Rd., Ste. 3, Kinnelon, NJ 07405; (201) 838-5006.

Circle 366 on reader card

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Forms Cache	Yes	Yes	No	Yes
Tilt/Swivel	Yes	Yes	Yes	Yes
Baud Rate	38.4K	38.4K	38.4K	38.4K
Screen Size	15"	15"	14"	14"
Block Mode	Yes	Yes	Yes	Yes



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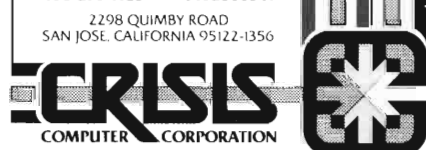
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ADVERTISERS INDEX

Reader Service Number	Page	Reader Service Number	Page
158	Access Data	199	HP Australia Ltd.
104	Adager	122	IEM, Inc.
163	Aldon Computer Group	262	IMACS Systems
128	Applied Data Communications	170	IMC Data Manager
386	Applied Reasoning Corp.	156	Infocentre Corporation
171	Arch Associates	247	Information Builders
250	Arkwright	181	Infotek Systems
244	Atlantic Tech Services	124	Innovative Information Systems, Inc.
266	BDT Products, Inc.	126	Intelligent Interfaces, Inc.
105	Bering Industries	249	Interop, Inc.
106	Bering Industries	185	Kelly Computer Systems
107	Bradford Business Systems	155	M.B. Foster & Associates
108	Bradmark Computer Systems, I.F.Cover	130	Martech
109	Bradmark Computer Systems, Inc.	154	Mitchell Humphrey & Co.
151	Clearpoint, Inc.	182	Network Research Corp. I.B.Cover
261	Cognos Corporation	267	Network '90
111	Collier-Jackson	246	Newport Digital Corporation
101	CompuTech Systems Corp.	173	Northgate Computer Systems
167	Computer Solutions	152	NSD, Inc.
182	Cort Directions	161	NSD, Inc.
242	Cumulus Technology Corp.	260	Oak Grove Systems, Inc.
240	Dataram Corporation	190	Oceonics, Inc.
193	Digital Micronics	162	Operations Control Systems
113	Dynamic Information Systems Corp.		Oracle Corp.
115	Equinox Systems, Inc.	136	Personalized Software
116	Equinox Systems, Inc.	264	Precision Visuals, Inc.
117	Equinox Systems, Inc.	170	Productive Software Systems, Inc.
178	Facer Information Design	190	Smith, Dennis & Gaylord, Inc.
164	GBS Consultants	248	SOTAS International
252	Hermes Softlab	268	SST
253	Hermes Softlab	132	SST
254	Hermes Softlab	175	STR Software Company
255	Hermes Softlab	139	Tymlabs Corp.
256	Hermes Softlab	140	Tymlabs Corp.
119	Herstal Automation Ltd.	243	Tymlabs Corp.
	Hewlett Packard (Worldwide Customer Support)	142	Unified Software Systems
198	Hewlett Packard (Remarketing Division)	145	Walker Richer & Quinn, Inc. B.Cover
120	Hi-Comp America	146	Walker Richer & Quinn, Inc.
121	Hillary Software	192	Workstation Solutions
		237	Zubair Interfaces

[CALENDAR]

[SEPTEMBER]

9-13: The 1990 Lasers in Graphics (LIG) and Electronic Design in Print (EDP) conferences are scheduled concurrently in Orlando, FL. Call Patrice Dunn, (619) 758-9460.

19: The British Columbia Regional Users Group (BCRUG) is sponsoring a vendor show in Vancouver, B.C. Call Randy Cliff, (604) 661-8048. Vendors call Frances Bryant, (604) 643-5538.

19: The Southeastern Michigan Users Group (SMUG) is holding a meeting at Hewlett-Packard-Novi, Novi, MI. Guest speaker, Vladimir Volokh. Call Leanne Littrell, (213) 282-0420.

24-25: Frost & Sullivan is sponsoring its seventh annual third-party maintenance conference at the Fairmont Hotel, San Francisco, CA. Call Sheila McDonald, (212) 266-0269.

[OCTOBER]

8-9: All four HP Regional Users Groups in Texas have joined to organize a combined conference at the San Luis Hotel on Galveston Island. Call (713) 425-5957.

11-12: NEVCAL'90, a regional user group conference is being held at Caesar's Lake Tahoe Resort Hotel/Casino, Stateline, Nev. For vendor registration call (916) 544-6474, ext. 281; for paper submission call Glen Gollick, (916) 444-9304.

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