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MAY 1989

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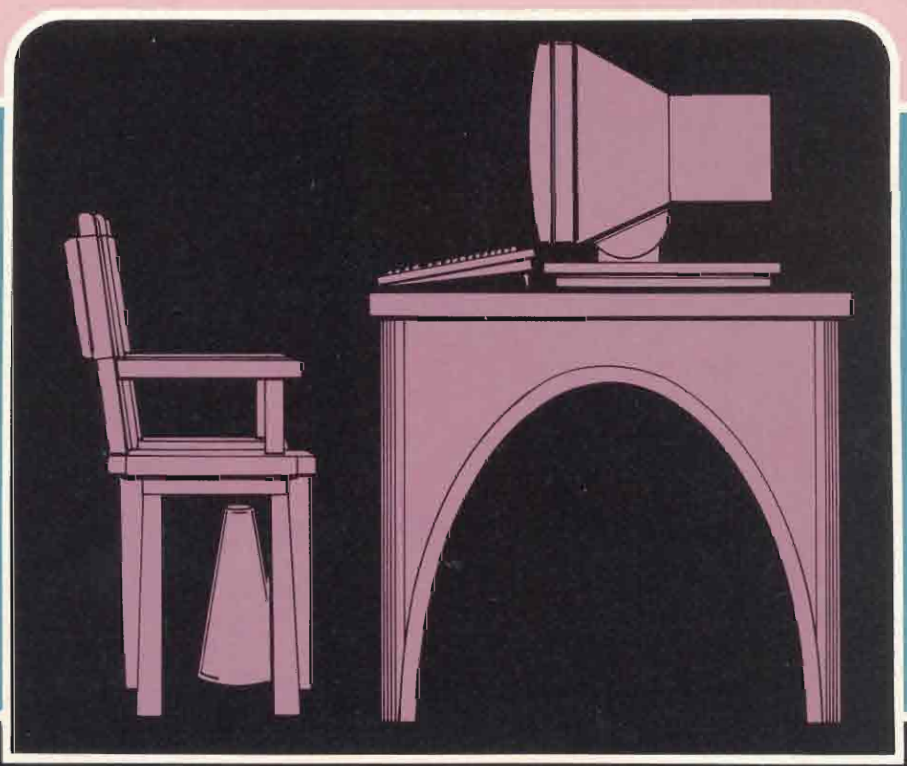

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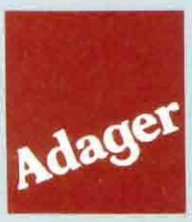

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CIRCLE 102 ON READER CARD

Sea Changes

Once every long while, a market change occurs so basic and powerful that all rules are off and everything changes.

We are in the middle of one of those sea changes right now. The availability of RISC chips has caused the price of a workstation MIP to tumble by an order of magnitude (that's 10x) in the space of just a few months. Everything that was sacrosanct and price secure now is obsolete and rapidly becoming worthless. Workstation prices no longer are dictated by the platform suppliers, but by the merchant semiconductor houses that are locked in a fierce, *can you top this* performance battle.

First, DEC took the plunge, buying a share in MIPS to assure flow of parts, and then announcing workstation/server combinations that literally blew the lid off the market. Then Data General (remember them?) unveiled a line at Uniforum that was even more radical in price performance. Overnight, the stodgy world of computer marketing turned into a street fight.

Now, the gang from Cupertino has done us one better. In a brillant move, HP became the number one vendor of workstations in the world, buying major market share for a truly bargain price and suprising everyone in the market. Not only did the purchase yield a large new installed base of automatic customers, but also, the purchase gained quite a few major software vendors' products, greatly widening the appeal of HP workstations to the engineering and design communities.

Number one is a perilous place to be. There's always someone breathing down your neck. The real results of the Apollo purchase will take a few years and a lot more courage and money to bring to maturity. Clearly, HP has realized that this is a new ball game and there's only room at the top for the bold and the best.

Our hats are off to the HP management team as we welcome Apollo's employees and customers to the *HP Professional* fold.

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LETTERS

Address letters to the editor to the *HP PROFESSIONAL* magazine, P.O. Box 445, Spring House, PA 19477-0445. Letters should include the writer's full name, address and daytime telephone number. Letters may be edited for purposes of clarity or space.

IS THERE A 'GOTCHA' LURKING?

I've been reading Don Person's contributions to *HP Professional* for some time and invariably find them interesting, informative and even amusing.

In the May 1988 issue he did an article on the serial port usage. I saved it against the day when it might come in handy. As luck would have it, I am in the process of finishing off some serial port interfaces for the IBM PC compatible family. Because it now is of more direct interest, I reread it to see how I'd done compared to Mr. Person's suggestions. Except for style, I managed to pretty much conform to his suggestions.

One thing in the sample program, that I also noticed in his September 1988 article was the use of:

```
JMP $+2 ; wait
```

after most IN or OUT instructions. Why? Reading various manufacturers' literature provides no reason to think this is necessary. On the other hand I can't imagine he'd stick these instructions in for fun. As Einstein used to say (approximately) "make things as simple as possible, but no simpler . . . " While my code seems to work fine I'm a little nervous that there is a "gotcha" lurking. Maybe he can enlighten me.

Dan Somerville
Somerville Associates
Hingham, MA

Dear Dan:

The purpose of the ubiquitous "jump to the next instruction" you discovered didn't originate with me, but is the result of remembering and applying a specific caution found in the IBM PC-AT prototyping board manual. In PC-AT systems, the system may allow as little as 150 nanoseconds between address setup and the conclusion of the I/O W-R signal state transition. This is exaggerated by the prefetch instruction queing feature of the '286. The JUMP $+2, being a branching statement, forces the que to be reset, and in the process, stretches the I/O cycle. This gives devices with long address setup or long "address to data output" time, the time needed to respond.

The combination of the old 8250 UART and PC-ATs with an 8 MHz bus can be a killer. This artificial wait state extender is required under these circumstances. Without this trick, you occasionally read "FF" (an undetermined bus) instead of the true register value you seek to read or write. The converse problem of failing to complete the register write occurs rarely if at all, but I program defensively for it in this example.

HP makes use of this twist in its BIOS when handling the 8259 Interrupt controller for basically the same reason. You really only need to add this delay if you know the device accessed by your program has poor time domain performance.

At the moment, I'm working on a 8 channel serial project, programming the 16550 (FIFO'ed UART) at a 10 MHz bus rate; no delays inserted. It's my belief that the '550 is a great undiscovered wonder. Topping its list of features is handling 38 kbaud traffic with fewer interrupts per second than a '450 produces at 4800 baud. Check out the spec sheet and you'll see what I mean.

Don Person

CROSS-REFERENCING ON THE FORTRAN 77

Last summer, I had my company purchase a FORTRAN 77 compiler for our HP 3000. I immediately discovered that the FORTRAN 77 compiler didn't have the capability to produce cross-reference listings as did the FORTRAN 3000 compiler, which I had been using. Because I find that the capability to produce cross-reference listings greatly aids development of software, I immediately expressed my concern to HP. I started at the Response Center and followed up all the way through to the product manger for FORTRAN 77. This process took several months and resulted with the following feedback from HP:

- Sure, you can have cross-reference listings . . . just buy a Spectrum machine.
- Sorry, if you don't have a Spectrum machine you can't get a cross-reference listing. The reasons for this is that we (HP) find it technically difficult to produce and we choose to expend our resources on Spectrum and not on MPE.

My argument to HP was that FORTRAN 77 should be considered an upgrade of FORTRAN 3000, and I don't appreciate losing an important capability when I make that upgrade. HP's response was one of understanding; but they tell me I'm the only one to have ever raised such a concern. If enough users were similarly concerned, then HP would re-evaluate its position.

Ed Puccinelli, MIS Manager
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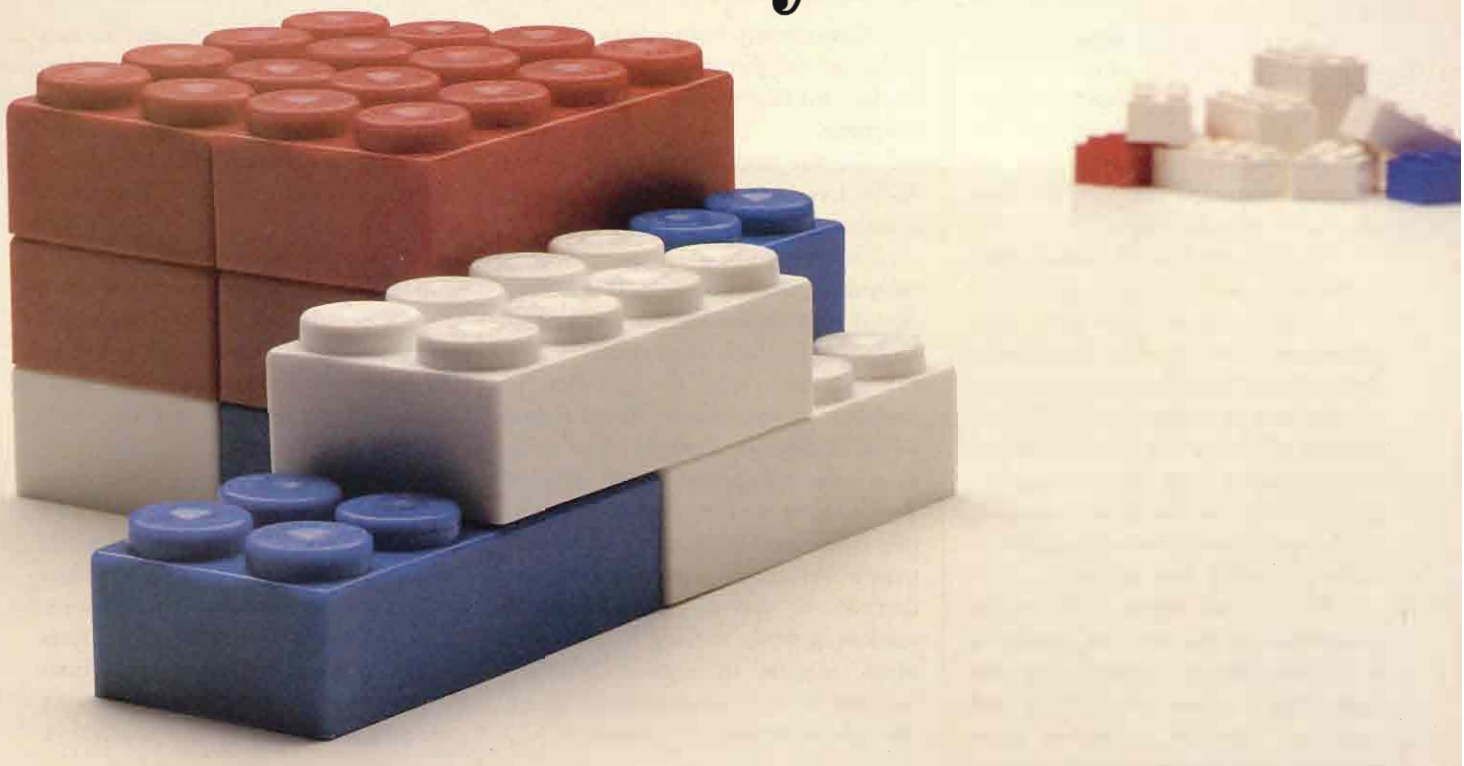

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INDUSTRY WATCH

Peggy King

Listening To The Voice Of The Customer

Quality Function Deployment (QFD) is a fancy term for the process of learning what the customer wants and designing products that meet these functions.

The concept behind QFD is both simple and complex. The simple aspect is that listening to what QFD proponents refer to as the *voice of the customer* during the planning and design phases of product is an economical and efficient method of finding out what will appeal to customers. It beats designing a product and then learning from customers (or through sales reports) that the product wasn't what they wanted.

The complex aspect of QFD is that the method incorporates many statistical tools and involves constructing and evaluating a series of matrices and diagrams. The best known of these matrices is the House of Quality chart. The chart forms a conceptual map of the characteristics that the customer wants most in a product and assigns numerical values to assess the relationship between customer expectations and the engineering decisions.

When it comes to implementing QFD, HP has both advantages and disadvantages over other large manufacturing companies. On the positive side is HP's well-deserved reputation for listening to its customers and holding their needs in high regard. In fact, it didn't take implementing QFD training to make HP start listening to customers. In HP's corporate objectives, first published in 1957, the company stated its commitment "To provide products and services of the highest quality and the greatest possible value to our customers, thereby gaining and holding their respect and loyalty."

Consistently high scores on HP's customer satisfaction surveys attest to the fact that this objective still guides the company.

On the negative side, HP historically has been a technology-driven company. During its first 35 years, HP was an engineering company whose customers were engineers. It was easy for HP to second-guess the needs of its customers so much like themselves. Nor did customers mind the fact that HP could anticipate their needs. At a time when customers thought their slide rules were indispensable, Bill Hewlett decided they needed a handheld scientific calculator. According to the company's 1988 annual report recalling the decision to sell the calculators. "A marketing study showed there wasn't much interest in such a product, Hewlett threw the study in the trash and the rest, as they say, is history."

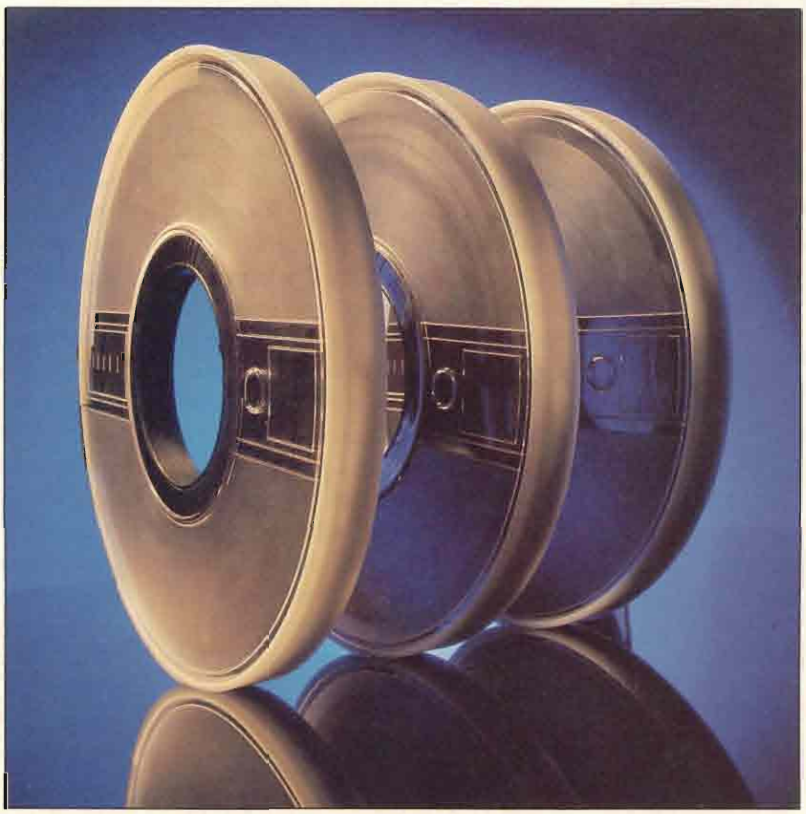
WHEN HP WAS an instrument company with engineer employees designing for engineer customers, the market for all of its products was the "next bench." In many instances, the HP customer had few competing products to consider. But the next bench *phenomena* becomes the next bench *syndrome* when there are customers whose needs and preferences are different from those of the product designers.

The introduction of the HP 3000 brought a set of customers who worked in offices rather than labs. Their needs were less familiar and therefore harder to discern than the needs of the traditional HP customer. Sometimes, HP's product didn't suit.

HP's Executive Memo Maker word processor is an example of engineers designing a product for office workers without knowing their needs. Had they talked more to people whose jobs require writing, the product developers might have designed a way to reformat a paragraph that doesn't require having to select text and hit three function keys. They also would have devised an easier way to add a blank line between paragraphs than making the writer enter a two-keystroke command.

As a growing percentage of HP's

The QFD team uses a white board and post-it notes to figure out how to make use of information they gathered from talking to customers.



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CIRCLE 149 ON READER CARD

customers work in business environments, HP is learning to use QFD as a way to listen to the voices of customers who work at desks, as well as those who work at benches.

David Borton, quality manager at Pacific Technology Park (Sunnyvale, CA) talks about the importance of "customer murmurs." "Dissatisfied customers shout; they make their demands known through warranty claims, bug reports and irate letters or phone calls," he explains, adding, "It takes a more focused effort to get satisfied customers to tell product designers what attributes are important to include in new or revised products."

Borton recommends listening to customers in focus groups and at trade shows. Any questions that a team member asks customers should be open-ended and be phrased in the kind of language a customer would be likely to use. Leading questions should be avoided because software engineers and product marketing specialists preconceived notions about product features can get in the way of finding out what customers actually want.

After an extensive quest for the voice of the customer, the real fun begins when the team starts trying to decide what product features would satisfy the most customers and still be manufacturable.

Customer Attributes

The QFD term for customer preferences or requirements is customer attributes (CAs). At HP's Industrial Applications Center (Sunnyvale, CA), team members write CAs on post-it notes and use the large whiteboard in a conference room to group the CAs in related clusters. After hours of grouping and regrouping and countless compromises, a team comes up with a list of desirable attributes.

Later, team members examine each CA and decide what the trade-offs would be if that attribute were incorporated in the product. Then it's time to assign priorities to each attribute on the basis of how this attribute correlates with the customer's perception of a quality product. The object of the process is to plan a product that has the features that customers consider most important.

Sometimes what the customers want doesn't square with the product designers' plans for improving a product. Too often "creeping featurism" (adding the bells and whistles that are fun for engineers to design but of no concern to customers) makes products more expensive to design and manufacture.

When HP's New Jersey division used QFD to find out what features their customers wanted in a power supply, engineers had expected customers to want one that packed more power in a smaller package and operated more efficiently. The product designers had estimated it would take the engineers at least three months to develop the new technology for these changes.

In the process of hearing the voice of the customer, HP's New Jersey division's QFD team learned that having a "diddle knob" to use for making manual adjustment, and being able to do a quick disconnect were two features that were named important to customers than having a smaller, more efficient unit. By listening to the customers and heeding their preferences, the New Jersey division saved at least three months of design time.

QFD is neither simple nor painless to implement, especially at a company that prides itself on inventing leading-edge products. Nevertheless, the process can result in shorter design times, fewer engineering change orders when the product is manufactured, and more satisfied customers. Chuck House, general manager of the Software Engineering Systems Division and HP's favorite phrasemaker, summarizes the benefits of QFD:

> Developing the Product Right
> Developing the Right Product

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To succeed today, you need powerful application development tools, and none are as powerful as PowerHouse.

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NEWS & TRENDS

N&T

Walker Richer & Quinn Ships TelnetManager

TCP/IP Network Link For PC-To-Host Communication

Walker Richer & Quinn, developer of Reflection terminal emulation software, announced shipment of TelnetManager, a TCP/IP network link for PC-to-host communication.

A complement to Reflection, TelnetManager is a PC-based implementation of the TELNET protocol which provides terminal sessions between networked PCs and hosts. Users can establish single or multiple sessions to one or more host computers through simple commands from within Reflection using TelnetManager's session management capabilities. This release of TelnetManager supports TCP/IP network software from Sun MicroSystems, FTP Software Inc., Excelan and FTP redistributors. Future releases of TelnetManager will support Wollongong network software.

TelnetManager requires Reflection 1 PLUS, 2 PLUS, 4 PLUS, or 7 PLUS versions 3.33 or higher. TelnetManager, running under Reflection, requires an IBM PC, XT, AT, PS/2, or compatible with a minimum of 512K RAM, a TCP/IP network connection between the PC and the host, as well as a TELNET server running on the host.

Reflection and TelnetManager software provide emulation of HP 2392, HP 2627, HP 700/92, VT220, VT240/241, and 16-color 340 ReGIS graphic terminals.

TelnetManager comes with a user manual and is available from authorized Walker Richer & Quinn distributors or directly from the company. A 30-day software evaluation program is also offered.

For more information, contact Walker Richer & Quinn Inc., 2825 Eastlake Ave. East, Seattle, WA 98102; (206) 324-0350.

Circle 396 on reader card

EDS And HP Sign Cooperative Agreement

Provides Framework For Future Projects

Electronic Data Systems Corp. (EDS) and HP have signed an agreement establishing cooperation on systems integration projects.

Under the agreement, HP and EDS will submit joint proposals to customers for the development, design, management and support of projects requiring the integration of hardware, software and project management services.

For more information, contact Roger Still, EDS, 7171 Forest Ln., Dallas, TX 75230; (214) 661-6188.

Circle 395 on reader card

Relational Technology Forges Marketing Alliances With HP

INGRES RDBMS Offered Under HP Loaner Program

Relational Technology Inc.'s INGRES relational database management system (RDBMS) has been selected by HP as one of its third-party software packages being offered under the HP Loaner Program. Relational Technology also was named a HP national account and INGRES will be supported by HP sales and marketing staffs.

Under the Loaner Program, eligible UNIX customers receive HP 9000 Series 800 Precision Architecture midrange computers for evaluation. Qualified users also can obtain Relational Technology's INGRES RDBMS for evaluation.

For more information contact Relational Technology Inc., 1080 Marina Village Pkwy., Alameda, CA 94501; (800)-4-INGRES.

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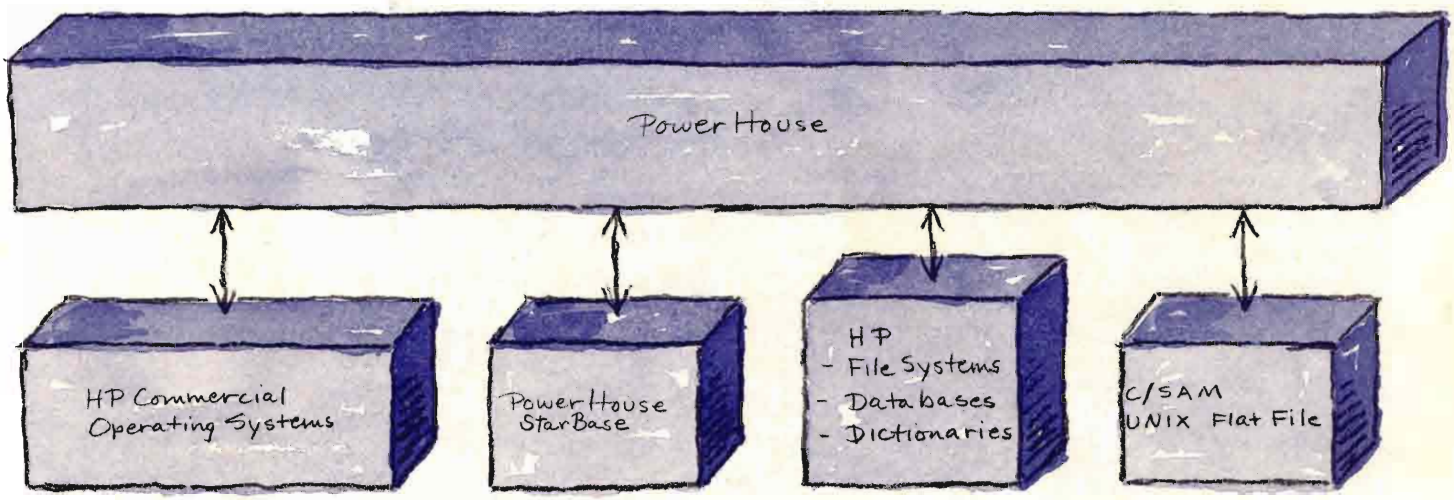
What you didn't know is that only PowerHouse integrates every HP commercial operating system, including HP-UX.®



When you implement the PowerHouse solution, you integrate your HP environment.

That, in a nutshell, is the strength of the PowerHouse solution.

Unlike common database approaches, which chain you to a captive environment, the PowerHouse solution acknowledges a simple, salient *business* fact: you've spent time and money getting to where you are today. Far from expecting you to abandon your current applications, as common 3rd party databases do, our solution preserves and enhances the investment you've already made in HP hardware and software.

The PowerHouse solution also acknowledges a simple, salient *computing* fact: environments today are as likely as not to be a mixture of different hardware platforms, operating systems, databases, even data sites. The beauty of PowerHouse is that it works with and, even more importantly, *helps you integrate* the disparate elements that make up your computing world.

With the PowerHouse solution, you get powerful 4GL development tools with links to CASE products, spreadsheet programs and PC LANs.

You get flexible database options —options that bring cohesiveness and enhanced performance to the most popular HP databases and all HP dictionaries. You get full support for all of HP's commercial platforms, including MPE V®—which other, so-called "complete" solutions ignore.

Perhaps most interesting of all, PowerHouse StarBase,™ our new RDBMS, will soon support HP's Precision Architecture Systems. Creating a distributed data management environment that offers you unparalleled performance, flexibility and freedom.

No wonder PowerHouse is formally recommended for internal use within HP.

Now that you know all this about PowerHouse, the only thing that remains for us to tell you is the number at which we can be reached. It's 1-800-426-4667. For seminar information, 1-800-548-6750.*

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CIRCLE 193 ON READER CARD

Datascan Makes Custom Cartridges From HP Scalable Fonts

Ensures Compatibility With Laser Printers Within A Company

Following the announcement by Hewlett-Packard that scalable typeface outlines for its LaserJet family of laser printers are available, Datascan announced that it can offer LaserJet users a service to burn soft fonts created using HP's new Type Director software into high capacity for easier handling and faster loading.

For corporate laser printer users, this means that with HP Type Director software and Compugraphic font outlines, users can create and revise experimental packets of soft fonts until they're refined to actual, corporation-wide, day-to-day requirements. Datascan then incorporates them into its HyperFont cartridge that an operator plugs in and forgets.

Datascan can ensure compatibility of the new fonts with other types of laser printers being used within the same company. Output from a central high-speed laser printer such as Xerox 9790 will be identical to what prints on the LaserJet.

For more information, contact Datascan Font Service, 1 Lakeside Office Park, Wakefield, MA 01880; (617) 246-2700.

Circle 398 on reader card

DATAPREP CANADA LTD Expands Hot Site Service

HP Disaster Recovery Service Relocates

DATAPREP CANADA LTD. announced the relocation and expansion of its HP disaster recovery service.

Established in 1972, DATAPREP has offered HP computer hot site service since January 1987.

The move enables DATAPREP to expand its offering to include with the hot site service, cold site, PORTA-site, administration and support area, boardrooms and local accomodation. As well, DATAPREP is able to offer a total solution package to users of HP and DEC/IBM/UNISYS Systems.

The new location is at 2550 Argentia Rd., Ste. 100, Mississauga, Ontario, Canada, L5N 5R1.

For further information, contact Don McGregor, DATAPREP, 2550 Argentia Rd., Ste. 100, Mississauga, Ontario, Canada L5N 5R1; (416) 858-9400.

Circle 394 on reader card

CCC Named A HP Value-Added Reseller

Combines FutureSource Technical And Vectra QS/16 For Power And Speed

Commodities Communications Corp. (CCC), developer of a technical analysis trading tool, has been named a Hewlett-Packard value-added reseller (VAR).

CCC will add its software, FutureSource Technical, to HP Vectra QS/16 PCs before offering the package to traders, brokers and market analysts.

The combined system of FutureSource Technical and HP Vectra PCs supplies the power needed to run hundreds of studies dealing with futures contracts, foreign exchanges and options in realtime, plus the speed required to receive technical signals quickly and clearly.

FutureSource Technical requires a minimum PC configuration of an HP Vectra QS/16 with 2 MB of random-access memory, a 40-MB hard-disc drive and a video-graphics adapter.

Wescom Systems Signs Marketing Agreement

To Market Program Testing Tool, SPEEDTEST/3000

Wescom Systems has signed an agreement with Intelware Systems Ltd. to market SPEEDTEST/3000, a tool that lets a programmer test a program using a production database.

Under SPEEDTEST's control, the program being tested opens the source database in read-only mode and performs all its write operations to an auxiliary database created by SPEEDTEST.

After the test program executes, the programmer examines the net input/output change with SPEEDTEST's validation modes to get a quick understanding of exactly what the program did without looking at source code.

A full set of trace options shows step-by-step program execution and eliminates the need for DISPLAY statements in source code.

Other features include, programmer control over read access of the source database and a mode that lets end users train on live applications.

SPEEDTEST costs $4,800 for the first copy license and can be evaluated on trial.

For more information, contact Bill Swett, Wescom Systems, 212 Pleasant St., Norwood, MA 02062; (617) 769-4344.

Circle 400 on reader card

What's The Last Thing That Comes To Mind When We Say Spreadsheet?

Mention "spreadsheet" to a lot of people, and you can see the wheels turn a total of once. For them, spreadsheet equals PC.

Pity. For as many of you will soon discover, the HP™ 3000 running MPE is an *ideal* spreadsheet platform. Especially when the spreadsheet is 20/20.™

Developed by the leading supplier of spreadsheets for multi-user computers, 20/20 is 1-2-3™-like in the way you use it. But it's more useful.

With 20/20, you and your people can create and share models of virtually unlimited size. 20/20 supports HP graphic devices, and integrates tightly with other applications. It also supports PC's as terminals and runs under MS-DOS and UNIX.™

So you can create a budget on the 3000 and distribute it to department managers running PC's to do their projections. Then the whole thing can be consolidated into a corporate-wide forecast on the 3000.

As for all those Lotus files you presently depend on—20/20 reads and writes them.

Our Evaluation Kit is proof of 20/20's advantages. To order one, call 508-655-9191. Or write Access Technology, Two Natick Executive Park, Natick, MA 01760.

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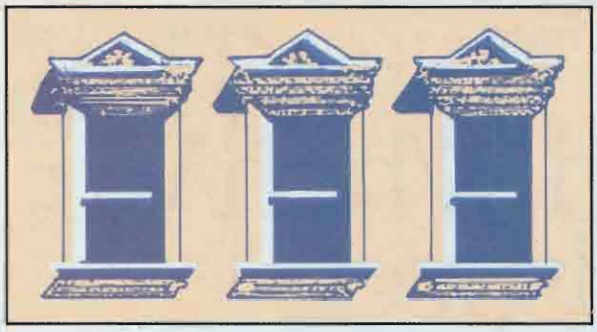

Eakins Associates Offers X Window Display Station

Compatible With Any X Window Client

Eakins Associates entered into an agreement with Visual Technology Inc. to resell and integrate Visual's Model 640 X Display Station (XDS).

The Model 640 XDS brings low-cost, high-quality graphics and X window capabilities to micros, minis and mainframes. It combines the benefits of a high-cost workstation with a terminal's low cost and easy set-up.

The Model 640 XDS brings low-cost, high-quality graphics and X window capabilities to micros, minis and mainframes. It combines the benefits of a high-cost workstation with a terminal's low cost and easy set up.

The X Display Station features a full implementation of MIT's X Window System Server (Release 3), with NFS extension and is compatible with any X window client, including Sun, DEC, HP, Apollo and most UNIX system computers. The Model 640 supports a variety of communications including thick or thin Ethernet with TCP/IP as well as RS232 SLIP.

List price of the Model 640 XDS is $1,995.

Contact Eakins Associates, 67 East Evelyn Ave., Mt. View, CA 94041; (415) 969-5109.

Circle 369 on reader card

Informix Endorses Open Desktop Environment

Offers Extended Version To Provide Users With More Options

Informix Software Inc., a supporter of open systems, endorsed the Open Desktop integrated 80386-based software environment. Informix supports the Open Desktop environment with its Wingz graphic spreadsheet and its line of 4GL application development tools.

In addition, Informix announced that it plans to introduce its own extended version of the Open Desktop environment, which will include the company's OLTP DBMS engine, Informix-Turbo. Informix will offer two separate extended products, a personal productivity product and a developer productivity product.

The personal productivity product comes bundled with the Wingz graphic spreadsheet. In this product, Wingz will be more tightly integrated with the DBMS engine, giving it full-fledged relational DBMS capabilities, so that users will be able to store and retrieve spreadsheet data from the database.

The developer productivity product will bundle Informix's leading line of 4GL application development tools. With this product, developers will still be able to support and develop the character-based applications that make up a large percentage of database applications.

For more information, contact Informix Software Inc., 4100 Bohannon Dr., Menlo Park, CA 94025; (415) 322-4100.

Circle 392 on reader card

Ford Aerospace Corp. Awards HP $42 Million Contract

Agreement Includes 1,200 HP 9000 Model 330s Running HP-UX

Hewlett-Packard announced a contract with Ford Aerospace Corp. for HP-UX workstations and peripherals valued at more than $42 million (U.S. list price).

Ford will use the equipment in the U.S. Army's Maneuver Control System (MCS) and Non-Development Item (NDI) programs for defense applications.

The NDI program was instituted in 1983 to determine the feasibility of using commercially available hardware and software to partially satisfy the needs of the MCS. These programs are part of the Army command and control system, established in 1979 to automate and eventually network together each of the five points of the Army "Star" (maneuver control, logistics support, air defense, artillery and intelligence).

Under the contract, HP will provide various configurations of more the 1,200 HP 9000 Model 330 workstations running the HP-UX operating system and based on the Motorola 16-MHz 68020 processor.

The Model 330 also features an MC 68881 coprocessor; 4 MBs of random-access memory (RAM); and HP-IB, RS-232-C, HP-HILL, DMA and LAN interfaces. The configured systems will include HP disc drives, printers, plotters, terminals, tapes, color displays and digitizers.

Bering's solution series.

Bering introduces three new members to its family of Hewlett-Packard subsystems. Each of these products is specifically tailored to meet today's demanding storage needs.

The new EconoPac 5050, delivers 500MB of storage capacity, an ideal solution for local area networking, or any other large capacity requirement.

The TwinPac II offers removable storage for security, expandibility, exchangability, backup and archiving. The all new 5¼ inch format means even more convenience and continued reliability.

And Bering's new 2000MB Tape backup subsystem can handle any backup need. State-of-the-art helical scan technology ensures efficient, error free backup.*

Bering's products are 100% hardware and software compatible with HP computers using CS/80 and SS/80 command sets, including, HP9000 Series 200/300/500, HP1000, and HP3000 computers. Also, each unit is protected by a one year warranty.

Bering remains committed to high quality and high performance at a savings.

Call Bering's sales department for more information.

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*Product available for shipment 1/89

CIRCLE 104 ON READER CARD

HP And 3Com Form Alliance To Provide Networked Systems

Includes Joint Product Development, Worldwide Service and Equity Investment

Hewlett-Packard and 3Com Corp. announced an alliance that includes six areas of joint product development and marketing, a worldwide service agreement and an initial equity investment by HP of up to five percent of 3Com's outstanding stock.

In addition to HP providing multivendor support services for 3Com workgroup products, the agreement includes cooperation in the six key product areas including: 3Com's 3+Open LAN Manager, an operating system for local area networks (LANs) based on the Microsoft LAN Manager co-developed by Microsoft and 3Com; HP LAN Manager/X, a version of LAN Manager for the UNIX operating system being jointly developed by HP and Microsoft; Transmission Control Protocol/Internet Protocol (TCP/IP), the most widely used set of communications protocols for enterprisewide networking; network management under the HP OpenView architecture; electronic mail; and HP NewWave, a software-application environment based on object-management technology.

Mt Xinu Releases Enhanced Berkley UNIX Alternative For HP Series 9000

HP Customers Can Run Traditional 4BSD And HP Commercial Applications

System software developer Mt Xinu Inc. (Berkley, CA) has announced an alternative UNIX-based operating system for HP Series 9000 computers.

In cooperation with HP's educational marketing group and developers at the University of Utah, Mt Xinu will provide MORE/bsd, its enhanced version of 4.3BSD (Berkley UNIX) on both the Model 300 and Model 800 classes of HP computers in order to better meet the needs of HP's educational and research-oriented customers.

The software will be source-code compatible with 4.3BSD as it originated at UC Berkley, and will also be binary-code compatible with HP-UX, HP's implementation of AT&T's System V Release 2 UNIX software. In this way, HP customers can run both traditional 4BSD software and HP commercial applications.

Though MORE/bsd remains source-code compatible with original 4BSD from Berkley, Mt Xinu has added many enhancements and thousands of bug-fixes in order to keep the software up-to-date with today's software technology. For example, Mt Xinu has integrated Network File System (NFS) software, an industry standard for distributed file-sharing; the latest TCP/IP networking improvements; and support for networked discless workstations. In this way, MORE/bsd customers gain commercial support and ongoing improvements, while retaining the power and openness of 4.3BSD.

For further information, contact Mt Xinu Inc., 2560 Ninth St., Berkeley, CA 94710; (415) 644-0146.

Circle 391 on reader card

HP Receives $1.85 Million Graphics Workstation Lease From McDonnell Aircraft Co.

Nine-Month Lease Includes 216 HP 9000 Graphics Workstations

Hewlett-Packard announced a nine-month lease for 216 HP 9000 graphics workstations totaling $1.85 million from the McDonnell Aircraft Co., division of McDonnell Douglas (St. Louis, MO).

McDonnell Aircraft manufacturers the AV8B Harrier, the F/A and the F-15 fighter planes. The HP 9000 Model 360SRX graphics workstations will be used with the company's proprietary CADD (computer-aided design and drafting) software.

HP was chosen by the McDonnell Douglas Information Systems Company earlier this year to be a UNIX system workstation vendor. As an HP value-added reseller (VAR), McDonnell Douglas combines its Unigraphics software with HP 9000 workstations and servers to provide a complete ME CAD/CAM offering.

The HP 9000 Model 360SRX, announced earlier this year, is HP's midrange graphics workstation based on the MC68030. Included with the system is HP's SRX 3D solids-rendering graphics subsystem, 4 MB of RAM, a 20-MB disk drive, the HP-UX operating system, a 16-in. color monitor, keyboard and interfaces.

Note: If you have any questions regarding a Hewlett-Packard announcement mentioned in ***News & Trends****, please contact the Hewlett-Packard sales office listed in the white pages of your telephone directory.*

Would You Buy Your Watch a Piece At a Time?

VISIMAGE PC Puts It All Together

Report Writing

Simple and detailed reports are easy to create. The unique painting facility allows users to draw the report layout directly on the screen. VISIMAGE PC provides all the functions of a powerful report writer, simply designed for the end user.

PC/HP3000 Access

VISIMAGE PC includes a new communication package designed by Walker Richer and Quinn that allows you to access HP3000 data using any PC network. Users have access to IMAGE databases, KSAM, MPE and SD files. VISIMAGE comes complete with interfaces to OMNIDEX, DICTIONARY/3000 and POWERHOUSE dictionary. Sophisticated features allow the DP department to retain total control over security, confidentiality and system resource usage.

On-line Tutorial

VISIMAGE PC's ease of use is enhanced by a tutorial mode for novice users. Pop-up windows guide the users through each step. Very quickly you will become an expert at reporting and downloading data.

Downloading

Your HP3000 data can be automatically downloaded to the PC. All the major PC formats are supported, making your data available to spreadsheets, word processing and other productivity tools (e.g. LOTUS 1-2-3, DBASE III, etc.).

Windows

VISIMAGE PC combines the power of VISIMAGE with the flexibility of a window environment. Pull-down menus and pop-up windows give the user easy access to timely information. Use the mouse to design the layout of your report or "click" the items you want to select. VISIMAGE PC runs on all IBM compatibles, using MS-DOS or OS/2, with a basic configuration.

VISIMAGE PC puts all the pieces together giving users a complete solution. Call today for a demo diskette to learn how VISIMAGE PC can benefit you and your company.

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CIRCLE 186 ON READER CARD

HP PC Family Expands With HP Vectra QS/20

Hewlett-Packard expanded its Vectra personal computer family with a 20-MHz desktop PC based on the Intel 80386 microprocessor.

Designed for business and entry-level, CAD applications, the HP Vectra QS/20 PC provides users the power of the 32 bit Intel 80386 microprocessor in a compact desktop system.

The QS/20 PC can be configured with up to 16 MBs of random-access memory (RAM) on the processor board; it has three mass-storage shelves and seven industry standard expansion slots.

This PC supports the Lotus/Intel/Microsoft expanded memory specification (LIM EMS 4.0). It also is compatible with new software programs that will take full advantage of the power of the Intel 80386, such as Microsoft Operating System/2, Microsoft Windows/386 Presentation Manager and Santa Cruz Xenix 386.

Included with the HP Vectra QS/20 PC are serial and parallel ports, disc-cache software and HP terminal-emulation software for connectivity with HP minicomputers.

BACKUP.UNET Permits Backups And Restores

UNITECH Software Inc. announced BACKUP.UNET, a backup and restore product for UNIX system networks that permits centralized and decentralization backups and restores, and sharing of tapes and drives from one or more terminals.

BACKUP.UNET takes advantage of the network environment and arbitrates tasks and resources as designed by the adminstrator. Backups and restores can be initiated locally or from any system so one system administrator can manage several systems each with their own procedures if desired. Tape drives can be shared so one tape drive can perform backups and restores for any number of machines and requests for a device are kept in order.

BACKUP.UNET is priced according to the size and number of computers in the network.

Contact UNITECH Software Inc., 1800 Alexander Bell Dr., Suite 101, Reston, VA 22091; (703) 264-3301.

Circle 376 on reader card

Enhanced HP Graphics Gallery For Less Than $500

A new version of HP Graphics Gallery software for industry-standard PCs offers greater compatibility and more drawing and charting features at a U.S. list price of $499.

HP also announced it has signed an agreement with MAGICorp (Elmsford, NY) slide service bureau to provide HP Graphics Gallery customers overnight conversion of graphics files into 35mm slides.

HP Graphics Gallery consists of HP Charting Gallery for creating presentation-quality charts and HP Drawing Gallery for creating and editing text, illustrations and charts.

Each is available separately or as part of the HP Gallery Collection that includes the HP Business Management Portfolio picture library.

OCS Announces A Batch Partition Facility

Operations Control Systems (OCS) announced a comprehensive batch partition facility to manage environments that receive a large number of user-submitted jobs. This new facility is included at no additional cost as part of Release 5.10 of the OCS/EXPRESS batch job scheduling system.

This new batch partition feature allows

HP announced a new version of HP Graphics Gallery software.

a shop to prevent individual users from dominating the batch execution queue. An unlimited number of batch partitions can be created for specifiic users or applications. Up to 100 priority levels may be used to prioritize jobs.

Operations can restrict the maximum numbers of user-launched jobs that can process simultaneously. As a result, the data manager can handle the random arrival of ad hoc requests without manual efforts.

When users submit their ad hoc jobs, they automatically are intercepted and placed into partitions based on time windows, accounts, groups, users or job names. Jobs with the same "jobname" can be serialized to insure that they run sequentially. This capability reduces contention for specific system resources such as databases, files or tapes.

The batch partition management system is fully integrated with OCS/EXPRESS. OCS/EXPRESS is a batch job scheduler for the HP 3000.

Contact Operations Control Systems, 560 San Antonio Rd., Palo Alto, CA 94306; (415) 493-4122.

Circle 379 on reader card

Introl Product Line Ported To HP 9000/300

Introl Corp. (Milwaukee, WI) has ported its entire line of INTROL-C Cross-Compilers, INTROL-Modula-2 Cross-Compilers, INTROL Macro Cross-Assembler and INTROL IDB Source Level Debuggers to a number of previously unsupported computer systems including Sun 3, Apollo, HP 9000 Series 300, Macintosh and 80368-based systems.

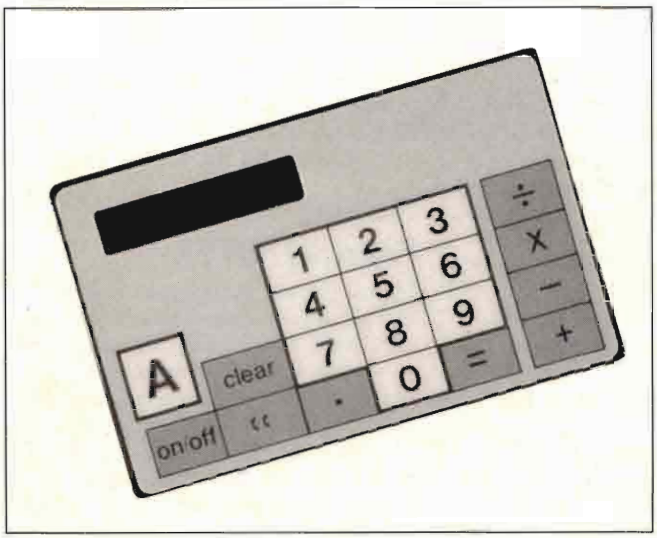
All host versions of each INTROL product are functionally identical in all respects and source files. Object modules are 100 percent transportable from one development host environment to another. This feature enables embedded systems developers to use multiple types of development systems on the same software development project.

Contact Introl Corp., 647 W. Virginia St., Milwaukee, WI 53204; (414) 276-2937.

Circle 375 on reader card

I-O Corp. Upgrades 8200 LaserCard

I-O Corp., a manufacturer of printer interfaces for IBM midrange systems (AS/400 and S/3X), announced an upgrade of the I-O 8200 LaserCard, an internal protocol converter for the HP LaserJet II.



Enigma Logic's UNIX-Safe Version 3.5 supports the AccessCard, an encryptor for ensuring user authentication.

The benefits of twinax connectivity now extend to the duplex printing feature of the new HP IID printer. Any twinax system user who wants to use the HP IID's capability of automatically printing on both side of a page need only plug in an I-O 8200 LaserCard and set its switches.

The I-O 8200 LaserCard plugs into the "Optional I/O" slot at the rear of the HP LaserJet II or IID.

The I-O 8200 enables midrange users direct access to most HP LaserJet fonts by specifying an IBM typestyle number in an word processing document. LaserJet fonts can also be access from data processing using RPG programming. Suggested retail price is $995.

Contact I-O Corp., 2256 South 3600 West, Salt Lake City, UT 84119; (801) 973-6767.

Circle 380 on reader card

Sbrowse — An Interactive Program Analysis Tool

Sbrowse, from Computer Enterprises Inc., makes available the facts you need to learn how a complex program works without flipping through multiple listings. Sbrowse requires no links to written or in-line documentation. Large source programs in C, C++, Lex and Yacc are manageable.

Sbrowse is designed to answer questions such as: Where is this variable used? What is the value of this preprocessor symbol? Where is this source file in the directory structure? What files include this header file?

Sbrowse includes a symbol index that it constructs the first time it's used on the source files and reconstructs only if a source file has changed or the list of source files is different. When the index is reconstructed, the data for the unchanged files is reused, keeping performance at optimal levels.

The UNIX version of Sbrowse is currently available on DEC's VAX, Sun Microsystems Inc.'s SUN 3, HP 9000 Series 300 and 800, AT&T's 6386, UNISYS machines with UNIX and Concurrent Computer Corp.(formerly Perkin-Elmer) 3200 Series. For more information contact Ann Winter, Computer Enterprises Inc., P.O. Box 8, Port Jefferson, NY 11777-0008; (516) 473-7500.

Circle 389 on reader card

Enigma Logic Enhances UNIX-Safe SafeWord

Enigma Logic announced Version 3.5 of its UNIX-Safe SafeWord software. The package runs on a wide range of UNIX operating systems, supporting user identification and authentication methodologies that meet the strictest requirements for securing computer systems and networks. UNIX-Safe has been evaluated by the National Computer Security Center (NCSC) as meeting the specifications of the Department of Defense Trusted Computer System Evaluation Criteria for identification, authentication and audit.

Version 3.5 of UNIX-Safe introduces a number of new features, including the implementation of authorization groups for decentralization administration of access grants, an integrated set of master merge (import and export) utilities, tty-specific secur-

ity and enhanced logging of administrative actions. UNIX-Safe 3.5 has been ported to most UNIX operating systems including UNIX System V, Systems 4.2 and 4.3 BSD, System III Ultrix and Xenix.

Pricing is based on the number of users and ranges from $500 for two users on a single workstation to $33,150 for 1,000 users on a multiuser VAX. The integrated master merge facility which permits export and import to and from other UNIX system administration databases is available as a product option for $600.

Contact Enigma Logic Inc., 2151 Salvio St., Suite 301, Concord, CA 94520; (415) 827-5707.

Circle 378 on reader card

Gold Key Font Cartridge Available On LaserJet

Gold Key Electronics announced its new HP LaserJet compatible font cartridge. The Gold Key Font Cartridge can be plugged into any of the LaserJet series of printers and provides the full set of LN03 internal fonts — Courier, Prestige Elite and Letter Gothic.

The cartridge is designed for use with the SWITCHmate Intelligent Printer Switch LN03 emulation.

With the Gold Key cartridge plugged into the standard font cartridge slot on your printer the SWITCHmate LN03 emulation provides full support for legal applications in portrait and landscape and gives you the complete Roman-8 character set in Courier and Prestige Elite.

The Gold Key Font Cartridge (part number FC-LNHP-001) is available for $299.

Contact Gold Key Electronics Inc., 11 Cote Ave., P.O. Box 186, Goffstown, NH 03045; (603) 625-8518.

Circle 377 on reader card

REDUCE Available For HP 9000/300

Innovus Inc. introduced REDUCE for the HP 9000 Series 300 HP-UX computer, a mathematical system that offers differentiation, integration, polynomial and integer factoring, matrix calculation and solutions of linear equations.

REDUCE includes an easy-to-use programming environment that is similar to Agol and Basic, offering access to LISP programming, file handling a statement editor plus many other utilites. Also available to the HU-UX version of REDUCE is a new 2D and 3D graphics display capability and a complete new documentation set including both a user's guide and reference manual.

Initially, REDUCE is available for the HP 9000 Series 300 family of computer and will become available for the Series 800.

Contact Helen Crabbe, Innovus Inc., 204-200 James St. S., Hamilton, Ontario L8P 3A9; (416) 529-8117.

Circle 371 on reader card

Memory Boards From INFOTEK

Infotek Systems announced a new product line of low cost memory boards for users of HP Model 330, 350 and 370 workstations.

Infotek's new products include: the EM300, a 4-MB RAM controller board; the EM300 + 4, a 4-MB add-on board; and the EM 300 + 12, a 12-MB add-on board. The new boards are geared to scientific and engineering users working with HP Series 300 workstations, particularly in multi-use environment such as UNIX.

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

Circle 372 on reader card

Gradco's Paper Cassette Utilizes Three Trays

Gradco Systems introduced its new Model 550 Triple Paper Cassette and Envelope Feeder for the HP LaserJet Series II and other SX engine-based laser printers. It allows users printing from workstations to select paper cassettes from the print menu or by embedding printer commands into documents. In a single document, for example, the printer automatically can feed letterhead, then second sheets, then plain stock, then an envelope to the printer.

The multiple cassette feeder allows you to switch paper trays on a central printer from a remote location. The cassette has a 250-sheet capacity.

With the 550 Feeder, any combination of the three paper cassettes can be used, including letter, executive, legal and A4 sizes. The envelope cassette holds up to 50, 20-pound envelopes or card stock or transparencies and it adjusts to fit commercial No. 10 envelopes, International DL and International C5 envelopes.

The 550 Feeder is available for HP LaserJet Series II printers and can be adapted to other printers.

Contact Gradco Systems, 7 Morgan, Irvine, CA 92718; (714) 770-1223.

Circle 370 on reader card

PaperPeeper — A Paper Alarm For LaserJet II

The Laser Edge has introduced PaperPeeper, a paper alarm for the HP LaserJet Series II printer.

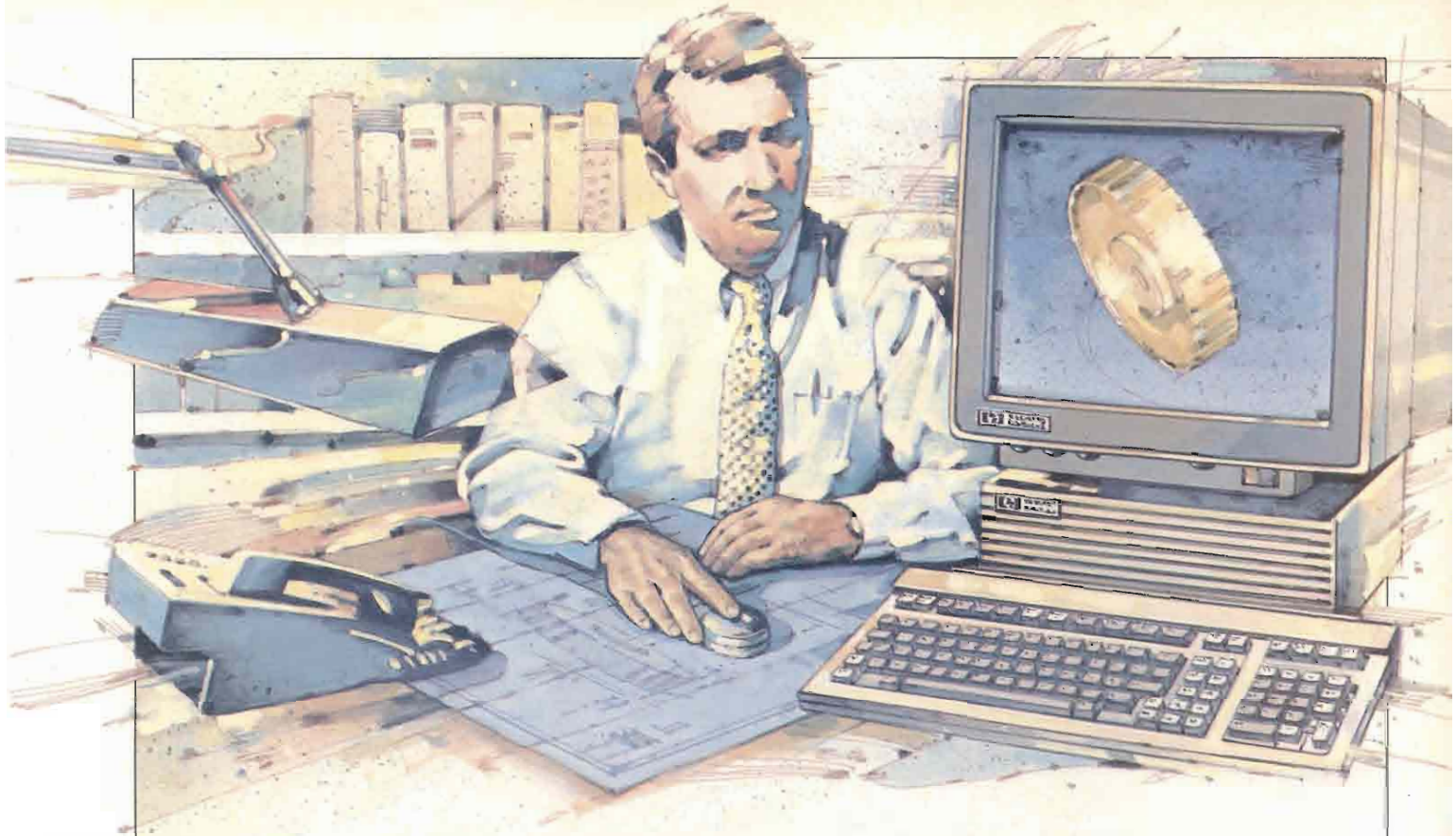
PaperPeeper beeps gently whenever the printer runs out of paper. It also will alert users of a paper jam. Designed as a stand-alone accessory, PaperPeeper is battery powered and mounts to the front panel of the printer using a peel-and-stick operation.

Contact The Laser Edge, 360-17th St., Suite 203, Oakland, CA 94612; (415) 835-1581.

Circle 373 on reader card

Continued on page 86.

Gradco's Triple Cassette and Envelope Feeder enhances productivity.



HP 330/350/370 Users. Imagine Spending Less For More Memory!

If you have (or are considering buying) an HP Model 330, 350 or 370 computer, don't do another thing until you talk to Infotek! Chances are you're going to need more memory to run UNIX or memory-intensive applications like CAD and graphics. So, why spend more than you have to? And why get a short warranty when you can have a full two years?

Infotek EM Series memory gives you an economical way to bring your computer to maximum memory capacity. Select:

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- EM 300 + 4: 4MB add-on board
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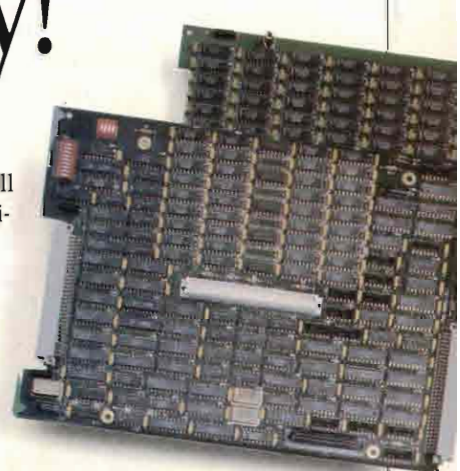
Infotek Systems, 1045 S. East Street, Anaheim, California 92815, (714) 956-9300, TELEX 678870, FAX: (714) 758-0289.



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CIRCLE 142 ON READER CARD

The Least Expensive Methods Can Be The Most Effective Means

TRAINING TECHNOLOGY

[By Peggy King]

Before the days of interactive videos, audiodigital playback devices, inexpensive CD-ROM players, voice digitizers and sophisticated authoring software, companies measured computer training by price, rather than by its effectiveness. That perception proved the old adage, "You get what you pay for." Back then, manuals were the cheapest form of training — and the least effective because only the eyes were involved in the learning process. Tape recordings used with written materials were more effective because audio enhanced computer education. But technical methods were still less effective than the most expensive form of training, having an instructor appear in front of a class. This close correlation between effectiveness and cost held true until approximately seven years ago.

Today, however, some of the least expensive methods also can be the most effective means of involving the user in training, and it's no longer safe to assume that the cost of technology is the main factor in determining the cost of non-instructor-led training. For example, the cost of videotaping has plummeted because of inexpensive camcorders. But the costs of producing a videotape suitable for use in training now averages $1,200 a minute. Why the discrepancy? Television and home videos have made people so accustomed to the professional quality of mass media productions that less expensively produced segments strike viewers as amateurish and are less effective for training.

Jan Bleil, of HP's User Training Services Group, has been involved in user training since 1976. According to Bleil, there have been two important changes in the past

seven years that have begun to make non-instructor-led training increasingly accepted in corporate settings: the popularity of the Sony Walkman and the emergence of voice mail in place of answering services. Now that most employees either own or have used a Walkman or similar unit, portable cassette players have become an integral component of the audiodigital playback system sold by User Training Corporation.

Voice mail, especially if it's interactive, is a technology that was popularized by the advent of the telephone answering machine. Corporate employees now are accustomed to leaving messages and therefore are more willing to respond to instructions delivered by a voice on a tape.

In the User Services Training Group courseware, "A Walking Tour of the HP 3000," Jan Altman explains MPE commands as the commands playback on the screen. When Altman instructs listeners to try an exercise, they respond by typing the commands. We learn by doing, just as if a live instructor were prompting us during a lab session.

According to the findings of learning theorists, the basic condition for effective training must incorporate seeing, hearing and doing in order to learn. Bleil uses the word synergy to describe the fusion of various technologies into interactive training programs. In the computer-based training (CBT) industry, most of the companies involved in selling training software, playback or recording devices are small companies that stand to profit rather than lose from the proliferation of new ways to synthesize different styles of learning. The industry is uniquely positioned to prosper more from cooperation than competition.

In the August 1987 issue of *HP Professional*, Don Mitchell of SIMULEARN Inc. defined CBT as "software that provides interactive instructional experiences." The five software packages described in this article are all authoring systems that make interactive training possible on the HP 3000 and the VECTRA PC. Applications that run on the VECTRA PC also will run on any similarly configured MS-DOS systems.

AN AUTHORING LANGUAGE is a tool for course developers rather than users. In effect, these languages are productivity tools for producing CBT by using a high-level language instead of coding. Most authoring languages are designed to produce "silent" or screen-based CBT. A more recent development is the ability to incorporate audio or voice-based training along with the screen displays.

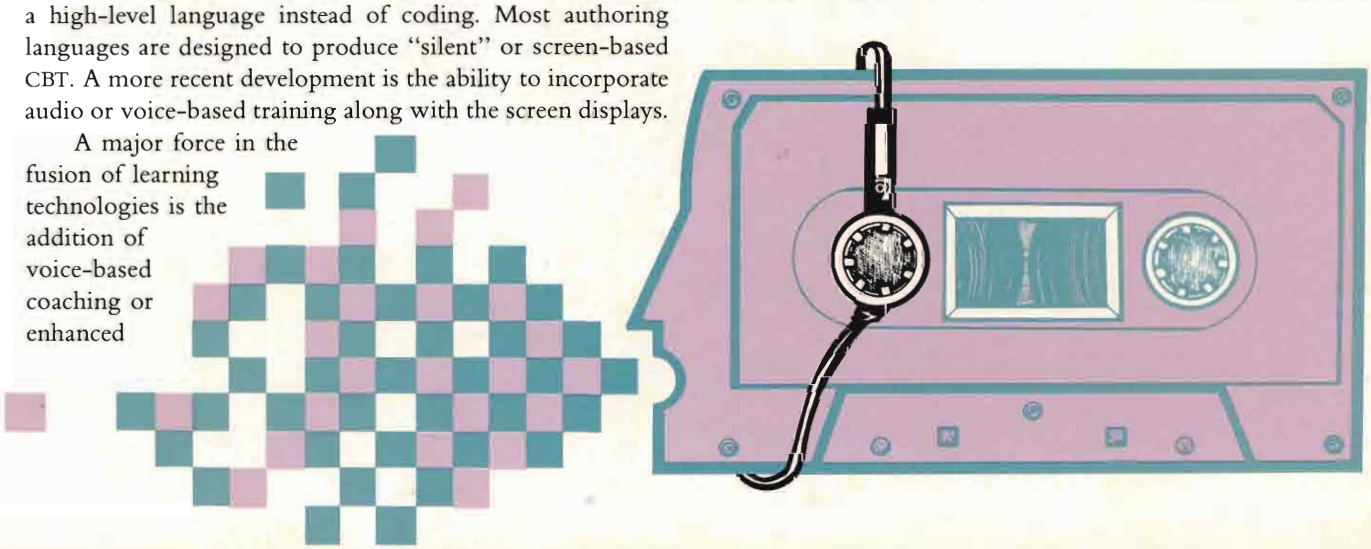
A major force in the fusion of learning technologies is the addition of voice-based coaching or enhanced video displays to CBT products. There are several authoring languages that provide one or more such enhancements that go beyond merely presenting a replica of a terminal screen. These authoring languages come with device drivers for the hardware needed to provide playback for audio or expanded visual capabilities.

SIMULEARN has found a way to create CBT for the HP 3000 using the VPlus screen handler that comes with MPE and MPE/XL. SIMULEARN makes VPlus perform the functions of authoring software and uses it to create screen-based CBT packages such as the one written to teach users the FCOPY file management command in MPE. With SIMULEARN and VPlus, a course developer can design interactive screens on HP 3000 terminals, write a program for judging answers, keep track of the user's progression through training screens and build reports. The company offers training for course developers in the use of VPlus for designing screen-based CBT.

John Korb, of Innovative Software Solutions, has written TMAuthor, an authoring language for the HP 3000 that provides an interface to MPE and allows the execution of any commands that are accessible through the COMMAND intrinsic. Since TMAuthor uses privileged files on MPE to protect the files, the product can run compatibility mode but not native mode on an MPE/XL system. Company President Donald Gholson used TMAuthor as the authoring language to write 12 modules of TeachMe/3000, a computer-based training system for the HP 3000. The source files for CBT can be created and maintained on any editor used on the HP 3000.

Computer Enhanced Interactive Technology (CEIT) produces Authology, an authoring language that integrates text, graphics, animation and video. Although the Authology language creates courseware that runs on MS-DOS systems, the courseware that it generates can be delivered under other operating systems, including HP-UX.

Hewlett-Packard's Worldwide Customer Support Organization (WCSO) is conducting a yearlong evaluation of Authology before choosing an authoring language to be used for courseware developed throughout the company. Authology is being considered because it delivers courseware on HP-UX



systems and because the software controls CD-ROM players and videotapes. The Fundamentals of Calibration, a self-paced course for instrumentation engineers at HP, is the first WCSO course developed with authology. This course is given on VECTRA PCs and uses animation and color graphics to illustrate concepts. Authology's flexible structure makes it possible to have learner-controlled rather than computer-controlled instruction. Learners guide their own progress through the course by electing to repeat sections and by choosing when to take the master tests and final exams.

CEIT's software is divided into three modules: Author, Presenter and Student Record Manager. Course developers use Author for combining the text, graphics and video to be included in the courseware. Presenter is used to deliver the courseware and to save the scores and responses of trainees. The Student Record Manager is used to present the scores and responses in a screen display or a hardcopy report.

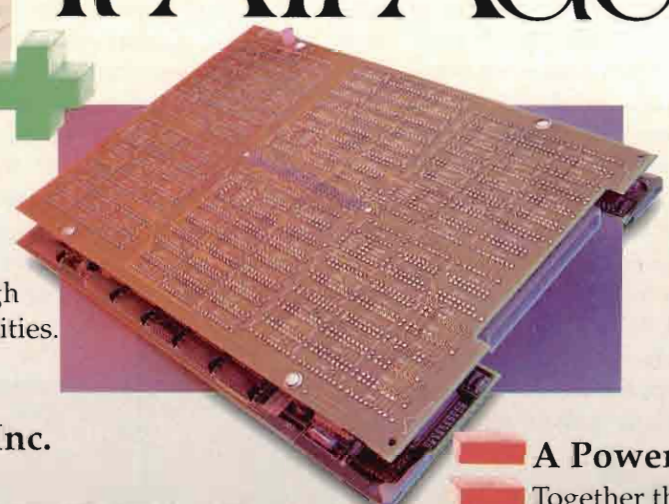
AMT Learning Automation Inc. sells SOLO Authoring System as part of a course development system that also includes the SOLO Audio/Sync Player and runtime software for whatever platform (MS-DOS, UNIX or VAX/VMS) the training will run on. Courseware developed on SOLO delivers screen-based instruction. Learners needing more explanation press keys to bring up the pop-up help windows that explain the features of the screen. In addition, the screen presentations are enhanced by voice coaching. When the voice-based option is added, there are fixed locations on the playback tape where a voice describes the features of the screen.

AutoTrainer from Software Recording Corporation is a software development tool for designing custom CBT. The memory-resident software can run concurrently with an application or can be used to simulate the software that the user is learning. The software captures both the screen design and the keystrokes used for interactive responses.

AutoTrainer's two modules, Player and Recorder, can be purchased separately or together. Recorder is used to record software "tapes" by capturing the keystrokes. It's possible to use Recorder to capture the keystrokes and the screens concurrently, but most people prefer to use the "filmer," a tool that allows the course developer to capture live segments of applications and then develop a simulation so that users won't have to contend with the results of having pressed the wrong keys. Player is used to playback the software tapes created on Recorder.

The Recorder and Player both run on the VECTRA, but Recorder can be used to emulate the HP 3000 when it runs con-

It All Adds Up



The Hewlett-Packard 9000 Series 300:
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The Folsom Research, Inc. Aurora/300:
An affordable scan converter boardset for the HP 9000 Series 300, that delivers real-time scan converted RS-170A RGB and composite (NTSC or PAL) video output.

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- Full-screen, real-time compression to standard video
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- Frame buffer access via DIO-II Bus
- 24 bit/pixel output
- Supports Wavefront Software

A Powerful Tool

Together they form a bridge to standard video formats, allowing the use of:

- Standard video tape and disk recorders
- Animation systems
- Projection systems

Hewlett-Packard and Folsom Research, Inc.: **It All Adds Up.**

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Photos courtesy of Hewlett-Packard

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currently with AdvanceLink or Reflection. Therefore, it's possible to develop courseware that simulates the HP 3000 but runs on the VECTRA.

IN JUST A FEW YEARS it will be commonplace for computers used for training to have CD ROM players, voice digitizers and keystroke playback recorders built in. But at present, course developers and trainees need to connect instructional computers to other devices in order to create and use CBT that includes voice, animation or video.

There are two types of units that record both voice and sound. One alternates audio and digital and the other provides simultaneous audio and digital. The SOLO Audio/Sync Player is a teaching device that plugs into the printer port. The unit has two channels, the right one for voice and the left one for a tone that synchronizes with the audio cassette. In a typical application, the taped voice describes the operation and then the tape stops so that the learner can type the commands. The unit simulates an interactive session by switching between the instructor's voice and the student's keystrokes which are captured by the software. Company President Richard McMahon explained that this training method is not designed for conceptual training, but rather for training users on specific software. The SOLO Audio/Sync unit works best in training situations where there is only one right answer; if the learner makes a mistake, a help message appears on the screen.

The audiodigital Recorder/Player offered by User Training Services Group (UTSGroup) provide simultaneous audio and digital instruction. The course developer uses the audiodigital recorder/player to capture screens and keystrokes on the RS-232 channel and voice on the audio channel at the same time. When the learner puts on the headphones to listen to the audio tape on a Sony Walkman (or any playback unit with a standard left/right channel that's compatible with the audiodigital unit), he hears the instructor's voice and keyclicks at the same time the instructor's keystrokes appear on a screen. When the tape stops, the student can stop the player, turn to the workbook and practice the material that has just been covered.

Products Work Together

MANY OF THESE TRAINING PRODUCTS can work together to enhance the learning environment. According to Jan Bleil, the best training environment is the one with the greatest verisimilitude to the actual working environment. Because working environments and training needs vary so widely, no one product is best for creating verisimilitude. For example, keystroke capture is important for simulating the working environment of a data entry clerk using software screens, but watching a videotape may be a better simulation for a technician learning how an instrument works.

It will be commonplace for computers used for training to have CD ROM players, voice digitizers and keystroke playback recorders built in.

All six of the companies mentioned have products that will work with at least one of the others. Modules of training designed for the HP 3000 don't need to be run on the HP 3000 because the VECTRA PC can be used to simulate interactive sessions. With TORI Corporation's RS (remote support) board, it's possible to record online sessions from the PC without using memory-resident software. Two training technologies can work together in such a way that one provides the observation environment and the other gives the user interactive practice sessions in a real or simulated application. For example, "silent" CBT programs like Simulearn or TeachMe/3000 can be used with UTSGroup's audiodigital recorder to provide the added reinforcement of hearing an instructor describe the screens and seeing a sequence of keystrokes appear on the screen.

The synergy between products also can create training that involves more of the senses or provides a more accurate simulation of the real working environment. If, for example, VECTRA PCs running Authology are used to train system operators to start recovery on the HP 3000 Model 950, it is possible to integrate text, animation and graphics. A touch screen and interactive video could demonstrate the indicator lights and switches on the control panel. Another part of the training can use a TORI RS Board recording to simulate the commands that operators use to soft-boot the system. Authology's device drivers make it possible to mix or alternate the use of different media (such as CDs and videodiscs) according to the application's needs.

Putting the UTSGroup's audiodigital trainer together with the AutoTrainer software system creates a full-featured training environment. A course developer can write courseware for the audiodigital tape unit with interactive exercises that require keystrokes filtered by AutoTrainer software and passed to the HP 3000 to execute the successful command on the real system.

More special features and livelier simulations aren't always the programs best suited to the trainee's needs. There's still a place for the simple screen-based training. Richard McMahon finds that about half of his customers prefer "silent" applica-

The leading HP terminal emulator for the Mac is now the only Windows-based emulator for the PC.

Session for Windows: The next generation in HP terminal emulation is here.

Four years ago, Tymlabs pioneered the development of Session™ for Macintosh, an HP terminal emulator for the see-and-point desktop environment. Packing a sophisticated feature set into an intuitive, enjoyable and productive user interface, our Mac products have won acclaim from users and critics alike.

Building on the foundation of Microsoft® Windows for the PC, Vectra, and compatibles, we have been able to bring the power and ingenuity of our Mac-based emulators to Windows users as well. On both Mac and PC platforms, Session makes terminal emulation a full partner with today's desktop applications. For example, you can extract data from a database on your HP host and display it on your "terminal screen" (your Session window). Using the mouse or keyboard commands, you can copy the information into your PC or Mac-based spreadsheet, perform a few calculations, then paste the results into a memo which you send out via HPDESK. You can even run multiple concurrent sessions on the host, leaving HPDESK or a lengthy compile running in one window, while you go on to other HP-based activities in another.

If this sounds like the solution you've been waiting for, don't wait any longer. Whether your organization has PCs, Macs, or both, you can standardize on Session for all your emulation needs. And because Windows is the stepping stone to HP NewWave and OS/2 Presentation Manager, Session protects your investment in software and training as you move to these powerful new environments.

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SIMULEARN Inc.
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Innovative Software Solutions
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Fairfax, VA 22032
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AutoTrainer
Software Recording Corp.
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Dallas, TX 75206
CIRCLE 295 ON READER CARD

Authology
CEIT Systems Inc.
225 Charcot Ave.
San Jose, CA 95131
(408) 943-0423
CIRCLE 298 ON READER CARD

SOLO Authoring System, SOLO Audio/Sync Player
AMT Corp.
183 Guggins St.
Boxboro, MA 01719
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tions. Although companies with dedicated training facilities usually want audio-enhanced training materials, the "silent" CBT works best at offices where most of the employees use the courseware at their own desks.

In the next few years, more and more technologies will become integral parts of the training environment. As the choices increase, course developers will need to consider every project separately to determine which software, recording and playback technologies will allow them to create the most effective design at a cost the company can afford and with features that most closely will resemble the trainee's actual work environment.

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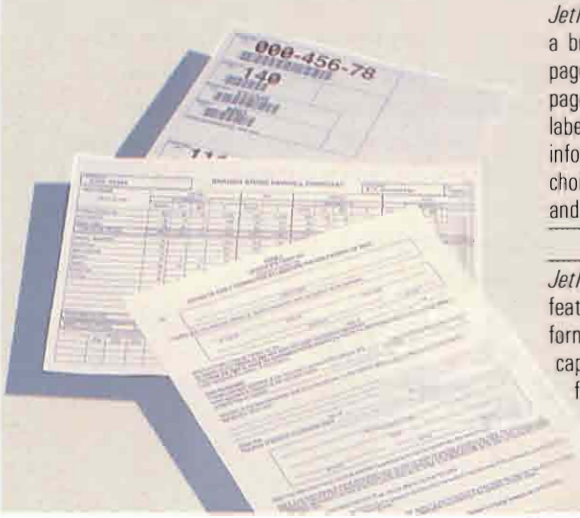

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CIRCLE 119 ON READER CARD

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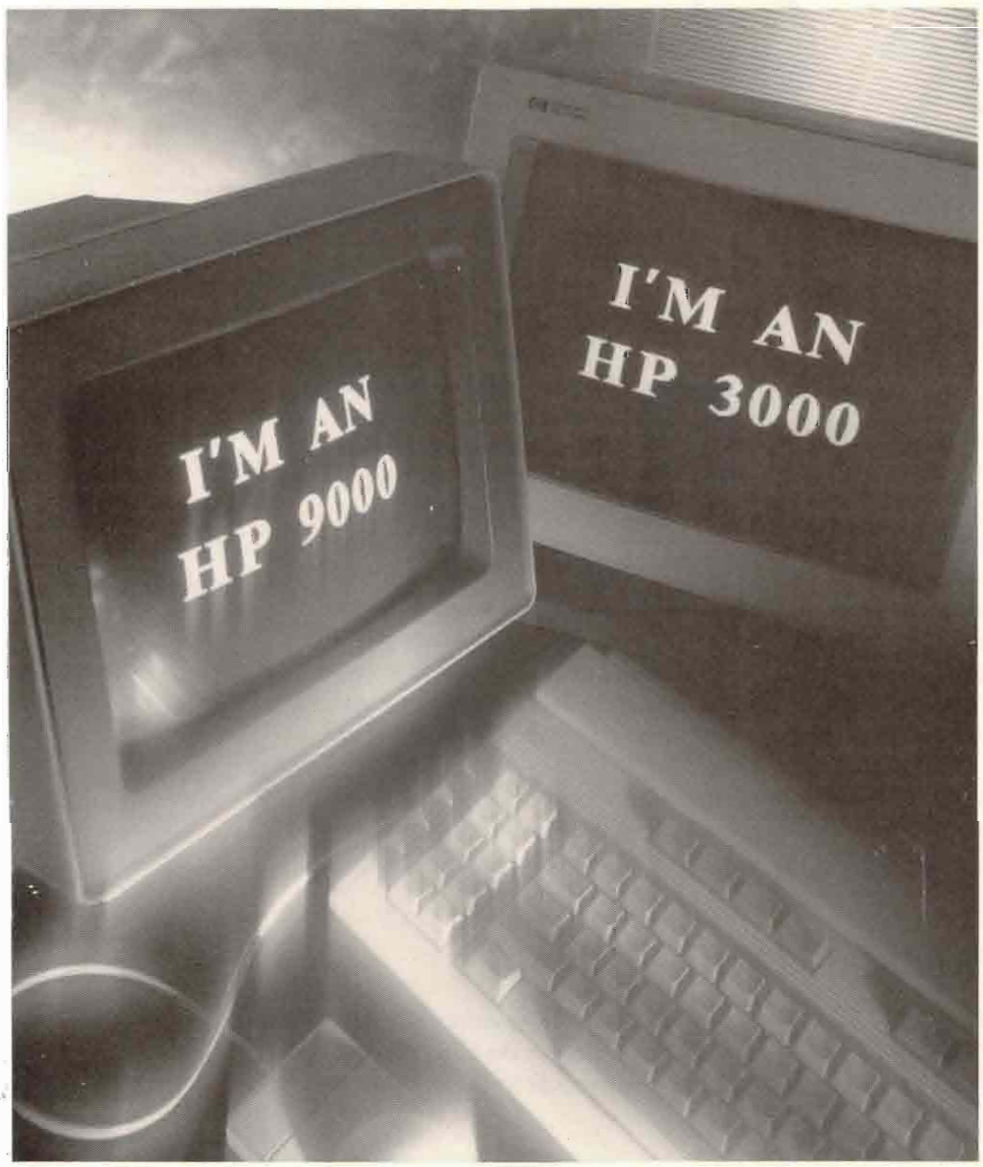

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Continuous Upgrading
The result is a network of PCs which can manipulate, store and exchange data more efficiently than ever before. And like all Hewlett-Packard products, you can be sure it will be continually improved and upgraded. In fact this advertisement is probably out of date already so for full details of the latest version of AdvanceLink call us now.
Please contact your nearest HP dealer or your nearest HP office.

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HEWLETT PACKARD

CIRCLE 237 ON READER CARD

First, Do Your Homework

Selecting A Maintenance Service Contract

[By Ron Levine]

Remember the days when you only had one company offering telephone service? If you wanted to open a checking account you went to a commercial bank? When you bought a computer system, service was provided by the manufacturer either on a contract or per call basis?

Well, things certainly have changed. Today, selecting a telephone service is not so simple. It now requires days to search out the numerous vendors and their offerings. Checking accounts can be opened at not only commercial banks, but at savings banks, savings & loan associations, credit unions and a host of other financial institutions. And, when it comes to computer maintenance services, the choices seem just as varied.

Gone is the simple, "Do you want contract or per-call service?" Here, instead, are various service choices, often with additional options and riders that can greatly affect your actual time-to-repair and up-time performance.

Servicing The Host Computer

WHEN DECIDING ON YOUR HP equipment service options, Hewlett-Packard or a third-party (independent) service firm are the likely choices, though a few users (those with capable in-house technical staffs) may

decide to go it alone. Your decision must bear in mind the type of coverage that best fits *your* situation: full-service, round-the-clock coverage; first- and second-shift maintenance; prime-time coverage only; two- or four-hour response time;

Additional software support on a 24-hour, seven-day-per-week basis also is available through the HP Response Center for the 3000 computer line.

or simply per call service with no monthly contract fees. Additional variations on these options also are available in most regions of the country. Basically, these are the choices that face the MIS responsible for purchasing equipment service.

From HP you can choose from three general contract service programs:

Standard Maintenance — Provides Monday through Friday coverage between 8 a.m. and 9 p.m. A maximum four-hour response time is guaranteed. (Note: Upgrades for additional coverage can be purchased under this program.)

Basic Maintenance — Provides next-day response, Monday through Friday between 8 a.m. and 5 p.m.

Guaranteed Up Time — HP's full-coverage service offering (24-hour, seven-day, four-hour response time). The customer is guaranteed 99 percent up time in any one-month period or a credit is received.

All HP maintenance service contracts include a remote support modem offering predictive support, preventive maintenance, automatic installation of engineering improvements and an account-assigned CE. All contract program offerings may not be available on all HP computer lines.

Additional software support on a 24-hour, seven-day-per-week basis also is available through the HP Response Center for the 3000 computer line. And HP has two field support offerings in place for the self-maintenance user: the Co-Op Support Service (which provides documentation of known problems and fixes and also updates information), and a non-contract Time & Materials service option. There's also a full network support maintenance services program available for LAN and WAN customers.

The standard warranty on HP systems is 90 days. During this time, on-site service is provided with a four-hour response time.

A number of independent maintenance and service providers also offer many of these types of service programs, variations of them or additional custom-designed service offerings to meet individual site needs.

Let's move out of the host HP equipment area and into the peripherals and networking arena. Here, service selection really becomes mind-boggling. HP and non-HP products may or may not be serviced by your host CEs. Yet, chances are it's here that most of your maintenance service will be required, and whoever services these products will offer a maze of options.

For example, with networking we're talking about PCs, workstations and terminals connected to the host computer. The maintenance service options available for them go from mail-in exchange to full on-site service arrangements and include everything in between.

PC, Workstation And Terminal Service Options

HP-COMPATIBLE NETWORKING stations are provided by many sources. Their servicing arrangements include a wide selection of options and therefore can be very confusing.

Though you can prevent many problems simply by keeping your machines clean, away from hazards (spills, etc.), and following the directions in the associated operator's manual, it's likely that sometime in the station's life it will need service. The following is a review of the most common types of service agreements available for this class of equipment. Other plans and agreements from service vendors are possible, but those listed here generally are available in most regions of the country and from manufacturers and/or independents on a national basis.

It isn't my intent to recommend one service provider over another, but simply to inform those responsible for purchasing services what is available, so the names of all maintenance and service organizations providing the data have been omitted.

Warranty Service

THE FIRST TYPE of service new equipment purchasers must be concerned about is warranty service. If a problem occurs with a PC, workstation or terminal during the warranty period, usually *you* must deliver the malfunctioning unit to the service center or dealer.

The manufacturer should provide at least a 90-day warranty on all system units. Dealers sometimes provide their own

extended warranty in addition to the manufacturers, commonly issued for periods of 120 days to six months from date of purchase.

Advantages: Equipment reliability backed and serviced — if needed — by the manufacturer.

Free service by dealer during extended warranty period.

Dealer usually is close by.

Disadvantages/Cautions: Dealer may not be capable of supplying the required service.

Extended warranty is only as good as dealer's reputation (dealer backed by whom, how long in business, likelihood of still being there when your machine needs his attention).

On-Site Service

VERY LARGE INSTALLATIONS, or those with 100 percent up-time requirements, may contract for on-site service. Few manufacturers of PCs, workstations or terminals provide this type of coverage themselves, but it's available from third-party sources.

On-site service agreements can be tailored to meet each customer's requirements, so no two may be exactly alike. Extremely large users have dedicated customer engineers on site. A typical standard service arrangement calls for full coverage from 8 a.m. to 5 p.m., on a five-day-per-week basis. This can be extended to include second and third shifts (24-hour on-site service). Seven-day, 24-hour coverage is also available, but costs dearly.

More typically, an on-site plan will be modified to include full coverage on a specified shift only, with the remaining shifts receiving on-call service. Another common modification of the on-site plan calls for full first-shift coverage, with preventive maintenance (PM) performed on the second shift.

Central Site Repair Agreement — This type of service contract works well with PCs, workstations and terminals. Service is provided on-site at one designated location within a company. All units needing maintenance or repair are brought there by the user.

District Field Service Agreement — In this "not always" on-site type of service, an assigned CE may maintain two to five accounts in the same area. These contracts should provide a guaranteed response time to a trouble call from the user. Typically, four hours is common. It may be reduced to two hours upon user request, with a corresponding increase in contract cost. This type of arrangement works very well for smaller sites that have some leeway on up-time requirements, but still want some type of on-site service.

Scheduled On-Site Visit Program — One OEM and one TPM service vendor we spoke to provide a special class of service to customers who have a large volume of PCs or workstations operating on the same site. An on-site visit each working day is made by a "resident" CE to ensure that all systems are working properly, to answer questions and to provide other service-related assistance. The various on-site service contracts available fill individual company needs by balancing service requirements versus affordable costs. Because each type can be customized and is aimed at a specific user need, we make no general advantage or disadvantage comparisons to the packages as a whole.

> A District Field Service Agreement provides a guaranteed response time to a trouble call.

Other Types Of Service Contracts

WHEN IT COMES TO PCs/workstations/terminals purchased at retail, there are many types of service agreements you can enter into with the computer dealer or a computer service company. The main ones are:

Coupon Plans — For a fee, you receive a booklet with coupons for PM (cleaning, routine service) and a specified amount for corrective maintenance (repairs and/or replacements). Each time service is performed, a coupon is removed. Once your service requirements exceed your coupon allowance, you are charged.

Yearly Service Plans — This is usually an unlimited service agreement for the length of the contract, commonly six months or one year. This contract also should include at least one free PM during the contract period.

All good coupon and yearly service plans will be for parts and labor, although *you* are usually responsible for getting the equipment to the professional at your expense. Labor-only contracts should be avoided because the cost of parts can be substantial.

Advantages: You've paid a flat fee for service for the length of your contract (or until your coupons are used up).

Service is less costly than on a per call basis.

No additional parts charges (a new computer board can be very expensive).

Replacement parts can be traded or loaned to you while yours are being repaired.

HICOMP-SOFTWARE IS SAVEWARE

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Hewlett-Packard recently acquired the worldwide rights, with unrestricted usage for their own company, to two advanced tools, HIBACK and DBTUNE from HI-COMP.

This partnership provided sufficient reason for Klaus Stamer, General Manager of Hewlett-Packard in North Germany (photo right) to personally present Uwe Hinrichs of HI-COMP Hinrichs GmbH with a special certificate.

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HICOMP SOFTWARE IS SAVEWARE

CIRCLE 116 ON READER CARD

> During the first year that you own your system, it's unlikely that any major repairs will be required . . .

Phone assistance often is given cheerfully to help you define and/or fix the problem.
Disadvantages: You've paid the fee whether or not you need the service.
Again, this is only as good as the service firm.

Per Call Repair — The system is serviced on an as-needed basis. This type is offered by most manufacturers, third-party firms, dealers and computer retail stores. They may provide for on-site service, or *you* may be required to bring or ship it to the dealer or service center when a problem occurs. Charges for labor are on an hourly basis (usually a minimum service charge is required); parts charges are additional.

Under the per call type of service, you have not entered into any contract and therefore, you aren't liable for any payments unless service is actually required. However, if a serious problem develops in your system, it will be more costly to fix than if you are covered by either a warranty or a service contract.
Advantages: Pay as you go — only if required.
You can switch repair firms if you are dissatisfied.
You can take your terminal to a firm specializing in that brand of terminal, etc.
Disadvantages: Costly if major repairs are needed.
Your equipment is given a lower priority than contract customers.

Express Mail-In Repair — Low-end products (i.e., PCs, workstations, terminals, etc.) many times can be serviced adequately via mail-in arrangements. The fastest of these stipulates that the vendor ships a new replacement part to the site within 24 to 48 hours after receiving the customer's request. The customer must return the failed part or unit within a specified time to avoid additional charges.
Return Mail-In Repair — This is the slowest form of repair service offered. No contracts are usually required. The user simply ships or carries in the problem unit. It is repaired and returned (via mail or personal pick-up). A turnaround time of five to 10 days after receipt of the failed unit is average. Sometimes units must be shipped across the country to the vendor's service depot, resulting in a door-to-door repair time of 15 days or more.
Advantages: None, except for cost, if local non-contract services are available.
Disadvantages: Time to repair.
You must determine the failing unit(s) to be shipped.
Damage can occur in shipping.
Shipping costs add to service costs.

Phone Assistance Only Service — Large companies with in-house technical ability may be able to cut service costs by opting for this service assistance program. While performing their own maintenance tasks, customers are able to call the service vendor for telephone assistance in troubleshooting and/or repairing malfunctions. This type of service arrangement, available for hardware and software, is much more dominant in the software, rather than hardware, support area.
Advantages: Extremely inexpensive and fast.
Disadvantages: Simply put: You're on your own.

Some Recommendations

MOST BRAND-NAME PCs, workstations and terminals have been engineered for long, reliable operation. During the first year that you own your system, it's unlikely that any major repairs will be required (break-in problems, if any, usually show up well within the warranty period). Therefore, a service contract probably isn't necessary for most sites where a "downed" station on the network isn't fatal, because its cost is likely to exceed use.

Unless the station is used heavily on a daily basis, the second and third years also are usually relatively free from any major maintenance costs. After the third year, the reliability and dependability of your system depends on how well you've cared for it.

MIS and DP managers at each site must take into consideration the amount of protection desired versus the cost of obtaining that protection. A site having an almost 100 percent critical up-time requirement will have to spend the extra money to insure the availability of full, on-site service, while a site with less critical service requirements can save 35 percent and more in service costs by opting for a mail-in agreement versus four-hour response time service.

Generally, each increase in contract hour response time corresponds to a decrease in cost, thus allowing service users to select both the service and cost level appropriate to meet their needs.

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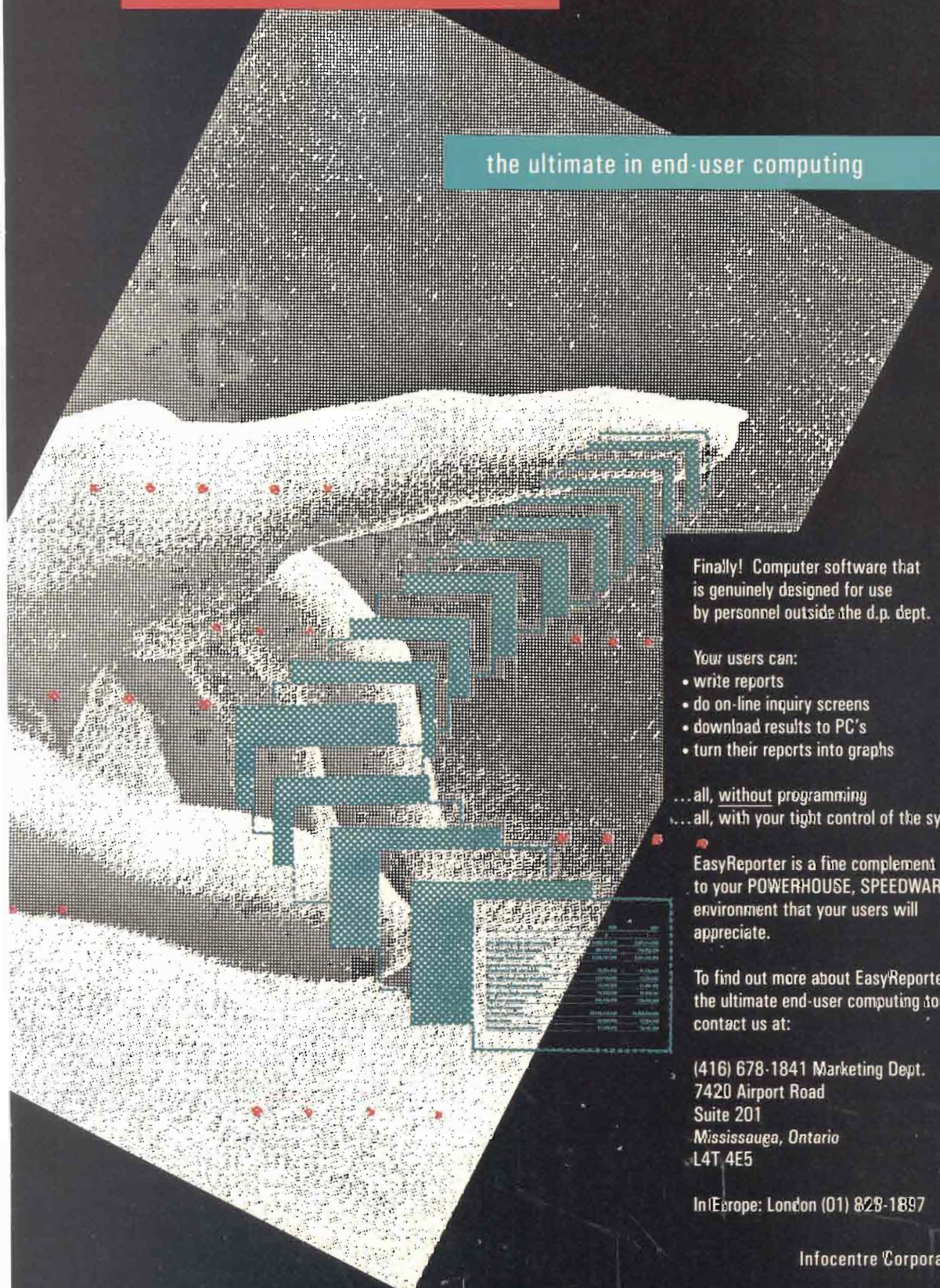

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Customer Education The HP Way

The Unique Style Of The Customer Education Center

At HP, training is viewed as an extension of customer service. There is a synergism between the system engineers who answer customer calls for product support and the instructors who train customers in the same products. Many of the instructors began their HP careers as systems engineers and some split their time between teaching and solving customer problems at the response center. The employees who have split assignments usually teach specialty and advanced courses.

Instructors teaching scheduled classes at all U.S. training sites follow a uniform curriculum written by course developers at the Application Support Division or one of the product divisions. This division was formed in 1986 when HP decided to extend its course offerings to reach different types of users. Until this division was formed, most customer training only focused on teaching people how to use products, but training specialists at HP realized that there are aspects of training that go beyond product knowledge.

Introductory courses such as Computers for System Operators, and Data Communications and Structured Analysis and Design, teach technological concepts rather than specifics of a system or a software product. Other courses aimed at management level employees cover the business aspects of incorporating new products into an organization.

All 10 HP centers in the U.S. offer classes in the areas that HP refers to as its core curriculum. Some of the core curriculum areas are Business Systems and Office Applications for HP 3000 systems, HP-UX for HP 9000 systems, Technical Computing for the HP 1000 and Test and Measurement for network analyzers, controllers and other instruments. Most of the education centers also offer some specialty courses. HP has tried to locate the specialty courses at sites where demand would be highest; for example, the manufacturing courses are offered from the center near Detroit and financial courses are offered in Chicago. The map in *Figure 1* shows which centers offer various specialty courses.

Just as preparation for course content begins long before the instructor enters the classroom, the customer service aspect of training begins long before the customers arrive at the training center or the instructor gets to the customer site. A customer's first experience with HP Customer Education can be with the sales rep who quotes a price for training along with other costs associated with a new system. When a customer purchases sophisticated test and measurement equipment, such as a Network Analyzer System, the equipment comes bundled with credits to allow two employees to enroll in the training for no additional charge. In cases where a system engineer installs a newly purchased system, he may talk to the employees who will use the system in order to help them select the appropriate level of training and to decide who needs it.

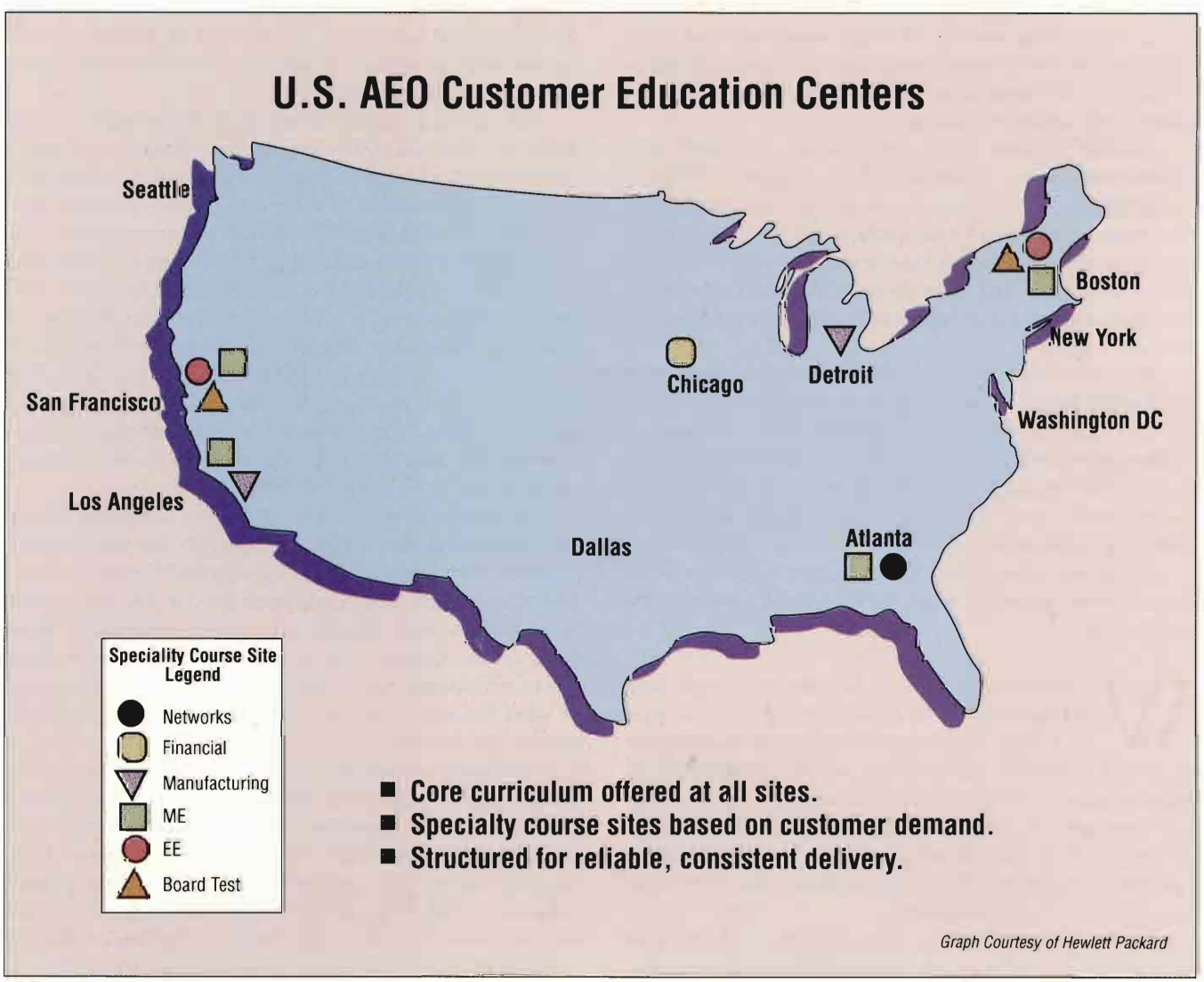
[BY PEGGY KING]

Any sales rep will tell you it's easiest to sell training at the time a product is purchased because the additional cost appears as a small line item on a large purchase order. However, the need for additional training arises, employees and managers often have a difficult time justifying the expense of the course, the travel, the per diems and the time away from work.

Good instructor-led training is expensive to develop and deliver, and the prices reflect the costs of maintaining a low student/instructor ratio, producing first-rate materials, providing enough equipment for each trainee to get plenty of hands-on experience and equipping classrooms with teaching aids, such as data projectors that allow students to see a magnified image of the instructor's screen, and HP LaserROM devises for electronic access to product documentation. Prices for scheduled classes range from $300 to $360 for a one-day course to between $1,150 and $2,000 for a five-day class. Hardware maintenance courses generally are the most expensive.

The marketing department for HP training has devised a way to help employees justify the cost of courses to their supervisors. The department is in the process of publishing a series of brochures entitled "Maximize Your Training Dollars." The two brochures already available (one for the design center classes and another for test and measurement education) have an inside page that describes how to do a cost/benefit analysis of training by estimating the number of hours it would take for the employees to learn the material by themselves and multiplying the hours they'd spend training themselves by the loaded hourly labor rate (the price a company pays for the employee). The cost is then compared to the cost of the course plus travel expenses.

On the adjoining page of the brochure there are several copies of a Savings Analysis Worksheet. Employees who fill in the worksheet are likely to conclude that taking a training class actually will cost the company less than the loss of pro-



Graph Courtesy of Hewlett Packard

ductivity that would result from their attempts to train themselves.

The people who facilitate, deliver and evaluate customer training showed me a side of training I could not have learned from the brochures or course descriptions. I spoke with four HP customer education employees who have direct contact with customers and each one of them described their responsibilities in terms of how they served the customer.

Customers who live west of El Paso can call a toll free number to enroll in classes. When they do, chances are one in three that they will talk to registrar Brooke Sanders. Sanders explained that her job requires her to be familiar with all the scheduled courses and knowledgeable about the entire HP product line. Frequently, customers who call the 800 number have questions about products and services other than training, and Sanders refers them to the division or sales office that can answer them or does some research before calling the customer back.

Another of the registrar's responsibilities is to gather leads for on-site training courses. HP offers on-site training in instances where six or more people wish to receive training in a course at the same time or when the company prefers customized employee training.

Because Sanders is the first contact, she determines whether the on-site option would be appropriate. When a customer calls to enroll a group of people or mentions that the person being trained subsequently will be training other employees, she explains how on-site training works, estimates what it would cost and helps the customer evaluate whether having an instructor come to the customer site would suit the company's needs.

When the customer's business is located far enough from the training center to require lodging and air travel, it frequently costs less to bring the instructor to the company or business provided that there are adequate facilities and equipment for the training. If on-site education is a possibility, Sanders makes notes so that she can refer the lead to the marketing department.

If Sanders believes there's a good match between what the customer needs and what the HP course provides, she enrolls them.

WHEN CUSTOMERS HAVE TO travel to courses, there are bound to be mishaps along the way, and part of Cindy Charles' job as the education center supervisor is to minimize the effects of these disruptions. If the plane is late or there's no rental car available, Charles will make arrangements for the customers to get a ride to the site and confirm their hotel reservations while they're in training. Customers who have trouble finding hotels near the education center can receive assistance.

The other side of Charles' responsibilities is to support the instructors. "I make sure the equipment is set up and working and that the configuration of classroom furniture is right for what is being taught. When an instructor gets to the class, he or she should be able to concentrate on teaching because I have handled the administrative details."

There are 70 full-time instructors teaching in HP's U.S. customer education centers. Some companies emphasize teaching skills rather than content knowledge when they look for instructors. At HP, however, the instructor's technical background is the most important consideration. Among the candidates with proven expertise in their subject matter, HP selects instructors with excellent people skills. Because most of HP's courses devote between 50 and 60 percent of class time to labs, an instructor must be effective working with trainees on a one-to-one basis.

Two such instructors who teach courses on the HP 3000 are John Moore at the Seattle (Bellevue) center and Michele Dingerson at Mayfield (Mountain View, CA). Dingerson learned MPE/XL before the Series 930 was released and has experience as a course developer, and Moore spent six years working on HP equipment. He summed up his two years as an instructor by saying, "Never have I worked harder or gotten more satisfaction from a job."

HP customer education instructors always begin a course by having members of the class introduce themselves, describe their background in the subject and tell what they hope to gain from taking the course. If these introductory remarks leave the instructor with questions about whether or not the class is appropriate for someone enrolled in the class, he will declare a break before beginning the instruction and use the time to talk with that person. If it turns out that the student isn't at the required level, the instructor can give him the option of leaving and receiving a full refund from HP or of spending extra time with him to make sure they're keeping up with the course. Most students choose the second option and instructors take the extra steps to insure that even the less prepared students can profit from the course.

At the end of the course, HP has the customers fill out an evaluation as most training vendors do, but the company goes one step beyond by having instructors evaluate every course they teach. The Application Support Division, (ASD) keeps files of every student and instructor evaluation from every course. Course developers at ASD have access to both sets of evaluations so that they can get a more complete view of what features of the course content or delivery methods need to be changed.

The student evaluation form asks customers to rate the course contents, the labs or exercises, the instructor, and the training facility and its personnel. The last set of questions asks them to give their overall impressions of the course. Each category has room for comments. Instructors encourage participants to write comments about anything they'd like to see changed about the course. The Instructor Feedback Form has even more space for comments than the customer form does,

and the largest space is left for the instructor to tell what suggestions they have after having taught the course.

Dingerson doesn't believe in exceeding the allotted time for training because she feels that a full day of training makes most people too overloaded to absorb any additional instruction. By contrast, Moore describes himself as willing to come in early, work late and take a working lunch if there are students who wish to grab a quick sandwich and keep going so they have time to ask questions or go beyond the concepts presented in lab and lecture. But both instructors believe in ending promptly on the last day of class, because by then the out-of-towners are scrambling to catch planes and almost everyone is exhausted.

When they're asked what makes HP customer training unique, instructors and members of the Applications Support Divisions will point to the high ratio of labs to lecture, the comprehensive testing and metrics applied to each course, the thorough technical background of the instructors or the well-equipped facilities. But I feel that they take for granted one of the most important differences between coming to a course at HP and taking training from another large vendor. Customers have the same privileges in the building as employees do.

When I've attended courses at other companies, the trainees always were separated from other employees. At Digital, for example, I took a course at a building where there was a separate entrance for trainees and a sign reminding non-employees not to enter the rest of the building. At other companies, lunches usually were brought in to the training room and on one day the instructor would take the class to a restaurant, but there was never an opportunity to mix with the employees.

AT THE MAYFIELD CUSTOMER Education Center, the visitor badge that customers wear gives them access to the entire first floor of the facility. They can see employees on a typical business day as they walk to and from the classroom on breaks. At lunch time they have the same options that an employee does. They can sit down to lunch alongside employees they don't know (or eat with employees they do know), or they can grab a quick sandwich and rush back to the classroom to ask the instructor a question about the lecture or lab. During their course, customers may have a guest visit from a Response Center Systems Engineer that the instructor has invited to present a different perspective on the course material. As John Moore puts it, "we treat training customers as part of the family."

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CIRCLE 139 ON READER CARD

HP Is Focusing On User Needs

TECHNICAL DOCUMENTATION

[BY MIKE CARL]

How many times have you heard corporate executives say, "We can't continue to do business in the same old way."? Well, for those of us in the computer industry, it's time to take heed. What these industry executives have known for some time now is that computers and their related products must not only be engineering driven, but user driven as well. In other words, a new chip design shouldn't always lead a product to market.

It's been said by companies that didn't make the grade in the digital arena, "We didn't understand the end user." One case of user neglect was related by Don Herman, chairman of UNIX International. While leading Comten, a hardware firm, Herman learned that the customer's interest always comes first. He admitted once that Comten came close to folding within three years of its founding because it didn't pay enough attention to customer needs. Comten then refocused on the user, Herman said, consequently improving both its image with customers and its financial position. He added that some of Comten's competitors, on the other hand, were less successful because of their disregard of customer needs.

"Some failed because they developed a product that was intended to benefit themselves more than it benefited their customers," Herman said.

Take the case of proprietary technology applied to computer hardware and operating systems. By proprietary technology I mean a computer system that only works with hardware and software produced by the original manufacturer and commonly aids a manufacturer's bottom line more rather than their customers' needs. Almost every major vendor offers

> A key ingredient in the evolution of customer education at HP has been the growing technical sophistication of its educators.

a product-line based on proprietary hardware and to a lesser extent, proprietary software.

As users turn to multivendor solutions and look for ways to protect their software investments, proprietary computer systems carry a stigma similar to Sony's Beta System. To avoid this stigma and meet their customer's preference for open and standard systems, companies such as Hewlett-Packard are quickly organizing standard bodies such as the Open Software Foundation (OSF) and the Extended Industry Standard Architecture (EISA).

Also witness the increased push within the industry to develop and market products that target users who are not highly versed with an operating system or software application, coupled with the proliferation of user interfaces that are characterized by pop-up menus, icons representing file systems and executable programs, windows and pointing devices.

Pop-up menus don't always guarantee interaction will be easier or even appealing. However, designed correctly, users who are unfamiliar with a system, command syntax, or need help structuring their task, can find menu selection systems effective.

The pictorial symbols or icons of filing cabinets, drawers, folders and documents are a identifiable hierarchy for storing information that is standard for paper documents and is emerging as the standard for online documents. For carrying out independent tasks (e.g., leaving your word processor to read a mail message) or viewing information in a hierarchical fashion, a windowing system is a must. Direct manipulation of text and graphics with a pointing device such as a mouse frees the user from having to learn commands, reduces the chance of typographic errors and keeps the user's attention on the display. Consequently, users benefit from faster performance, fewer errors, easier learning and greater satisfaction.

Compare the above advances with the protocol of interaction demanded of users in the past. Using most computers required arcane knowledge of specific and unforgiving commands. When programming was necessary, the user was faced with learning the complex constructs and syntax of an accepted programming language. In short, computer systems were designed by engineers with cost and performance in mind, not for natural usage by ordinary people. When turning for help, the user faced the burdensome task of finding the correct reference from the volumes of manuals shipped with the system, and then reading through manuals that were commonly created as an isolated, last stage of the product development. Unless you were the type who enjoyed bootstrapping the system with the panel switches in octal, using a computer was, for most people, difficult and often frustrating.

Such was the nature of the beast until some companies began selling large numbers of computer systems and software applications that required less time to learn and were more intuitive to use. The computer industry is waking up to the fact that users want to spend less time learning and more time being productive with their machines. When you think about it, the user's view of a computer is strictly limited by what they enter into it and what they get out of it. What goes on behind the scenes can be appreciated, but in most cases it doesn't need to be understood in any detail. So, why expose the user to the inherent complexity of the machine when tools are available to mask it?

The Changing Role Of The Educator

HEWLETT-PACKARD IS listening to its users and promoting products that are easier to learn and use. The results can be found not only in the end-products, but also in the segment of HP's workforce most aware of the user's need for less complicated and easy-to-learn products, the educators and technical writers. HP has formally titled them Learning Products Engineers (LPEs).

Product development is motivated out of a perceived need by potential customers. The engineers, usually with cost and performance in mind, build the product for potential customers to help them reach their goal. Once armed with the product, it's the educators responsibility as to whether the customers meet their goals with little or no difficultly, or with more gray hair. It's the educator who must have empathy for the customer and view the use of the product from the customers standpoint. A solid understanding of the end user helps the educator ease the learning curve for the student. At HP, LPEs are becoming specialists in user needs and perspectives, and are addressing those needs in print, on-line, or by whatever media is required. LPEs view the product not from the technology "out," but from over the user's shoulder "in."

A key ingredient in the evolution of customer education at HP has been the growing technical sophistication of its educators. If educators are to become contributing members

of project teams and aid in the design and development of the product, it's essential they understand the technical issues. More so than ever, educators must interact comfortably with hardware and software engineers on issues that effect not only documentation, but also system design as it pertains to the user's needs. The ready solution of hiring a computer scientist or electrical engineer as an educator may appear to be the remedy, but is it? The catch to added technical sophistication for the educator isn't emphasizing technical training to the point of losing the user perspective and communication skill.

Early Participation

LPEs ARE PARTICIPATING in the investigation stage (the first stage of the product development cycle) of a new product. At HP, it's common for an LPE to be drafting documents and course material for a product that doesn't yet exist. The LPE's involvement, however, didn't happen by accident. Process planners at HP wanted to guarantee the LPEs got involved in each stage of the product's development by defining criteria for documentation and training to satisfy before the product could move to the next stage of development.

For example, before a product can progress from the "investigation phase" to the "lab phase," a Learning Products Plan must be drafted containing a profile of the target user and a complete analysis of the tasks the user will do with the product. As experts in users' perceptives and needs, LPEs wear the hat of "user advocate" throughout the stages of a product's life.

Compare the above approach with the earlier approach of introducing documentation and training into the product development at the last possible instance. While in a "hurry-up offense," educators had no time to give their insights, test for the product's usability (i.e., can the product be easily used by the intended customer), or recommend changes to the product to better provide the user with what he or she wanted.

Testing The Product's Usability

AN ADDITIONAL ADVANTAGE to early involvement of an LPE in product development is the opportunity for usability testing. This testing asks a first-time user to do a set of tasks with the new product and allows the LPE to observe the user's interaction with the tools in completing the tasks. The ultimate results of usability testing are adjustments not only to the documentation but to the design of the product as well.

If a usability test finds the level of user support (i.e., documentation, help screens, phone consultation) not enough for the test subjects to complete the task, the problem may not lie with the documentation and support effort. Bad design philosophy, high expectations of the user's skill level, or not anticipating the demands of the task in a real world environment are often the shortcomings. Early testing helps determine what the user really wants, needs, or expects, and this knowledge can be brought to light before the product goes out the factory door or incorporated into the next release.

During the usability testing of The Portable (HP's laptop PC), for example, LPEs found that some help screens that were displayed by pressing a function key didn't state clearly how to get out of the help screen. One help screen set, consisting of several screens, didn't tell the user how to exit until the fourth screen. The software engineers listened to the reviewer's comments about the design problem. The Portable PLUS, developed after The Portable, also uses help screens but the first screen of every help screen set clearly tells the user how to exit.

As I mentioned earlier, the computer industry is pouring a lot of R&D dollars into improving the user interface to their products. HP recognizes that getting LPEs involved in the user interface research and design is a natural extension of their current responsibilities, as well as a smart investment of their time. It's the educator who looks at the product through the user's eyes and has much to contribute on man/machine interaction. Specifically, as usability testing impacts more on design issues, it's far more elegant to incorporate the necessary help or user support implicitly in the design rather than to provide it explicitly through documentation or increase consultation.

For example, a usability test might show that a certain pop-up menu is difficult to use. Maybe it's difficult to understand the linear list of choices as representing directional alternatives. One solution might be to allow the user to pick the menu, hit a "help" key and receive information on how to use the menu, with definitions of the choices. A better solution, however, would be to redesign the menu so that the directional alternatives were physically represented in the shape of the menu. The distinction between user interface design and documentation becomes unclear in the above scenario.

Online Help

THE INCREASING USE of computer systems as the primary device for delivering documentation has acted as a catalyst for improvements in online documentation and help systems. The latest development in help systems is using what is called "context sensitive help." With this approach the system tracks the context in which an error occurs

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Hypertext, at its most basic level, is a DBMS that lets you connect or access screens of information using associative links.

and provides instructions relevant to that context. A good implementation also notices what command the user was trying to execute and presents specific information about the command. If an error message has just been received, the system knows this and makes constructive suggestions.

To round out a complete online documentation system and to provide the user with information about the whole system, the entire set of reference manuals should be placed online. In the past, the drawbacks to such an idea were that the material consumed too much of the system's disc space (this is especially true of PCs and laptops) and the interfaces to the information were too restrictive (i.e., you could only get information, if you knew the command name). Now, with the introduction of Compact Disc-Read Only Memory (CD-ROM), the systems developers and end users have an affordable media for storing the equivalent of hundreds of thousands of pages of valuable information. (One CD can store up to 200,000 pages of text — the equivalent of 1,500 floppy discs, 25 linear feet of shelf space, or almost eight meters of printed information.) HP's implementation of this technology not only gives the user access to the complete set of system documentation, but permits information to be searched for on any key word(s) or logical combinations of key words.

Hypertext

THE FRONT-END to mass online documentation has been greatly enhanced with the advent of hypertext. Hypertext, at its most basic level, is a DBMS that lets you connect or access screens of information using associative links. Hypertext systems created primarily for browsing online documentation feature clear, understandable screen displays for presenting information, easy-to-operate browsing commands for perusing the information and push-of-a-button access to cross references or notes. One such system, developed by HP's Advanced Manufacturing Systems Operation, formats daily service bulletins and troubleshooting information on Ford automobiles into a hypertext system for access by mechanics.

While only in its research phase, LPEs are evaluating the possibility of applying techniques learned in the development of expert systems to the area of user support (e.g., creating question and answer databases for troubleshooting system problems). The skills of an educator: Taking complex processes and breaking them down into discrete components, organizing those components into logical sequences and understanding the nature of problem solving also are essential skills in knowledge-based systems engineering. After all, expert systems that advise, help troubleshoot and help diagnose are documentation.

Many LPEs already deliver their documentation through the computer system; expert systems simply take online documentation one step beyond.

Expectations For The Future

WHAT CAN USERS of HP systems look forward to? Joel Birnbaum, director of HP's Information Architecture Group, may have envisioned the answer when he wrote in an article, "Toward the Domestication of Microelectronics":

"Software must be designed to optimize not the way machines work, but the way that people think, and we can go a long way even with our present machines. Integrated programming environments are beginning to mask details from the user and to provide consistent access to services; natural language, touch screens and speech are being combined to replace and augment the formalized keyboard interaction. In the new world of domesticated computers, slow, surly, uncooperative software will not survive. I believe that as we enter the fourth stage of computer technology, the successful companies will be the ones that recognize that in a rapidly expanding industry most of the users are beginners. The cumbersome instruction manuals and training classes of today must give way to an intuitive form of learning by doing the things that seen natural."

The end users, along with the industry educators, will provide much of the momentum to the change. —*Mike Carl is a Learning Products Engineer for Hewlett-Packard's Workstation Group in Sunnyvale, CA. He currently develops documentation and customer education for the HP-UX operating system.*

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– Don Seuferal, Corporate Controller, Spalding Sports Worldwide

Sporting goods manufacturer Spalding had been using both a Series 70 system and a Series 58 system from HP. But as the company experienced double-digit annual growth, large-scale data processing began to take longer and longer. The result? A bottleneck that kept end-users from accessing the system.

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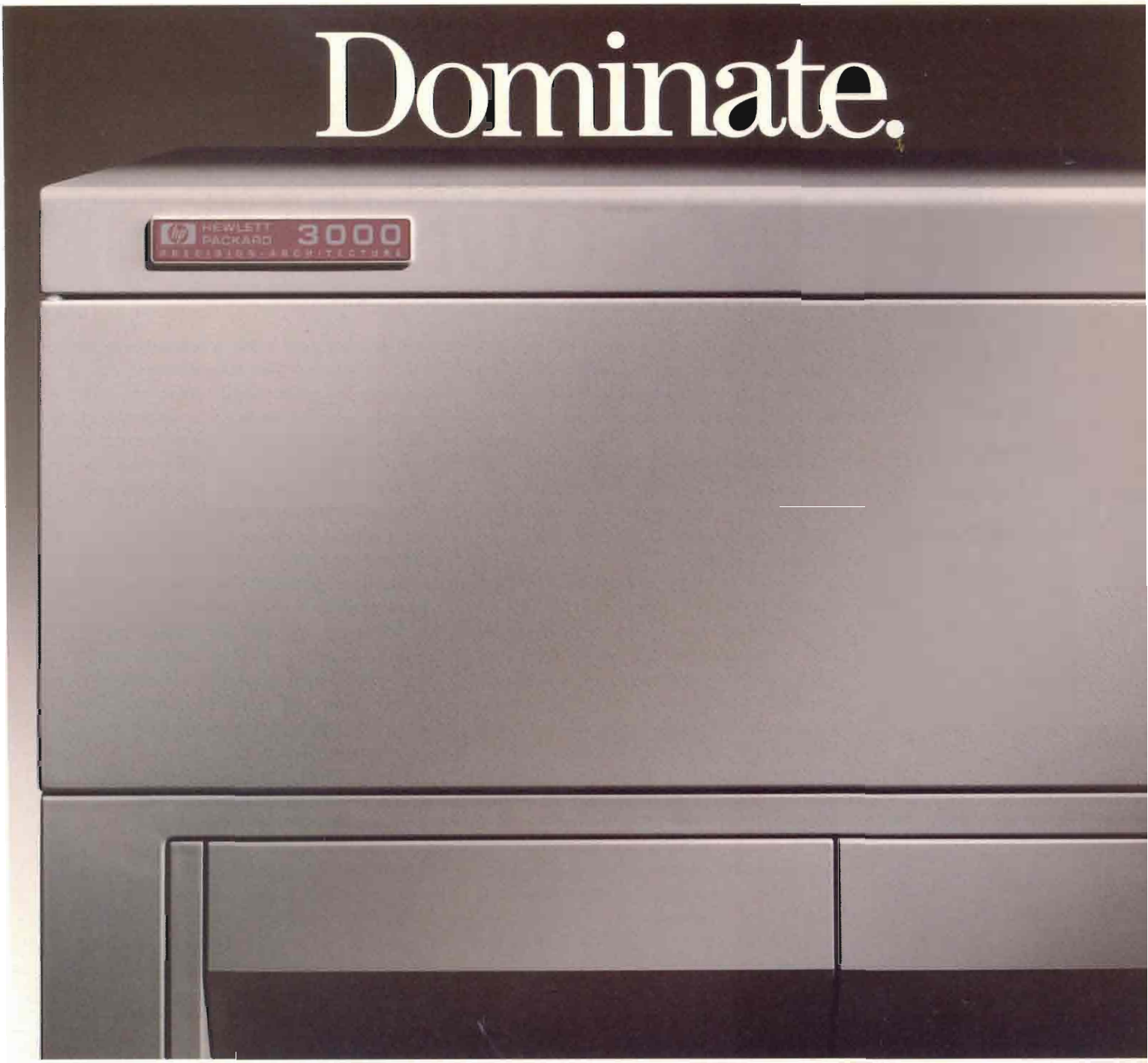

"Since our HP 3000 Precision Architecture system was installed, our claims entry is at a record high, and our claims backlog is at a record low. It's a very nice position to be in."

—Richard Villari, Vice President, Community Blue

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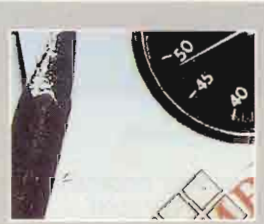
TRANSACTION ACCOUNTING

A Non-Technical Approach To Performance Analysis



PERFORMANCE

Larry Kemp

Transaction accounting represents an intuitive approach to analyzing the performance of a computer system. This approach considers that the performance a computer system delivers is a function of the workload requested. Because the workload is controllable and predictable, this approach allows useful conclusions to be drawn regarding system capacity, problem diagnosis, application tuning and workload scheduling.

By contrast, most of the traditional tools analyze internal measurements. While the analysis of I/O rates, memory management clock cycles and so forth are important in tuning an operating system (or perhaps in determining which hardware to buy next), these measurements are at best indirect indicators of how an application is performing.

The transaction accounting approach analyzes external performance factors in the following relationship: Response time is a function of transaction rate, transaction mix and resource consumption per transaction.

This relationship is generically referred to as the closed system model. A simplified way of explaining this relationship is that the performance delivered is a function of the workload requested.

The instrumentation required for transaction accounting is a log of all application work. For interactive workloads, this means logging each transaction. As applied to batch, this means logging each program that executes in batch. In both cases, the log must contain the name of the transaction, the time the transaction began and ended and the resources required.

This type of analysis is not new. Early batch systems used a job accounting log to analyze workload. This information is available from the system logfile under the MPE operating system. Obtaining the same type of information about transaction processing is not as simple, because MPE allows various definitions of a transaction. For Vplus programs, the definition is simple: A transaction can be defined as the name of the form that is used to converse at a block mode terminal. For character mode applications, manual instrumentation may be required.

There are many levels of analysis possible given an application log: historical trending of throughput and resource consumption, response time and resource consumption analysis by transaction type and transaction consistency analysis.

These types of analyses allow the performance analyst to distinguish between overcommitted hardware resources versus application inefficiencies. For example, the presence of a single resource-intensive transaction during a period of slow response time may indicate an application inefficiency, while a transaction mix with uniform resource requirements probably will indicate overconsumption of hardware resources.

These analyses allow the system administrator to correct inefficiencies before users recognize them as problems. For instance, a transaction with a high degree of variability in resource consumption can be identified just as well on a little-utilized system as on a system that is highly utilized.

Early in the life of an application, before the system is loaded, a transaction inefficiency can be identified and corrected. This can take place before the transaction produces slow response times on a fully loaded system.

While the transaction accounting ap-

proach is useful in identifying sources of system and application bottlenecks, it does not necessarily result in identifying solutions to performance problems.

For instance, while a transaction can be identified as being resource-intensive, the identification of the transaction itself does point to *why* the transaction is resource-intensive, nor is there necessarily an indication of how to make the transaction less resource-intensive. The intent of this type of analysis is that once a problem is identified, additional steps (such as looking at database activity or program logic) can be taken.

The Service Contract

For several years now, large mainframe organizations have provided its users with a service contract — a formal agreement that response times will be within an acceptable range. A common measurement is "90 percent of responses to be less than *n* seconds," where *n* is two or three seconds depending upon the application.

HP 3000 shops have had a similar attitude in their desire to provide good service to users. The fundamental difference, however, is that the service contract requires objective rather than subjective measurements. Success for the service contract organization is measured as response times meeting a goal, rather than the absence of complaints. In effect, quantitative measurement allows an organization to determine when it succeeded; without quantitative measurement an organization only knows when it has failed.

There are two characteristics of response time: average response time and consistency. Both of these components are represented in the 90 percent formula. A similar type of analysis can be made, however, using average response time and standard deviation.

HP 3000 applications differ from traditional mainframe applications in that the HP 3000 applications tend not to be "pure" transaction-processing applications. While most transactions on the HP 3000 are of the short variety, there usually are a few long duration transactions. Online extracting and reporting, for example, commonly are performed from a terminal.

The MPE scheduler does a good job of identifying and prioritizing long versus short transactions, so long transactions normally should not have an adverse affect on the system. Long transactions, however, should be identified by the performance analyst and excluded from any service contract goals.

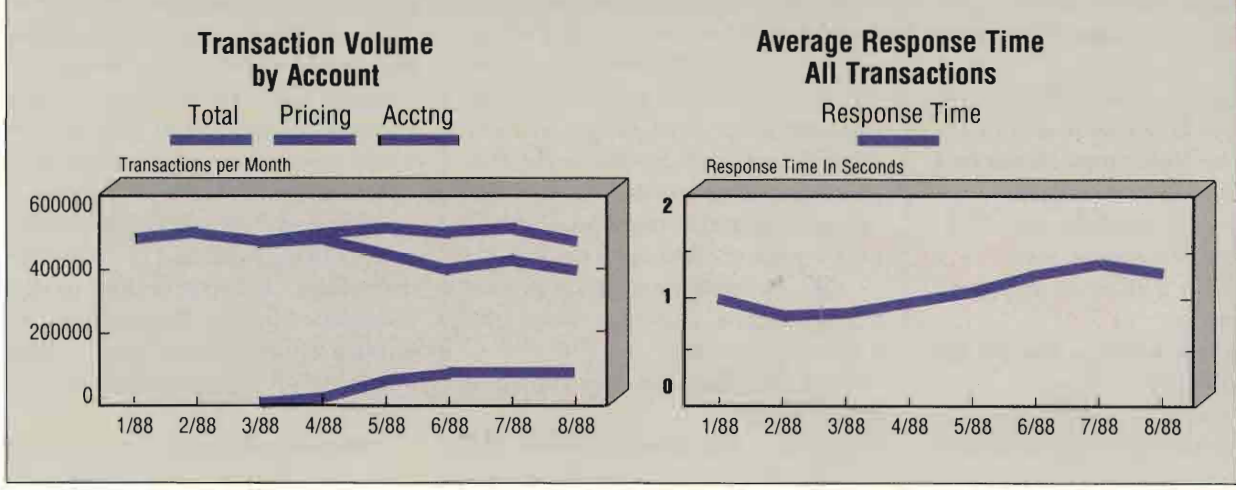
An alternative to manually identifying long transactions is to amend the service contract to consider only transactions that use less than a specified amount of hardware resources. This type of restriction somewhat begs the performance question; and besides, the user is not necessarily in control of his own application.

My preference is manual identification. This is not a difficult task: A report of transactions, sorted by average resource use per transaction, will give a good starting point for the analysis.

Case Study No. 1: Historical Analysis

The most obvious form of transaction accounting is the analysis of raw numbers of transactions executed and resources used over time. In the most simple analysis, this information can be used to identify increases or changes in the amount of work requested of the system. At least, this information can be used to explain whether aberrations in response are because of greater than normal workload, or system problems. In its best use, this information is useful

FIGURE 1



An analysis of raw numbers of transactions executed and resources used over time.

in planning for system growth.

These numbers are represented best in summary form which, depending on the amount of history to be analyzed, can be transactions per day, week or month. Ideally, this data is represented by application group. In the HP 3000 environment, an application group easily is defined as an account.

. . . performance delivered is a function of the workload requested.

An example of this type of analysis is shown in *Figure 1*. It shows an overall slight decrease in the number of transactions, but a significant increase in the number of transactions from the workload group PRICING. In this case, the workload generated by PRICING was responsible for a significant drain on the system, increasing response times, thereby decreasing the total volume of transactions. A deeper level of analysis would focus on the specific workload of the PRICING application.

This type of analysis also is useful for answering a significantly larger set of questions:

- What is the current response time and how much does it vary?
- Is a perceived change in response time real?
- Is a change in response time caused by an increase in raw numbers of transactions or by higher resource use by a similar number of transactions?
- Did a change in either an application or hardware component result in a change in either transaction volume or response time?
- How much of a system does an application consume?

These questions and more can be answered by looking at the following data: response times over time, summarized response times, transaction throughput by application over time, summarized transaction throughput by application, resource utilization by application over time and summarized resource utilization by application over time.

Case Study No. 2: Transaction Identification

The ideal transaction processing environment would have a mix of equal or at least similar length transactions. Similar size transactions would simplify the closed system analysis, because deviations in response time would be tied strictly to changes in the incoming transaction rate.

Similar size transactions also would assure uniform and consistent response times given a stable workload.

In practice, most successful transactions are similar in size. Successful transactions are those that are processed to completion; that is, they pass syntactical and database edits and do indeed process data.

The identification of workload per successful transaction is useful in determining which transactions are not similar. The presence of high-volume transactions, which have very high resource utilization, may indicate an application bottleneck. And the absence of great variation indicates a healthy application.

Figure 2 gives an example of transaction identification. It shows that the transaction ZX0000_00_0C uses considerably more processor time per transaction than other transactions. Further analysis showed that this transaction was present during periods of poor response time. Even deeper analysis showed that each invocation of this transaction caused six database opens to occur. Tuning this transaction would have a positive effect upon the system.

The identification of processor time per transaction also can answer the following questions:

- What are the resource-intensive transactions?
- Is there a correlation between the presence of resource-intensive transactions and periods of poor response time?
- What is the correlation between resource-intensive transactions and high-volume transactions?
- Did a change in the system hardware, operating system or application code result in a change in the resource requirements per transaction?

It may seem more obvious to look at response time per transaction rather than resource requirements per transaction. In general, response times would lead to the same conclusion.

Resource use per transaction actually is a better measure, because it takes into account the fact that response time includes not only the time to process a target transaction, but also the time waiting for other processes to relinquish resources. On loaded systems, one poor transaction may cause all transactions to suffer.

Case Study No. 3: Transaction Consistency

Another dimension of measuring transaction consistency is to examine the variation in resource requirements for different executions of the same transaction type. Given that the analysis is made upon complete (error-free) transactions only, there should be very little variance.

Because the application code is the same between all invocations of a transaction, variations in resource requirements commonly are because of physical database dynamics. For instance, a retrieval of a primary key in an Image database requires less processor time than retrieval of a secondary key, although both operations are invoked via the same application code. As you would expect, some amount of variation is normal.

The examination of variation can be used to identify database or system abnormalities. One example that I recall is a database that contained orders by account number, where the average number of orders per account was less than 50.

However, all over-the-counter cash sales were assigned a single account

FIGURE 2

Vplus Transactions sorted by CPU per Transaction

Formfile	Formname	Trans	Mean Response	Mean CPU/Tran
ZX0000F	ZX0000_00_0C	17	16.2	1.39
ZX0000F	BM1620_01_1A	2	.91	0.69
PS0000F	PS0000_03_1A	10	1.89	0.55
ZX00002	SD3001_04_2A	14	1.28	0.55
ZX0000F	GA1100_03_0C	2	2.47	0.53
PS0000F	PS0000_02_1A	10	2.09	0.51
PS0000F	PS0900_01_0A	2	8.03	0.49
ZX0000F	BM1630_01_1A	1	17.31	0.46
ZX00002	SM400X_01_2A	164	1.73	0.45
PS0000F	PS0000_04_1A	4	2.18	0.44
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.

ZX0000_00_0C uses more processor time per transaction than other transactions.

FIGURE 3

Transaction Consistency Analysis
Sorted by Ratio of Standard Deviation to Mean

Formfile	Formname	Trans	Mean	Max	StdDev
PS0000F	PS1000_00_1A	3	0.02	0.06	0.04
ZX0000F	BM3000_02_1B	19	0.10	0.35	0.18
ZX0000F	MM2100_01_1A	19	0.16	0.88	0.28
ZX0002F	SM400X_01_3A	66	0.12	0.55	0.19
ZX0002F	SM5001_03_0A	15	0.08	0.20	0.11
ZX0002F	SM2001_01_0A	21	0.06	0.47	0.08
ZX0000F	BA1000_01_0A	5	0.19	0.12	0.25
ZX0002F	IS1001_15_0A	62	0.04	0.46	0.05
ZX0000F	BM3000_02_1A	19	0.23	0.76	0.28
ZX0000F	BA1000_01_1D	7	0.19	0.87	0.23
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.

Several transactions have a standard deviation that is greater than the mean.

number, so there were approximately 15,000 orders for that one account number. Access to the cash account was significantly slower than to other accounts, and what was worse was that the entire system would slow down when certain types of cash sales were entered.

In this example, changing the mechanism of entering cash sales resolved a general system problem.

Figure 3 shows a report of transactions sorted by the ratio of standard deviation to mean response time. This ratio shows the amount of variation in resource requirements per transaction. Users will perceive variations in response time only for transactions with significant response times, so the analysis of variation should be isolated to long transactions only.

A similar type of analysis also could be made by comparing the maximum processor time per transaction with the mean processor time per transaction.

Figure 4 shows that several transactions have a standard deviation that is greater than the mean. There are no cases of a transaction with a high variation and a high processor time per transaction.

There will be situations in which all transactions are consistent, both between and within transaction types. Such cases suggest a healthy application. In this scenario, improving the efficiency would mean improving the entire application. In this case a hardware upgrade may be the more appropriate measure.

Taking Action

The techniques that I described above differ from traditional performance analysis approaches in that they examine the application first and look at the hardware second. This approach allows the system administrator to make an informed decision as to whether to fix an application or upgrade hardware.

These techniques work with external measurements of application performance. This type of analysis is system independent, because it can be applied to any system. This type of analysis can be applied to MPE/V, MPE/XL, HP-UX or even MVS. Internal factors, such as processor and disc speed, will be reflected in such measurements as processor time per transaction.

The conclusions drawn from this type of analysis do lead to application tuning when tuning is possible. And these conclusions will give quantitative justification when a hardware upgrade is appropriate.

—Larry Kemp is a systems consultant at Hewlett-Packard, Bellevue, WA.

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DATA REPORTING

The PC Connection

PCs

Christopher Nelson

Business data usually resides on mainframes, minicomputers or other data servers. Traditionally, the data center staff has been responsible not only for the maintenance of the data, but for programming and sometimes generating reports for system users and the business community.

Today, PCs are in wide use and excellent software tools exist for manipulating and reporting data in graphical or tabular form. Data downloaded through terminal emulators can be reported by the user in the format he or she requires. Changes from minor formatting to summarization or extrapolation of data no longer needs to involve the data center staff.

Host software vendors and in-house developers can take advantage of PC-based reporting by providing support of "flat file" output in a number of formats. With an application generator or 4GL, the user can perform his queries requesting output to a file in the desired format.

The ultimate implementation of this concept is found in products like Cognos' PowerHouse, Infocentre's Speedware, Crosstalk Communications' Crosstalk and IBI's Focus. These packages are available for the host and PC and can pass data back and forth in an application-specific format.

File Formats

File formats can be divided into two classes based on their readability. A file, which is readable and may be browsed or listed to some benefit, usually is called an ASCII (American Standard Code for Information Interchange) or flat file. Files that look like "garbage" when listed or printed are called binary files.

ASCII files are so-called because a 7-bit character code can be used to represent the file without loss of data. Bytes with an 8-bit set are used for graphic and line-drawing characters that are not part of the ASCII code. In data communications, the 8th bit often is used for parity (an error detecting code).

The simplest of ASCII data files contains lines of comma-separated values (CSV). When each line contains the same number of values, the data may be described as normal or regular. *Figure 1* shows a simple CSV file.

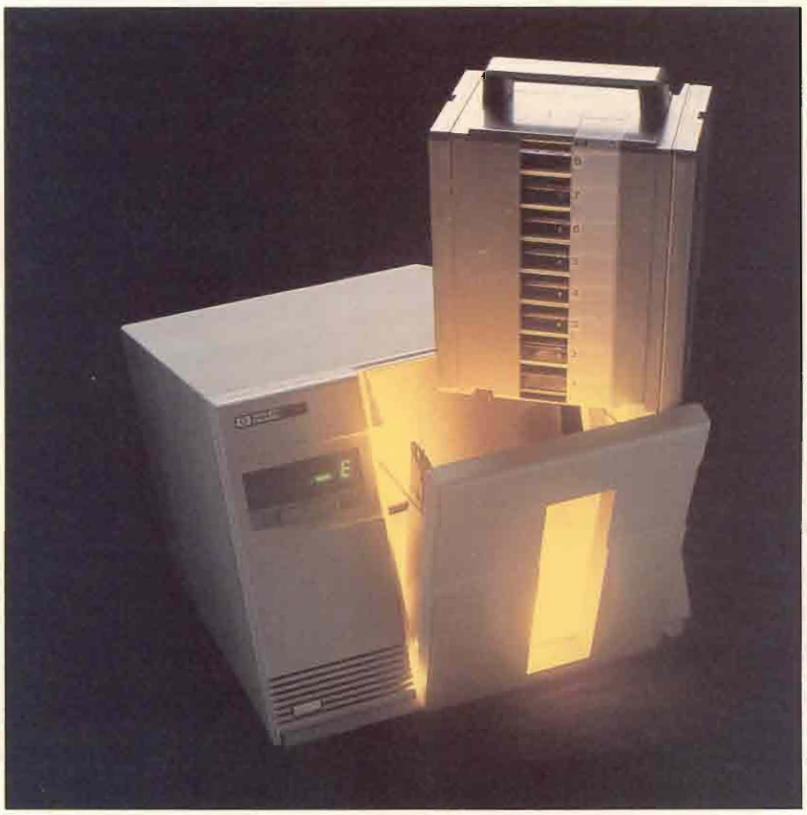
The problem with CSV is that the values cannot contain commas. Consider a mailing list with "Jones, Smith, & Co." When read from a CSV file, this would come out "Jones", "Smith", and " & Co.". Worse, $12,000,000 becomes "$12", "000", and "000". Hardly what was intended.

One way to get around the problem of commas in values is to put data in fixed-width columns. dBase, a popular PC database, calls this System Data Format and uses an SDF or TXT extension for the names of these files. *See Figure 2.*

While easy to read and write, SDF files suffer from being large. Because "Bob" and "Robert M. Jones, IV Esq." take the same amount of room in an SDF file, there can be a lot of blank space. This is an inefficient use of storage and can make SDF files take much longer to transfer between host and PC.

To account for commas and other special characters in text fields without the wasted space of an SDF file, Lotus Development implemented a modified CSV file format for importing data into its 1-2-3 spreadsheet. Named PRN, this format provides for text fields to be surrounded by double quotes and does not allow numeric values to be punctuated with commas. *See Figure 3.*

Binary files generally are machine and ap-



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plication specific and make use of all 256 8-bit codes. As a result, these files are somewhat harder to read and write and sometimes cannot be transmitted over a data communications link that uses parity. Nonetheless, when there is a large enough user group to warrant the programming effort, these formats can be useful. Jeff Walden's *File Formats for Popular PC Software* and *More File Formats for Popular PC Software* (John Wiley & Sons, Inc., NY) provide excellent references for a number of formats.

Even if you are not going to take on the task of building PC application files on your mini or mainframe computer, a familiarity with the popular formats is helpful in knowing what happens to ASCII data once it gets to the PC.

Perhaps the largest body of busi-

Figure 1.

```
1,Elmer J. Fudd III,6,13.04,902000,15.32
2,Roger Rabbit,4,8.70,549325,9.33
3,Luke Skywalker,4,8.70,516500,8.77
4,Winston Churchill,4,8.70,501900,8.53
5,The Masked Avenger,3,6.52,372500,6.33
6,Barbara Walters,2,4.35,295000,5.01
7,Joe Lewis,2,4.35,258000,4.38
8,Sky Masterson,2,4.35,222500,3.78
9,Paris,1,2.17,215000,3.65
10,Jubal Harshaw,2,4.35,205000,3.48
```

Comma-separated values (CSV) represent the simplist of ASCII data files.

Figure 2.

1	Elmer J. Fudd III, Esq.	6	13.04	902,000	15.32
2	Roger Rabbit	4	8.70	549,325	9.33
3	Luke Skywalker	4	8.70	516,500	8.77
4	Winston Churchill	4	8.70	501,900	8.53
5	The Masked Avenger	3	6.52	372,500	6.33
6	Barbara Walters	2	4.35	295,000	5.01
7	Joe Lewis	2	4.35	258,000	4.38
8	Sky Masterson	2	4.35	222,500	3.78
9	Paris	1	2.17	215,000	3.65
10	Jubal Harshaw	2	4.35	205,000	3.48

SFT or TXT files put data into fixed-width columns.

Figure 3.

```
1,"Elmer J. Fudd III, Esq.",6,13.04,902000,15.32
2,"Roger Rabbit",4,8.70,549325,9.33
3,"Luke Skywalker",4,8.70,516500,8.77
4,"Winston Churchill",4,8.70,501900,8.53
5,"The Masked Avenger",3,6.52,372500,6.33
6,"Barbara Walters",2,4.35,295000,5.01
7,"Joe Lewis",2,4.35,258000,4.38
8,"Sky Masterson",2,4.35,222500,3.78
9,"Paris",1,2.17,215000,3.65
10,"Jubal Harshaw",2,4.35,205000,3.48
```

The PRN file format provides for text fields to be surrounded by quotes and doesn't allow numeric values to be punctuated by commas.

Figure 4.

```
1   L>>>*******L>>>>>>>*********L>>>>****L*******L>>>>>*****L
2   Rank        Salesman          Units    %        Volume      %
3   **V***L>>>>*L>*L>>>*L>>*******V****V>>>>****V>>>>>>***V>>>>
4     1   Elmer J. Fudd III        6     13.04     902,000    15.32
5   *V>***L>>>>>>>>>>>>>>>>>>>>>>>V****V>>>>****V>>>>>>***V>>>>
6     2   Roger Rabbit             4     8.70      549,325    9.33
7     3   Luke Skywalker           4     8.70      516,500    8.77
8     4   Winston Churchill        4     8.70      501,900    8.53
9     5   The Masked Avenger       3     6.52      372,500    6.33
10    6   Barbara Walters          2     4.35      295,000    5.01
11    7   Joe Lewis                2     4.35      258,000    4.38
12    8   Sky Masterson            2     4.35      222,500    3.78
13    9   Paris                    1     2.17      215,000    3.65
14    10  Jubal Harshaw            2     4.35      205,000    3.48
15  *******L>>>>*L>>>>>********V>*L>>>>*******L***V>>>>>>>>
16          Grand Totals          46 units        $   5,887,325
```

DATA PARSE allows any text file to be imported to a spreadsheet as a column of labels (text strings) then broken into separate fields based on a prototypical line.

ness data on PCs resides in Lotus 1-2-3 spreadsheets. Each revision of 1-2-3 has its own format and file naming convention. For version 1 (or 1A), the filename extension is WKS (worksheet). Native version 2 spreadsheets are named with a WK1 extension. Version 2 also can read, but not write, WKS files. Because

There is the tendency to read and write multiple formats of data files.

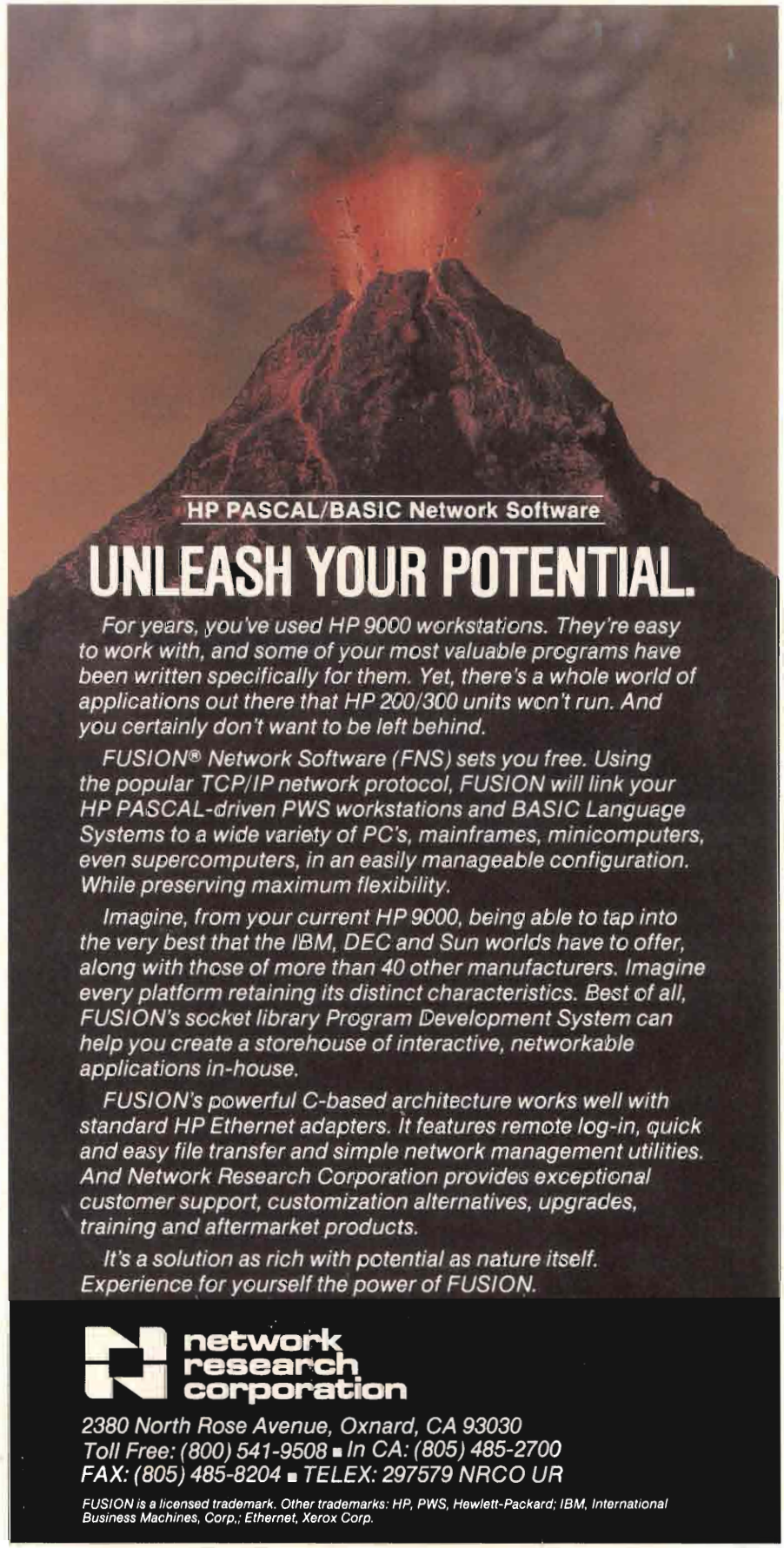
of 1-2-3's popularity, these formats are supported for import and export by a number of other packages making them a good target for development efforts.

Data Interchange Format, DIF, originated with the VisiCalc spreadsheet and is supported by 1-2-3 and a number of other products. It is, however, somewhat limited and is becoming less frequently used. (Anyone involved with military applications or contracting should note that Lotus DIF and Navy DIF are different and incompatible formats.)

In the PC database arena, Ashton-Tate's dBase is a recognized leader. dBase databases are stored in files with a DBF (Data Base File) extension. Here, again, dBase's popularity has led to support of the DBF format (at least for import and export) by a number of other PC programs.

An interesting trend in PC programs is the tendency to read and write multiple formats of data files. For example, Borland's Quattro spreadsheet, reads and writes 1-2-3 version 1A and 2 and Symphony spreadsheets, as well as dBase and Paradox database files.

Another binary format, which comes up frequently when discussing host-to-PC file tranfers, is the ARC, or archive format. An archive file is a collection of compressed binary and/or ASCII (text) files that is easier to manage and faster to transfer than separate, un-



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compressed files. The ARC format originally was implemented by Systems Enhancement Association in its ARC program but has gained popularity and is supported by a number of other programs such as PKPAK (an ARC workalike) and ARC-E (an archive extractor). These utilities are shareware and generally are available in executable form on CompuServe and other information services.

Data Conversions

For the most part, data in ASCII files is translatable between host and PC directly. Some esoteric characters in text strings may not translate directly, but you can avoid or learn to live with this problem. More insidious is the conversion of times and dates.

Every system seems to represent dates differently. Some systems have no accessible, internal representation for times and dates; leaving users to handle the application specific formats. Other systems provide a standard, accessible format, e.g., the HP 1000 counts seconds since midnight, April 1, 1970.

In ASCII files, dates can be represented either in "English" (09/20/88 or Sept. 20, 1988) or as the digits corresponding to the numeric represention of the target application. For Lotus 1-2-3, dates are represented as the number of days since December 31, 1899. Thus 1 is January 1, 1900; 32 is February 1, 1900, etc. In 1-2-3 version 2, time is supported in real numbers. A second is 1/86400 (24 * 60 * 60) days, so 12:01:00, January 1, 1900 is 1.0006944444 (approximately).

In dBase, dates are stored as eight-character strings in the format YYYYMMDD. For example, October 22, 1962 would be represented as 19621022.

Transfer Techniques

There are a number of ways to transfer data from a host to a PC. These range from screen captures to cooperative processing to network file transfer.

Walker Richer & Quinn's Reflection and HP's AdvanceLink both allow logging to a PC disc file as a terminal would log to a slave printer. This simple technique allows data to be captured from a host application that has no provision for file output or transfer. The logged data then may be edited or parsed into one of the ASCII formats described above.

Somewhat more sophisticated is protocol controlled file tranfer. This requires that the host application at least be able to report to a file, preferably in a simple columnar or delimited format like PRN. In addition, both the PC and the host must support the same file transfer protocol. For direct or modem connections, the choices include AdvanceLink protocol, XMODEM, Kermit and BLAST.

HP's AdvanceLink protocol is supported on PCs by the AdvanceLink program but not Reflection. On the host end, the AdvanceLink monitor is available for HP 3000 and HP 1000 systems but not HP 9000 systems.

XMODEM and Kermit are both public domain protocols designed for use with a wide range of systems. On the PC end, Reflection supports both protocols and AdvanceLink supports only XMODEM. On the host end, XMODEM is available for the HP 3000, HP 9000 and HP 1000. Kermit is a better but somewhat less widespread protocol available for only the HP 1000. One significant advantage of Kermit is its server mode, which allows one end of the link to control all aspects of the transfer rather than having to synchronize commands entered on the host and PC.

BLAST from Communications Research Group, is a commercial program available for a wide range of systems. It's several times faster than Kermit or XMODEM and has the added advantage of being a supported product rather than a "swap tape" type utility.

Finally, with PCs connected to a host over a LAN, protocols like NTF (Network File Transfer), FTP (ARPA File Transfer Protocol) and FTAM (File Transfer, Access and Management) are available. While there is an added level of complexity for these implementations, the transfer rate is much higher than a serial connection and the pro-

PC-based reporting offers a number of benefits . . .

tocols are defined by standards bodies rather than by wide acceptance and implementation.

Importing Techniques

Each PC package has its own way of importing (and exporting) files. Some require a standalone translator to be run. Others manipulate the foreign files directly. A PC user savvy enough to make good use of downloaded data typically knows his application well enough to import the data as well.

Whereas most programs read a limited number of well-defined formats, the DATA PARSE facility available in Lotus 1-2-3 version 2 and work-alikes deserves special mention. DATA PARSE allows any text file to be imported to a spreadsheet as a column of labels (text strings) then broken into separate fields based on a prototypical line. The 1-2-3 FORMAT-LINE CREATE command examines the input data and makes an initial guess at the format of the prototype. If the guess is incorrect, FORMAT-LINE EDIT allows modification. This is useful when host-generated reports specifically are not formatted and/or different sections of a report must be parsed differently.

Figure 4 shows sample DATA PARSE lines. Lines 1, 3 and 15 of the figure are as created by 1-2-3. Line 5 has been edited to allow for the spaces in text fields and longer numeric fields.

For dBase (and other programs that read DBF format), a number of utilities are available on CompuServe's ASHFORUM (the Ashton-Tate support forum). MAKEMEM and MAKEDBF convert text files to memory variable files or DBF files. SDF2DBF converts an SDF file annotated with field names directly into a DBF file.

Concerns over integrity often require data to be maintained on minicomputers and mainframes. However, PC-based reporting offers a number of benefits including reducing the work load of data center staff and giving users the reports they want or need instead of the standard fare offered to the rest of the company or department.

—Christopher Nelson is a systems analyst and freelance technical writer based in Stamford, CT.

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SOFTWARE

Gaelen Smith

HP's Manufacturing Productivity Division (MPD), which develops and markets an integrated line of MRP II, maintenance management and financial software systems, is gaining the attention of manufacturers.

In fact, after IBM, HP holds the largest share of the midrange-based manufacturing resource planning (MRP II) market, according to International Data Corporation (Framingham, MA).

Consequently, HP is putting more muscle behind getting the word out on MPD's software prowess. In fiscal year 1988, MPD's manufacturing software sales in turn leveraged more sales of the HP 3000 computer line than that of any other software vendor.

"Our goal is to be the vendor of choice for manufacturing system software," says Jean-Pierre Patkay, MPD general manager. That goal, he asserts, is beyond mere hyperbole; rather, it's grounded in numerous long-term relationships with leading process-repetitive manufacturers.

"HP is unquestionably recognized as a world-class manufacturer," Patkay notes. "That stature is no accident. HP focuses intensely on its own manufacturing operations, which function both as a test bed for software development and an end user of such proven solutions. By extension, the manufacturing software of choice at HP facilities worldwide is from MPD.

"In fact, more than 50 divisions run their operations with HP's integrated manufacturing software. HP is committed to the product and to the market. And we intend to continue to be increasingly successful in that market."

Custom Software Systems

As with many manufacturers, necessity was the mother of invention at HP regarding early software development. Though its core business is manufacturing, it found it needed sophisticated computer-based tools to help manage its manufacturing process as the complexity of its products increased and as its competitive environment intensified in the early 1970s. Its internal MIS staff developed its own MRP II software for various HP manufacturing operations around the world. Each system was laboriously custom-fitted to meet the specific requirements of each facility.

In the process of building custom software systems, its MIS staff garnered considerable expertise in application software development. In the mid-1970s, management decided to leverage its manufacturing application expertise into a new revenue stream by going to market with HP software. However, a major issue had to be addressed first: how to provide the flexibility and fit of custom software without the high development overhead.

"The issue was how to provide for some source-code-like changes, but without the pain of tampering with source code," says Steve Baker, MPD product line manager. A classic HP "what-if?" scenario ensued among development personnel. The outcome was a novel customization strategy.

In brief, the genesis of HP's customization technology was in deciding to design the customization procedure to be independent of the application source code. That design permits users to alter or add features to tailor data items, reports, screens and more, with regard to field size, layout, security or any number of user-defined elements. No programming knowledge is required; no program changes to the source code are executed. The procedure is easy and the results are transparent to end users.

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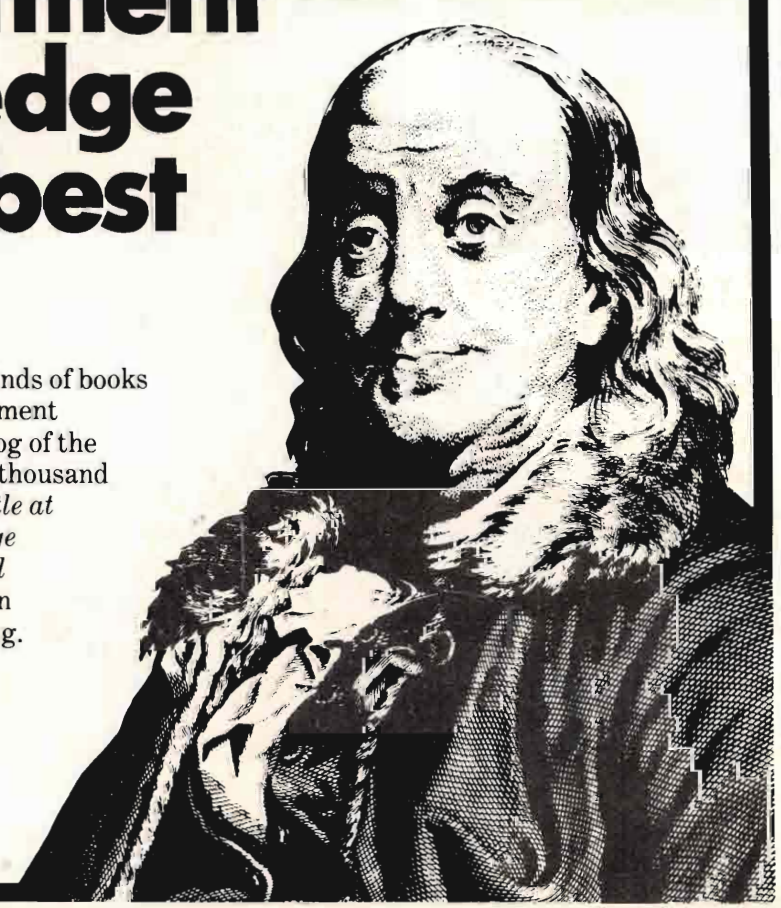

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Today, HP's MPD markets integrated manufacturing application software in three broad areas: materials and production management, financial accounting and maintenance management.

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Customization also has contributed directly to MPD's success overseas. Using the same technology as provided to customers, HP software product organizations worldwide have translated MPD products into over a dozen languages. Because databases and program logic have not been changed, international manufacturers can run common software in multiple local languages. Both the customer and HP benefit from the resulting efficiencies in training, implementation and support.

Manufacturers Self-Tailor System

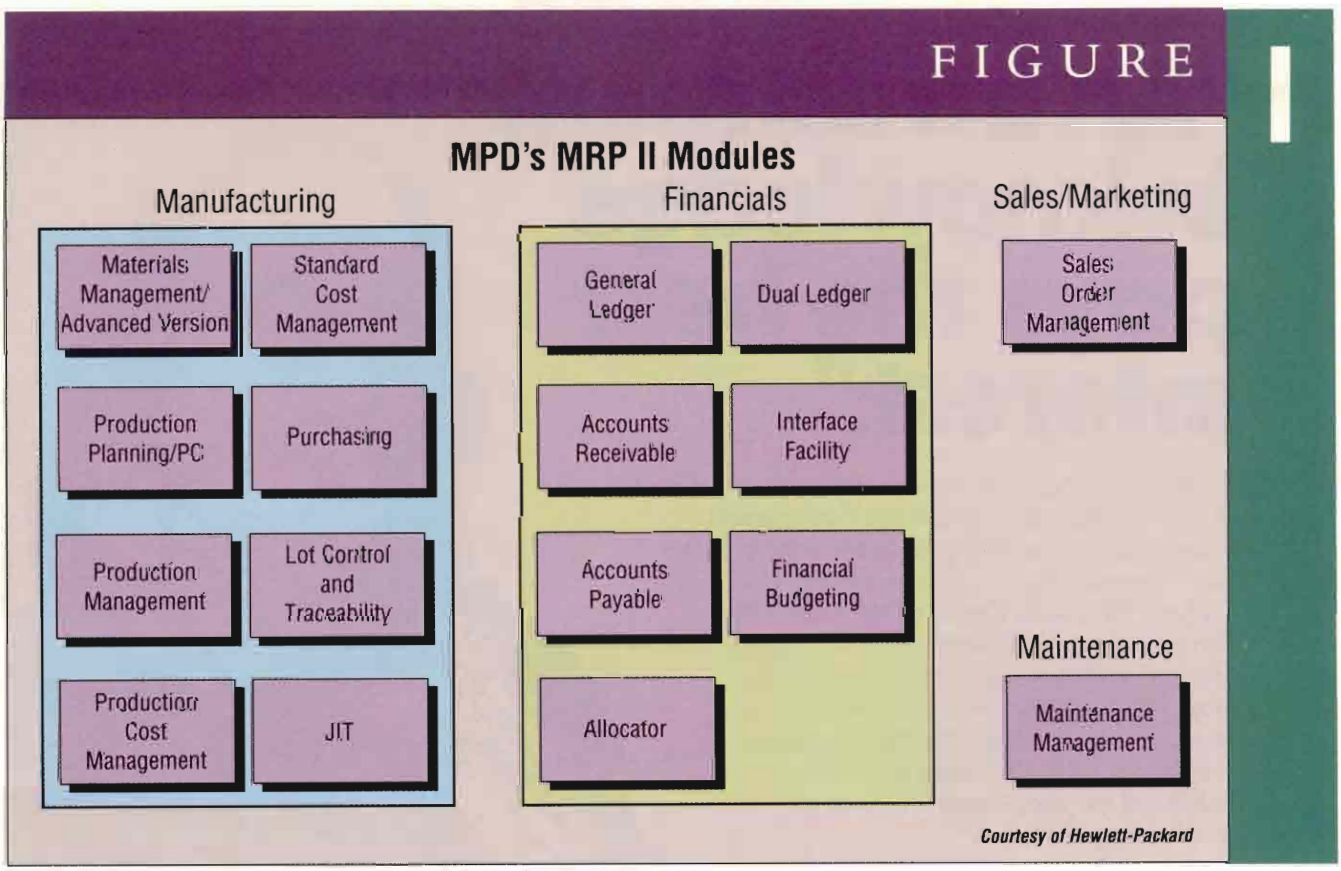
"What really won us on HP software was its customization technology," says Roland Crespo, programmer specialist with American Cyanamid, headquartered in Wayne, NJ.

When American Cyanamid's Agricultural Group, manufacturer of animal feeds, farm herbicides and insecticides, decided to automate its production planning and control function, it was looking for a single-source vendor. Though the nearby corporate computing center was an IBM shop, the Agricultural Group was open to exploring all solutions that fit its heavily batch process manufacturing environment.

"In truth, what HP then had to offer was not exactly a perfect fit," Crespo says. However, the customization technology allowed them easily to tailor the system to their specific needs. HP also told them it was committed to enhancing the system to address additional process industry and repetitive production requirements.

The HP customization technology was also a key reason Boyd Coffee (Portland, OR) selected HP software. The food processing company required an inventory system with quantity fields capable of holding values to the fifth decimal point. "It allowed us to modify about 90 percent of the standard screens that came with the system," says John Gillam, Production/Inventory Control manager. In addition, they added screens, reports and job specifications,

FIGURE 1



all with the customization feature in the system. "And this was done by the users, not by data processing," he says. "It is a very user-friendly technology."

High Marks From Analysts

HP's MPD and its software products get generally high marks from industry analysts. "They're deeply committed to that market," says Alice Greene, analyst-consultant, Plant-Wide Research Corp. (North Billerica, MA). "They have a product that is very well received in the market, and it works; hence, they've carved out a solid number two spot in that market."

In the overall midrange computer market, according to a recent survey by Plant-Wide Research, HP's share is 5.7 percent, compared to IBM's 36.7 percent share. But if you consider vendors competing exclusively in the HP hardware arena, MPD dominates the market with a 37 percent share, Greene says.

"The user can customize the database without disturbing the system's logic," Greene says. "What that means is that HP can offer customization to the market, yet when they come out with a new release, the user can take the upgrade without any problem. I think that's pretty significant. I don't think that any other vendor currently can provide that."

Another reason HP is performing well, according to Lynn Wigglesworth of Datapro Research Corp. (Delran, NJ), is growing preference among manufacturers to limit the number of vendors they must rely on to create a computer-integrated manufacturing (CIM) environment. "It makes it easier to get your hardware and software from one vendor. You only have one place to go when you need support," Wigglesworth says.

Bruce Richardson, senior analyst for Advanced Manufacturing Research (Cambridge, MA), sees HP as being well-positioned in the overall CIM marketplace by virtue of its strong presence on the factory floor. A survey his group recently completed of Fortune 500 manufacturers showed that HP holds

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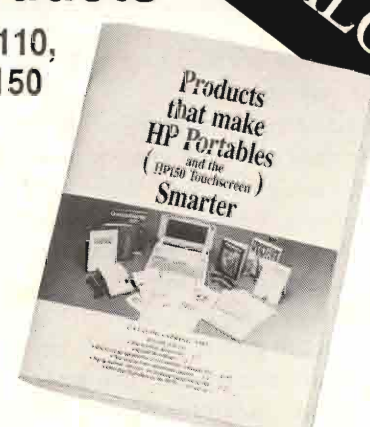

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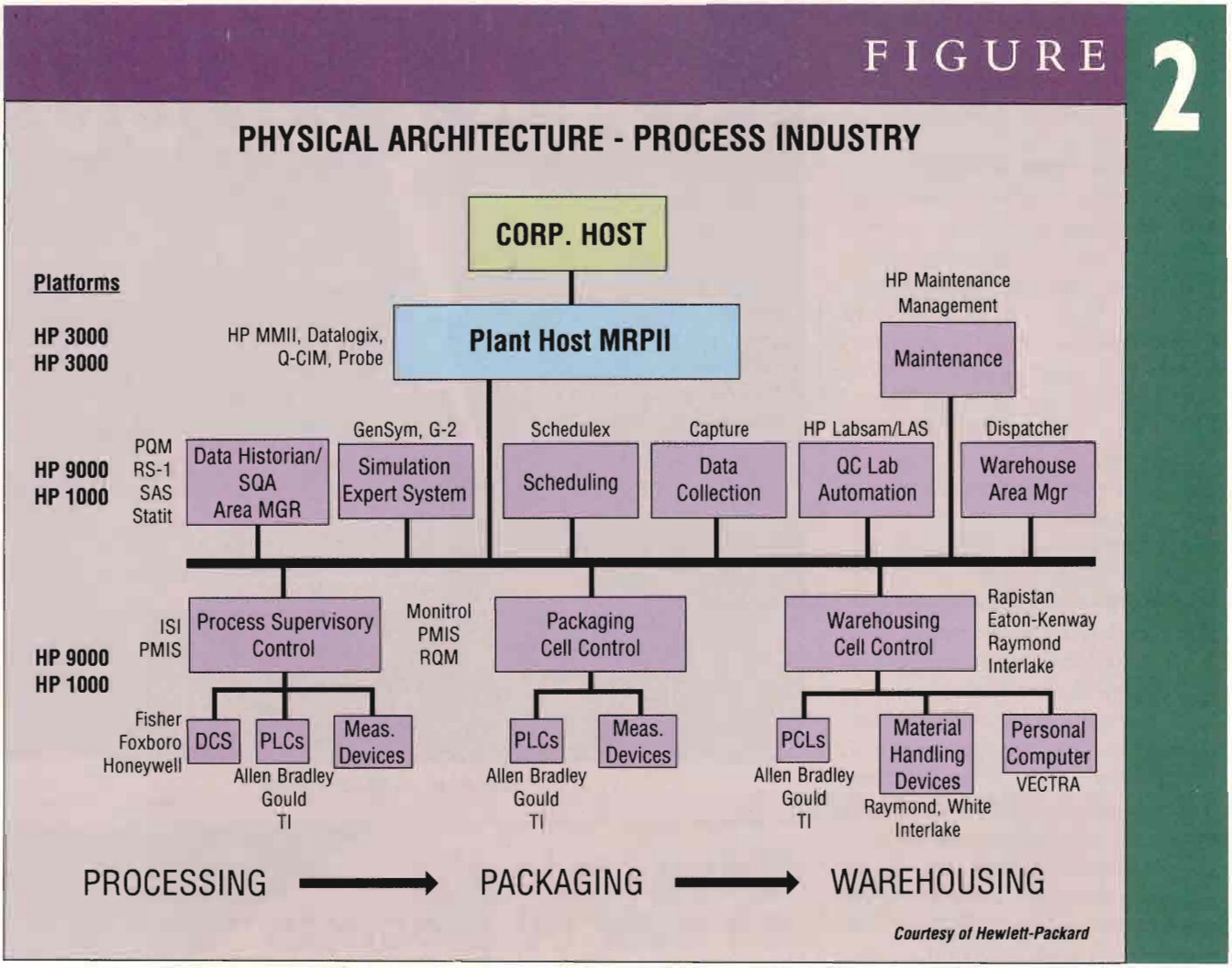
FIGURE 2



Courtesy of Hewlett-Packard

20 percent of the installed base of factory floor systems.

"HP has two advantages in that market: It embraces open systems and it provides a high level of support," Richardson says. Both of these advantages translate well to its software market, he adds. "HP has a strong reputation for support." And if a manufacturer can get his software from the same vendor that provides him with his factory floor equipment, all the better, Richardson adds.

Full-Featured Software

The functionality of HP's MMII package earns high marks from manufacturers that are using the software. Benefits include improved productivity to increased organizational responsiveness. For American Cyanamid's Agricultural Group's Hannibal, MO, plant, the gain was in both increased efficiency and reduced costs.

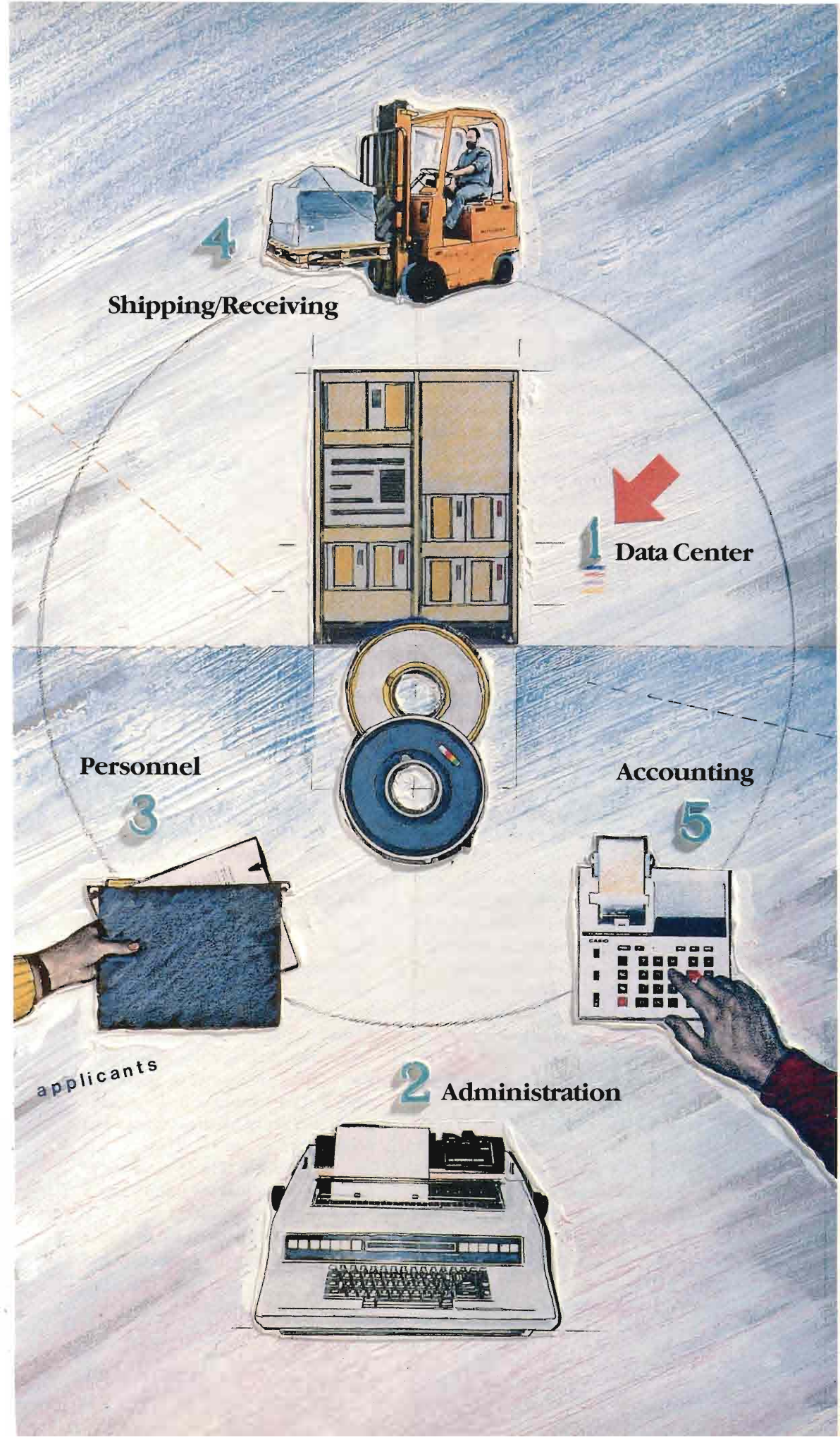
"The power of the backflushing feature in MMII is an enormous asset to our operation," says Roland Crespo. It greatly streamlined the transaction entry function for tracking material use, he explains. Backflushing permitted them to execute one transaction at the end of a cycle of batch process production, effectively eliminating 15 previously-required transaction entries.

"It was like landing on the moon for us," Crespo says.

American Cyanamid also benefited greatly from the features in the HP Maintenance Management System.

"One of our overall goals in the Agricultural Group is to add 15 new products in five years," says Dr. Susan Arseven, director of business support in the Agricultural Group. "That has a profound impact on manufacturing, having that many new products coming on stream in that short amount of time." Maintaining peak performance capability of plant facilities and equipment is critical, she says.

The online features of the Maintenance Management System permit American Cyanamid to manage the complete maintenance lifecycle from ap-



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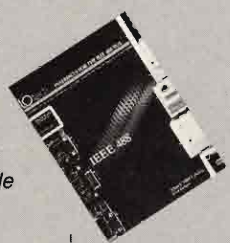

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proval to scheduling to execution, and enable them to track costs, parts availability, and quality performance simply and easily. Using system-generated schedules and parts pick-lists, they've been able to trim costs and boost productivity in the maintenance area, while improving overall factory performance. Because of improved parts and inventory accuracy, they have managed to reduce service parts inventory by 20 percent, effecting a $750,000 savings. That's over and above the $10 million a year the HP MMII system has helped them save in finished goods inventory.

Increased competitiveness has been the end-benefit of using HP software at Boyd Coffee. The standard product costing system permits Boyd to calculate production costs very quickly.

During 1981-1982, when the price of sugar was fluctuating wildly on a daily basis, Boyd was able to keep up with the changes and determine the real costs of its finished products soon after each run.

"In our business, it is crucial to have that flexibility," says John Gillam. "You have to know what your true costs are in order to ensure that you are profitable, that you can stay in business. The system allows us to respond on a daily basis to changes in the price of raw materials."

Flexibility is critical not only with process manufacturers like American Cyanamid and Boyd Coffee, but with discrete manufacturers as well. RTE Deltec, a San Diego-based manufacturer of uninterruptible power supply systems, has gained production flexibility with HP's Production Planning/PC System. Spanning the HP 3000 and the PC, it integrates production information in MMII with plans developed using Lotus 1-2-3 spreadsheets included in the product. HP Production Planning/PC enables this predominantly make-to-order manufacturer to easily and quickly perform critical "what-if?" analysis. That capability permits them to create the most workable production schedule on a daily basis.

"HP's PC-based Production Planning System makes 'what-if' analysis possible," says Ted Pardo of RTE Deltec. "It allows you to go in and revise the work-order quantity prior to releasing it, without a lot of subsequent effort. Because of that, we're better able to control our work-in-process (WIP). If you can control your WIP, you gain a tighter control on your manufacturing lead times."

Before, Pardo explains, it wasn't feasible to change the master schedule because of the amount of manual intervention required to alter all related work orders. The resulting effort would negatively offset any possible gains due simply to the amount of lead time added for processing all deallocations and reallocations of orders.

"The bottom line on what we've gained with this system," Pardo says, "is better customer service."

HP's MPD is continuing to devote resources to both its marketing and

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American Cyanamid
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Boyd Coffee
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development efforts. Much of its effort is targeted at providing solutions for the process market. One key reason for this focus is that the process industry represents a large segment of the market that has been relatively untapped by MRP II sales until recently. Process manufacturers historically have focused more of their automation efforts on the factory floor. But now they're lifting their sights to consider enterprise-level information technology for planning and controlling production and maintenance.

"In truth, there is a major blurring of distinctions taking place between process and discrete manufacturers," says William Walker, MPD marketing manager. "Discrete manufacturers are beginning to pay a lot more attention to factory automation, implementing group technology and repetitive-style production, striving for shorter cycle times, while process manufacturers are looking toward implementing planning and control systems. Their production profiles are beginning to merge," he says. Though HP's system development lately has been skewed toward providing new enhancements in support of process operations, Walker says, many of those same features and functions also support the direction discrete producers are moving in as well.

In December 1988, MPD released an enhanced version of MMII with several critical features to support process manufacturers. Backflush with and without work orders, alternate products and ingredients, byproducts, and selective MRP are fully integrated into existing product modules, including full compatibility with HP Lot Control and Traceability. The new release, like all MPD solutions, is designed to take advantage of HP's Precision Architecture (HP-PA) hardware. For customers moving from the MPE/V generation of CPUs to RISC-based HPPA, the migration of their manufacturing applications is easy; it typically can be completed over a weekend.

"Manufacturers should know that their investment in HP software is secure no matter what platform they choose to run it on," Walker says.

"We have designed our software with the greatest emphasis on flexibility," Walker adds. "We have the hardware, the software, and the customization technology to ensure a good fit to their business and operations environment. From implementation support to system support, we're committed to their success." —*Gaelen Smith is a New England- based freelance writer specializing in manufacturing technology.*

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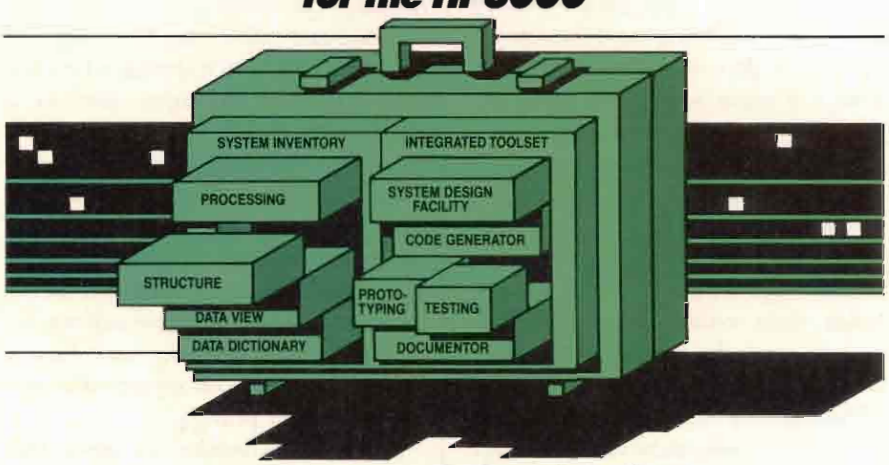

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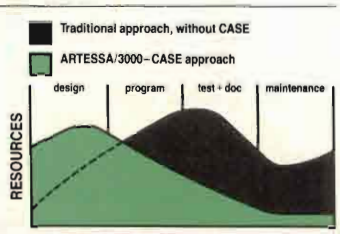

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from the lab

NSD's JobRescue

By Del Lukens Do you sometimes feel like the cobbler's child. You know how the story goes . . . all the kids have new shoes except for the cobbler's kids. I feel that way every morning as I watch my operations personnel flipping through a stack of paper output looking for abnormal job endings and messages some squirrelly-minded programmer hid in the job output.

JobRescue from NSD Inc. (San Mateo, CA) is a package that intercepts $stdlists and reports from the spooler, holds them online, prints exception reports, sends the output to history and finally purges the original spoolfile. All of JobRescue's functions are controlled through files that can be changed on the fly. Most of the options can be disabled, allowing for a higher degree of manual control. But once the system is installed and running, you'll want JobRescue to take full automatic control of the spooled $stdlist files.

Installation

JobRescue is easy to install. All you do is create the NSD account and restore the files from the tape. It can be used in Privilege Mode or non-Privilege Mode. Privilege Mode allows JobRescue to run much more effeciently. NSD included a standard options file which looks for MPE or IMAGE errors. Now you stream one batch file, and JobRescue is running.

JobRescue runs in the background waking up every 20 seconds to scan for deferred spoolfiles. When it finds one, it copies the spoolfile into its database and optionally purges it from MPE's SPOOK system. If it finds any errors, JobRescue can notify the console as well as any predefined user.

One of its advanced functions is an auto-dial module that can dial out to a beeper network and transmit a message code to your beeper. Having no access to a beeper, we didn't actually test this function, however, as with the rest of the package, this feature is well documented and appears rather easy to set up.

In addition to trapping errors and non-standard messages sent to a $STDLIST, JobRescue also offers modules to manage reports and schedule jobs. These are optional with the basic software and can be turned on or off depending on your site requirements. The report management module allows you to automatically save reports for online access, printing and banner generation for those reports that will eventually get printed.

The job scheduler consists of two programs. The main scheduler and the one-time scheduler. The main scheduler is used to manage the day-to-day operations and job schedules.

The one-time scheduler is used to make temporary schedule changes without the need to recompile the entire main schedule. Both schedulers provide the ability to insert passwords at execution time as well as variable insertion into your job streams. The latter is especially handy if you need to insert dates or run-time parameters into your regular job streams.

The main scheduler initiates batch processing in one of two ways. The first method is based on dependencies. Entire schedules can be made dependent on other schedules as well as individual jobs. This method checks for successful completion of those jobs or schedules before allowing other scheduled jobs to start. It allows you to create groups of jobs or schedules independent of one another, yet dependent on individual steps through each schedule. In other words, if one job fails, it will affect only those jobs dependent upon that particular job or schedule. Remaining schedules or jobs that didn't depend upon the failed job will be processed.

The other method of scheduling jobs is based on date, time, day or month. This method allows you to schedule jobs and schedules to run at a particular time on a particular day or date (much the same as with the MPE V stream option.) How narrowly you set up the schedule is up to you.

Both the main and the one-time schedulers can control the system limit settings and allow more than one job to run. Again, this is controlled by schedule to avoid job conflicts.

All in all, JobRescue is a comprehensive package that can start you on your way to automating your computer room operations.

JobRescue

PLATFORMS/SYSTEM REQUIREMENTS: HP 3000, MPE V

PRICE: $3,500

NSD Inc.

HEADQUARTERS:
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San Mateo, CA. 94402
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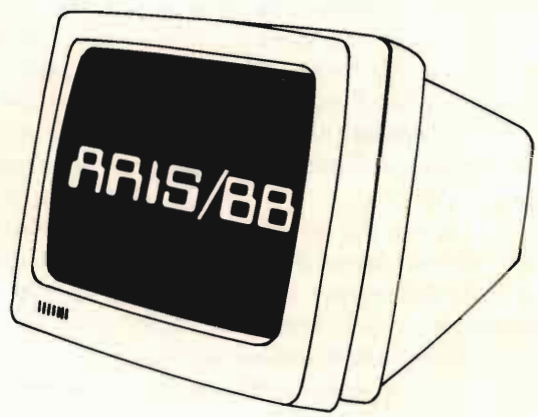

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HP-UX

Andy Feibus

Taking Advantage Of The C Shell

When I first started using HP-UX, my login shell was the Bourne shell. I didn't request it; the administrator of my system decided that the Bourne shell was the shell I would use and I didn't know enough to stop him from doing this to me.

Within two weeks I was going crazy. Every time I made a mistake typing a long command, I had to retype the whole command. That's when I started using C shell.

When you log in with C shell as your default login shell, the shell automatically executes these files:

/etc/csh.login — the system-wide C shell command file, which contains the commands that the system administrator wants all C shell users to execute when logging in.

.login (in your home directory) — your C shell command file, which contains the C shell commands you want to execute when you log in. These commands are executed once the commands in ***/etc/csh.login*** are executed.

.cshrc (in your home directory) — your C shell command file, which contains the C shell commands you want to execute each time a new C shell is started. These commands are executed after the ***.login*** commands are executed for the login shell.

Like the Bourne shell, the C shell has the concept of environmental and local variables. Many of the environmental variables defined for the Bourne shell are the same as those defined for the C shell (e.g., **TERM**, **HOME**, **PATH**). The **env** command displays these variables and the **setenv** command is used to assign values to them. For example,

```
setenv TERM hp2392
```

sets the **TERM** environmental variable to "hp2392". This value automatically is "exported" (to use a Bourne shell term) by the **setenv** command. Environmental variables usually are set in the ***.login file***.

Certain local C shell variables (usually assigned in the ***.cshrc*** file) control the manner in which the shell executes. Some of these include:

autologout — The amount of time (in minutes) after which the shell exits (or logs out, if this is the login shell) if you don't use the system. Setting this variable to 60 means that if you don't use the system for one hour, the shell will exit.

prompt — Permits you to specify what your shell prompt looks like.

history — Determines the number of commands to remember (more on this variable in a moment).

Use the **set** command both to view the values of the local variables and to assign values to local variables. The following three examples illustrate this:

```
set autologout = 60
set prompt = "\!> "
set history = 30
```

The first example command instructs the shell to exit if you have not executed a command for 60 minutes.

The second example command changes the shell prompt to display the "event number" followed by a greater-than sign. The event number is maintained by the shell and increments each time a new command is executed by the shell. If the above examples were entered as the first commands to a new shell (with initial shell prompt of "%"), the following would be displayed:

```
% set autologout = 60
% set prompt = "\!> "
3> set history = 30
```

Notice that the third line displays the new prompt and indicates that the command entered on the last line now is automatically preceded by the number of the command (or event) to be executed by the shell.

The third example command instructs the shell to remember the last 30 commands executed by the shell (starting with the current command; all previous commands have not been saved) in the shell's "history list." Any command in the list may be re-executed later. To view the contents of the list, use the command history. An example history list is shown below:

```
5> history
    1 ls
    2 pwd
    3 vi /etc/inittab
    4 find . -mtime -10 -print
    5 history
6>
```

Notice that each command in the list is preceded by its event number. You can re-execute any command in the history list by knowing either the command's event number, the relative location from the current event of the command, or the text of the command. All history list references are preceded by an exclamation point (!).

To re-execute a command when you know the event number, use the command **!n**, where **n** is the event number of the command to re-execute (e.g., to re-execute the command with event number 2, use the command **!2**). A special form of this command is **!!**,

which re-executes the last command attempted.

To re-execute the command entered two event numbers prior to the current command, use the command **!-2**, which is equivalent to the command **!5**, except that you don't need to know the event number to execute it. To re-execute the last **vi** command attempted, use the command **!vi**.

You may also reuse arguments from different commands in the history stack to form a new command to execute. For example, if the history stack contained the following:

```
11> nroff -man /usr/man/man1/ls.1 | more
12> more /etc/inittab
13> vi hello.c
```

You could compile **hello.c** using the following command:

```
14> cc !$
```

The **!$** references the last argument from the previous command. When a command is executed, the "pieces" of the command are numbered from left to right starting with 0. For example, in command number 11 (above), argument two is "/usr/man/man1/ls.1". To display this file without retyping it, you could use either:

```
15> more !11:2
or
15> more !nroff:2
```

More than one command's arguments may be used to create a new argument. A ridiculous example of this:

```
16> !15:0 !13$ !nroff:2
```

which executes the command **more hello.c /usr/man/man1/ls.1**.

Let's say I typed the following:

```
17> mroe /usr/man/man1/ls.1
```

How can I correct this without retyping the whole line? Type:

```
18> !!:s/mroe/more
```

This command references the previous command and substitutes the text "mroe" with "more". The changed command then is executed. Only a single substitution may be performed for any one command. To change command number 11 (above) to execute nroff on the file "/usr/man/man1/cat.1", use the following:

```
19> !11:s/ls/cat
```

To change the file (instead) to "/usr/man/man3/strings.3c", use the following command:

```
20> !11:s ^1/ls.1^ 3/string.3c
```

Notice that the substitution delimiter doesn't matter as long as it is used consistently. If you must use a specific character to delimit a substitution and that character is contained within either the originating command or the substitution text, precede each character that is not intended as a delimiter with a backslash (\). For example, command number 20 could also have been specified as:

```
20> !11:s/1 \/ls.1/3 \/string.3c
```

Another way to perform a command substitution on the previously executed command is to merely specify the substitution information using carats (^) for the delimiters. For example, instead of the substitution entered for command number 18 (above), the following substitution could have been used:

```
18> ^mroe^more
```

Next month, I'll conclude this discussion of the C shell with command completion, aliasing and job control. *—Andy Feibus is a software engineer for Bradley Ward Inc., Atlanta, GA.*

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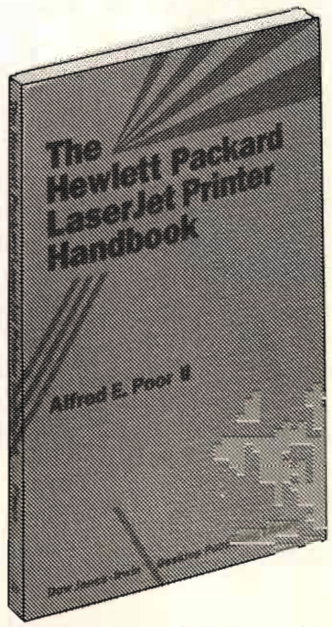

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RDBMS

Fabian Pascal

A DBMS That Doesn't Support R-Tables Can't Claim To Be Fully Relational

The Structure Of Relational Tables

When asked to define relational database, even users only vaguely familiar with the term mention "tables." This isn't surprising, because the relational approach aims to simplify data management, and the familiar tabular format is a central — though by no means the only — simplifying element. As explained in previous columns, however, a relational database is one perceived by users as a collection of R-Tables; i.e., a special type of tables obeying the following discipline:

- No duplicate rows
- No intrinsic ordering of columns and rows
- No "repeating groups"; i.e., table values are atomic

The reasons for the second and third points have been addressed in a previous column. This column discusses the structure of relational tables and its practical implications, and further justifies the first point.

Let me first introduce the PROJECT database, which I'll use for examples throughout this series. It's a software project management database consisting of the following tables:

```
DEPT       (DEPT#, DEPTNAME, MGR#, RDEPT);
EMPLOYEE   (EMP#, LNAME, FNAME, DEPT#, HIRED,
           SALARY); PROJECT (PROJ#, PROJNAME,
           DEPT#, PSTART, RESPEMP,
           PSTAFF, MAJPROJ);
ACTIVITY   (ACT#, ACTNAME)
PROJ_ACT   (PROJ#, ACT#, ASTAFF);
ASSIGN     (EMP#, PROJ#, ACT#, ESTART, ETIME);
```

The details of the data will gradually become clearer as we go along.

Note: The database is properly normalized; i.e., designed in accordance with relational principles. Normalization and its practical objectives will be discussed in a future column.

Tables represent in the database entity types of business interest. Departments, employees, projects, activities, allocations of activities to projects and assignments of employees to allocated activities are such entity types in software project management. Each table describes individual entities (or instances) of its type (the rows) in terms of their attributes (represented by columns).

Each row in EMPLOYEE, for example, represents an employee, characterized by employee ID (EMP#), name (LNAME, FNAME), hiring date (HIRED) and SALARY values.

Row Identification: Primary Keys

Information about the real world must be reflected accurately in the database. Two entities (e.g., employees) can't be identical. If they were, how would we tell them apart, let alone access their individual rows in the database? Therefore, row uniqueness is not just a computer access matter, but also an integral part of database accuracy. But because the relational approach prohibits burdening users with any computer internal addressing schemes, unique row content is also the only way in which users can and should access values in individual rows.

The unique row identification task is fulfilled in each table by a PRIMARY KEY, one or more column that has unique values in each row. The following columns form primary keys (PK) in the PROJECT database:

Table:	PK:	Identifies:
DEPT	DEPT#	departments
EMPLOYEE	EMP#	employees
PROJECT	PROJ#	projects
ACTIVITY	ACT#	activities
PROJ_ACT	PROJ#,ACT#	allocations of activities to projects
ASSIGN	EMP#,PROJ#,ACT#	assignments of employees to allocated activities

Multicolumn keys (as in the last two tables) are COMPOSITE (or compound) keys. There may be situations where all the columns in a table combine to form a primary key.

A table may have more than one column/combination with unique values (e.g., employees may have both a unique employee ID and their SSN recorded in the database). Nevertheless, only one must be declared as the primary key, otherwise some serious complications and problems arise, defeating the simplicity and reliability objectives of the relational approach. Thus, in a relational database, every table must have only one primary key.

How do we choose primary keys for tables? Selection is dictated by business reality, not by the relational model or computer matters. In most cases, the attribute(s) that uniquely identify entities are obvious (e.g., employee or department IDs). In others, they are natural combinations of identifiers

in other tables (e.g., EMP#, PROJ# and ACT# uniquely identify rows in ASSIGN). Where the choice is not clear or is ambiguous, the guiding principles are:

- stability
- familiarity
- simplicity
- minimality

Thus, primary key values should seldom if ever change; shouldn't be complex (i.e., a long composite key may have to be supplanted by a new, simple identifier, if one can be found that is familiar to users); and each column participating in a key must be necessary for uniqueness (i.e., dropping it from the key would defeat the uniqueness of rows).

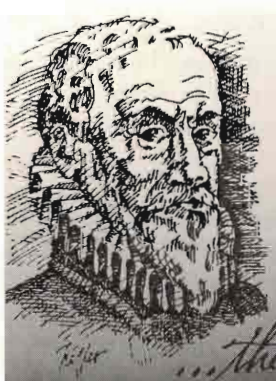
Intertable Relationships: Domains And Foreign Keys

Using databases for informational purposes frequently requires us to combine data from multiple tables. For example, what if we want to find employee information (e.g., name, hiring date and salary from the EMPLOYEE table) for a specific department name (from the DEPT table)? In nonrelational databases, tables are connected by predesigned physical links or pointers that the user must know and "navigate" through to combine data. Thus, some internal mechanism must exist that points from each DEPT row to its EMPLOYEE rows, and somehow must be specified by users in queries or programs to obtain the information.

This approach complicates matters and burdens users with digressions to computer internals, irrelevant to the data tasks at hand. Moreover, there may be all sorts of table combinations of interest in the database and the pattern of these combinations may change over time.

Explicit predesigned physical links bias the database for some combinations (for which links exist) and against others (for which they do not). A change in user needs will necessitate restructuring the links, as well as the queries and programs that are dependent on them. This imposes maintenance burdens on both system administrators and users. In short, nonrelational databases are complex and inflexible.

The relational approach prohibits predefined physical links between tables that are exposed to users in applications to avoid all these problems. Users must be able to express intertable relationships in the purely logical and familiar terms of their data. For this purpose, the process of database design requires that tables have appropriate common (or shared) columns, which can be used to combine data from tables sharing them.



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This shifts the internal navigation burdens from users to the DBMS (which is why relational DBMSs are called "automatic navigation" systems), and avoids unnecessary maintenance. The following columns are shared in the PROJECT database:

Column:	Shared by:
DEPT#	DEPT, EMPLOYEE
EMP#	EMPLOYEE, ASSIGN
PROJ#	PROJECT, PROJ_ACT, ASSIGN
ACT#	ACTIVITY, PROJ_ACT, ASSIGN

In order to effect table combinations, the values in shared columns must be comparable; i.e., of the same type (numeric or character) and length (where necessary). To insure comparability, the values in a shared column must be drawn from a common Domain. A domain is an independently defined set of values from which one or more columns are allowed to draw their own values. Thus, if a EMPID domain was defined in the PROJECT database as:

```
CHARACTER(6) [0-9,0-9,0-9,..], < > NOT ALLOWED
```

(i.e., the non-numeric range 000000-9999999, to which the < and > operators are inapplicable), then the EMP#, MGR# and RESPEMP columns would be allowed to have values only within that range. Consequently, material joins between the DEPT and EMPLOYEE tables would be allowed by the DBMS on DEPT# columns because it would know that the JOIN columns have comparable values. Another example of JOIN columns by virtue of being defined over a common domain are HIRED, PSTART, ESTART. A DATES domain could be defined by users (or even built-in the DBMS) as:

```
DATE [MM/DD/YY], < > ALLOWED
```

Note: Domains have other important functions in a relational database, such as simplification of table definition, integrity support, simplification of operational expressions and performance improvement. I'll cover them in future columns.

Now take another look at the DEPT# columns in the DEPT and EMPLOYEE tables. In EMPLOYEE, DEPT# represents an attribute of an employee — the department to which he is assigned. In DEPT, however, DEPT# is a primary key that uniquely identifies department rows. In other words, the DEPT# value in each EMPLOYEE row "references" a row in the DEPT table. Columns whose values reference primary key values in another (or even the same) table are called FOREIGN KEYS. A table can have more than one foreign key, and each foreign key can reference more than one primary key. The PROJECT database has the following foreign keys:

FK:	References PK:
EMPLOYEE.DEPT#	DEPT.DEPT#
DEPT.MGR#	EMPLOYEE.EMP#
PROJECT.RESPEMP	EMPLOYEE.EMP#
PROJ_ACT.PROJ#	PROJECT.PROJ#
PROJ_ACT.ACT#	ACTIVITY.ACT#
ASSIGN.EMP#	EMPLOYEE.EMP#
ASSIGN.PROJ#	PROJECT.PROJ#
ASSIGN.ACT#	ACTIVITY.ACT#

Foreign keys that reference a primary key in the same table are:

FK:	References PK:
DEPT.RDEPT	DEPT.DEPT#
PROJECT.MAJPROJ	PROJECT.PROJ#

where RDEPT is reporting department and MAJPROJ is the major project to which a project belongs. In fact, this is how relational databases represent hierarchies.

Note: Foreign keys are only a special case of relationships between tables. Non-key common columns are also possible and can be used to relate information from multiple tables, as long as they are defined over the same domains. But foreign keys are important for the support of referential integrity and view updatability, which will be discussed in future columns.

Leave It To The DBMS

To summarize, a relational database is a perceived collection of specially disciplined tables, made of columns and rows. Each table has one primary key uniquely identifying its rows. Relationships between data in different tables can be expressed logically by means of comparable values in shared columns, drawn from common domains.

One final point is critical: Domains and keys must be declared to, known and understood by the DBMS, which must use this knowledge to enforce the discipline itself. It is the precise point of relational data management to shift enforcement to the DBMS. It shouldn't be left to users because it is a burden and would invite errors or may be forgotten altogether. Thus, a DBMS that doesn't support domains, keys, and thus R-Tables, can't claim to be fully relational. Since the purpose of this requirement is intended for the practical benefit of users, it should be demanded from vendors, rather than ignored. *—Fabian Pascal is a Washington, DC, microcomputer analyst, consultant and author specializing in relational database management and SQL and is affiliated with Codd & Date International.*

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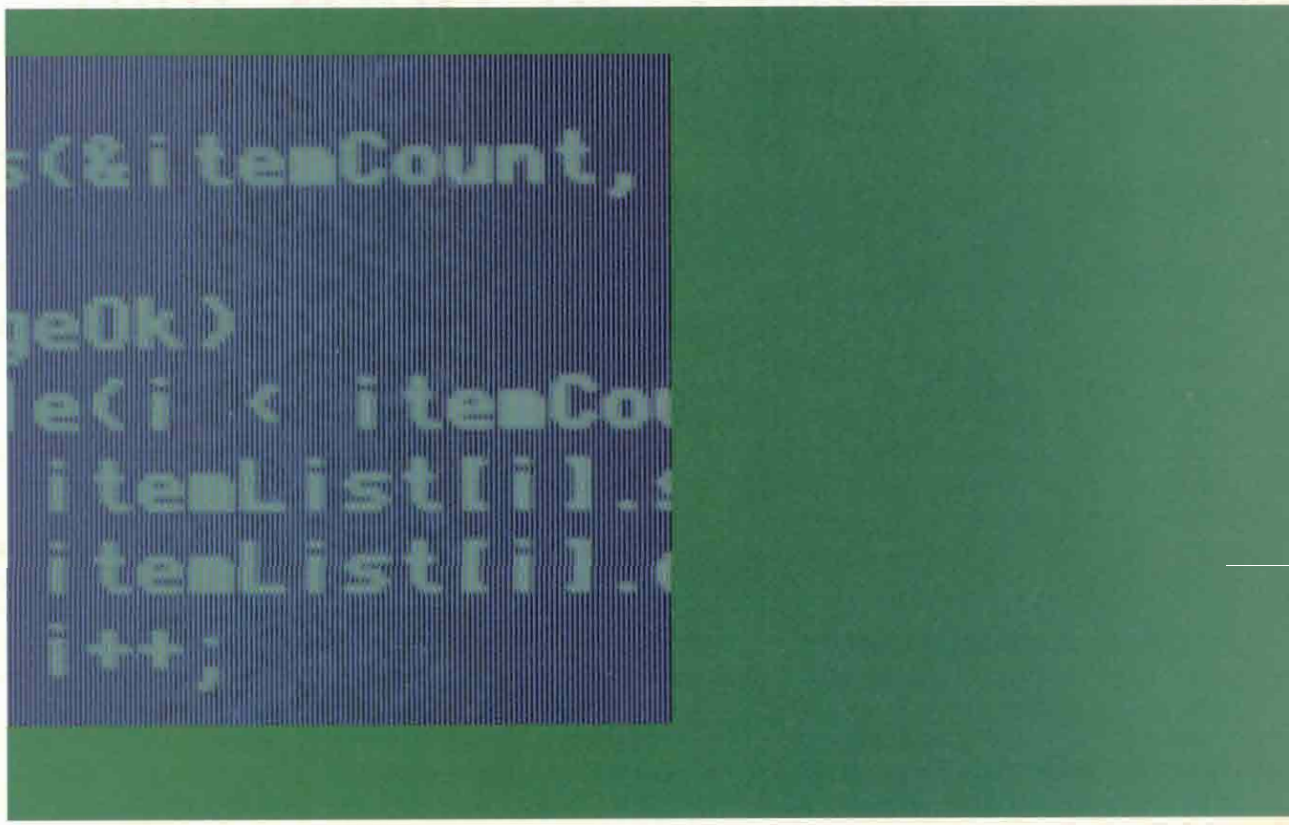
The Consumer's Guide to Buying a C Compiler for the HP 3000.



The release of Spectrum has sparked new interest in C among HP 3000 users. If you're adding a C compiler to your software shopping list, here are four criteria to consider.

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CIRCLE 238 ON READER CARD

SECURITY

Jeffrey Caldwell

Anyone And Everyone Can Be A Threat

Who Can Break Into Your System?

Who is the main security threat to your system? Is your first response, system hackers? But, stop and ask yourself, who uses your system or has contact with it?

Although almost anyone can get into your system because of advances in telecommunication capabilities, there are three specific categories: employees, non-employees and a group I'll call consultants.

Employee Access To The System

The employee category presents an interesting security challenge because by virtue of being an employee, a person can have sign-on access, physical access to terminals, access to magnetic or printed data and in some cases even physical access to the computer.

Members of this group range from occasional users who only inquire on previously entered data, to unsophisticated users such as clerks with one or two input functions, to knowledgeable users such as programmers or system operators who can do almost anything on the system. Because members of this group must have access to the computer and the automated information in order to perform their jobs, a balance of preventative and detective controls must exist. The idea is not to prevent total access to the computer, but instead allow controlled access to the system and data and detect any exceptions to the rules.

The risks associated with this group are many. On the minor side, employees could gain access to data such as the payroll register or promotion list. On a more serious side, the ability to change interest calculations, and account balances, produce checks, alter audit trails to cover unauthorized transactions, or sell customer lists to competitors can cause major financial problems.

Non-Employee System Access

The non-employee category can be simply classified as people who are not in any way connected to the company. Call them hackers, bandits or pirates. They simply don't belong on the system or in any part of the system. Many of these people are highly skilled and view accessing computers as a hobby or a challenge. How do they know so much about computers and Hewlett-Packard computers in particular? Simple. They are trained. Just think of the number of HP computers that have been installed and the number of people supporting them. Add to that hardware and operating system knowledge, the knowledge of the many standard password and control features of well known application software or utilities. You now can understand how potentially large this group of hackers is.

Moreover, these people pose a different risk to the system. Where employees may use the system for personal benefit or illegal activity, non-employees usually aren't trying to steal something, rather, they are in it for the "fun."

The security controls needed for non-employees shouldn't focus on controlling their access as is the case with employees. Instead, controls should prevent access or detect a breakdown if the preventative controls fail.

Consultants And Others

This last category of system users is an interesting blend of the first two. It consists of many individuals such as contract programmers, software vendors, hardware maintenance personnel, auditors and even nightly cleaning crews. They all in some way come in contact with the computer and may even be given system manager access on a temporary basis. The problem is that they usually are not recognized as a threat to the system.

Many times most employees don't know exactly what these people *should* be doing, so they don't question what they *are* doing, or *why* they're doing it. In addition, if they ask for access to dif-

TABLE I

ACCESS CONTROL TABLE

	PREVENT ACCESS	CONTROL ACCESS	DETECT ACCESS
EMPLOYEE	LOW	HIGH	HIGH
NON-EMPLOYEE	HIGH	LOW	HIGH
CONSULTANTS	HIGH	HIGH	HIGH

This table depicts the level of controls that should be in place for the three groups who can access your system.

ferent accounts, or specific data files, access might be granted without many questions.

But remember, some of these people do need access to the computer to fulfill their duties. Therefore, access should be granted with controls as it is with regular employees.

On the other hand, some members of this group should be treated as non-employees. What about the nightly cleaning crew that nobody every sees? How hard would it be for a member of the cleaning crew to see a sign-on id taped to a terminal, or use a signed on terminal to access valuable corporate information.

As you can see, this group presents an interesting blend of all risks and controls. Because these people might not have long-term commitments or a high level of loyalty to your company, they might try and access data, have fun with the system, or even try and corrupt the system. You must deny access to some members of this group, control access to others and detect security failures for everyone.

Who Can You Trust

Now that you know the potential risks of individuals who come in contact with your system the questions is: Who can you trust? The answer: everyone and no one! Not all employees are bad and will steal company secrets and sell them to your competition, or write false checks to themselves. For every one employee you have had problems with you probably have a hundred or a thousand honest employees.

For all of the attention that is given to hackers breaking into systems, this group might pose the least problems to you. Some easy controls such as dial back modems, periodically changing passwords, and other security measures can greatly limit these individuals.

And, as for consultants such as auditors, programmers, HP service engineers and others that come in infrequent contact with your system, most are very reputable and do a good job.

So now that we have identified the various groups of users, the type of risks they pose, and the type of controls that should be emphasized for each, you should be more aware when a consultant asks for access to your system, the modem phone rings when it is not supposed to, or a new employee is granted access to the system.

What's the old saying? An ounce of prevention is worth a pound of cure.

—Jeffrey Caldwell is an information technology manager specializing in computer security and control for Coopers and Lybrand, Los Angeles, CA.

TABLE 2

RISK TABLE

	INFORMATION RISK	DESTRUCTION RISK
EMPLOYEE	HIGH	LOW
NON-EMPLOYEE	MEDIUM	HIGH
CONSULTANTS	HIGH	MEDIUM

This table depicts the risk associated with each system user category. Information risk is the risk that the information will be accessed and used in an unauthorized manner. Destruction risk is the risk that the system will be damaged by the users.

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CIRCLE 192 ON READER CARD

PC TIPS

Miles B. Kehoe

Writing Graphics Data

In April's column I presented several different ways to write text to the Vectra display. The conventional method of using standard language output statements proved much slower than treating the display as an array of memory and copying text directly.

There are two ways to write graphics data on the screen: Using ROM BIOS calls, which is very flexible but somewhat slow; or direct memory writes, which is fast but lacks some of the flexibility.

The EGA And CGA Cards

I should explain that there is a third method of writing screen graphics. This method offers the most flexibility and power in graphics mode and involves direct programming of the EGA or VGA card. These are very powerful interfaces and allow the advanced programmer to do anything he may want.

However, writing programs at this level is very complex and I would not recommend it unless you have a need for powerful control of the graphics environment. If you've ever browsed through a computer bookstore looking for documentation on direct control of the CGA, EGA and VGA, you know there are entire books on the topic.

Graphics Basics

The Vectra, like all IBM compatibles, allows 32K bytes of its memory map for display memory. At 640 pixels, or screen dots per line, this defines the highest possible resolution as 32K bytes divided by 80 bytes per line (640 pixels), which is 400 lines.

At this resolution, you have only one bit of display memory available for each screen pixel. Therefore, each pixel only can assume a value of zero or one, off or on respectively, so you're limited to a maximum of two colors, usually black and white.

If you're willing to reserve two bits of display memory for each screen pixel, you can have four colors with half as many pixels. This is typically 640 by 200 pixel resolution.

Before you do any operations in graphics, you need to set the screen mode to one of those which supports graphics. *Table 1* illustrates the modes that are mentioned throughout. You can set these modes with the 'set_video_mode' procedure included in the sample program segment in *Program 1*.

Using The ROM BIOS

The BIOS built into the Vectra supports a function to put a pixel on the screen at a particular row and column position. In addition, you can choose to write the pixel directly or you can toggle it by performing an "exclusive OR" operation with the data already stored at that pixel.

Because your code needs to be device dependent, you might think about the faster method to draw screen graphics: direct memory writes.

If you're in the lower resolution four color mode, you also can specify the color.

The sample program in *Program 1* will draw a line across the display from coordinates (0,0) to (100,100). The example sets the video mode to six, so you should see "CGA resolution" no matter which display you're using. If you have an EGA or VGA, you can set the mode accordingly and see a higher resolution line.

Note that in 'put_pixel' the value stored in the AL register is 15 decimal. In CGA mode, only the low order bit is used, but as you mode to the other modes, more bits are allowed for color. By setting the value to 15, I am setting all the bits for all modes. The high order bit, if set, would specify that the pixel

TABLE I

Graphics Modes

Mode	Cards	Resolution	Colors	Address
6	C/E/V	640 x 200	2	B800:0000
16	E/V	640 x 400	16	A000:0000
18	V	640 x 480	16	A000:0000

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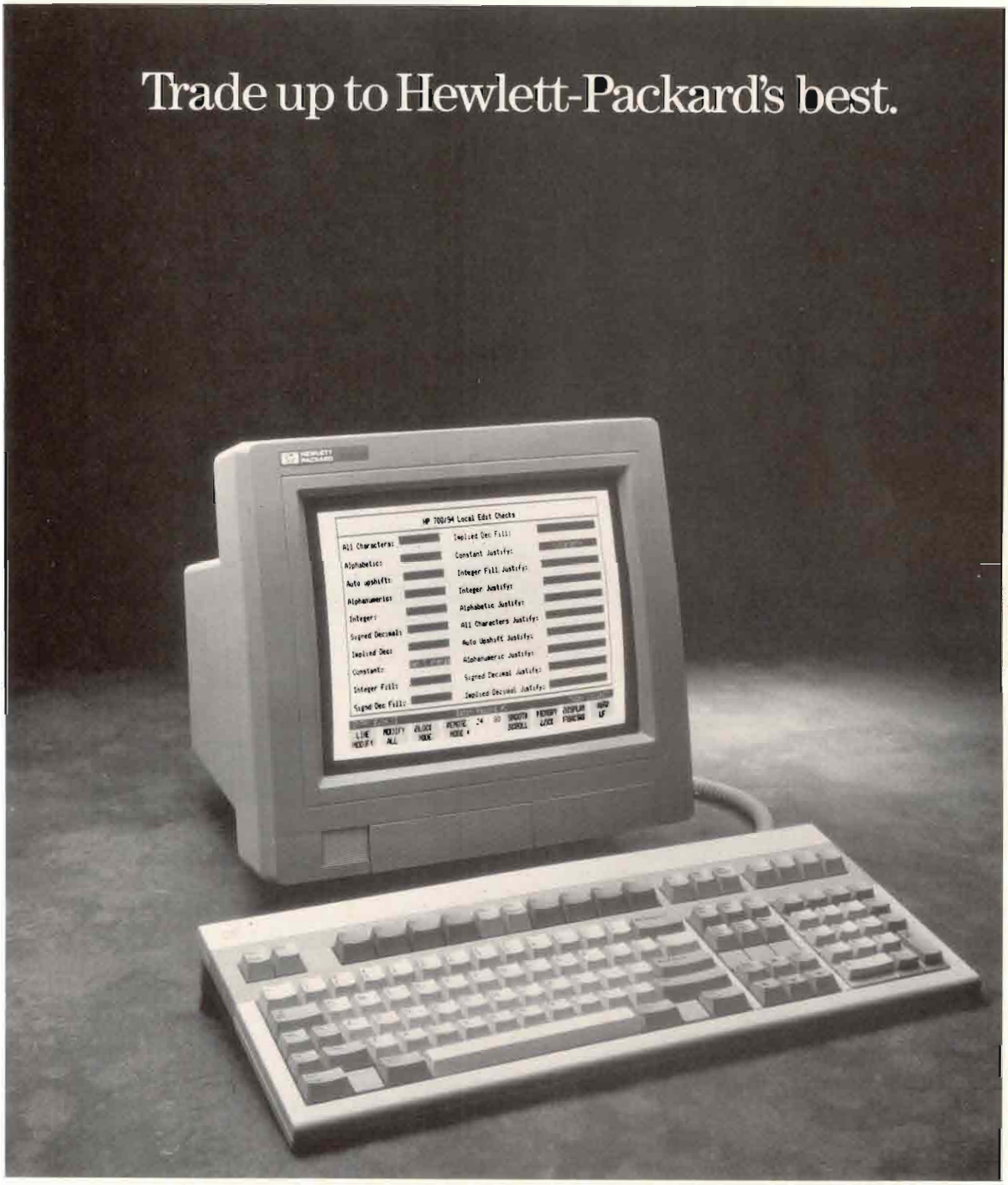

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HEWLETT PACKARD

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Program 1.

```
#include <dos.h>

union REGS regs;

int set_video_mode();
void put_pixel();

int save_mode;
int i, j;

main()
{
      printf("Starting now\n");
      getch();
      save_mode = set_video_mode(6);

      for(i=0, j=0; i < 100; i++,j++)
         put_pixel(i,j);

      getch();
      save_mode = set_video_mode(save_mode);
      printf("All done\n");
}
```

```
void put_pixel(int row, int col)
/*  Put white cursor at row, col in graphics mode */
{
      regs.h.ah = 0x0c;    /*  Put pixel  */
      regs.h.al = 15;      /*  Set pixel  */
      regs.x.bx = 0;
      regs.x.cx = row;
      regs.x.dx = col;
      int86(0x10,&regs,&regs);
}

int  set_video_mode(unsigned int mode)
/*  Set video mode and return current video mode */
{
int save_mode;
     regs.h.ah = 0x0f;
     int86(0x10,&regs,&regs);
     save_mode = regs.h.al;
     regs.h.ah = 0x00;
     regs.h.al = mode ;
     int86(0x10,&regs,&regs);
     return(save_mode);
}
```

Program to Write Pixels using ROM BIOS Calls.

PCTIPS35.DOC

Program 2.

```
#include <dos.h>
union REGS regs;

int set_video_mode();
void put_pixel();

int save_mode;
int i, j;
char far *screen_start_addr;
char far *screen_byte;

static char mask[8] = { 0x80, 0x40, 0x20, 0x10,
0x08, 0x04, 0x02, 0x01  };

main()
{
     screen_start_addr = 0xa0000000;
     printf("Starting now\n");
     getch();

     save_mode = set_video_mode(16);
     for(i=0, j=0; i < 100; i++,j++)
        put_pixel(j,i);
     save_mode = set_video_mode(save_mode);
     printf("All done\n");
     getch();
}
```

```
void put_pixel(int row, int col)
/*  Put white cursor at row, col in graphics mode */
{
unsigned long offset;
offset = (row * 80) + (int)(col/8);
screen_byte = screen_start_addr + offset;
*screen_byte |= mask[col % 8];
}

int  set_video_mode(unsigned int mode)
/*  Set video mode and return current video mode */
{
int save_mode;
     regs.h.ah = 0x0f;
     int86(0x10,&regs,&regs);
     save_mode = regs.h.al;
     regs.h.ah = 0x00;
     regs.h.al = mode ;
     int86(0x10,&regs,&regs);
     return(save_mode);
}
```

EGA/VGA Direct Pixel Writes.

should be XOR'd with the previous pixel value at (row,col).

Some programmers feel that using the ROM BIOS provides them with greater device independence when they write code, but as you see here, the actual line you will see is a function of the graphics mode you set. In CGA mode, coordinate (100,100) is much farther 'down' the screen than the same coordinate on a VGA-based system.

Because your code needs to be device dependent, you might think about the faster method to draw screen graphics: direct memory writes.

Memory Access

The CGA, EGA and VGA interfaces and monitors are mapped into the VECTRA at the memory addresses in *Table 1*.

In the CGA, every other line of the graphics display is interlaced. The upper left eight pixels are at address B800:0000; the next eight pixels to the right are at address B800:0001; and the last eight pixels at the upper left are at address B800:004f because there are 80 decimal bytes on each graphics scan line.

However, the byte at address B800:0050 isn't the leftmost pixel on the second scan line. In CGA mode, every other line of display memory is contiguous in memory. Therefore, the leftmost byte on the third scan line is address B800:0050. Because of page boundaries, the leftmost byte on the second scan line is actually at B800:2000, 2000 hex bytes after the byte immediately above it. This is illustrated in *Table 2*.

The EGA And VGA Screens

Fortunately, the EGA and VGA interfaces provide a much nicer memory organization. Each line is contiguous, so that writing a block of any length 640 bits wide will appear correctly on the display.

Both EGA and VGA memory starts at address A000:0000, and both are 640 pixels in width. The only real difference for our purposes here is that the VGA provides additional lines at the bottom, since the EGA resolution is 640x400 and the VGA 640x480. *Table 3* shows this memory organization.

If you are programming just the EGA and VGA screen, you easily can map a particular pixel coordinate into the correct byte of memory. Given a particular (row,col) coordinate, the arithmetic to calculate the memory address is as follows:

```
Byte_Offset =
  (row * bytes_per_scan_line) + (col / 8)
```

The individual bit within this byte can be calculated from the column coordinate modulo 8. However, since the most significant bit is at the 'left' of the byte, we need to set the bit which is (7 — (col % 8)). *Program 2* shows the same program modified for direct memory writes in EGA or VGA modes.

When I test both programs for performance on my Vectra, I find the direct memory writes better than 10 times faster than the same writes using the ROM BIOS call. Using the ROM BIOS, I can draw close to 2,400 pixels per second, while the direct memory writes draw better than 25,000 pixels per second.

Of course, the direct write call I have included here has a number of limitations. Because we aren't controlling the EGA and VGA registers, we are limited to color (black and white) graphics only. In addition, I make a number of assumptions about the size of the display and the number of pixels I can address. Because I find this device dependence even using the ROM BIOS call, I feel the extra speed of direct graphics writes is well worth the loss of color. You may find that color is important to you, in which case I'd suggest you spend the time to investigate programming the EGA/VGA directly. Your programs will be much faster, and your users much happier. *—Miles B. Kehoe is an online support manager for Verity Inc., Mountain View, CA.*

TABLE 2

CGA Memory Organization

B800:0000	B800:0001	B800:0002	B800:0	B800:004f
B800:2000	B800:2001	B800:2002	B80	B800:204f
B800:0050	B800:0051	B800:0052		B800:009f

TABLE 3

EGA/VGA Memory Organization

A000:0000	A000:0001	A000:0002	A000:0	A000:004f
A000:0050	A000:0051	A000:0052	A00	A000:009f
A000:00A0	A000:00A1	A000:00A2		A000:00Ef

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Continued from page 26.

NWA Releases LIMS For UNIX System Labs

Northwest Analytical Inc. (NWA) released NWA LIMS, a UNIX operating system laboratory information system, designed for small to medium sized laboratories. NWA LIMS is a full-featured laboratory information system that includes a complete audit trail to support laboratory quality assurance programs.

Laboratory staff can set up and maintiain NWA LIMS without programming. The database and workflow procedures can be defined using menu driven, prompted query screens. Worklists and report formats definitions are straightforward combining formatting instructions with embedded calculations and logical operators. NWA LIMS supplies data management for applications not covered by conventional data systems. In addition to data from bench instruments, NWA LIMS can accept data from external sources such as process intruments and industrial networks.

NWA LIMS interfaces directly with NWA Quality Analyst (NWA's Statistical Process Control software), and can be configured to automatically produce SPC charts and reports for process parameter. With NWA LIMS organizing the process data, complete and timely process is feasible.

NWA LIMS is targeted for laboratories that require up to 30 data stations. Smaller systems (up to 25 users) can be installed on 80386 based IBM PC/AT, PS/2 and compatible computers running XENIX, a microcomputer version of UNIX. Larger systems are available for selecting UNIX system computers.

Contact Northwest Analytical Inc., 520 NW Davis, Portland, OR 97209; (503) 224-7727.

Circle 381 on reader card

PDOS Ported To HP 9000 Applications

PDOS from Eyring Research, a real-time operating system for embedded applications, has been ported to the HP 9000/300.

PDOS will enhance the HP 9000/300 by providing true real-time operation as well as full target development software tools. This means that applications developed under PDOS on the HP 9000 can be executed on the host or any target system that is 680X0 based.

PDOS provides a complete, fully featured OS that allows developers to build real-time applications or to develop new applications for embedded systems.

Ports for PDOS include several different VMEbus-based board-level computers. Many of these boards employ the kernelized form of PDOS called VMEPROM. The HP 9000/300 now can access this via the HP VMEbus interface. Developers can combine the HP 9000/300 with processors from many manufacturers to create multiprocessing solutions that range from a few mips to supercomputing levels. PDOS provides the utilities, libraries and tools needed for successful integration.

The HP 9000/300 port is supported by high-level language and cross development links to HP-UX.

Price is $4,950.

Contact Eyring Research Institute Inc., 1455 West 820 North, Provo, UT 84601; (801) 375-2434.

Circle 367 on reader card

UniPress Ports SCO's Lyrix 5.0.4

UniPress Software Inc., a UNIX software developer and publisher, introduced a version of SCO's Lyrix 5.0.4 word processing system for Sun 3 workstations through UniMarket, its new UNIX software distribution division. Lyrix 5.0.4 allows you to change any menu messages by editing the Lyrix Command File. Lyrix also features "Point and Pick" document editing, mail merge and a built-in spell checker containing 80,000 words.

You can control other document style features like headers and footers, footnotes, page size and font selection with the Page Layout Menu. The Global Find lets you make corrections one at a time or all at once. Additionally, Lyrix can be customized to display messages in a foreign language.

SCO's Lyrix for all Sun 3 workstations is available immediately from UniMarket for $595.

Contact UniPress Software Inc., 2025 Lincoln Hwy., Edison, NJ 08817; (201) 985-8000.

Circle 387 on reader card

BBN Software Ports RS Series To HP 800s

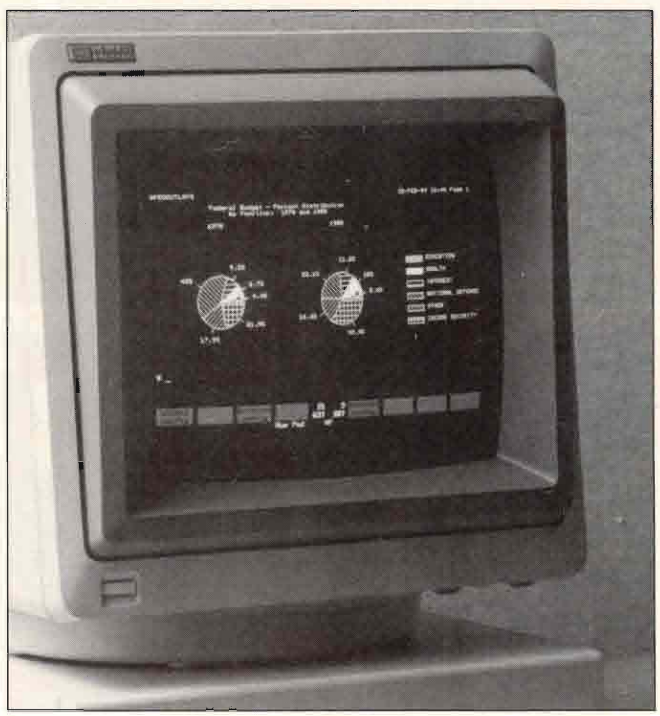
BBN Software Products Corp. announced new releases of its RS Series data analysis software for HP 9000 Series 800 RISC computers under the UNIX operating system.

The RS series of advanced analysis and graphics software is specifically designed for the scientific, engineering and manufacturing marketplace.

Price for the RS/1 software begins at $4,000.

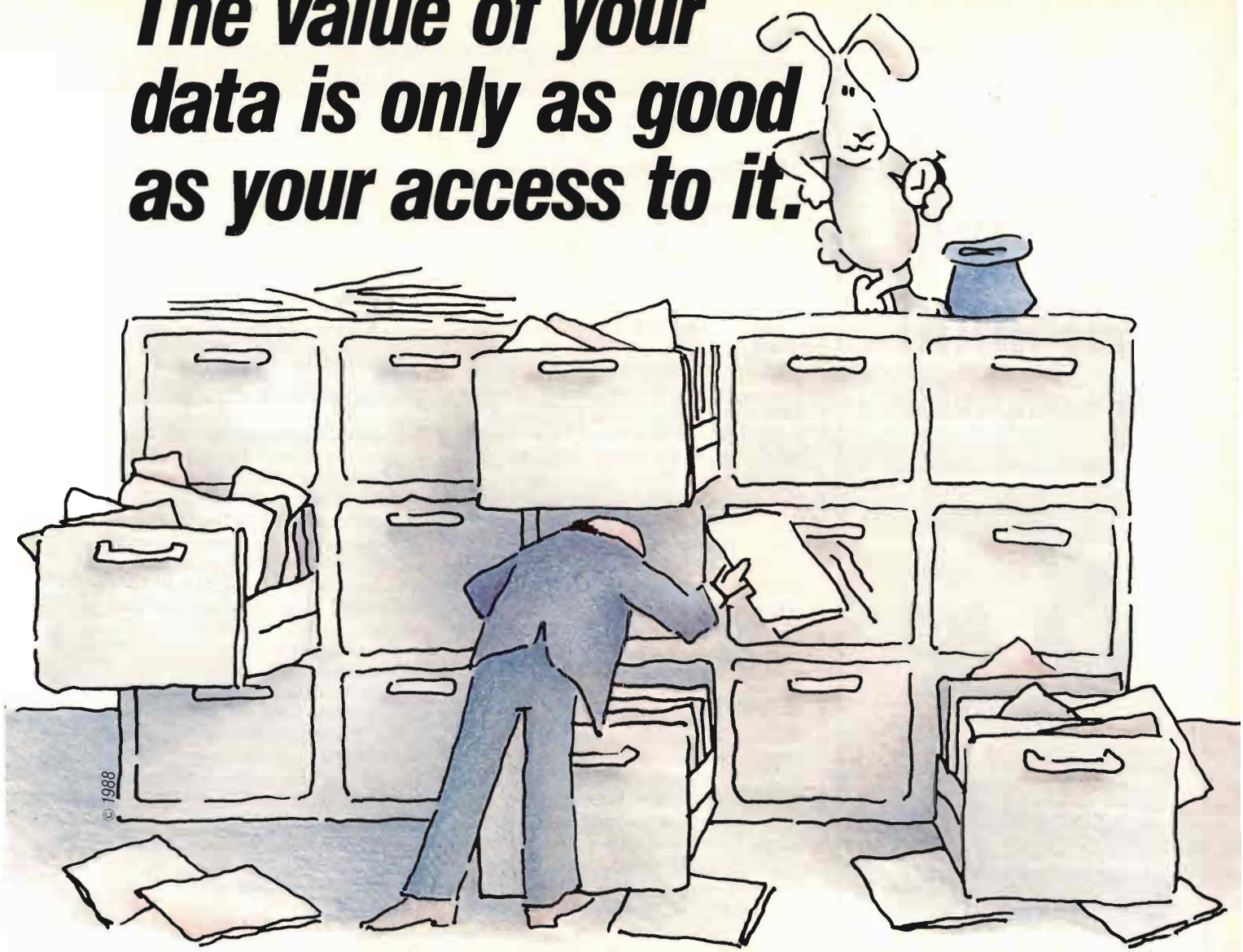
Contact BBN Software Products, Marketing Communications, 10 Fawcett St., Cambridge, MA 02238; (617) 873-5000.

Circle 382 on reader card



BBN Software Products RS series of advanced data analysis tools for technical professionals now runs on HP 9000 Series 800 RISC computers.

The value of your data is only as good as your access to it.



In a way, it's ironic. We invest millions of dollars to develop computerized systems to store information . . . data that is crucial to managing a successful business. Yet the sheer volume and variety of data that we have to store make it increasingly difficult to find the specific information we need to make decisions.

Executive Information Systems (EIS) are the latest approach intended to address the problem. In theory, an EIS should provide "easy access to individually specified mainframe information by non-technical end users."[1] In reality, it can't be done on the HP3000 without OMNIDEX.

***OMNIDEX** gives users the ability to instantly retrieve records based on multiple field and multiple set selection criteria, keywords and partial key values. Users can access information through all major report writers and with programs written in any 3rd or 4th GL, or use their PCs to retrieve summarized HP data directly into a Lotus 1-2-3™ spreadsheet using OMNIVIEW.*

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[1] *"The Three Pillars of EIS" by David Friend, August 1988*
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HP Enters High-Resolution PC Graphics Market

HP entered the high-resolution PC graphics market with the introduction of an intelligent graphics controller and a set of large-screen, high-resolution color displays.

At U.S. list prices of $1,400 for the controller and $2,795 to $3,695 for the displays, these products provide a price-and-performance solution positioned between HP's video graphics adapter (VGA) products for PCs and its higher priced, higher resolution controllers and displays for workstations.

Supporting resolutions of up to 1,024 x 768 pixels, the new controller can display 16 colors simultaneously from a palette of 4,096 choices. The controller is designed for all PCs based on industry-standard architecture. It comes with 896 KBs of on-board memory that can be expanded to 2.4 MBs.

CASET's CASE Product Supports X-Windows

CASET Corp. released a new version of its User Interface Management system that supports X-11 windows on Digital, SUN, Apollo, HP and SONY workstations running all supported operating systems (VMS, Ultrix, UNIX and Aegis.)

The CASET system, called SET (Software Engineering Toolkit), is a CASE product developed and maintained by a 45-person software engineering team. SET is a tool for the prototyping, development and management of the user interface/dialog portion of an application. SET supports full window management functionality and also manages user interaction with an application through a context-sensitive command line, pop-up/pulldown/static menus, input buttons, forms, prompts, input validation and hierarchical help text.

Data structuring, 2D/3D Phigs-like graphics capability and a skeleton code generator allows users to test-drive their application interface before any actual application code is written. The application developer specifies how the application should interact with users and SET automatically generates C or Fortran code that serves as a prototype of the application.

SET is targeted toward software developers working on large, complex applications, and those who need to provide a common user interface to applications running on a variety of hardware platforms, including timesharing terminals. SET with X-windows support is available immediately with prices starting at $7,450. User support is available through telephone helpline service and field support engineers.

Contact CASET Corp., 33751 Connemara Dr., P.O. Box 939, San Juan Capistrano, CA 92693; (714) 496-8670.

Circle 385 on reader card

LaserLister 3000 Generates Listings On Laser Printers

Innovative Software Solutions Inc. announced the release of LaserLister 3000, a multipurpose printing utility to better utilize LaserJet printers. It provides the capability of generating listings on laser printers from different sources in a variety of formats.

All models of HP's laser printers can be used. Input can be from flat files, KSAM files or COBOL formatted editor files. Output can be portrait, landscape, single column, double column and duplex (on the LaserJet 2000 and LaserJet IID).

The whole process can be initiated from a single RUN command or from a simple UDC. The price of the software is $1,200 and is available immediately.

Contact Innovative Software Solutions Inc., 10705 Colton St., Fairfax, VA 22032; (703) 273-5025.

Circle 384 on reader card

Beckman Associates Offer Myriad

Beckman Associates has announced Myriad, a word-processing application for Microsoft Windows/286 and 386, versions 2.03 and later. The program is a full-function word processor which supports many features traditionally reserved for desktop publishing applications. Myriad can import or export graphics and text through the clipboard, and imported graphic can have text wrapped around it. Using multiple document windows and the clipboard, Myriad easily cuts and pastes sections of one document into another.

Myriad enhances document appearance with graphic objects, such as lines, ellipes, rectangles and shading. "Borders" are used to associate a graphic frame with enclosed text, forcing the frame to move with the body of the document. Paragraphs can have borders associated with them in the style sheet. Myriad also provides style sheets, document merge, table and index generation, full page preview an "wysiwyg" presenta-

tion, headers and footers and automatic footnote placement. The application emphasizes ease of use without sacrificing the power many users need.

Included with Myriad is a complete version of Beckman Associates' Thesaurus & Speller reference system and easy-to-use online help. The program requires approximately 115K bytes RAM, bringing the minimum requirement to 512K bytes; 1 MB of free hard disc space is recommended. The package price is $249.95.

Contact Beckman Associates, 928 Oakcrest St., Suite A, Iowa City, IO 52246; (319) 354-5116.

Circle 368 on reader card

Data Integrity Protection For HP 3000 Series 900

Carolian Systems International Inc. has released INTACT B.00.00 for MPE XL systems. INTACT protects your database from logical damage caused by errors such as program aborts, bounds violations and stack overflows. INTACT automatically removes, in real-time, the incomplete transactions that are corrupting the database so that you're guaranteed reliable information.

INTACT XL offers logical data integrity for Spectrum machines, with all the functionality of INTACT for MPE V systems.

Carolian Systems other offerings include: GALCON, a product that provides centralized control and management of a multiple HP 3000 environment; SYSPLAN, a capacity planning and trend analysis tool; SYSVIEW, a performance optimization tool; OMNISPOOLER and INFONET, a spooling utility which enhances standard MPE spooling capabilities; and CALC1, a spreadsheet package.

For more information contact Carolian Systems International, 3397 American Drive, #5, Mississauga, Ontario L4V 1T8, Canada; (800) 263-8787 or (416) 673-0400.

Circle 386 on reader card

Bradmark Improves BASE BUILDER

Bradmark Computer Systems released a new version of its BASE BUILDER package that builds a small test database from production bases in the IMAGE environment using live data.

The new version includes an improved facility for creating the test base structure and optimized support of very large and complex database structures that require special

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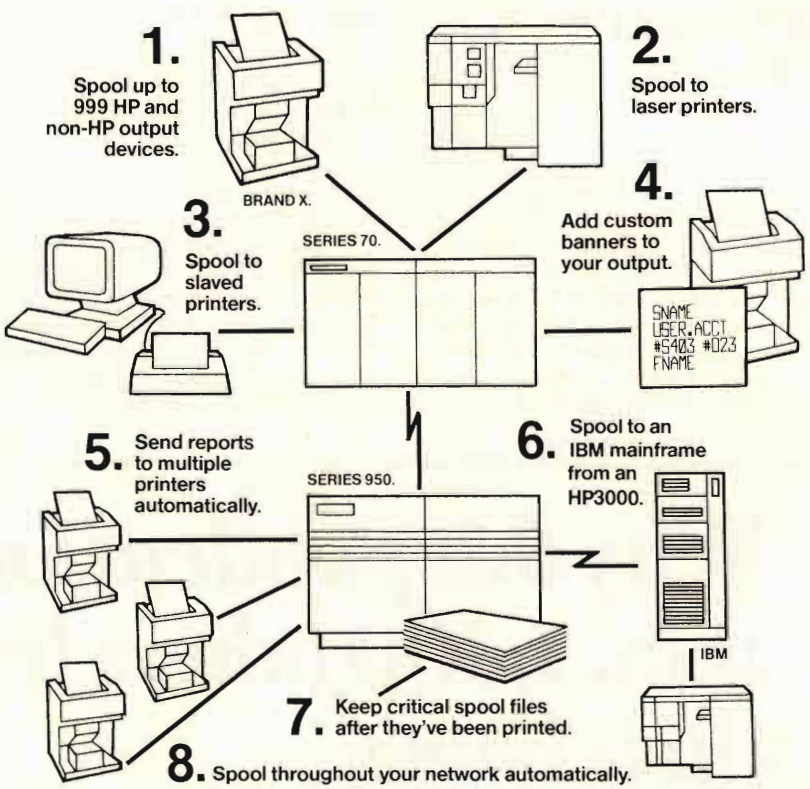

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navigation to copy all physically and logically related entries.

The new version and user manual will be shipped automatically to BASE BUILDER customers with current maintenance contracts.

Contact Bradmark Computer Systems, 100 Oceangate Ave., Suite 505, Long Beach, CA 90802; (213) 432-7713.

Circle 388 on reader card

SUPRTOOL 3.1 Released By Robelle

SUPRTOOL is an HP 3000 utility for data extraction from IMAGE, KSAM or MPE files. It lets you restructure and print fields and provides convenient, interactive editing of databases.

SUPRTOOL Version 3.1 includes: SUPRLINK, a new program for high-speed, multiple-file linkage; improved table searching; an output option that can convert your HP 3000 data into PRN-files that Lotus 1-2-3 can read, removes double quotes, converts binary to ASCII, inserts commas between fields and more.

SUPRTOOL costs $3,000 and is fully supported on MPE XL and there is no upgrade charge.

Contact Robelle Consulting Ltd., 8648 Armstrong Rd., R.R. #6, Langley B.C. Canada V3A 4P9; (604) 888-3666.

Circle 374 on reader card

Application Sharing With HP LAN Manager

Computer users now can share applications and resources across MS-DOS, MS-OS/2, UNIX operating systems and multivendor network environments using HP LAN Manager. In addition, HP announced two new high-performance, low-priced PC cards for its StarLAN 10 telephone-wire network.

HP's version of Microsoft Corp.'s OS/2 LAN Manager software provides DOS and OS/2 personal computer users a way to share files, applications, peripherals and network devices on OS/2 LAN servers. The new software can be fully integrated with HP LAN Manager/X operating system 3.

Because the MS OS/2 LAN Manager technology employed in HP LAN Manager runs independently of network protocols, it may be used in a variety of network environments. It also incorporates open application-programmatic interfaces (APIs) which aid in the development of distributed applications.

HP LAN Manager software resides on a LAN PC server running the OS/2 operating system. From a DOS or OS/2-based PC, such as the HP Vectra PC, users can take advantage of the high-performance network capabilities of the HP LAN Manager software. These capabilities include enhanced interprocess communications, security, network administration device sharing and print spooling.

***Note:** For more information about HP products, contact the Hewlett-Packard sales office listed in the white pages of your telephone directory.*

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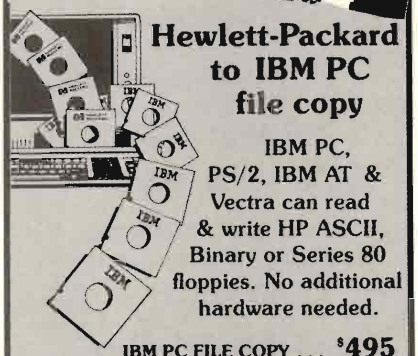

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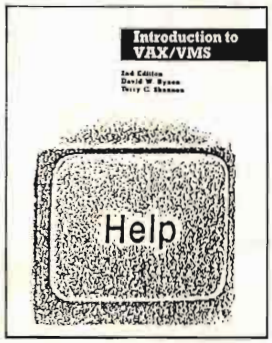

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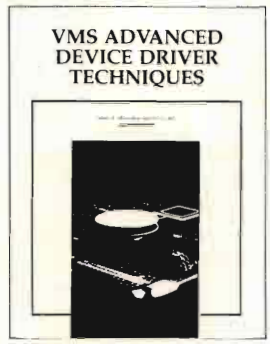

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[CALENDAR]

[MAY]

16: NOWRUG is holding a meeting at 6:30 p.m. in the Greenwood Hotel in Bellevue, WA. The speaker is Craig Fransen of Fransen/King Ltd. The topic is HP 3000/PC Integration: Can You Get There From Here?". Cost $10. Contact Sharon Robbins, (206) 282-6888.

25: Invitational Computer Conferences (ICC) is sponsoring a graphics conference at the Crowne Plaza in Dallas, TX. Contact ICC, (714) 957-0171.

30-6/2: NECRUG will hold the 10th Annual Eastern American Hewlett-Packard Users Conference at Harrah's Marina Hotel and Casino in Atlantic City, NJ. Send $279 check to NECRUG Inc, c/o Jeri Fuller, U.S. Mortgage Insurance Co., P.O. Box 190, Blue Bell, PA 19422; (215) 825-7760. (After 4/28 send $319, also non-NECRUG members add $21.) For more information contact Jeri Fuller, for vendor information contact Scott Baldwin, (215) 875-5324.

[JUNE]

5-8: Vesoft is offering two seminars, Turbo-IMAGE/3000 (Mon. & Tue.) and Effective HP 3000 SM (Wed. & Thu.) at the Beverly Hill Ramada Inn, Los Angeles, CA. Cost is $500, per registrant, each seminar, or $900 for both paid on same check. Send check payable to VESOFT, Inc., 1135 S. Beverly Dr., Los Angeles, CA 90035. (213) 282-0420.

7: There will be a conference on Intelligent Mapping at the Anaheim Marriot. The theme is "Focus on Desktop Mapping." Contact the conference director, Intelligent Mapping '89, 11956 Bernardo Plaza Dr., Suite 425, San Diego, CA 92128; (800) 882-2058.

16-17: The NBI Users Group will hold its 1989 National Conference in Houston, TX at the Houstonian. For more information contact Dick Stuart, (713) 226-1347.

21-24: "The Consultant as a Professional" is the theme for the Independent Computer Consultants Association's annual conference at the Catamaran Resort Hotel in San Diego, CA. For more information call 1-800-GET-ICCA or write ICCA, 933 Gardenview Office Pkwy., St. Louis, MO 63141.

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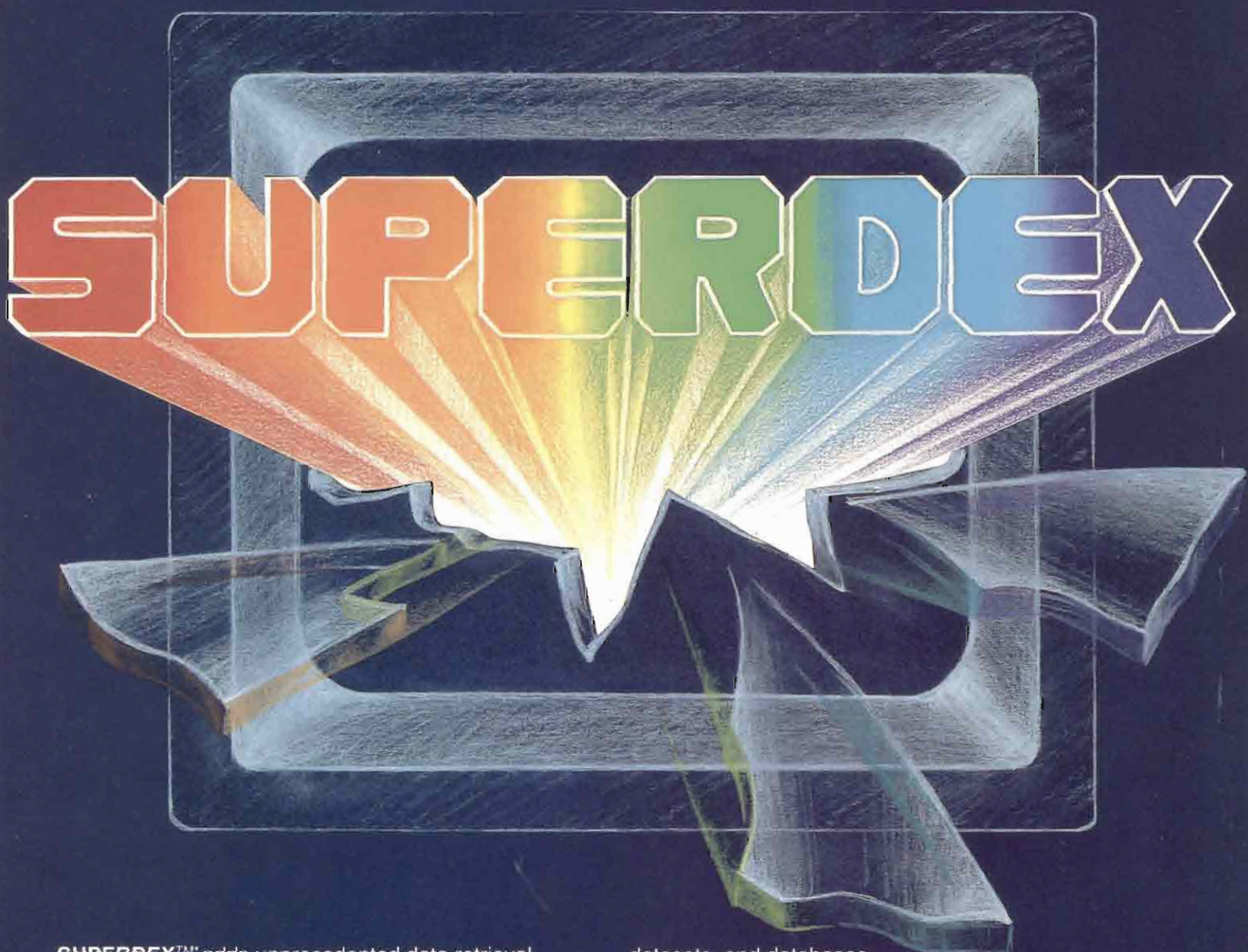

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