A Professional Press Publication

HP Professional

AN INDEPENDENT PUBLICATION FOR USERS OF HP COMPUTERS ■ VOL. 2 ■ NO. 2 ■ $4.00

FEBRUARY 1988

- Database Modeling
- LAN Interconnection Devices
- X Window, Part 2

DESKTOP PUBLISHING

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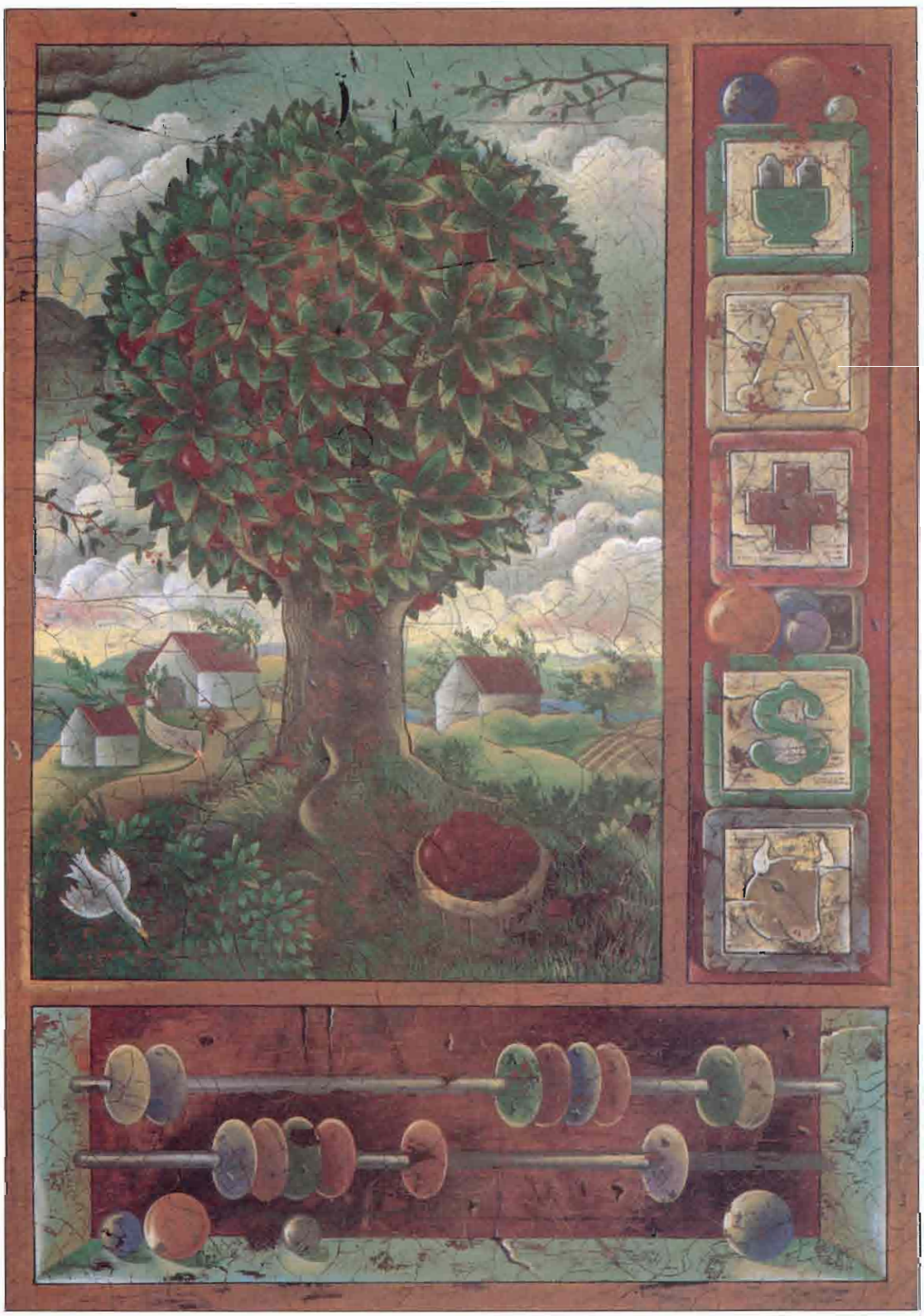

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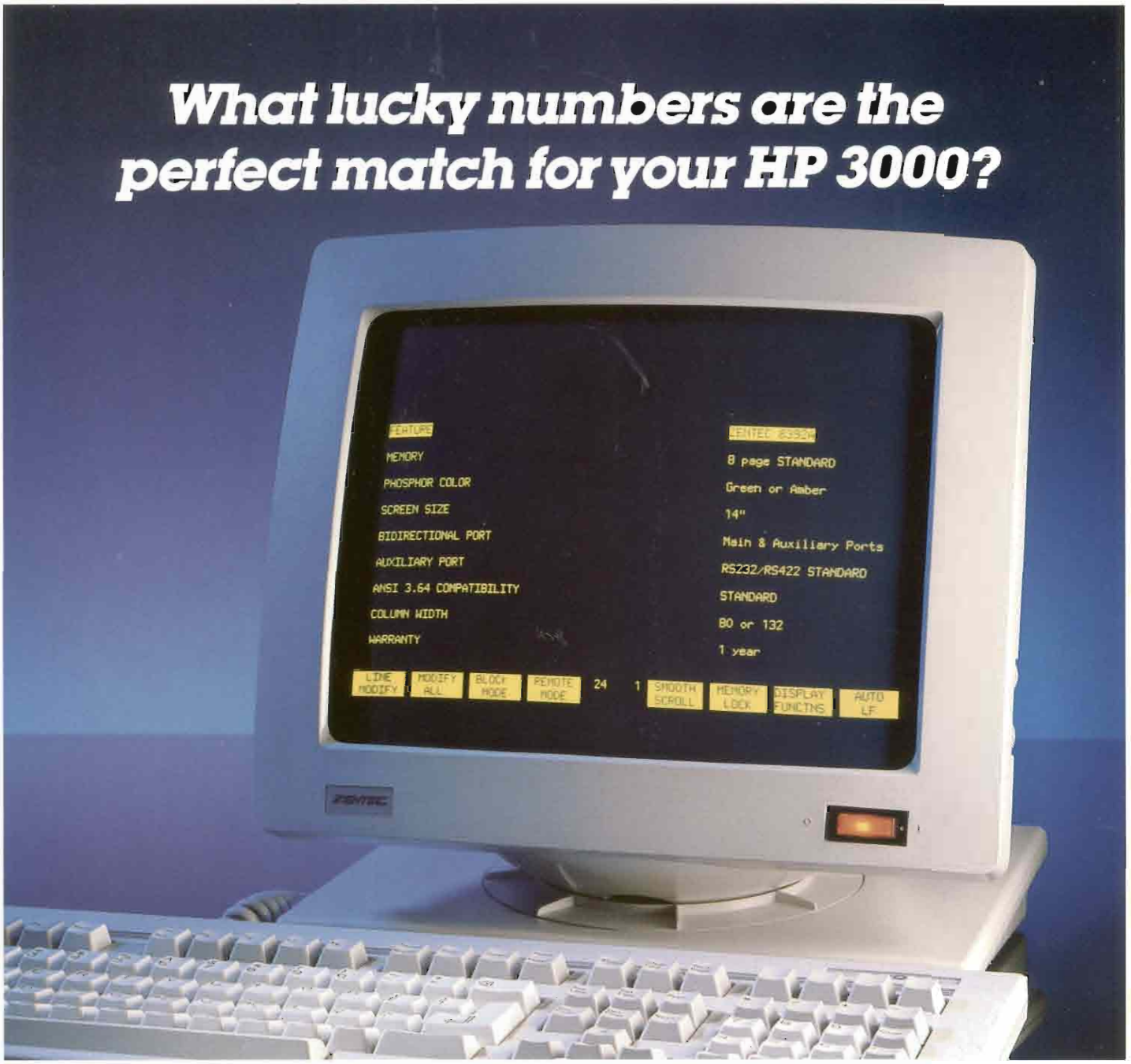

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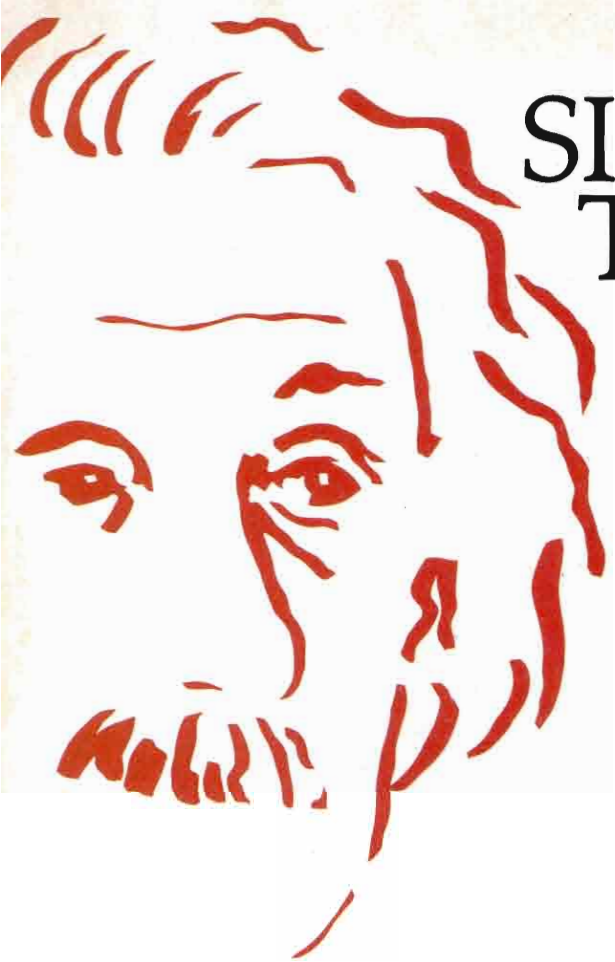

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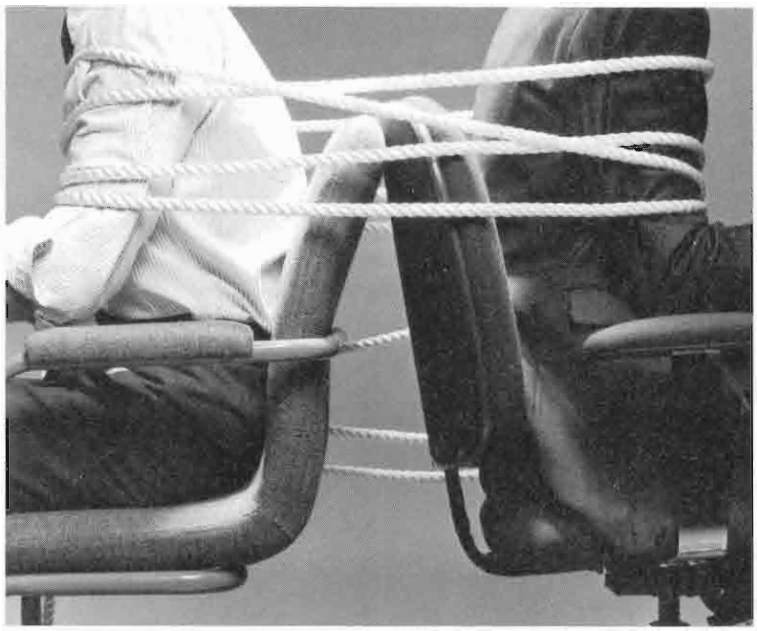

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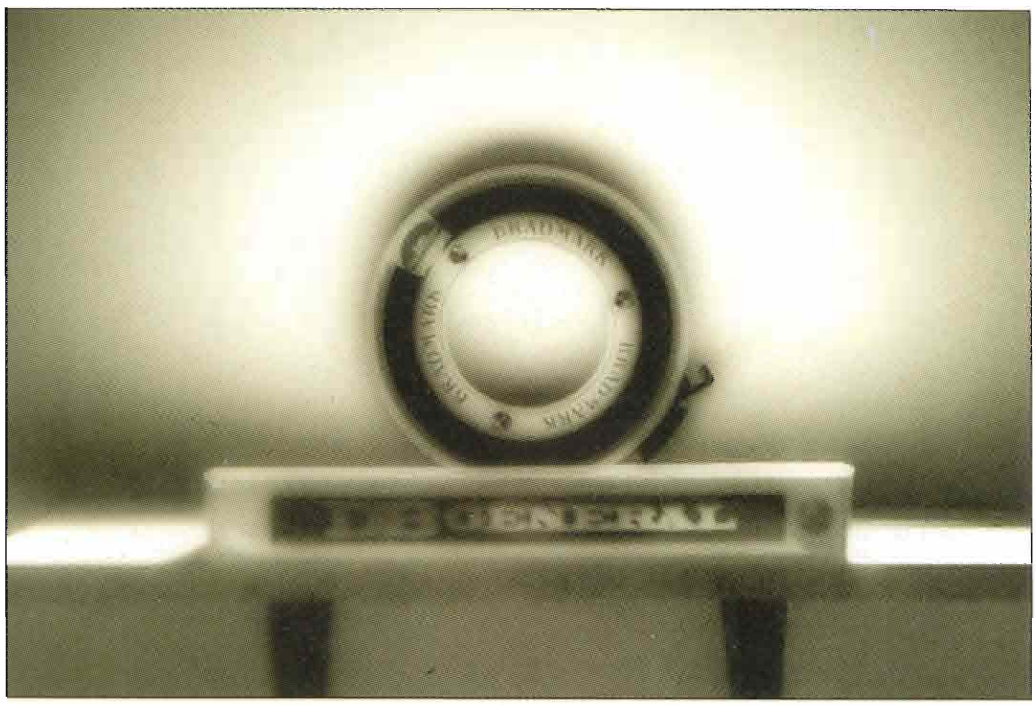

If this is where you keep your database maintenance utility, you've got the wrong one. IMAGE and TurboIMAGE database maintenance means more than capacity changes—it requires regular analysis and tuning to maintain optimum performance and avoid problems.

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Adager began shipping Spectrum-compatible software in August 1987.

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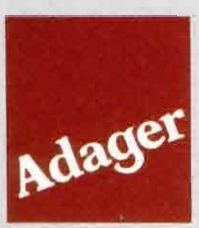

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X Window Is *It*

A good operating system/user interface is like the proverbial Cheshire Cat. As it ages, everything slowly disappears except the smile.

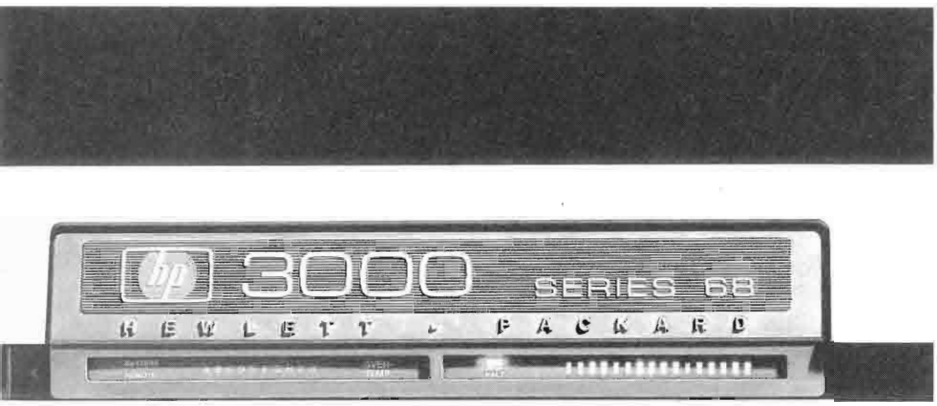
UNIX has a lot of ground to cover in this area. A UNIX sysgen is like a time warp back into the early '70s. The shell level commands are like a first-generation line editor.

Fortunately, many of the issues are fixable. Systems can be shipped with the system preinstalled. (But what do you do with the next release?) There are other user interfaces that are more MAC-like, and X Window is coming to save us all.

The visionaries among us foresee a day when the platform and the operating system are truly irrelevant. By the time we get to 80586s, 68050s and the next generation of Precision Architecture, perhaps that will be true. After all (and this is an old IBM truism), the worst junk in the world will run beautifully if you can put it on a fast enough platform.

The world rapidly is converging on a true standard user interface. X Window, with all its embellishments, is it for the next decade (DEC even has it in VMS V5). If you don't know anything about X, take it from me, it's time.

A minor projection: By 1990, the asynchronous terminal of today will be GONE. Replacing it will be the X Window "server." This is a "terminal" with enough smarts to seem like a workstation to the network. Remember the adage: The network *is* the computer.



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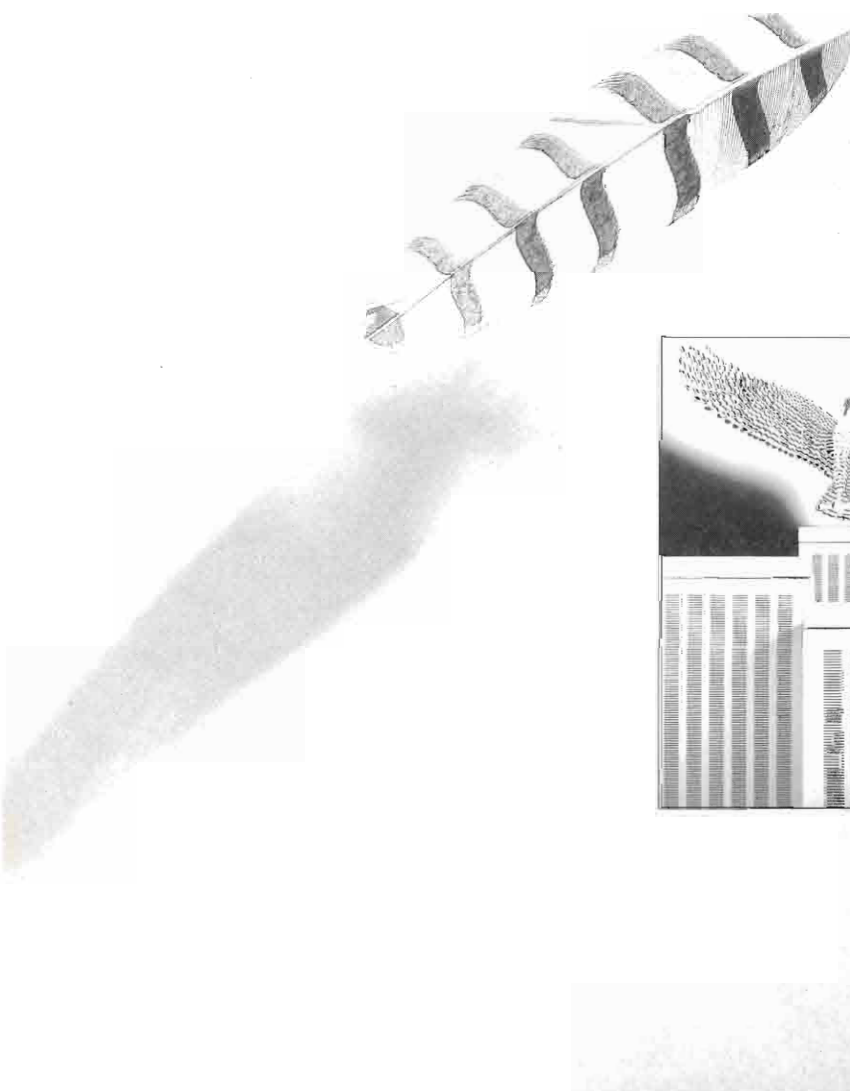

To further assure reliability, every Falcon is fully compatible with HP's sophisticated fault isolation diagnostics. EMC's network of Sales and Service locations worldwide provides on-the-spot service.

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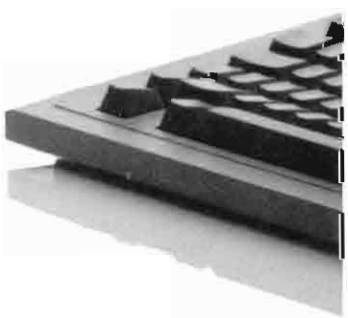

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ONE MORE FOR LOGO

As an educator who has been involved in computer education for many years, I was appalled by Cliff Lazar's article, "Computer Fraud Upon Our Children" (September 1987, p. 82). Mr. Lazar so misrepresents LOGO in particular and computer education in general that I feel compelled to respond at length.

Mr. Lazar contends that children are expected to produce perfect LOGO designs in a lock-step manner. In this, he totally misses the point of LOGO instruction. In the LOGO classroom, children are encouraged to explore and discover. There is no "right" or "wrong" way to complete an activity. "Bugs" are seen as opportunities to learn; debugging is an important part of the learning experience.

LOGO was never intended to be a painting or drafting program. It's purpose is not to produce "great art." It is highly inappropriate to compare LOGO to such tools.

As to the LOGO interface, the newest version of LOGO, called LogoWriter, has reduced the amount of typing, allowing the child to scroll back through already typed commands, edit and run them. Further, most versions of LOGO interface with the joystick port allowing them to become immersed in engineering and science activities in their classrooms.

More important, however, LOGO is not about hardware, but about thinking. It is a microworld in which a child can explore ideas, can be empowered to control the computer rather than be controlled by it. I fully agree that all of today's children should learn to use the computer as a tool in every area of their lives. They need to understand the technology that will be an integral part of their world.

However, I have seen children of all ages make LOGO one of their tools. I have seen children develop better problem-solving skills as they worked with LOGO. I have seen children grow in understanding of the tremendous effort that goes into producing a powerful piece of software as they write their own simple programs. These children certainly have a good basis from which to critique the Star Wars system.

Mr. Lazar's argument that students should be taught BASIC rather than LOGO seems strange in light of his contention that students should be taught up-to-date skills. BASIC is an old language; LOGO is much newer. BASIC was designed for college students; LOGO is a general-purpose language that is accessible to children. Writing structured code in BASIC requires heroic effort; writing structured code in LOGO is natural.

Clearly, Mr. Lazar has not done much programming in LOGO or he would understand that LOGO is a flexible language, allowing the development of control structures and data structures tailored to the need of the programmer. LOGO is, after all, a child of Lisp, the language used in much artificial intelligence research.

As a computer science teacher who began with FORTRAN, moved through BASIC to PASCAL and then LOGO, I am convinced that LOGO offers the young child an opportunity to explore his own thinking and the older student opportunities to better understand computers and computing. For the advanced student, LOGO offers powerful list-processing capabilities unavailable in either BASIC or PASCAL. Students who learn LOGO first have a much better understanding of the procedural nature of PASCAL (or any other procedural language) than those who know only BASIC.

Certainly, there are teachers in our schools who teach LOGO badly. Perhaps the situation is worse in computer education because the computer in the classroom is a relatively new phenomena. However, rather than write articles defaming computer education, I would rather see Mr. Lazar encouraging his school board to provide good teacher training in the area of computer education in general and for the LOGO teachers in his school district.

And, for those readers who want to understand what LOGO is all about, I suggest reading *MindStorms: Children, Computers, and Powerful Ideas* by Seymour Papert. In it, Papert, often called the "father of LOGO," explains the philosophy behind LOGO and his vision of a future in which computers are an integral part of our culture. A more recent book by Sylvia Wier, *Cultivating Minds, a LOGO Casebook*, addresses both theoretical and practical issues surrounding the use of LOGO.

Sharon Burrowes, Ph.D
LOGO Computer Systems Inc.
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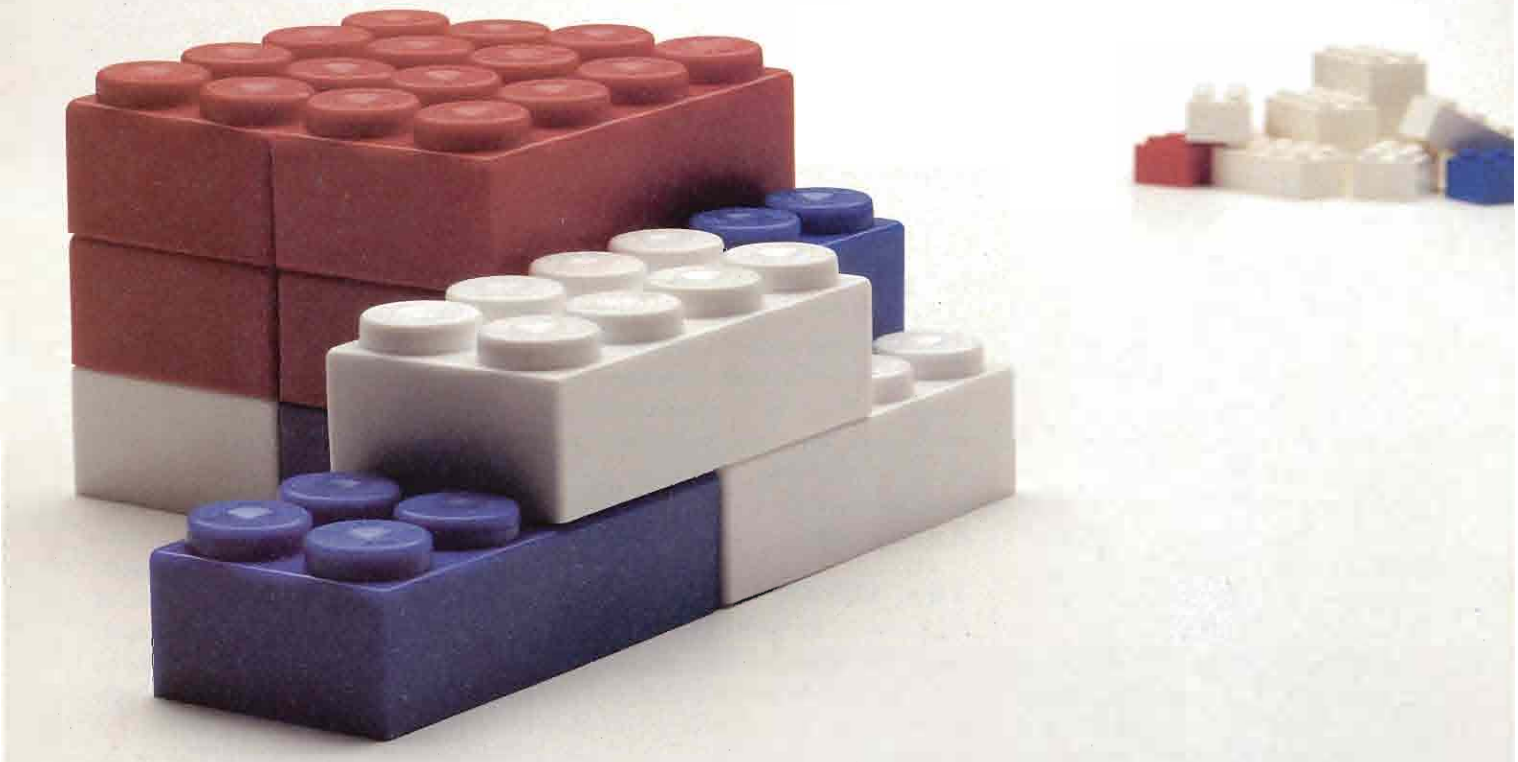

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THANKS FOR AI

Please accept my deepest gratitude for publishing the article, "AI: Myth and Reality," written by Robert Stanley (November 1987). I enjoyed reading that immensely. The article was put together very well, and it was very informative. I want to use this opportunity to congratulate the *HP PROFESSIONAL* editors for a job well done and an excellent magazine.

Sohrab Jaber
Springfield, VA

AN INTEGRAL WORKSTATION

In the October issue of *HP PROFESSIONAL*, Jay Martin Anderson of Tymlabs Corporation describes an HP/Macintosh workstation. I would like to bring to the attention of your readers an alternative solution that has been overlooked. A solution, moreover, that remains within the HP fold. This solution is to replace the Macintosh with an HP Integral personal computer.

For those not familiar with the Integral, it is a fully transportable, all-in-one-box (keyboard, screen, 3.5-inch disc drive and Thinkjet printer) UNIX computer, upwardly source-code compatible with the HP 9000 Series. The rudiments of UNIX come standard in ROM, and the complete UNIX development system is available on a 2.1-MB plug-in ROM board for about $1,100. Besides being expressly designed as an inexpensive engineering workstation (e.g., a 68000 microprocessor with a graphics coprocessor chip), the Integral has all the qualities cited in the article in favor of the Macintosh.

I will concede that the Integral does not have the 68020 or math coprocessor (hence speed) of the Mac II nor its color capabilities, but I believe the Integral is about half the price of the Mac II. The only advantage the original Mac may have over the Integral is in some of the software such as *MacPaint*. However, considering the similar architectures of the Mac and the Integral, I don't see why there should be any difficulty developing analogous versions for the Integral. These could be inserted into ROM, if desired.

In conclusion, I would just like to reiterate that in addition to being a standalone workstation and an introduction to the more powerful members of the HP 9000 Series, the Integral would be ideally suited for interfacing with the 3000 Series as described in the article, especially since HP already provides some software to effect 3000-to-9000 conversions. The major drawback is that the Integral has never really gotten the publicity it deserves nor are there many users. However, I hope this letter has made readers aware of some of the features of the Integral which could increase the user base and inspire further software development. Maybe we'll even see a feature article on the Integral in an upcoming issue of *HP PROFESSIONAL*.

Alan Goldsmith
Brooklyn, NY

T&M SERVICE

Readers of J. Michael Mason's opinion piece, "HP, What Are You Afraid Of?", in your November 1987 issue should be aware of a few facts regarding both the modifications of HP's Time and Materials (T&M) service and Mr. Mason's company that were conspicuous by their absence.

HP's decision to offer a next-day instead of a four-hour response uplift for T&M service was made for customer-related business reasons. Because HP's field service organization is staffed based on known commitments for warranty and contractual services, it became increasingly difficult to guarantee a reasonably priced four-hour response when requested on a T&M basis. Conversion of the four-hour uplift to a next-day uplift has allowed us to better meet response-time commitments for both contractual and T&M customers, and more realistically set customer expectations for when T&M services will be available.

To say that HP made T&M changes without notice, as Mr. Mason did, is inaccurate. I sent a letter dated August 1, 1987, explaining the changes to all T&M customers who had directly ordered a four-hour uplift from HP during the preceding 12 months.

The November opinion piece contained other inflammatory comments aimed at arousing fear and suspicion. HP frequently makes changes in its support programs to improve customer satisfaction by more clearly setting expectations, by addressing changing needs, by simplifying administrative procedures, etc. Successful companies in dynamic markets must continually improve their offering to remain competitive. Such changes are most appropriately viewed as a positive attribute in sustaining long-term relationships.

Regarding certificates of maintainability, it is important that HP equipment users understand the purpose of the Certificate. The Certificate makes clear that HP will continue to support designated equipment that has been maintained under an HP support agreement when it is moved to a new location. The Certificate does not insulate purchasers of used systems from the cost of repairing a system that does not work.

Readers of the article also should be aware that, although Mr. Mason's "opinion" refers to a pending federal antitrust suit against HP in California, nowhere was it mentioned that his company, HyPoint Technology, Inc., which acts essentially as an independent service-insurance broker, filed a similar lawsuit against HP in Ohio. His firm, in fact, is represented by the same attorney involved in the California suit. HyPoint's suit, which we feel is totally without merit, is still pending.

I am confident that HP equipment users will see beyond the efforts of a third party to create uncertainty by distorting the facts for its own purposes. We are proud of the range of support services available from HP and want our customers to know that the goal of HP's support organization always will be to improve those services to better meet customer needs.

Roger Costa
General Manager,
Product Support Division
Hewlett-Packard
Mountain View, CA

■

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ENTER 109 ON READER CARD

DeskJet Provides Laser-Quality Output For Under $1,000

Based On Third-Generation InkJet Technology

Earlier this month, HP announced its HP DeskJet printer, a personal printer with laser-quality output for less than $1,000.

The HP DeskJet printer ($995) is designed for professionals, owners and managers of small companies, or departments of larger firms. It's aimed at users of low-priced impact dot matrix printers who would like to trade up to laser-quality text and graphics for typical office applications.

HP believes the DeskJet will create a new category in the personal printer market by addressing the unsatisfied needs in the impact dot matrix market, similar to what the HP LaserJet printer family has done in the daisywheel market.

HP DeskJet printer applications include a wide range of word processing and personal productivity tasks for individual printing needs, such as correspondence, memos, reports, spreadsheets and business graphics.

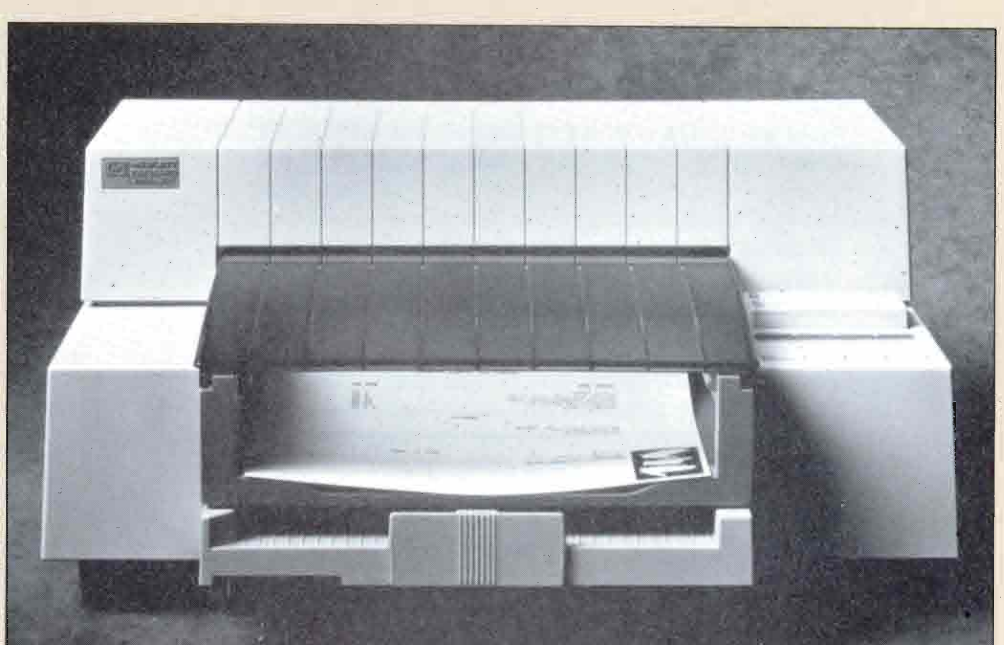
The HP DeskJet printer prints 300-dpi, high-resolution text in multiple fonts and full-page graphics. It uses all common office paper and also handles merged text-and-graphics output from numerous popular application packages.

The new DeskJet prints text at speeds of 120 characters per second (cps) or approximately two pages per minute for laser-quality text and 240 cps for draft quality. The printer has a 16-KB buffer.

Multiple fonts are available in a wide variety of typefaces, sizes and styles via 12 font cartridges (four or more fonts per cartridge) and one soft or downloadable font with universal character sets (e.g., IBM-8, HP-Roman-8, ISO-7).

The printer employs HP's PCL printer language, making it compatible with most HP LaserJet printer-support software packages. Additional HP DeskJet printer features are supported through HP DeskJet printer drivers available in more than 60 software packages at the time of introduction.

The HP DeskJet printer works with a variety of HP, IBM and IBM-compatible computers and comes standard with Centronics parallel and RS-232C serial interfaces.



HP's new DeskJet printer offers laser-quality output for under $1,000.

HP-UX 6.0 Provides Discless Computing, NFS 3.0 Support

AT&T's UNIX System V Implemented For HP 9000 Series 300

Hewlett-Packard recently announced HP-UX 6.0, the latest release of its implementation of AT&T's UNIX System V operating system that runs on all members of the HP 9000 Series 300 family of engineering workstations.

HP-UX 6.0 expands HP's commitment to distributed computing and industry standards by supplying discless computing capabilities and support for both the Network File System (NFS) Release 3.0 and VME interface cards.

The discless capabilities of HP-UX 6.0 are transparently integrated with the kernel, making it look to discless users as if they're running on a multiuser machine with the power of a high-performance workstation.

The high level of integration enables HP-UX 6.0 to pass the AT&T System V Verification Suite (SVVS) in both discless and non-discless operation. This ensures a high degree of applications portability to and from other System V Interface Definition (SVID) compliant machines.

HP is able to offer customers consistently high levels of performance when running discless because the HP-UX discless-computing capability was designed from the ground up rather than as an add-on. In most cases, the disc server also can be used as a workstation with little performance penalty, yielding a price advantage over competitors' dedicated-server configurations. All of these benefits are delivered using industry-standard IEEE 802.3 networking.

A built-in dynamic-reconfiguration capability allows nodes to asynchronously join or leave a discless cluster. The system is designed to recover from transient local area network (LAN) cable breaks, adding another dimension to its fault tolerance.

HP has added support for NFS 3.0 to complement its existing distributed-computing capabilities, giving users a de facto standard method of transparently sharing files within a heterogeneous network of machines, something that's important in multivendor, distributed environments.

Support has been added to HP-UX 6.0 for its new VME expander. Customers now have access to several thousand third-party VME interface cards in addition to the standard HP offerings.

Compatibility with former versions of HP-UX was one of the design goals of HP-UX 6.0. The first Series 300 engineering workstations were introduced in 1985, running HP-UX 5.0. Since then, several generations of new hardware and software have been introduced. Object code compiled on all previous versions of HP-UX will run on all members of the Series 300 family running HP-UX 6.0.

A two-user license-to-use HP-UX 6.0, NFS and ARPA/Berkeley Networking Services are shipped with all Series 300 workstation bundles at no charge. Media and manuals are available for $450. Upgrades for 16 and 32 users are available. Customers with existing Series 300 workstations who aren't on support services and wish to run HP-UX 6.0 may purchase an upgrade.

New Disc Drive Offers Flexible Capacities, Rugged Design

Designed For Industrial, OA, Scientific Environments

Hewlett-Packard recently announced a new data-storage subsystem for HP personal computers, engineering workstations and low-end technical systems.

Designed for industrial, office automation and scientific environments, the HP 9153C ($1,980 — $3,640) is a reliable, rugged desktop disc drive available in four capacities.

Three of its capacities (10-, 20- and 40-MB) are available standard from the factory. The fourth capacity (30-MB) is achieved when a user, who initially purchases a 10-MB version, orders the HP 9153M 20-MB add-on mechanism to the original package. The HP 9153M also can be placed in the 20-MB model.

All three basic hard-disc capacities can be purchased with an integrated 2-MB (1.42-MB formatted), 3½-inch floppy disc drive. This floppy is twice the capacity found in previous HP models, but is available at the same price.

New Software Manages HP 3000, PC Integration

Business System Plus, Cooperative Services Tool Available Now

Hewlett-Packard recently introduced HP Business System Plus Software, which combines key office-systems applications to integrate personal computers and HP 3000 business computers into a single, centrally managed system.

Concurrently, the company introduced the HP Cooperative Services development tool for creating cooperative-processing applications that enable personal computers and HP 3000 business computers to process information jointly across a network.

The HP Business System Plus software ($29,220 — $65,570) incorporates new utilities that enable HP's PC and workgroup software applications to be centrally downloaded and managed from the HP 3000. Workgroup software provides services such as electronic mail and access to minicomputer databases to all network users.

The HP Business System Plus software is designed to incorporate the recently introduced HP NewWave application environment when it becomes available in the second half of 1988.

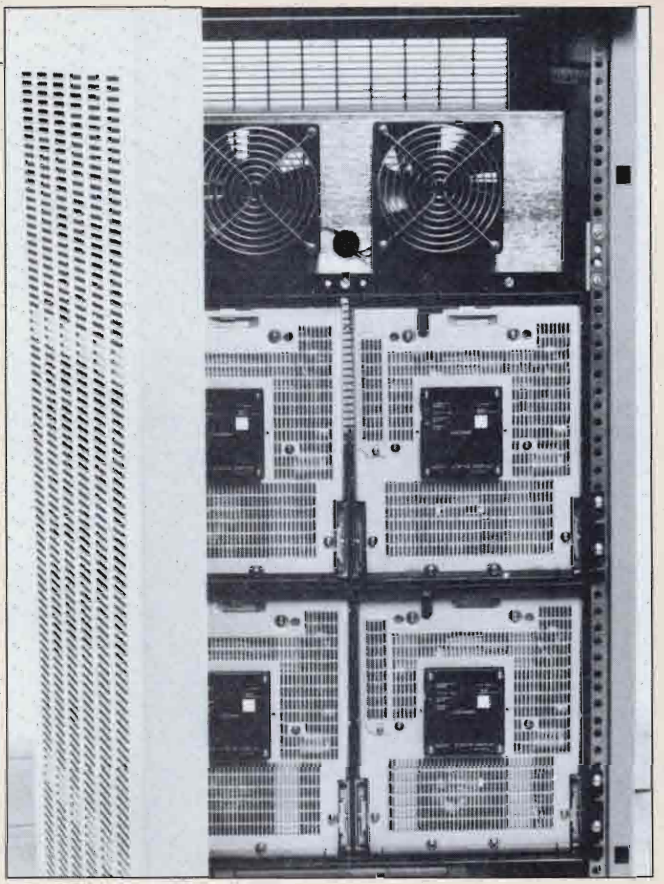
It comes on a single HP 3000 tape and includes the HP DeskManager for host-based communications, HP Information Access to simplify data retrieval from the HP 3000 database, HP Resource Sharing to take advantage of all network peripherals, and the HP Vectra Office Professional Pack for PC applications such as spreadsheets, word processing, graphics and PC-based communications.

A companion product, the HP Business System 3000 minicomputer ($39,260), includes an HP MICRO 3000 computer configured with an HP StarLAN network.

The Cooperative Services development tool ($2,700 — $8,700) simplifies the creation of new application types that share processing across the network.

For example, HP Cooperative Services software could be used to create a sales application that spans both PCs and an HP 3000. Product pricing and specifications could reside on a portable or desktop PC, and frequently changing data, such as inventory levels, could be stored centrally on the HP 3000.

Another benefit of this approach is that data processing applications can take advantage of the many features inherent in PC environments, including the recently introduced HP NewWave applications environment and MS Windows user interface.



Falcon Series For Spectrum

EMC Makes 'Significant Investment'

EMC Corporation's Falcon Series Disk Subsystems now are fully compatible with Spectrum, Hewlett-Packard's new RISC architecture machines. EMC is the first independent manufacturer to develop hardware for the Spectrum class machines and to compete with HP in this marketplace.

According to Joseph Gately, senior product manager for EMC's HP Group, a firmware change on the Falcon's controller was all that was necessary in order to insure compatibility with the RISC-based machine. "By introducing the first compatible products for Spectrum, EMC has made a significant investment in the success of the new series," said Gately.

"HP 3000 users are moving to the bigger, faster Spectrum machines. To meet the increasing user demand on their computer resources, these sites will need the higher performance and greater storage capacity provided by the Falcon subsystems. Falcons offer a substantial performance increase over older removable drives like the HP 7933."

In addition to providing savings of 10 percent to 30 percent over comparable HP offerings, the Falcon Series offers four different capacities to choose from. Falcon 400 has 406 MB of storage, Falcon 600 offers 625 MB, Falcon 800 has 890 MB, and Falcon 1200 provides users with 1.25 GB of mass storage capacity.

HP PLD Design System Automates Complex Design Activities

Part Of HP DesignCenter

Hewlett-Packard recently introduced its HP PLD Design System, a development system that automatically fits complex designs into programmable-logic devices (PLDs) and, if necessary, partitions designs into multiple devices.

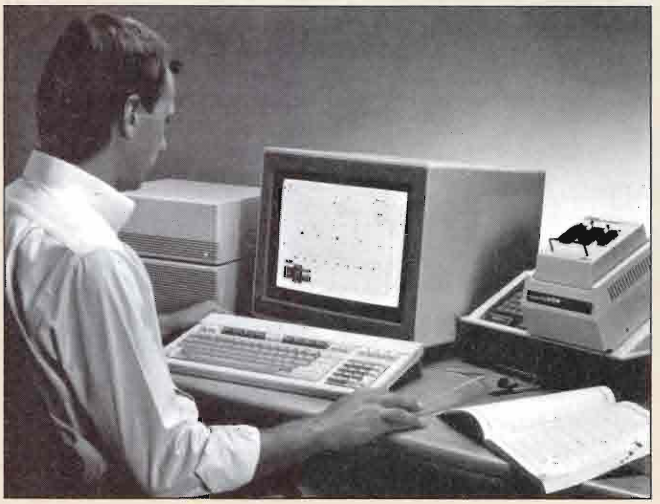
The HP PLD Design System ($8,000 — $14,500) enables engineers to focus on design rather than device selection using features such as graphical, interactive user interface; multiple-design editors and debuggers, including waveform entry; device-independent PLD design with automatic-design partitioning; comprehensive PLD library and automatic test generation.

As part of the HP DesignCenter, this system is available on the full range of HP 9000 Series 300 workstations.

The HP DesignCenter includes a broad line of product development tools for electronic, software and mechanical design, manufacturing and test. These tools, running on a range of industry-standard HP computers, can flexibly fit into multivendor CAE/CAD strategies and coexist with installed computing environments.

Unlike other systems that use batch programs requiring familiarity with system and language syntax, the HP PLD Design System features an interactive user interface with easily understood icons and pop-up menus. Engineers use the interface for all phases of development to shorten design cycles: capture, verification, automatic device selection and partitioning, fuse map generation, test vector generation, device programming and documentation.

Without considering the target device, engineers enter designs with schematic symbols, graphical state diagrams, truth tables, waveforms or Boolean equations. Designs also can be captured with the HP Electronic Design System and transferred to the HP PLD Design System. PLD debuggers specific to each design entry method are tightly integrated to quickly verify PLD designs at the same level of abstraction.



The HP PLD Design System allows engineers to focus on design rather than device selection.

The HP PLD Design System supports hierarchical design, a concept used in general CAE, to allow complex PLD designs to be split into subdesigns or blocks. Each block can be described according to the most appropriate design method, so a design team could describe a PLD using a mixture of schematic, state diagram or waveform entry.

Once designed and verified, the blocks can be interconnected and the entire circuit simulated. Engineers also automatically can generate HILO-3 (GenRad, Inc.) models of designs and transfer the models to the HP Electronic Design System for more thorough simulation of printed-circuit board designs containing PLDs.

The HP PLD Design System converts described circuits into low-level Boolean equations of equivalent logic, and automatically minimizes the logic. ■

Kelly, Wick Hill Sign Distribution Agreement

XL/3000 RAMDISC Forces Company Expansion

Kelly Computer Systems (Mountain View, CA) recently signed a distribution agreement with Wick Hill Associates, Ltd. (Egham, Surrey, United Kingdom).

Wick Hill, a well-known distributor of software products to HP users in both the U.K. and Scandinavian markets, will carry the entire Kelly product line including the XL/3000 RAMDISC announced last September at Interex.

The XL/3000 hard disc drive greatly enhances the traditional performance level of almost any HP 3000 system.

This agreement represents an important step in the corporate growth of Kelly and will provide Kelly users supported by Wick Hill with the same level of support and service that U.S. users receive.

INDUSTRY WATCH

HP PRO Staff

Singapore Operation To Focus On Networking

A facility that will focus on designing and marketing HP AdvanceNet networking software products has been established in Singapore. The research and development center, the HP Singapore Networks Operation, is the first such R&D center for HP in the Asia-Pacific region.

"HP has major networking operations in the United States and Europe designing and marketing HP AdvanceNet solutions," said Willem P. Roelandts, general manager of HP's Information Networks Group.

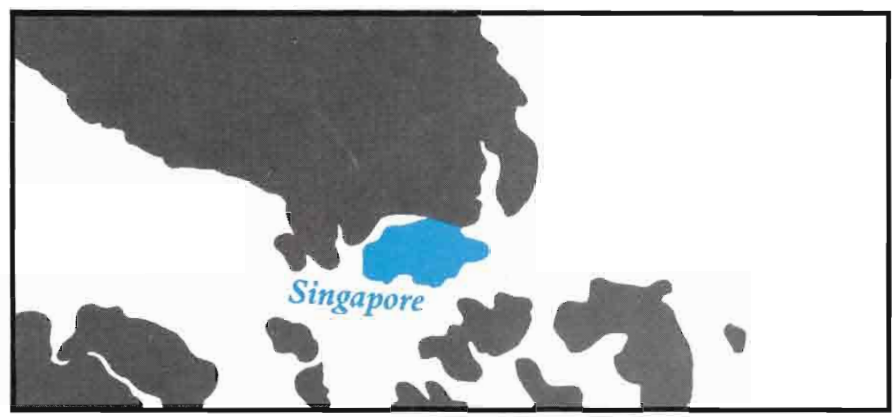
"Our new R&D center in Singapore will help us expand our offerings in an area of critical importance to computer users."

AdvanceNet products provide integrated, multivendor-networking solutions for business-office, engineering, manufacturing and company-wide communications needs. It unites two data processing methods: HP's local interactive access to processing and IBM's centralized batch processing.

The HP AdvanceNet strategy interfaces HP equipment with IBM and IBM plug-compatible products for both System Network Architecture (SNA) and bisync environments.

"Computer networking has risen to the top of the priority list for most companies because they now realize they have created 'islands of automation' by using computers. They've also discovered the way to increase their productivity and competitiveness is to connect these islands," said Roelandts.

"By establishing the Singapore Networks Operation, HP will address this need as well as capitalize on Singapore's position in the Asia-Pacific region, its competitive advantage as a total business center and its quality personnel."



Key Responsibilities

The Singapore Networks Operation will have two key responsibilities. First, it will develop software to help manage complex multivendor-computer networks within a building or between buildings or cities.

These will be marketed and supported by HP's worldwide sales and support organization and complement HP's other international networking efforts.

Also, it will develop products targeted for the Asia-Pacific region. Because of the center's location, HP will be able to funnel information on the specific needs of the Pacific Rim region for other products into HP's development laboratories in the U.S. and Europe.

The operation, scheduled to begin product-development efforts immediately, will recruit specialists in information-network technology.

Dominic P. Orr, former HP regional networks manager who set up HP's network consulting and support activities in the Asia-Pacific region, will head up the new center.

Initial training for the majority of the center's employees will take place in the U.S. and Europe. In addition to taking formal classes, they will take part in projects in HP's U.S. and European laboratories.

Communication Networks '88

At the Communication Networks Conference and Exposition (CN' 88), an annual telecommunications conference held in Washington, D.C., January 25-28, HP demonstrated AdvanceNet product offerings.

Demonstrations included industry-standard HP StarLAN and HP StarLAN 10 LANs in integrating office PCs with minicomputers; multivendor communications among HP, DEC and Sun Microsystems Inc. computer systems; a simulated manufacturing process that incorporates MAP 2.1; and a network-control center for HP's industry-standard X.25 wide-area network.

HP also demonstrated network-management capabilities for LANs and wide-area networks. ■

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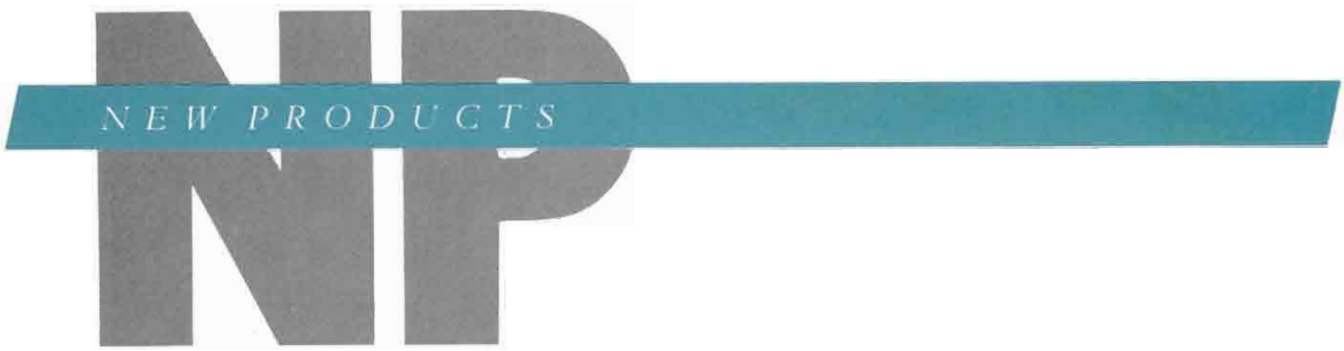


VOPEX-3A3 Expands Workstation Video Ports

Network Technologies Inc. has introduced the VOPEX-3A3, a new video output port expander designed for use with HP 825, MicroVAX 2000, Sun, Apollo and compatible workstations.

The VOPEX-3A3 ($649) permits building a video LAN consisting of a single computer driving up to three high-resolution analog color monitors located up to 100 feet from the computer. Each monitor displays identical information. It's suitable for training, CAD/CAM/CIM, presentations, process control, trade shows, etc.

Through a six-foot interface cable shipped with the unit, the VOPEX-3A3 accepts output signals from the computer. It amplifies and rebroadcasts the signals through three sets of individually buffered RGB outputs. Designed with 100-MHz bandwidth amplifiers, even 1,000-line monitors show no loss of color and graphics resolution at monitors up to 100 feet from the computer.

Standard BNC terminated RG 59 coax cable is all that's needed to interface the VOPEX-3A3 with the monitors. The Video LANs require no software or special operating procedures.

Contact Shirley Ross, Network Technologies Inc., 19145 Elizabeth St., Cleveland, OH 44128; (216) 453-1646 or (800) RGB-TECH.

Enter 905 on reader card

MicroGPIB Family Expanded

National Instruments recently announced three new members of the MicroGPIB interface family: the HPIB-232CV, HPIB-422CV and HPIB-PRL. The MicroGPIB series also includes other converters, controllers, buffers and extenders for the IEEE-488 bus.

The HPIB-232CV, HPIB-422CV and HPIB-PRL ($495 — 64KB version; $695 — 256 KB version), tailored for use as IEEE-488 (HPIB, GPIB) to RS-232, RS-422 and Centronics converters, are driven by 8-bit microcomputers. These new converters offer a low-cost method for connecting devices with serial or parallel (Centronics) interfaces to IEEE-488 instruments and controllers.

The new converters provide transparent data conversion in either direction. They're capable of interfacing either an HPIB controller or HPIB instrument to a computer or device with either an RS-232, RS-422 or Centronics port.

For example, the HPIB-232CV can be used to interface a device such as HP's HPIB plotter to a computer with an RS-232 port, or it can be used to connect an RS-232 printer to multiple computers that are interconnected using the IEEE-488 bus.

All three converters are controlled by a 64180 microprocessor, which includes an integrated DMA controller and either a 64-KB or 256-KB memory buffer.

The large RAM buffer and onboard DMA controller make the converters ideal for applications requiring high-speed spooling of data. Such an application is possible with any computer equipped with an IEEE-488 interface. Data can be transferred to the HPIB-232CV, HPIB-422CV or HPIB-PRL at high rates via the IEEE-488 port and then output to an RS-232, RS-422 or Centronics device at the rate at which the serial or parallel device can receive data. Efficiency is increased by isolating the system from the overhead of the slow device.

The onboard firmware operating system performs all the necessary communication protocol and system upkeep so that no user-supplied control codes or commands are required. Maximum HPIB performance is made possible by the SRQ_ON_EMPTY feature, which also allows a single serial or Centronics device to be shared by multiple users.

Contact National Instruments, 12109 Technology Blvd., Austin, TX 78727-6204; (512) 250-9119. Inside Texas, call (800) IEEE-488, Outside Texas, call (800) 531-4742. FAX: (512) 250-0382.

Enter 901 on reader card

DCX-24 Exchanges Data At High Speed

BayTech recently announced the DCX-24, a high-performance data communications exchange unit.

The DCX-24 ($895—$1,895) allows peripheral sharing, computer-to-computer communication plus buffering of print data. The unit has a 16-bit CPU plus multiple high-performance I/O processors that allow high-speed transfer of data demanded by new faster computers and software.

Each DCX-24 unit is customized by combinations of serial and parallel ports installed in four-port modules to a maximum of 24 ports. Ports are user-set as computer or peripheral ports, and data input and output are simultaneous on all ports. The standard 512-KB buffer is expandable to 4½ MB.

Full duplex communication eliminates isolated islands of information by providing computer-to-computer communications concurrent with all operations.

The DCX-24 is fully compatible with virtually all computers, printers, plotters, modems and other peripherals, including HP's LaserJet printers, the HP Vectra and HP 3000.

Contact Bay Technical Assoc., 200 N. Second St., Bay St. Louis, MS 39520; (601) 467-8231.

Enter 906 on reader card

Laser Toolkit Maximizes LaserJet Productivity

OPT recently introduced the Laser Toolkit, a collection of software tools designed to maximize the productivity of HP's LaserJet printers in a DP environment.

The Laser Toolkit ($1,000-$2,500) provides simplified LaserJet control without using escape sequences or requiring modification of application software. Using a file equation, LaserJet users can select duplex printing and specify the font, paper size, page layout and other parameters for each spoolfile. These capabilities are provided by the Laser Toolkit's facility for creating terminal-type files with a simple series of screens that eliminates the need to understand or create Printer Control Language (PCL) escape sequences.

The Laser Toolkit provides the ability to print two, four or eight standard-line printer pages on a single letter-sized sheet of paper.
Contact Vicki Toback, OPT, 299 W. Foothill Blvd., Suite 230, Upland, CA 91786; (714) 985-1581, (800) 858-4507.

Enter 903 on reader card

Aldus Announces Four New Products

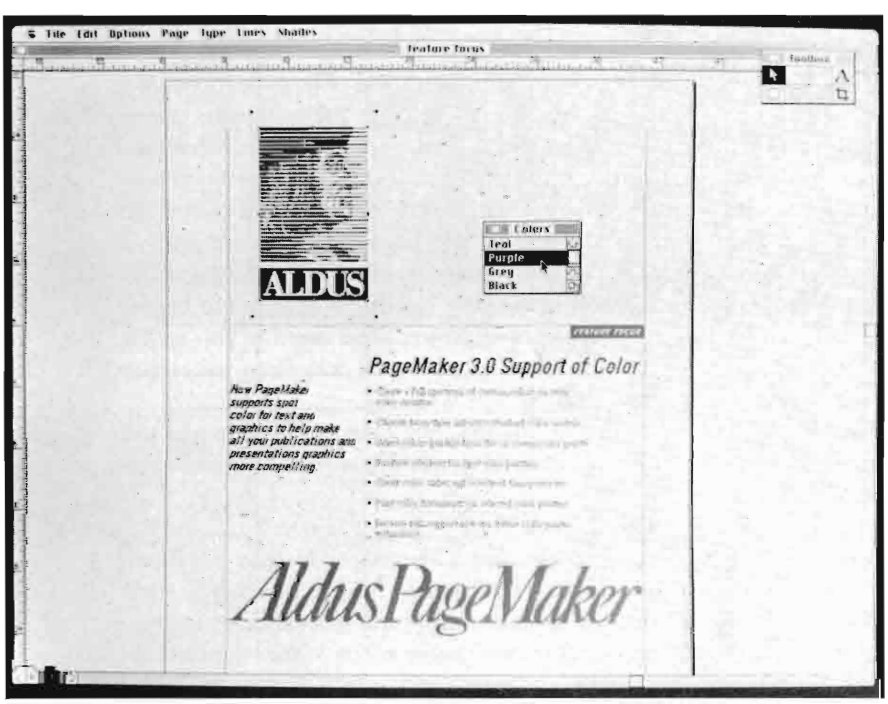
Aldus Corporation recently announced Version 3.0 of its original PageMaker desktop publishing software for the Macintosh and PC, and the Japanese Kanji version. Aldus also announced the acquisition of two new computer graphics programs — Freehand (Altsys Corporation, Plano, TX) and SnapShot (BioScan Incorporated, Seattle, WA).

The original PageMaker program integrates text and graphics and allows users to design, edit and produce high-quality printed communications in an office setting. The new releases, designated PageMaker 3.0 in both environments, include significant enhancements to the current PageMaker 1.0 for the PC and 2.0 for the Macintosh.

PageMaker 3.0 (Macintosh, $595; PC, $795) enables users to quickly produce long documents by flowing text automatically through successive pages, formatting text with user-defined style sheets and updating source files by exporting their PageMaker documents to selected word processors.

The PageMaker 3.0 (PC version) expands its support for printers based on Hewlett-Packard's Printer Control Language (PCL), including the LaserJet Plus and LaserJet Series II. It requires MS-DOS 3.0 or higher and version 2.0 of Microsoft Windows. The PageMaker (Macintosh version) system configuration includes the Macintosh Plus, II, or SE and hard disc, and adopts Apple Computer's new user interface conventions, which include pop-up menus for additional on-screen mouse-selected commands.

Freehand ($495) is a basic drawing program compatible with Macintosh software applications and formats such as Macintosh Plus, SE, II, plus two 800K disc drives or a hard disc, and any PostScript language compatible output device. It incorporates color and the advanced capabilities of PostScript language drawing tools.



PageMaker 3.0 expands its support for printers based on HP's PCL.

SnapShot ($495) runs under the MicroSoft Windows operating environment on an IBM PC AT compatible with a minimum of 512K RAM, an image-processing board and analog RGB video monitor. It captures images from any RS-170 video source such as video cameras, VCRs and still-video cameras. Once captured, the video image is available for computerized editing and enhancement. Edited images can be placed in the PageMaker page-makeup program and printed on a laser printer or imagesetter.
Contact Aldus Corp., 411 First Ave. S., Suite 200, Seattle, WA 98104; (206) 628-2352.

Enter 902 on reader card

ATLAS Captures Batch-Job Errors

S.T.R. Software Company recently introduced ATLAS, a new error-capturing system that collects and retains information about online and batch-job errors. With ATLAS, you automatically can monitor every job or session that runs on your HP 3000 for those expensive runtime errors that can cost companies thousands of dollars in reruns and program maintenance. ATLAS finds those batch-job errors without having to search through hundreds of $STDLISTS. ATLAS automatically captures online program errors that previously were impossible to capture.

ATLAS ($2,250) automatically records any errors that occur in any program that runs on the HP 3000. MPE contains a sophisticated trap-handling facility. ATLAS uses this facility to identify and record arithmetic errors (such as divide by zero or "Illegal ASCII Digit"), library errors, intrinsic errors, code errors (such as bounds violation), etc. Batch-job command interpreter errors and special user-defined program application errors also may be captured by allowing your programs to call a special ATLAS-provided error routine.

Because ATLAS captures error information only as it occurs, it can notify you of program problems interactively to a terminal, as well as provide easy-to-read management reports. ATLAS will provide you with critical error information such as the job/session name and number, program name, the description of the error, 1dev#, date and time of the occurrence, etc. Using this information, it's easy to identify the program and job-stream problems that require the attention of your MIS department.
Contact S.T.R. Software Co., P.O. Box 12506, Arlington, VA 22209; (703) 689-2525.

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Continued on page 82.

Building An Information Plan

A Method To The Madness

[BY MARK P. SHIRMAN]

Like many people, I'm constantly asked at social gatherings what I do for a living. My standard reply is that I'm a management systems consultant. The usual retort typically is, "Oh, do you do programming?" "Yes," I respond, "That's part of what I do, but I also perform a lot of information planning functions." The conversation usually ends at this point with a confused look or an allusion to how good or bad the Red Sox are performing this year . . . just when I was beginning to warm up.

In this era of information management, I've found that many data processing shops quite often start the management process in the very middle, as opposed to beginning with a comprehensive information planning project. The intent of this article is to explain an approach to information planning that has been successful for me over the years, a "method to the madness" if you will.

Additionally, I'll try to pass on some positive and negative planning experiences and suggestions for getting the project started. If all else fails, maybe I'll improve my conversational luck at cocktail parties.

AS AN MIS CONSULTANT, I'm constantly confronted with clients who have automated systems that simply don't meet their needs or have manual systems that they're eager to computerize. The types of businesses cover the entire spectrum and the applications are equally as diverse. Usually these organizations don't know where to start the development process and what the first steps should be.

No matter how large the company or in what industry sector it operates, my initial

step usually includes some sort of information planning project.

What I've found is that the time and money spent up front on an information planning project will pay for itself many times later on down the road. I've been told that consultants are people who "put a price on common sense." If that's the case, I'm going to try to lay some serious common sense on all of you concerning systems development. Many organizations ignore the planning stage as part of the systems development process, which often leads to time-consuming and costly failures.

What Is Information Planning?

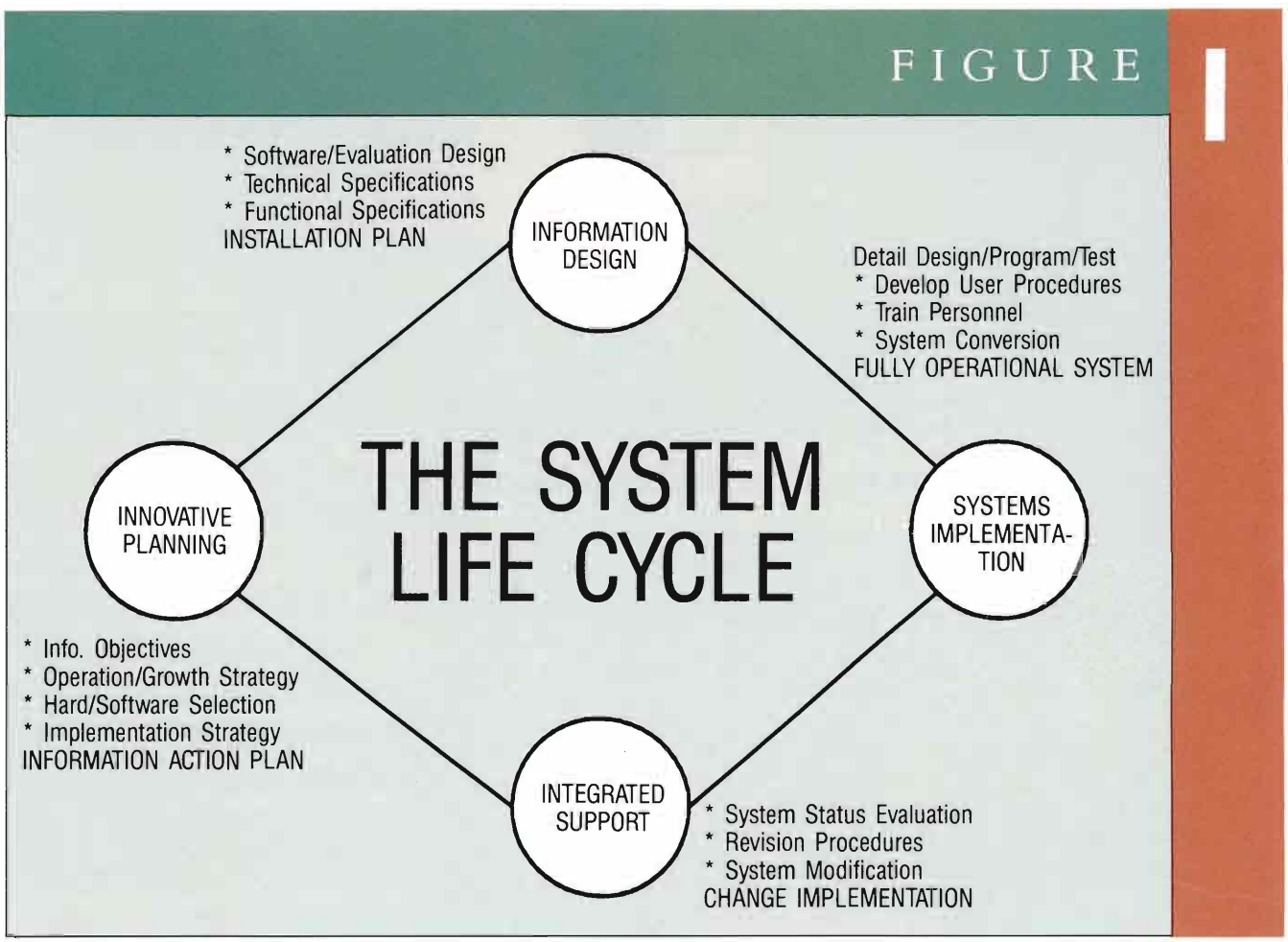
INFORMATION PLANNING IS SIMILAR to the traditional strategic planning process as it relates to an organization's information. Without a lengthy definition of what information is, let's just assume it's all the key data used to run a particular business operation. This includes the basic types of information a company may need; for instance, inventory levels for a distributor or scheduling for a manufacturer.

However, it also includes specialized strategic or competitive information. System plans that can be drawn up with enough foresight and comprehensiveness to include this specialized type of information can be even more powerful in their implementation. I've heard these types of plans often referred to as Strategic Information System Plans and they've been a hot topic lately.

An example of the utilization of this type of plan is the American Airlines Sabre system. The Sabre system has developed into a competitive tool used by almost half of all the travel agents in the U.S. today, which not only allows Americans to book more reservations, but also generates additional revenue to the parent company.

The emphasis in an information plan will be how all this data flows throughout an organization's workplace. An information plan is developed to assist a company in establishing a direction for how information is going to be processed for a period of time, typically three to five years.

FIGURE I



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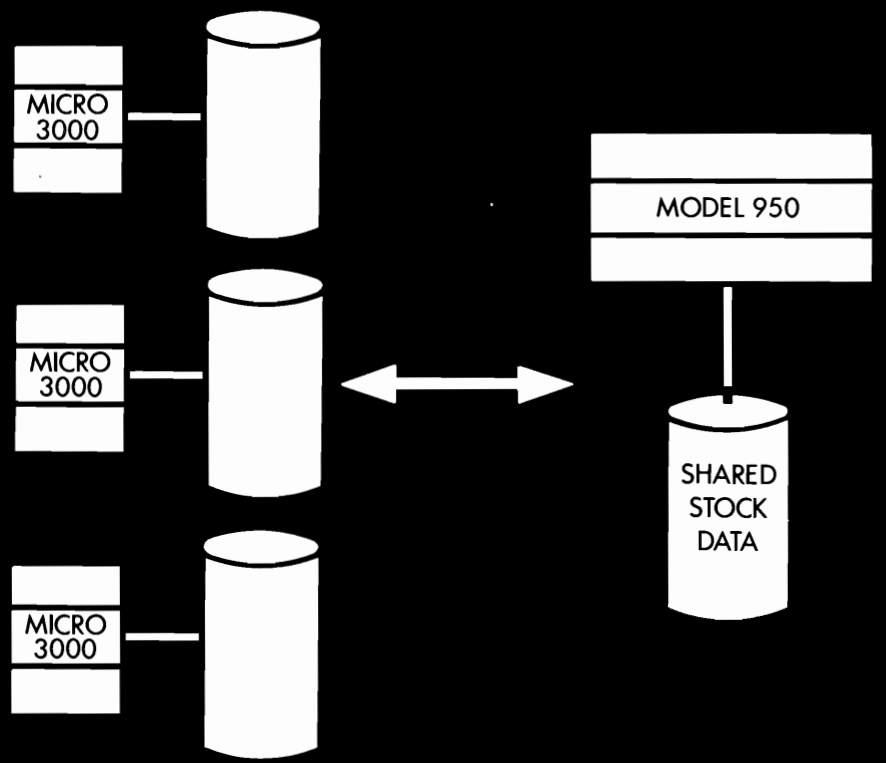

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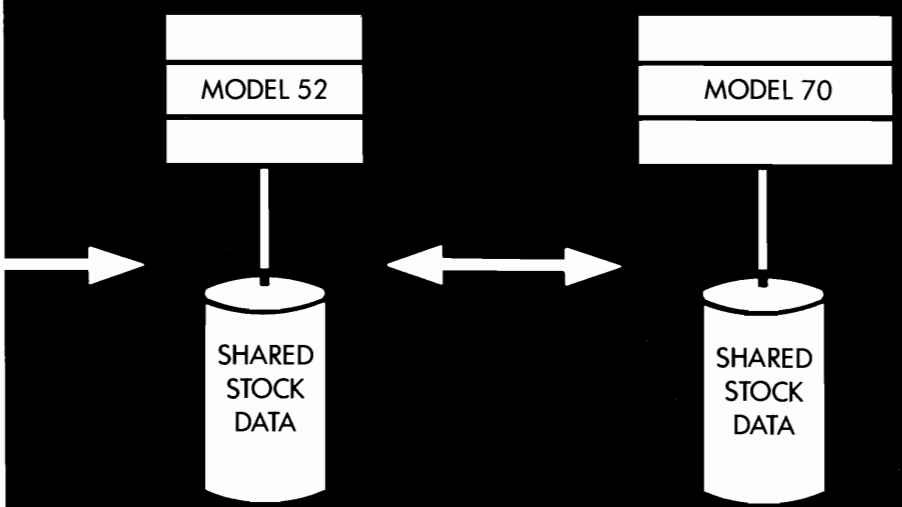

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The Plan is a management tool that defines the information requirements for an organization, determines the application features necessary to support their business objectives, and explores how the dynamic nature of data processing technology will affect its systems. In short, it's designed to offer a path consistent with the overall business objectives of a company so the systems implemented are consistent with the needs of the company and the resources available.

The reference to the information plan as a management tool shouldn't be lost. In almost any size organization, the owners/executives constantly are either formally or informally planning their business strategies with respect to basic operations, competition, resources or just plain staying alive. The information plan should be used as a model to help drive a company's business strategy as well as be driven by it.

Finally, it's important to remember that the information plan shouldn't be some pie-in-the-sky, high-priced report, but rather should be a plan of action to insure the successful implementation of those ideas espoused in the plan itself. By a plan of action, I mean there should be concrete deadlines, work plans and budgets for those projects identified as meeting key short-term objectives.

> Past successes and failures play an integral part in how the future systems will be developed and enhanced.

Those projects with a longer term orientation may be laid out in less detail, but it's important that data processing has key deliverables and barometers of success from the very beginning. This is particularly important because it can be very difficult to get management to realize the benefits associated with the information planning process. By providing some tangible results from the beginning, data processing can prove to a sometimes skeptical management the validity of the planning process. I'll touch upon this idea a little later on.

Where Does The Plan Fit In?

I LIKE TO LOOK at systems development in a modular fashion or as a "life-cycle." The life-cycle is illustrated in *Figure 1*. As you can see, it's an interdependent approach to systems development with the information planning tasks critical to the subsequent modules.

The information design usually tends to be a little more project-oriented than the overall information plan. This phase zeroes in on those applications deemed as high-priority items. Basic screen layouts, forms design and the general specifications usually are performed during this phase. As a systems designer, I find there never seems to be enough time for this phase of the project. The prevailing joke is that the information design is over when the budget runs out.

The systems implementation phase incorporates those tasks that usually take up the most time. This module includes the detailed design, programming, testing and conversion of the applications. Additionally, those tasks that often are overlooked in the development process, training and documentation, also are a part of this phase.

The last phase in the systems development cycle is support. This includes the maintenance and minor modifications of the system, as well as developing procedures to keep it running smoothly. You'll notice that the line then reaches back to the information planning stage. Information planning is an iterative process that always should be accepting input from the work it ultimately generated. Past successes and failures play an integral part in how the future systems will be developed and enhanced.

I mentioned earlier that very often, data processing shops start in the middle of the development process. This usually corresponds to somewhere between the design and the installation phases. I've noticed that HP shops seem particularly vulnerable to this problem. This is due to a variety of problems, but probably the most important one is lack of resources.

Many HP shops aren't huge mainframe-type data centers that can afford to take on projects of a long duration; they have neither the time nor the resources. Management also is accustomed to watching applications grow more immediately before their eyes as opposed to getting involved in a comprehensive strategy. I believe this can be a dangerous cycle. The little extra time up front spent planning and designing applications can help save an organization a lot of future heartache and money by reducing obsolescence costs and insuring that the systems implemented are in sync with a company's business operations.

A successful information planning project can yield the following benefits to an organization:

■ *Support for the basic business objectives.* This was touched upon briefly in the previous sections. The essence of this concept is that an information plan insures that an organization will be able to meet both the current and future needs for all types of information. Additionally, it's important that the systems implemented don't disrupt the manner in which a company does its business.

Regardless of how great a system is, it will be doomed to failure if it can't adapt to the way a firm runs its business. The integration of basic business objectives with an informa-

tion plan will help insure that a new or modified computer system will not turn the business on its ear.

It's important to note that systems can't be designed simply by technicians and outsiders. I've been part of several projects where the systems developed were too generic and too difficult to use. The result was chaos and frustration, which ultimately led to the scrapping of a good deal of the software.

■ *Improves the utilization of resources.* The plan can help insure that the development effort is structured. This can help prevent redundancy of data and work effort. The responsibilities for system implementation will be clearly laid out so that the firm can plan ahead to use all available resources in the appropriate target areas. This will save both time and money. It also can serve as a tool for both management and data processing, because if all the projects and priorities are correctly laid out, management more accurately can see that, if certain priorities or projects change, their expectations on other projects may need to change as well.

■ *Provides an organization with clear cost estimates.* A firm will know in advance what the anticipated systems development and implementation costs will be over the years. This will be helpful in the creation of budgets and will help insure that the information system provides the required rate of return necessary to meet the operation, financial and business objectives of the organization.

■ *Can improve morale within the data processing shop.* By establishing a set framework for projects and expectations, you can allow your DP staff to do what they do best, develop systems. It can get incredibly frustrating to work in an ad hoc nightmare all the time without any clear understanding of what the priorities are or what management's perceptions are.

The Project

THE FOLLOWING OUTLINES the tasks I usually perform as part of an information planning project. Keep in mind that every organization is different, so the approach will be different depending upon the personality of the individuals involved. Additionally, some tasks may be consolidated with others for smaller jobs and some may be omitted altogether. Remember, the overall objective of these information planning tasks is to create a plan of action, not a bunch of meaningless mundane conclusions.

■ *Organize the project.* Since one of the objectives of the overall project is to have a defined structured approach to information processing, it's important that the project itself be structured and planned appropriately. User committees should be set up, time estimates should be developed and the scope of the project should be clearly defined.

If the organization or project team is large, it's probably a good idea to use some project management software if you have access to a package. It's also important to define stand-

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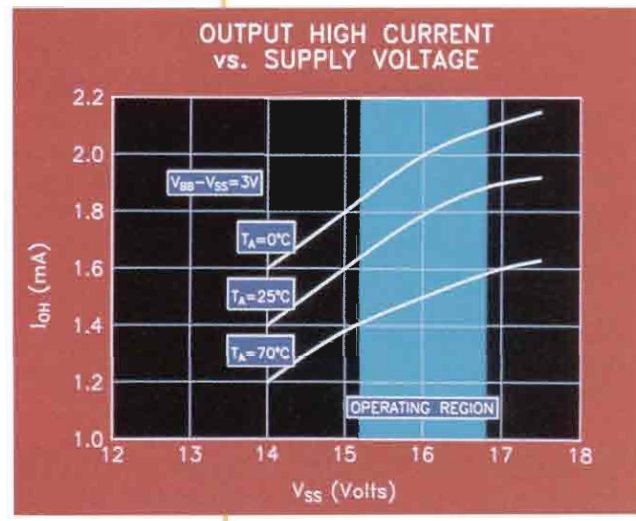

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ards with respect to the project's work papers and notes.

■ *Understand basic business strategies.* Through interviews with key management personnel and review of any business planning documents, the project team should gain a complete understanding of the basic business objectives of the company. Major characteristics of the firm should be studied with respect to competitive factors and industry trends. The key deliverable of this task should be a list of automation objectives or strategic direction memo. I think this is one of the most important parts of the plan's development.

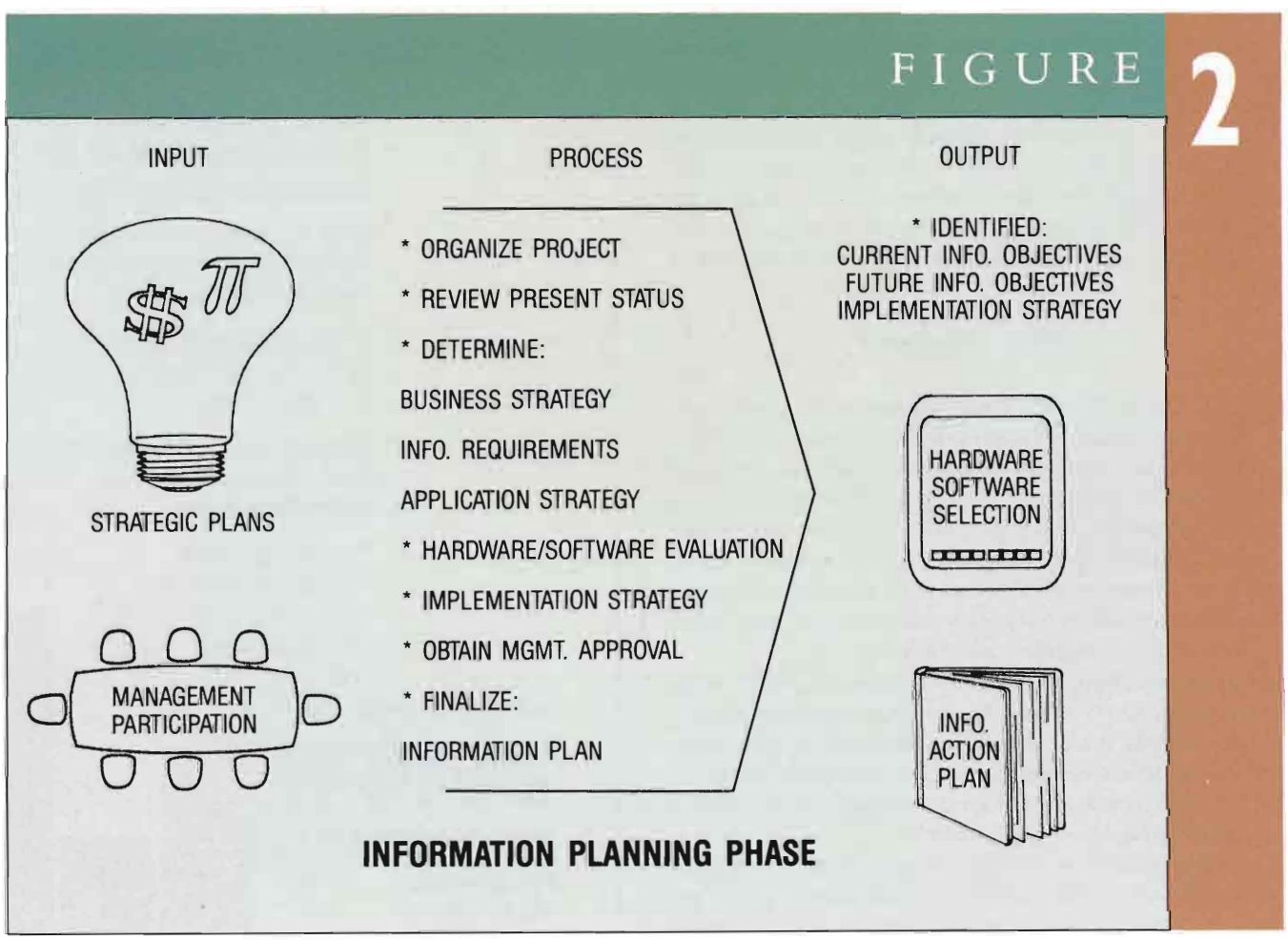
It can't be stressed enough how important functionality is to the system development process. Too often, data processing personnel emphasize technical issues. While these issues are important, they must not overshadow how an organization's systems interact with their basic business operations.

■ *Review current systems.* It's extremely important to gain a complete understanding of the current information processing environment. Both automated and manual procedures should be studied and reviewed. It's critical that any potential bad habits that exist in the current automated or manual system not be carried over into the new system(s). At this time it often is helpful to develop an information flow diagram, which can assist in the identification of potential and existing information bottlenecks.

■ *Determine information needs.* In this section of the planning process, detailed interviews with a company's personnel will help define those functional requirements necessary to meet their information objectives. This section also will be a key input into the development of an application strategy. In conducting interviews, it's imperative to keep the anxiety level to a minimum with the interviewee. As a consultant, I often get intense negative reactions from people, because they're afraid they'll lose their jobs with the new system. All you really want to do is make their jobs easier, so just try to get that across.

■ *Develop application strategy.* At this point, potential application areas are prioritized based upon the overall business objectives of the company and upon the information needs identified in the previous segment. The project team will develop the portfolio of application system projects that will be ad-

FIGURE 2



dressed within the planning horizon. Data management requirements and potential processing architectures also should be addressed at this time. I told you the "techies" would get their chance.

■ *Hardware and software strategies.* The nature of these tasks will vary depending upon the scope of the information planning project. At the very least, an approach for the evaluation of software and hardware will be outlined with the application strategy as a major input. Some projects will be more comprehensive in nature and will include a complete software and hardware selection and configuration. If this is the case, there's an entire list of subtasks necessary for the successful selection of software and hardware. For those applications that are deemed high-priority areas, projects should be set up to go into the design phase.

■ *Develop implementation strategy and cost analysis.* Based upon all the data gathered in previous tasks, a plan of action is developed with an estimated timetable of events. Each of the major action plans also should contain basic cost estimates so that short and long-term budgets can be developed for the various information strategies. This may be the most important part of the written plan. There are many managers who will only want to know what it will cost and how long it's going to take. If this is done correctly and completely, at least for the short-term, high-priority projects, you'll only have to do it once.

■ *Write information plan.* The plan should be written so that all the key management of the organization can both read and understand it. It should contain enough detailed charts and information so as to completely answer any questions the management may have concerning the information strategies laid out in the plan.

Tailor the information plan to your audience. If you have a bottom-line sort of crew, then make sure you have a comprehensive executive summary section that allows you to get your point across concisely. Graphs and pictorials go a long way in the final product.

■ *Feedback.* This is what brings the process full circle. If you've developed the plan in conjunction with key management personnel, there should be no huge surprises in your conclusions. That doesn't mean the plan is perfect. Remember, what you're creating is a model and framework so it can be flexible and respond to the changing needs of the organization.

The Planning Process

THE INFORMATION PLANNING process is illustrated in *Figure 2*. The diagram is similar to a standard computer program with inputs, processing and output. Regardless of how comprehensive a project is, this outline can serve as a good guideline.

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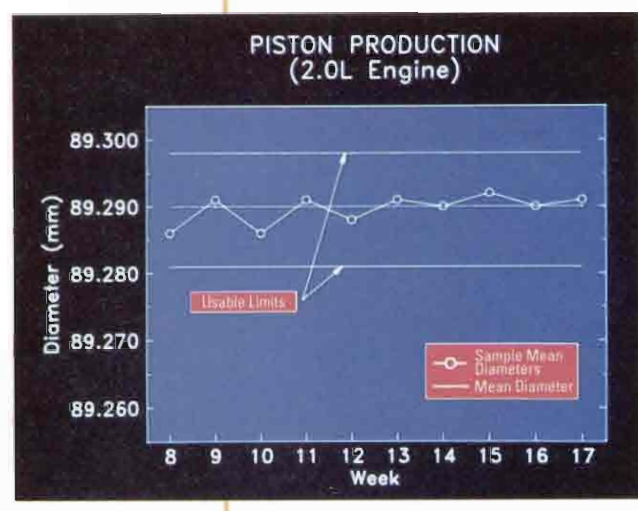

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that may have no formal strategic or business plan, it's important to emphasize the integration of the information planning process with what may be a less formal set of business objectives.

No matter what size an organization may be, the owners or management usually have some concept of what they want their organization ultimately to achieve. This is why it's important to involve key management personnel in all aspects of the planning process. In this way, it can be insured that the information plan can take on the personality of the company it's designed to assist, thus successful implementation will be closer to reality. Additionally, by involving management throughout the planning process, they have a vested interest in its success.

Make sure that the scope of the project is clearly defined. Nothing can put a damper on an information planning project more than a misunderstanding about the deliverable. There's a considerable amount of leeway as to what areas will be explored and to the amount of detail desired for analysis purposes. These parameters should be laid out from the very beginning.

It's important to have a complete understanding of the business that's being evaluated. The issues under consideration aren't strictly technical. In fact, the most important things relate to functional issues and analysis. By gaining a complete understanding of the business, you can insure an information plan that not only meets their short-term information needs, but will be flexible enough to handle their operations in the future. Remember, flexibility is a key ingredient in a successful information plan.

Try to take an objective approach to the project. Don't be swayed by statements like, "We've always done it that way" if you can help it.

Sometimes bringing in a fresh set of eyes with a consultant or another key user in the organization can help facilitate this process.

Once you've established a firm foundation for your information strategies, you can draw upon previous work. Until that time, however, make every attempt to look upon your organization's information flow with an objective view; you may be surprised with what you see.

How Do You Initiate The Project?

AS A DATA PROCESSING professional, you're sold on the idea of an information plan, but how do you sell management on the concept? This is the question I'm asked most often. The key here is to take a multi-pronged approach.

The first path is to play up any costly system failures. One failed project or problem software averted usually can cover the cost and time of an information plan. Almost every firm has some disaster story that can be easy to quantify in dollars and cents. These are the numbers your financial people love to embrace. Along these same lines may be the systems that really don't fit into the company's operations and, while they work, they're just a big pain in the neck.

Start small and sell management on the concept of planning. Then work your way up to more comprehensive projects.

Another path is to focus in on some pet project for a particular area of your organization. Start small and sell management on the concept of planning. Then work your way up to more comprehensive projects. In many companies, this represents a completely new way to approach systems development, but with diligence you slowly can train them to avoid the usual ad hoc methods.

You also may want to concentrate on competitive factors. There's nothing key management hates more than to feel like they're losing ground to their competitors. There now are some key "hot" application areas that can be used to help leverage your position in addition to the usual, "But XYZ company has such and such."

Sales force automation is one of the key new strategic areas where certain companies now are managing their leads more efficiently and completely. If you can get a leg up on your competitors by implementing this kind of system, you may be able to work it into the whole concept of an information plan.

No matter what size information system is going to be put in place and regardless of what industry a business belongs to, there are benefits to implementing an information planning project before proceeding with development. By doing this, an organization can insure that its investment in automation has a better chance of meeting its basic business objectives with respect to both cost and functionality.

By incorporating an understanding of the data processing alternatives with a comprehensive understanding of the business, you can develop a plan that's sufficiently flexible to handle the changing environment for a period of three to five years. — *Mark P. Shirman is a management systems consultant at Innovative Information Systems, Inc., Norwood, MA.*

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Important Requirements For Your DBMS

Six Steps To A Normalized Database

[By Paul Bass]

Relational database management systems are becoming increasingly popular for a variety of information needs. They enhance user productivity through ease of use and data flexibility. In addition, the productivity of the database itself can be improved by a process called "file normalization."

A database is a collection of logically related files. Each file contains records of data. Other synonyms for record are row, tuple and occurrence. Each record is made up of fields — "columns" or "attributes."

The following terminology needs to be defined:

- *Each record must be uniquely identified.*
- *First Normal Form (no repeating groups).*
- *Second Normal Form (functional dependence).*
- *Third Normal Form (transitive independence).*

A requirement for a normalized file is that each record can be uniquely identified. This is accomplished by a primary key for each file. A primary key is a field or set of fields whose values uniquely identify each record. Fields not part of the primary key can be referred to as "non-key" fields.

The First Normal Form (no repeating groups) can be satisfied by eliminating repeating groups of non-key fields. For example, we can use an Employee Master File with a primary

key of employee number. A repeating group could be a list of skills for each employee. The unnormalized version would be:

emp#	ename	skill 1	skill 2	skill 3	skill 4	skill 5
58	John	X	Y	Q	R	S
13	Sally	Y	R	X		
42	Fred	X	A1			

The problems with this structure are it limits each employee to only five skills and, if the average is two skills, disc space is wasted.

The normalized version would require two files:

emp#	ename
58	John
13	Sally
42	Fred

e#	skill
13	R
13	X
13	Y
42	A1
42	X
58	Q
58	R
58	S
58	X
58	Y

The advantages of the normalized files are that there's no limit on the number of skills per employee and less disc space will be used.

Notice that the unique identifier (or primary key) for the new file is the combination of employee number and skill.

The Second Normal Form requires that every non-key field be fully dependent on the primary key. This is an example of a file that's not in Second Normal Form:

emp#	skill	skill desc	date acquired
13	R	Negotiation	04/16/83
13	X	Group Speaking	05/30/81
42	X	Group Speaking	06/10/85

The primary key is the combination of employee and skill code. The date acquired is fully dependent on the primary key. The skill description is only dependent on skill code, not on the full key. One of the problems with this structure is that if we delete all the employees with a specific skill, the code and the description of that skill also will be deleted. Also, if the description of the skill needs to be changed, it would be necessary to update every record that contains the specific skill code.

The normalized version would, again, add a second file:

> Relational database management systems are becoming increasingly popular for a variety of information needs. They enhance user productivity . . .

emp#	skill	date acquired
13	R	04/16/83
13	X	05/30/81

skill	skill desc
R	Negotiation
S	Stenography
X	Group Speaking

The Third Normal Form requires that every non-key field must not be transitively dependent on the primary key. In other words, any case in which a non-key field is dependent on another non-key field rather than on the primary key must be removed. The unnormalized version would be:

emp#	ename	date hired	dept#	dept desc
13	Sally	09/02/78	101	Accounting
42	Fred	02/20/75	201	Sales
58	John	12/13/82	301	Manufacturing

The employee number is again the unique identifier (not the combination of employee/department number). "Dept description" is dependent on department number, not the employee. The problem with this structure is the same as the Second Normal Form. If all the employees in a department are deleted, the department number and description are also deleted.

The normalized files would be:

emp#	ename	date hired
13	Sally	09/02/78
42	Fred	02/20/75
58	John	12/13/82

dept#	dept desc
101	Accounting
201	Sales
301	Manufacturing
401	Shipping

A normalized database allows data to be retrieved in the widest possible variety of combinations. Summary informa-

tion, consolidations and subsets of both records and fields can be obtained. Files can be joined together to form new logical files.

Obtaining a normalized database means that all the files in the database need to be normalized. Let's now look closely at the steps necessary to design a normalized database. The six steps are:

1. List the unique identifiers.
2. Determine the relationships between identifiers.
3. Eliminate the many-to-many relationships.
4. Minimize the one-to-one relationships.
5. List the attributes of each identifier.
6. Check for normalization and correct if necessary.

Step 1: List the unique identifiers that your database will require. Identifiers can be actual entities, events, locations, codes or processes. Remember, it may require more than one field to accomplish this identification.

Each of these unique identifiers can be considered candidate primary keys or candidate files. They're candidates until the last step is completed. As each identifier is proposed, ask the following question: Is this truly a unique identifier or a non-key field that describes another unique identifier? There's a tendency to start listing the non-key fields as well as the unique identifiers. With practice, this tendency will diminish.

An example of "candidate" identifiers for a computer equipment inventory system follows:

- *The piece of equipment (serial # is the unique identifier).*
- *The location of the equipment (location code).*
- *The type of equipment (type code).*
- *The employee assigned to the piece of equipment (employee number).*
- *The port to which the equipment is connected (port number).*

The diagram of these identifiers (*Figure 1*) clarifies the selection.

Notice that at this point we don't list any non-key fields such as employee name, manufacturer of the piece of equipment or the description of the location, because they're not unique identifiers.

Step 2: The relationships between the unique identifiers selected in Step 1 must be determined. There are four possible relationships between any two unique identifiers:

- *One-to-One.* Each record in file "A" (occurrence of the unique identifier) has one unique correspondence in file "B." This can be diagrammed as follows:

- *One-to-Many.* Each record in file "A" can have one or more corresponding records in file "B." Conversely, each record in file "B" can have only one corresponding record in file "A."

- *Many-to-Many.* Each record in file "A" can have one or more corresponding records in file "B" and each record in file "B" can have one or more corresponding records in file "A."

- *No Relationship.* Each record in file "A" has no corresponding record in file "B."

Referring to the Step 1 example (*Figure 1*), the relationship between the files now can be determined (see *Figure 2*).

The employee-serial # relationship can be many-to-many. Each piece of equipment could be used by more than one employee. Employees may share terminals. Each employee could have multiple pieces of equipment.

The serial #-type relationship is one-to-many. Each piece of equipment can only be a single type, but each type of equipment can have multiple pieces of equipment associated with it.

The serial #-location relationship is also one-to-many. Each piece of equipment can reside in a single location. Each location can have multiple pieces of equipment.

The serial #-port relationship is one-to-one. Each port is limited to one piece of equipment. Each piece of equipment can (in most cases) be plugged into only one port.

Notice that in this example, there's no direct relationship between employee and type of equipment, and no relationship between port and location. There could be a relationship between location and employee. If employees are assigned to one location, the relationship would be one-to-many.

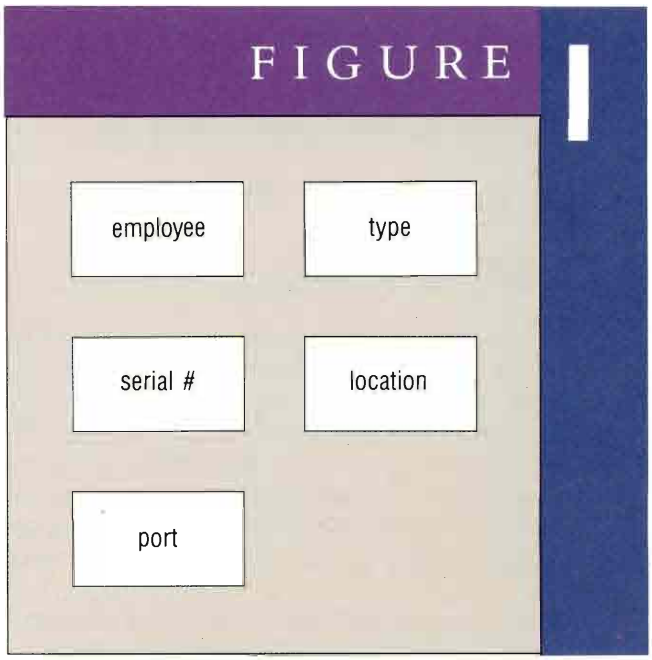
Notice the direction and placement of the arrows. This helps describe the relationships and can be useful when retrieving information from the database.

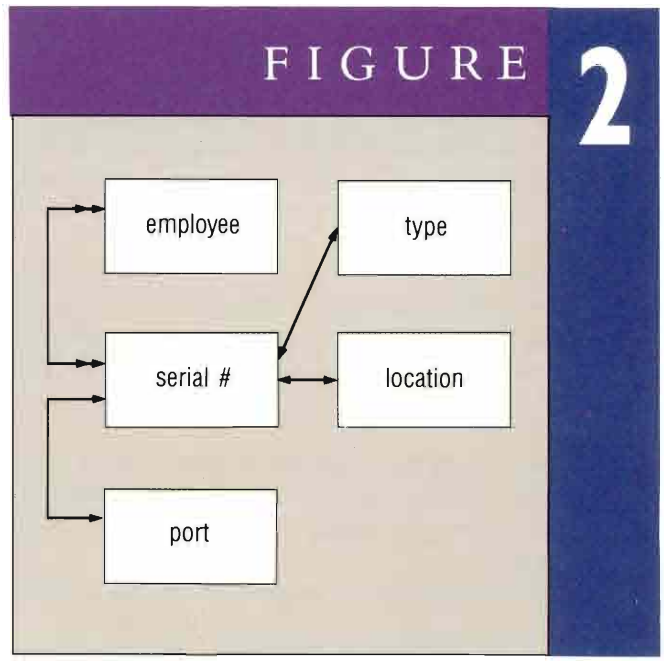
Step 3: Many-to-many relationshaips must be eliminated. The relational database system can't identify the matching occurrences of the two identifiers. In our example, which employee has which piece of equipment isn't recorded.

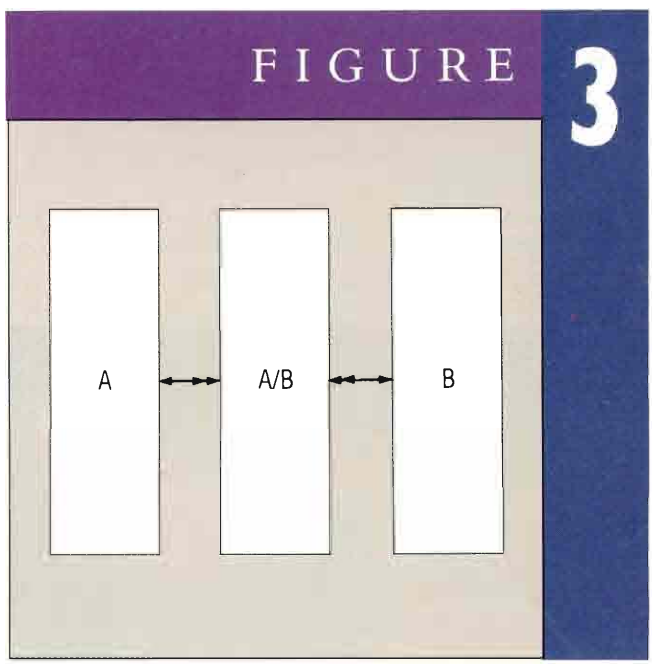
If file "A" and file "B" are many-to-many, a third file must be added that has as its unique identifier the combined primary keys. The file A/B is added to remove the many-to-many relationships (see *Figure 3*).

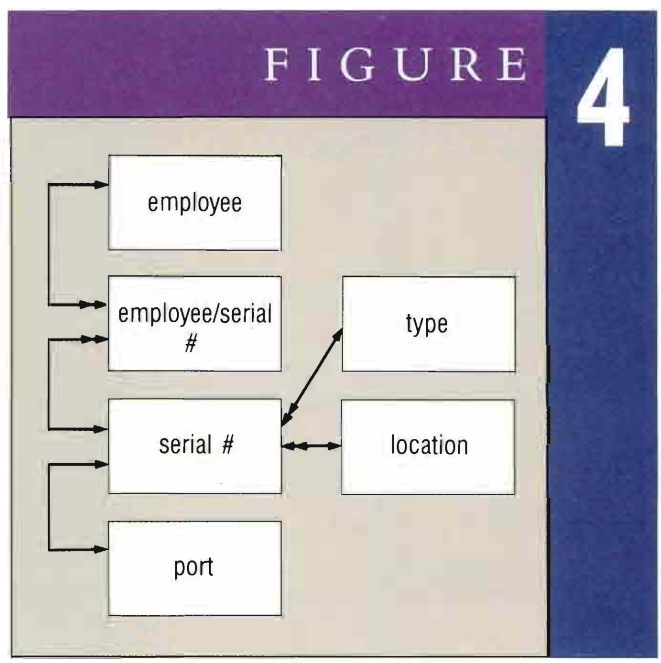
Our example then becomes that shown in *Figure 4*.

Step 4: One-to-one relationships are rare. Usually such a relationship signifies that the unique identifiers weren't correctly identified and you simply have one file.









becomes

In our example, we prefer to keep these files separate. A port may not have any equipment connected; a piece of equipment may not be plugged into a port. If we use the port as a non-key field in the serial # file and we delete the piece of equipment assigned to the port, the port is also deleted.

Other reasons for retaining one-to-one relationships could be the database management system limitations. These limitations could include number of fields per record or number of bytes per record. Efficient use of disc space also

could be a determining factor. Our example remains unchanged.

Step 5: Attribute is a term for non-key fields. List with each unique identifier all the non-key fields. Now we can proceed to add the other information, such as the location description, the employee name and the manufacturer to the files (see *Figure 5*).

Notice that each file that's on the "one" side of the one-to-many relationship must contain the key of the file on the "many" side. With the serial #, we must add the type and location. The port could be with the serial # or the serial # could be with the port.

Step 6: Does the design satisfy the rules of normalization for each file? Are there any repeating groups? Is the file in Second Normal Form? Is the file in Third Normal Form?

The example satisfies no repeating groups and, indeed, it's in Second Normal Form. However, the employee file isn't in Third Normal Form. The department description is dependent on the department number, not the primary key (employee number). Therefore, a department file must be added with the department number as its primary key and department description as an attribute (non-key field) (see *Figure 6*).

This six-step method will ensure that the data is organized in the most efficient manner . . .

If the department had been correctly identified as a unique identifier back in Step 1, our database would've been normalized.

Successful completion of Steps 1-5 will guarantee a normalized database. Step 6 will confirm the successful design.

With the expanding use and acceptance of relational database management systems and the drive toward increasing productivity, normalized databases are essential.

This six-step method will ensure that the data is organized in the most efficient manner without jeopardizing the flexibility of your data. — *Paul Bass is software support manager at CRI, Inc., Santa Clara, CA.*

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FIGURE 5

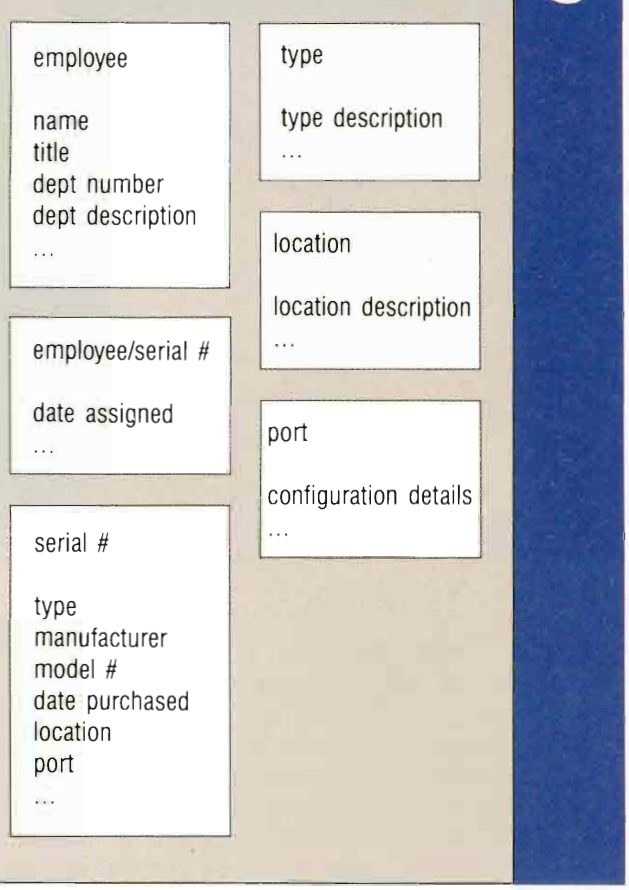
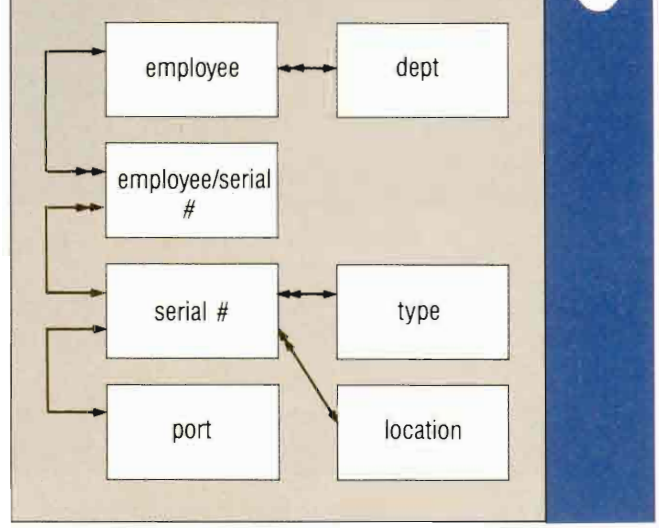


FIGURE 6



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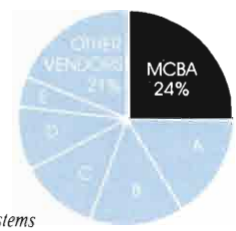
Competitor C	12%
Competitor D	4%
Competitor E	3%
Other Vendors*	21%



Source: Highgate Financial Systems

*Note: "Other Vendors" includes all vendors who have one percent or less of the total market.

Market share was based on number of modules installed on individual CPUs for each vendor's accounting software products.

*Information from *HP Professional,* Vol. 1, No. 6, November 1987; "Debits/Credits Revised" by Robert E. Shelley; published by Professional Press, Inc., 921 Bethlehem Pike, Spring House, PA 19477, (215) 542-7008.

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LAN Interconnection Devices: Their Applications And Advantages

Connecting LANs

[By Tad Witkowicz]

A great deal of confusion exists over the differences between repeaters, bridges, routers, gateways and file servers. In this article I'll describe the different kinds of LAN interconnection devices, some of their advantages, as well as a general overview of the applications for them.

If you're not yet using a local area network, it's only a matter of time before you will. The popularity of LANs is growing rapidly because of many benefits derived through productivity. As a user, you're faced with choosing from a variety of different product offerings and have to deal with increasingly aggressive sales efforts by the many vendors who want their LANs installed in your facility. Each vendor offers a variety of hardware and software products that solve a myriad of computer communications problems. The broad applications of computers complicate the picture even more.

The complex choices you must make as to which application, which vendor, LAN standard, technology, etc., ideally will result in an environment where you'll have installed not one LAN (the way you really would like to), but rather several different LANs. Each installed LAN will be justified on the basis of a different set of parameters, budgets and timetables.

The final challenge faced by network users is the problem of how to integrate all of the networks together. This problem already has been recognized by many vendors who recently have begun offering a number of different LAN interconnection products including repeaters, bridges, routers and gateways, which provide means

of connecting multiple installed LANs. I'll attempt to give you some insight into the different types of LAN interconnections.

THERE ARE AT LEAST a dozen major and 20 lesser LAN vendors offering hardware and software products for the LAN market. In addition, one must add the major engineering workstation and minicomputer manufacturers offering LANs as part of their product line. Each vendor offers a variety of basic LAN components and a number of applications-oriented hardware and software products.

Today, LANs are purchased primarily on the basis of their applications rather than on vendor or technology. This means that different applications are likely to be implemented using a variety of LANs from differing vendors. Also, the application orientation leads to a growth of LAN clusters, each dedicated to its own task. It's quite common to find clusters of engineering workstations, minicomputers, personal computers and LANs supporting terminal servers. The clusters often aren't implemented using the same LAN standard or networking hardware and software.

Despite the efforts of the many standards committees (and perhaps because of them), the number of LAN standards is expanding. Today there are four major LAN standards: Ethernet, STARLAN, Token Ring and MAP as well as a fifth, the Fiber Optic FDDI standard, in the works. In addition, there are a number of popular LANs such as ARCNET or IBM PC LAN which also are attractive in many applications. The result is that present and future LAN users should expect and plan for corporate networks that are multiLAN, multivendor and multistandard.

THIS ADVERTISING MOTTO of one LAN company is intended to promote the idea of LAN connectivity. The need to interconnect various LAN clusters doesn't appear obvious at first. Clearly, the reason for networking workstations and PCs in different clusters is based on the type of application; therefore, you might assume that intercluster communication isn't required.

This argument is lost quickly. You merely have to look at a corporate environment observing constant people and equipment mobility.

Several years ago, IBM conducted a study that showed that, in an office environment, personnel are moved twice a year. This means that a marketing group may start in one physical cluster, but soon find itself dispersed throughout a building or assigned to different clusters. As a result, the PC LAN designed to serve this group is no longer neatly contained, but is spread out, requiring a new and more complex cabling scheme.

To avoid constant rewiring, small LAN clusters should be connected together so that regardless of where an individual is moved, he can connect to the LAN at a new location and remain in communication with his original group. Such connectivity also allows the corporation to implement electronic mail and lets all the employees share all corporate resources.

Efficient LAN connectivity is also needed when LAN clusters begin to expand. As the number of devices attached to a single LAN cluster grows, LAN performance (throughput) declines.

An easy way to deal with this problem is to split up the original LAN into smaller segments and interconnect them using LAN bridges. LAN bridges restrict local traffic on each segment so that it doesn't contaminate the other segments, yet allows data to flow between devices located on different segments as if they were on the same LAN segment. This improves network reliability (failure of one segment leaves the other segments operational) and extends distance coverage.

These factors illustrate that connecting LANs together is simply the next step in the evolution of LAN technology.

SEVERAL IMPORTANT FACTORS enter the equation when a user decides to connect LANs together. Performance, cost and sufficient flexibility to accommodate future change become important considerations. Not all available products for interconnecting LANs fare equally well in these categories. The following is a brief description and analysis of each of the four connection methods available: repeaters, bridges, routers and gateways.

Repeaters are the simplest and least expensive ($1,500 to $3,000 each) of the four interconnecting devices in terms of design and functionality. They connect two similar LANs (two Ethernets, two Token Rings, etc.) together, functioning by repeating signals received on one LAN to the other. The repeater's application is to extend the distance LAN cable can cover.

Repeaters amplify and reconstitute (reshape and retime) distorted and weak signals (packets) before transmitting them onto the second LAN. Some repeaters are equipped with fiber optic interfaces to further increase the distance of the LAN coverage.

The repeater simplicity is also its drawback: While its function is to extend the LAN distance, it does so with limited success. Ethernet LANs can't be extended beyond the protocol's built-in propagation delay limit, which limits the end-to-end cable length to 2.9 km. With Token Ring applications where there's no such limit, repeaters can extend LAN distances much further.

Since repeaters simply repeat data, they offer no protocol conversion capability nor any data traffic reduction. In fact, as different LAN segments are connected using repeaters, the traffic on each segment increases by the sum of the traffic on each connected segment.

Bridges are intelligent devices that can connect similar and dissimilar LANs. Simultaneously they perform data packet filtering and media protocol conversion and act as LAN repeaters.

A bridge is a passive device that monitors data on each of the connected LANs and makes decisions about which data packets should be transferred across or should remain on the LAN where they were generated.

There are two bridge types: protocol independent or MAC layer (Media Access Control layer in the ISO LAN model) and protocol dependent, referred to as a Router. MAC layer bridges rely on the happy coincidence that all IEEE 802 LAN standards (Ethernet, STARLAN, Token Ring and MAP) use the same data packet addressing schemes. They use Destination and Source addresses of each data packet as a fundamental piece of information to make decisions regarding which data packets should be transferred from one LAN to the other.

The MAC layer bridge doesn't interpret the data information within each packet it handles and therefore isn't affected by the LAN protocol supported. It functions equally well with TCP/IP, XNS, DECNET, TOP, etc., or any combination of these.

In the process of data transfer, the bridge can change the transmission protocol so that an Ethernet packet is converted into a STARLAN, Token Ring or other type.

Routers rely on information within the data packet to determine which data packets to transfer. Consequently, routers need to understand the protocol of each data packet and will only bridge traffic of a single protocol.

Bridge performance is measured in terms of the number of data packets transferred between one LAN and another. Routers are slow with transfer rates of 500 to 1,000 packets/sec. MAC layer bridges transfer between 1,500 and 8,000 packets/sec. Despite the higher performance, MAC layer bridges actually are less expensive with prices ranging between $5,000 and $10,000. Router costs typically exceed $10,000.

Gateways perform all functions of a router and provide protocol translation. The term gateway often is used to describe a spectrum of devices ranging from bridges connecting dissimilar LANs to protocol converters that let TCP/IP devices access applications that run under DECNET.

Strictly speaking, a gateway provides connection at the network layer (layer 3) or above in the ISO LAN model. In contrast to bridges, which are passive, gateways are active devices on a LAN. When a network workstation uses a gateway to communicate with a host, two communication sessions take place, one between the device and the gateway and the other between the gateway and the host. Each of the two communication sessions uses a different LAN protocol with the gateway acting as a translator/manager of the two sessions.

It's easy to realize that a gateway necessarily will be slow and have limited performance. It only can support several devices simultaneously in contrast to a bridge, which can support thousands of devices. Despite its limited performance, it's still an important element of the LAN interconnection solution, allowing applications to run on different machines regardless of the LAN protocols used. Since the protocol translation problem is a complex one, gateways usually are limited to specific applications such as file transfer or terminal emulation.

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CrossComm Corporation
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Gateways are available that connect XNS, TCP/IP and DECNET-based LANs to X.25, SNA and, in limited capacity, to each other. Their cost typically is between $10,000 and $15,000.

File Servers are the central unit around which personal computer LANs often are built. They provide the PC LAN with an operating system, large-capacity data storage, file management and a limited number of gateway and bridge features.

It's the latter that's of interest here. By virtue of being the heart of the PC LAN, the file server handles every application on the network and therefore is in an ideal position to perform the LAN connection functions.

Several vendors offer file servers that support multiple PC LANs without being limited to the same technology. File servers often can support Ethernet, Token Ring, STARLAN, Arcnet, etc., simultaneously in the same box. Such file servers clearly perform the necessary LAN interconnection functions. They're especially attractive in that the interconnection feature comes at a slight additional ($1,000 to $2,000) cost over the file server price (typically $5,000 to $15,000).

The biggest drawback of this interconnection product is that it will work only for PC LANs and is limited to *single vendor LAN products.* Networks implemented with devices in addition to PCs and/or different vendor PC LANs can't be connected using this approach.

THE ABOVE DISCUSSION points clearly to the unique role that MAC layer (protocol transparent) LAN bridges will play in the LAN connectivity arena. The high performance and flexibility afforded by the protocol independence are the best choice for this application. This is especially important because the LAN world is destined to be multivendor, multiprotocol and multitechnology.

As far as the LAN interconnections are concerned, MAC layer LAN bridges will keep all the options open. By connecting similar and dissimilar LANs with bridges, you're assured of the ability to attach LAN devices anywhere within the network and establish connection with any other device. The addition of a few gateways also will provide the ability to establish communication sessions with machines running

dissimilar protocols, thus completing the connectivity picture. *Figure 1* shows published performance and prices for MAC layer LAN bridges available today.

The ISO model defines how LAN communication occurs. A computer running an application on one LAN (top layer in the model) sends data over a cable (physical layer at the bottom of the model). Data must flow down from the application to the physical layer, picking up additional overhead that defines the communication language and format.

The other computer connected to a different LAN receives the information on the cable (physical layer) and peels off overhead information to retrieve the actual data. Any one of the lower layers can be different in a multiLAN environment, hence, the complexity of LAN interconnections.

Repeaters connect the transmission media (the cable) and require that both media be identical (i.e., both Ethernets, Token Rings or STARLANs). Bridges interface two LANs at the data link layer regardless of the media layer used. Hence, similar and dissimilar LANs can be interconnected (e.g., Ethernet-to-STARLAN, Ethernet-to-Token Ring, MAP-to-Ethernet, etc.). The connection is just under the three layers that define LAN protocol (TCP/IP, DECNET, XNS, etc.), making the bridge protocol insensitive.

Routers connect at the network level, which is the lower LAN protocol layer, hence, they're protocol-sensitive. A router can link two TCP/IP-, DECNET- or XNS-based LANs, but not their combinations. Like a bridge, it performs its function regardless of the datalink and media layer types.

Gateways provide connectivity above the LAN protocol layers, providing a communication path between two LANs using different LAN protocols and type. A gateway must receive data from the medium on one LAN, peel off all the overhead specific to that LAN, and replace it with overhead of the other LAN. In this way, the host connected to LAN-B can understand the communication.

Since the gateway performs this function in both directions, it must understand both protocols. This process is very complex and subject to some variations that are application-dependent. Gateways don't provide universal translation and must be designed for specific applications.

File servers allow the same application (e.g., database management) by PCs located on two dissimilar LANs. They achieve this by virtue of the fact that the communication software (all the layers from application to network) is tailored for the specific application implemented. This generally is vendor-specific and highly proprietary. File servers form a closed system and can't be considered as universal devices for connecting LANs. — *Tad Witkowicz is president of CrossComm Corporation, Marlboro, MA.*

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FIGURE 1

Company	Price $	Filter Rate packets/sec.	Transfer Rate packets/sec.
Bridge Communications IB/1 Ethrnt/Ethrnt	10,000	7,000	2,500
CrossComm 487-EE Ethrnt/Ethrnt	5,400	15,000	7,500
487-ES Ethrnt/STARLAN	4,900	15,000	1,500
DEC LAN Bridge 100 Ethrnt/Ethrnt	8,800	8,000	4,500
Ungermann-Bass Net/One Bridge Ethrnt/Ethrnt	10,850	?	6,000

Available LAN interconnection products for the ISO Model.

Modeling: The Purpose Of A Database

A Special Case Of A Very General And Unwholesome Condition

A "Database Dynamics" essay I've written begins with these three paragraphs: A database models the dynamic behavior of entities and their relationships by means of entries. An entry consists of a key (which uniquely identifies the entity or relationship) and a collection of attributes (which give quality and color to the entity or relationship).

Entities and relationships don't just sit there. They interact with one another and with their environments: Transactions happen which affect (and are affected by) entities and relationships. Such transactions include changes in database structure as well as changes in the meaning and value of the information maintained by the structure.

We can't store a real entity or a real relationship in a database, just as we can't store a real orchestra in a stereo cassette. At best, we can hope to store a half-decent description or representation, which, through the magic of electronics, will play back a reasonably useful likeness. The representation, due to limitations of technology and economics, will consist of a group of values for a relatively small collection of characteristics, which, in the case of databases, we call *fields*.

[By F. Alfredo Rego]

In this article, I'd like to discuss the word that specifies the purpose of a database. Let's refer to my previous definition, with the emphasis now shifted from entries to models: "A database models the dynamic behavior of entities and their relationships by means of entries."

Why modeling? Modeling implies redundancy, since we now have to deal with two things: the model and the modeled. Why do we bother? For convenience, either intellectual or economical. We can afford to manipulate the model (even in ways that will break it). We can't afford to fool around with the real thing.

Even though we model because of convenience, most of the time, we deal with cumbersome models. Why do we put up with such ignominy? Let's explore the issues.

Most database models reflect only the static part of a database (the entries and the datasets, with access paths, for instance). Few database models concern themselves with the dynamic behavior of entries, which they ex-

hibit when they become involved in transactions.

Unfortunately, we find this malady in all kinds of modeling. The database modeling problem is just a special case of a very general and unwholesome condition.

Let's now consider models that, besides dealing with static structures, also deal with dynamic transactions. Instead of just asking, "What is it?", we'll also now ask, "What's going on?" Let's deal with modeling, in general, since this will cover database modeling in particular.

IN DISCUSSING THE Database Administrator, I've said that, traditionally, the DBA's position has been linked to the rather misunderstood task of "maintaining the database." I say misunderstood because the emphasis has been mainly on the data-structure aspect of the database.

Two other fundamental aspects have usually been slighted: the reality that the model is trying to reflect, and the algorithms that manipulate the model to produce the results actually desired from the computer model itself.

The DBA is faced with unenviable choices:

- *Which aspects of reality are going to be incorporated into the computer model, and which are going to be left out?*
- *Which algorithms are going to be allowed to manipulate the model, and which are going to be left out?*
- *Which data structures are going to be allowed to support the model, and which are going to be left out?*

The painful part in these choices comes from the fact that what is left out of the computer model is as important for the model's effectiveness as what is actually put into the model.

Modeling Checklist

A MODEL BUILDER has the awesome responsibility of choosing what is left out of the model as well as what is put into it. As a practitioner of this craft, I've developed, through the decades, a checklist that I'd like to share with you.

Avoid the blinding effects of powerful conventions and unquestioning familiarity. Don't take first principles for granted. Question them. Are they convenient? Are they useful? Are they current? Are they obsolete? Let's look at two specific examples: agendas and badges.

An agenda is a model for a meeting. There are many ways

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to arrange the order or topics in an agenda, depending on the meeting's objective. One seldom-tried order actually might increase the likelihood of agreement on thorny issues. The idea is to begin with items that most likely will bring consensus. This will create a feeling of cooperation and agreement that hopefully will spill into later discussions regarding conflicting items.

Many companies, including Hewlett-Packard, require that outsiders wear badges (bright red, to boot!) when they visit their buildings. This is very understandable. The badge is, in a way, a model of the person as that person is perceived by the company. Without affecting the usefulness of the model (from the company's perspective), the writing could be changed from "Escorted Visitor" to "Guest." The difference, as perceived by the outsider, would be dramatic and would benefit the visited company in terms of good will!

A good model should provide us with insight and understanding. It should encourage synthesis in thought, the shaping of analogy and the discovery of latent parallels. Given a choice among several models, go for the model that facilitates patterns.

For example, the touch-tone model of telephone dialing (besides being quicker) helps us remember long numbers by means of the "graphics" formed by the sequence of digits; such "graphics" are next to impossible to detect in a rotary dialing model.

As another example, consider the design of musical instruments, which are models for melody and harmony. I'm familiar with the piano and the guitar, but my first introduction to harmonics was through the acoustic (Spanish) guitar. This fact probably biased my opinion: The various keys and their harmonic chords, progressions and inversions are easier to detect, as patterns or graphics on the guitar (although I'm sure that some pianists would disagree with me, since they have the genius to detect any pattern on the piano keys!).

A good model shouldn't strain our memory. It should have good mnemonics. Software programs are notorious for failing to provide this common courtesy. Database schemas aren't far ahead. What do people mean when they say "MO-PD-X2-MSTR?"

A GOOD MODEL shouldn't overload the mind. Construction blueprints provide an example of division, in the name of sanity. We have an architect's drawing, which represents a perspective of the finished product (usually with trees, people, cars and so on, in a highly stylized format). We also have specialized blueprints for the plumbing, electrical, structural and decorative elements. Blueprints, in themselves, come in various flavors such as "as planned" and "as built."

A good model should "go with the flow." We should use binary notation when we deal with individual bits or with combinations of individual bits. We should use quaternary (tetramerous) notation when we deal with groups of two bits (since 2 to the power of 2 is 4). We should use octal notation when we deal with groups of three bits (since 2 to the power of 3 is 8). We should use hexadecimal notation when we deal with groups of four bits (since 2 to the power of 4 is 16), etc. Why, then, do we use octal notation on a 16-bit machine? This forces us to treat the rightmost 15 bits as five groups of three bits and the leftmost bit as an anomaly! This isn't too bad when we deal with one 16-bit word, but it becomes a stretching exercise for the brain when we deal with double words!

A good model should "go with the flow." We should use binary notation when we deal with individual bits . . .

AN IDEAL MODEL should be a work of fine art. It should have an immediate intelligibility because of its beauty, order and elegance. It should deal with useful questions and issues and it should be applicable to the greatest number of practical cases. It should stand the test of time and should be usable by a large number of persons.

Classic Models

CLOCKS AND CALENDARS model time. Even though we conceive time as a linear arrow that forever moves forward, our practical models of time tend to be modular. The classical clock has a round face with 12 divisions. The little ("hours") hand goes around the face in 12 hours. The big ("minutes") hand goes around the face in one hour. The optional "seconds" hand goes around the face in one minute. There are digital clocks that provide a "window" instead of a "face." This window flashes numbers that represent hours, minutes and seconds. Some digital clocks also flash days, weeks, months and years. It's easier to grasp the modularity of our time conventions if we look at a "classical" clock, with a face and hands that go around in the face.

In the classical calendar, we pull out a page at the beginning of each month. There are other calendar systems that have different moduli: They may have a page per day, week or year. Even though we know about other time chunks such as decades, fourscore, century, millenia, etc., we don't see calendars that model them. The ancient monuments created by the

Maya Indians in cities such as Tikal in Guatemala dealt with time in terms of thousands of years. The modern agendas and time-management systems have a hard time providing anything more long-term than a five-year calendar!

Theatre In The Air

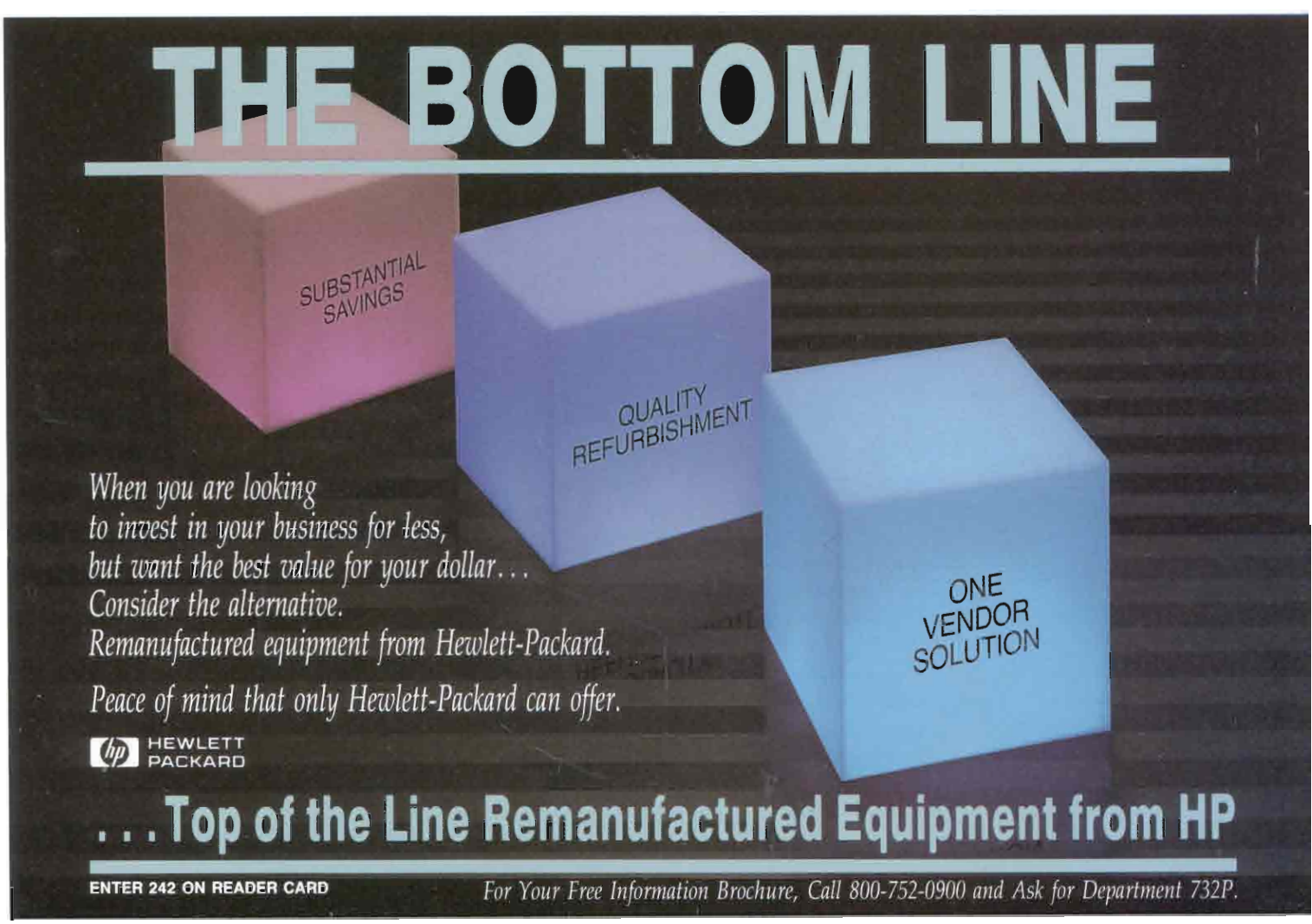
FEW DATABASE MODELS concern themselves with the dynamic behavior of entries, which they exhibit when they become involved in transactions. Unfortunately, we find this malady in all kinds of modeling. The database modeling problem is just a special case of a very general and unwholesome condition.

Let me share one of my pet peeves with you to illustrate my point.

I travel extensively on airplanes. As a result, I suffer (among other things) the opprobrium of "Theatre in the Air" movies. Movies, by the way, are models of fantasies. The fantasy created by the director, actors, etc., gets modeled by means of still frames that, when flickered on a screen in front of our eyes, fool us into thinking that the fantasy actually is moving. At any rate, when the movie is good, the captain comes on the sound system, just at the most intriguing moment in the dialogue, to tell us that the outside temperature is 60 degrees below zero or whatever. The captain, who supposedly is in charge, seems to take special pride in ruining the flow of a good movie.

On the other hand, when the movie is bad (which is most of the time), I have no way to escape and I'm even forced to close my window, so I don't even have the choice of enjoying the view outside. Even worse, when the movie is horrendously violent and vicious and I have my little children with me, my blood really boils, particularly when I read this pap in the in-flight magazine: "Although this film has been edited for airline use, parental guidance is suggested." Notice that they use the cowardly passive voice (i.e., they don't say who, specifically, suggests that I use parental guidance). Also notice that they don't say how, specifically, I'm supposed to exercise parental guidance, given the fact that we're all strapped to the seat and must remain strapped to the seat facing the screen.

May your models (and the systems that you impose on your users) be nicer! —*F. Alfredo Rego, Adager, Antigua, Guatemala.*



DATABASE LANGUAGES

Sophisticated Languages For Manipulating Large Amounts Of Data

LANGUAGES

David Goldstein

Closely related to business-oriented languages are database languages. These have been designed to efficiently store and manipulate large amounts of information. Although these languages often are used to obtain data for business decisions, their characteristics constrain them to optimally solve a smaller set of problems than those mentioned in my first languages article (see Vol. 2, No. 1).

Numerous commercial query languages are available. Many of the packages on the market are simply these same query languages with ascetic user-interfaces. **QUEL** and **SQL** are good examples of standard database languages used in packages such as INGRES and DB2.

Database languages generally include commands to select records, display the desired information, group information by type, combine two different types of records and generate statistics for groups. These languages are designed to answer queries about the data contained in a specific database. For example:

```
Range of PEOPLE is AUTHORS
Retrieve PEOPLE.NAME
Where PEOPLE.JOB =
  "GRADUATESTUDENT_CONSULTANT"
```

is a QUEL query asking for the NAME field of all members of AUTHORS whose JOB is GRADUATESTUDENT_CONSULTANT. Database languages, when used properly, are also almost self-documenting. Since the implementation details of file input/output, sorting, statistics and other complex considerations are hidden from the user, queries specify only how to manipulate data in some English-like syntax, as in:

```
(select customer.name from deposit where
   bank.branch = "Cheltenham") union
(select customer.name from loan where
   bank.branch = "Cheltenham")
```

(an SQL query for all customers with loans or deposit accounts at the Cheltenham branch of a bank)

These languages and packages also serve to provide a variety of subtle, but extremely worthwhile services to the database user, such as security enforcement, query optimization, implementing integrity constraints and guarding against system failures. These services are performed without bothering the user for any implementation details, again abstracting system functions to a higher level.

There are, however, classes of database problems that these languages don't solve (since many database languages aren't closed mathematically). Database languages also are very rigid in their possible uses (you would find many general programming problems almost impossible to solve using these tools).

To remedy this, versions of the language embedded in other applications often are available, such as **CEQUEL** (QUEL embedded in C). These products offer excellent solutions to a variety of problems, combining strong application-specific routines with a general-purpose programming language.

ANOTHER IMPORTANT CLASS of programming languages covers the domains of scientific research and engineering. The languages presented in this section all share the common traits of being efficient and procedural (solving problems in a step-by-step process from beginning to end).

Assembly languages are not so much

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computer languages as just human-readable machine code. Assembly language programs basically consist of mnemonic devices for the exact machine instructions the computer is to execute. These instructions tend to be very primitive, as in:

```
LOAD    #3,Y
LOAD    X,2
ADD     X,Y
STORE   Y,2
```

to perform a simple addition of two numbers. Assembly language is very efficient, but tedious to use and difficult to learn.

FORTRAN, the first "real" computer language invented, is known for its tremendous number-crunching capabilities. It has very rigid syntax, but is easy to learn.

FORTRAN is a very plain, but efficient language; it doesn't support recursion, defining new data types or overloading functions. One interesting feature of FORTRAN is that it does allow programmers to declare arrays with negative bounds (i.e., from -5 to 5).

PASCAL shares many similarities with FORTRAN. It originally was designed to teach algorithms and data structures. Therefore, PASCAL includes almost all the capabilities of FORTRAN, as well as a few important additional ones. First, PASCAL does permit recursion and defining new data types. This feature allows working with sets of discrete objects as many of the previously mentioned languages manipulate integers. Also, PASCAL permits the allocation of memory for building data structures on an "as-needed" basis. Therefore, PASCAL programs easily can represent data for which the upper bounds aren't known.

In contrast, FORTRAN allocates memory for variables in anticipation of encountering the worst case, and so can't tackle such a problem without risking an error except by allocating more memory than needed. There is a tremendous number of problems that naturally use this trait, such as building complex data structures.

FORTH is a tremendously efficient language allowing programs to perform a wide variety of tasks. However, although FORTH allows programmers to do just about anything, the versions I've seen don't provide a lot of error checking (and so are prone to runtime errors).

FORTH attains its speed by being very similar to assembly languages; i.e., by being very machine-friendly and user-hostile. However, different versions of FORTH include different commands and capabilities, some of which are extremely sophisticated.

Furthermore, almost all FORTH commands can be removed or added at any time to improve efficiency; the fewer the commands a version of FORTH knows, the less it can do, but the remaining commands execute more efficiently. The commands removed also can be incorporated as part of FORTH again simply by reading them from a file. FORTH is a very difficult language to learn, but very popular for realtime programming because of the tremendous efficiency it offers.

All of these languages are available in compiled formats. Samples also are displayed in *Programs 1* and *2*.

LANGUAGES ALSO ARE AVAILABLE for numerous other specialized domains. For example, **LISP** (List Processing) and **PROLOG** (Predicate Logic) are two popular artificial intelligence languages. LISP features a programming environment where all data and programs are composed of lists, called "s-expressions." Programs are written to manipulate lists as data structures, allowing virtually any type of information conceivable to be stored. For example:

```
(square (corner 10 10)
        (corner 0 0) )
```


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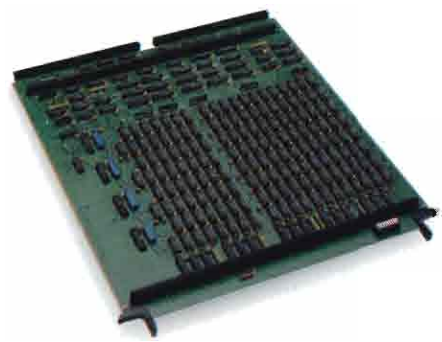

reads per second at best, not to mention other limitations.

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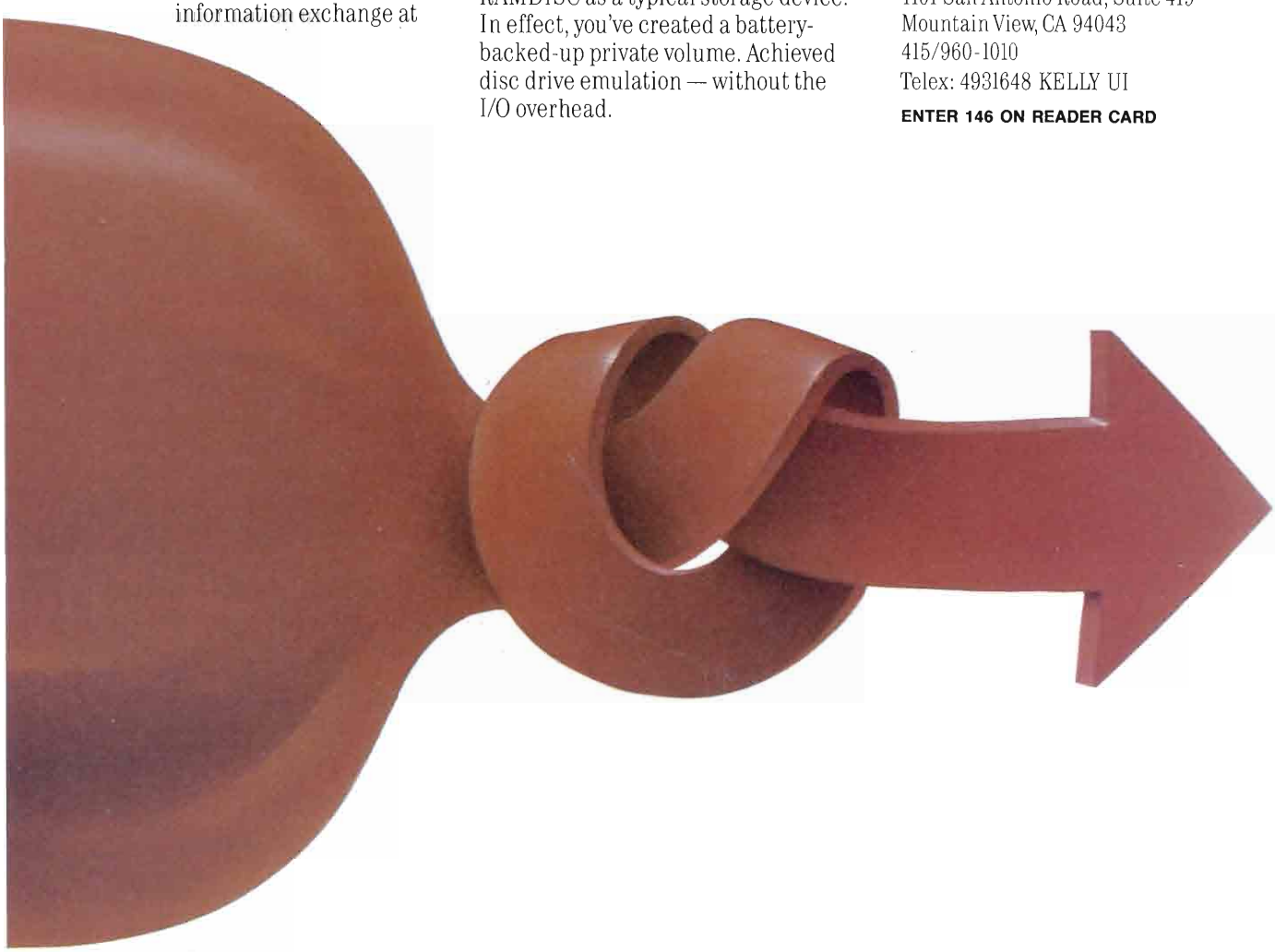

might be used to represent a square. This "square" then could be passed to programs to be manipulated in some form, as in:

```
(cube
      (surface
        (square (corner 10 10 10)
                (corner 0 10 10)
                (corner 10 0 10) . . .
```

which could be used as the beginning of a 3-D database. PROLOG, on the other hand, is a backwards-chaining, theorem-proving language.

Other noteworthy languages include **APL** (A Programming Language), a chic, efficient mathematical language; numerous simulations languages, such as **GPSS** and **SLAM**; as well as a variety of statistical languages such as **SPSS** and **BMDP**. In fact, there are languages specifically designed for almost any application imaginable.

One last interesting topic is military languages, such as **Ada** and **CMS2**. Various branches of the federal government have created several "ultimate" computer languages (each being considered the best by its creators and sponsors). Yet, despite the cynicism due to many military undertakings, Ada does offer quite a bit of promise as developers create larger libraries of software in it.

Although each of these languages is more complex than those presented above, and are beyond the scope of this article, a few of the features that were implemented as part of a tremendously long, carefully debated process are worth mentioning. Functional overloading, abstract data types, variable precision arithmetic, recursion and list processing are but a few of the features of these languages.

The mission to replace programmers with engineers via programming languages hasn't been an entire failure: Today's languages are so complicated and sophisticated that yesterday's programmers are now bona fide "computer engineers." Languages provide a wide variety of functions and should be chosen to suit exactly an application's needs or else valuable resources will be wasted. Besides allocating funds for purchasing software, buying the correct language is a function of equipment available, programming, training, documenting and maintaining the programs over their lifetimes. Making the correct decision on what language to use makes and breaks companies every day.

—David Goldstein is an independent consultant and free-lance writer based in Elkins Park, PA.

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Programs begin on page 54.

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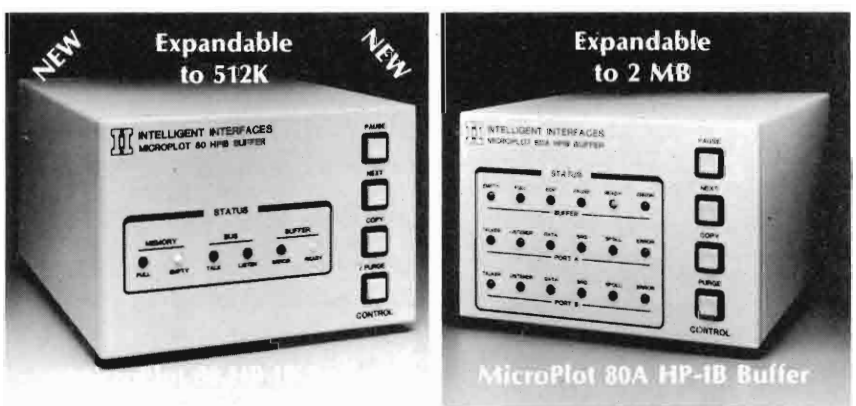

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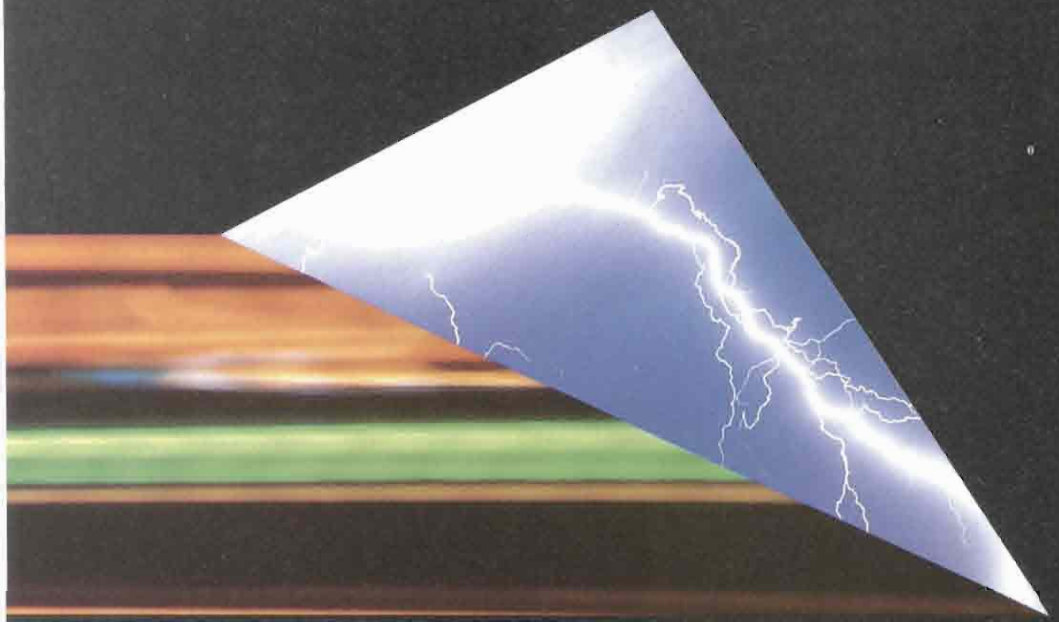

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Program I.

```
This program is the renowned Towers of Hanoi problem solved in PASCAL.
The problem features a number of descending-sized discs placed upon
the leftmost of three pegs.  The goal is to move these discs from the
leftmost peg to the rightmost peg, one by one, without ever placing a larger disc
atop a smaller one.  Because PASCAL allows recursion, the solution seems
quite intuitive: keep reducing the problem to moving (n-1) discs, until we
have only one or two discs to move, and then consider the discs removed in
the simplification.

A non-recursive solution to this problem (such as any written in FORTRAN)
would be neither easily explained nor understood.  A solution in C,
a recursive language, might appear similar to this one.


PROGRAM HANOI(INPUT,OUTPUT);

TYPE (* New data types - tracking # discs/peg & specific discs on peg *)
        SPTYPE = ARRAY [1..3] OF INTEGER;
        STACKTYPE = ARRAY [1..3,1..50] OF INTEGER;

VAR
        DISKS, FROM, PTO, COUNT : INTEGER;    (* # discs in problem, peg move *)
        I, J : INTEGER;                       (* from, peg move to, # moves so far *)
        SP : SPTYPE;              (* I,j - loop control; sp : represent pegs *)
        PEGS : STACKTYPE;         (* represent discs on pegs *)

PROCEDURE POP (PEG: INTEGER; VAR TO_PEG: INTEGER);
(* Pops a disk off a peg *)
BEGIN
        SP(PEG) := SP(PEG) - 1;
        TO_PEG := PEGS(PEG, SP(PEG));
        PEGS(PEG,SP(PEG)) := 0;
END (* POP *);

PROCEDURE PUSH((PEG, SOURCE : INTEGER);
(* Pushes a disk onto a peg *)
BEGIN
        PEGS(PEG, SP(PEG)) := SOURCE;
        SP(PEG) := SP(PEG) + 1;
END (* PUSH *);

PROCEDURE PRINTDISKS(PEGS : STACKTYPE);
(* Display all the discs on pegs *)
BEGIN
FOR I := DISKS DOWNTO 1 DO
                BEGIN
                        FOR J := 1 TO 3 DO
                                IF PEGS(J,I) <>0 THEN   (* CHECKIG EACH PEG FOR DISK *)
(* formatted write --> *)               WRITE ('--',PEGS(J,I) : 1,'--')
                                ELSE
                                        WRITE('     ');
                        WRITELN
                END (* FOR *)
END (* PRINTDISKS *);
[8

PROCEDURE MOVEDISKS(FPEG, TPEG : INTEGER); (* FROM, TO PEGS *)
(* Moves discs between pegs by placing "from" disc to "hand", then disc in

  "hand" to "to" peg *)
VAR
        HAND : INTEGER;
BEGIN
        POP(FPEG, HAND);
        PUSH(TPEG, HAND);
        PRINTDISKS(PEGS);
END (MOVEDISKS *);

PROCEDURE TOWERS(NDISKS, FPEG, TPEG : INTEGER);
(* Performs the recursive moves for Towers of Hanoi problem *)
BEGIN
        IF (NDISKS = 1) THEN
                BEGIN
                        COUNT := COUNT + 1;
                        WRITELN;
                        WRITELN(' MOVE A DISC FROM ', FPEG : 2, ' TO ', TPEG : 2);
                        MOVEDISKS(FPEG, TPEG)
                END (* IF *)
        ELSE
                BEGIN
                        (* Pegs can be treated as symmetric, so move N-1
```

Continued.

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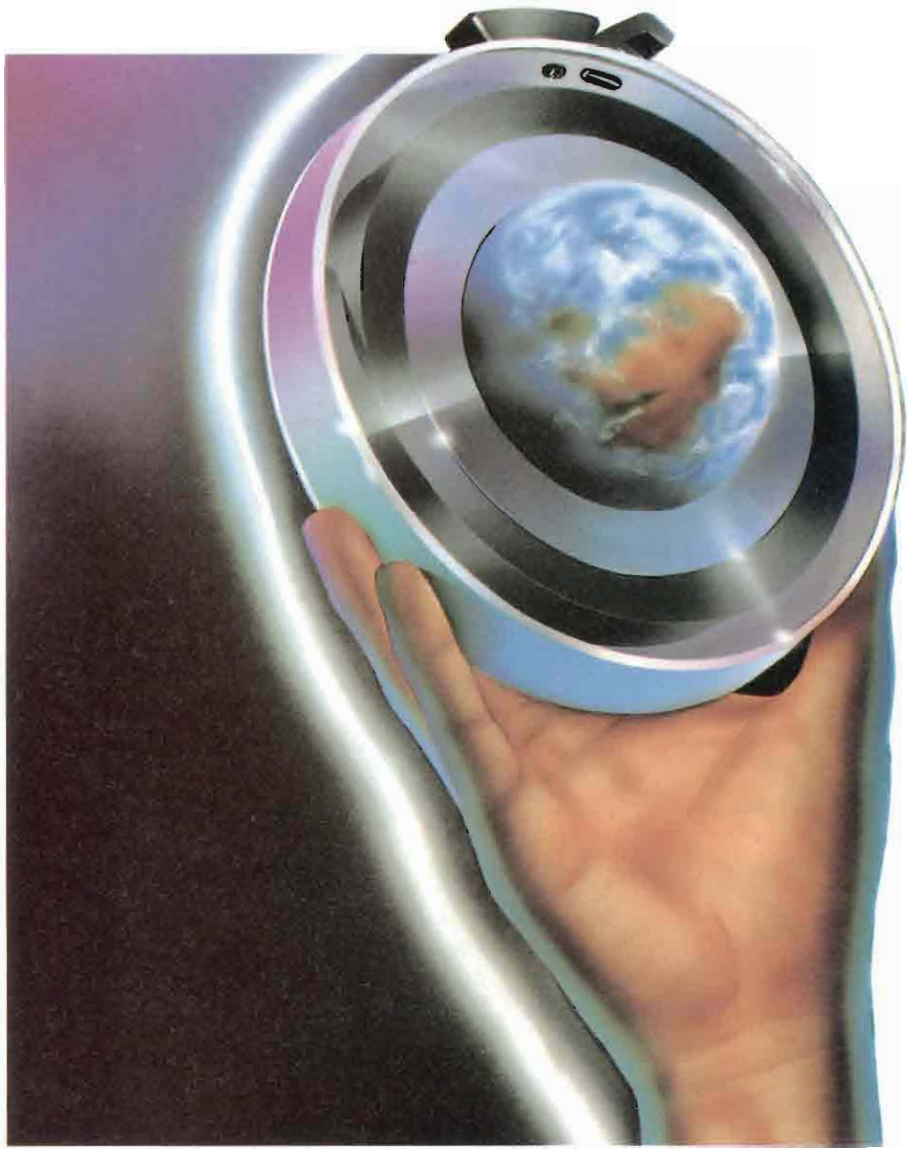

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Program 1 . . . CONTINUED

```
                        disks from one peg to "hand" to remaining peg *)
                    TOWERS(NDISKS - 1, FPEG, 6-FPEG-TPEG);
                    TOWERS(1, FPEG, TPEG);
                    TOWERS(NDISKS - 1, 6-FPEG-TPEG, TPEG);
                END (* IF *)
END (* TOWERS *);

PROCEDURE INITIALIZE;
(* Initialization (empty stacks, etc. *)
BEGIN
        COUNT := 0;
        FOR I := 1 TO 3 DO SP(I) := 1;
        WRITELN('   Towers of Hanoi Solution');
        WRITE (' Enter number of discs ');
        READ(DISKS);
        WRITELN;
        FOR I := 1 TO DISKS DO
            BEGIN
                    PUSH (1,I);             (* Prepare pegs *)
                    PEGS (2,I) := 0;
                    PEGS (3,1) := 0
            END (* DO *)
END (* INITIALIZE *);


BEGIN (* MAIN *)
        INITIALIZE;
        WRITELN('Initial state of pegs:');
        PRINTDISKS( PEGS);
        TOWERS( DISKS, 1 , 3);  (* Move all discs from 1 to 3 *)
        WRITELN;
        WRITELN('Number of moves required: ',COUNT : 4)
END. (* HANOI *)
```

Output:

```
   Towers of Hanoi Solution
Enter Number of Discs  3

Initial state of pegs:

-3--

-2--

-1--

Move a disc from  1 to  3

-2--

-1--          --3--

Move a disc from  1 to 2


-1--  --2--  --3--

Move a disc from  3 to 2


      --3--
-1--  --2--

Move a disc from  1 to 3


      --3--
      --2--  --1--

Move a disc from  2 to 1


-3--  --2--  --1-

Move a disc from  2 to 3


            --2--
-3--        --1--

Move a disc from  1 to 3

            --3--
            --2--
            --1--

Number of moves required: 7
```

Program 2.

FORTRAN

Since FORTRAN does not support recursion, there is no easy, intuitive FORTRAN solution to Towers of Hanoi. Problems that are recursively stated often have non-recursive solutions of the form:

```
if (the case one)
        (handle the one case)
  elseif (case two)
          (handle case two)
      elseif (case three)
              (handle case three)
          .
          .
          .
      endif
  endif
endif
```

Yet, if the number of cases is large, this type of procedure can become tedious. Also, since FORTRAN-77 has no type facility, datatypes are more restricted and less easy to understand to someone who did not originally write the program. There are other features FORTRAN lacks, but whose discussion is beyond the scope of this text.

FORTRAN is aptly suitable for most non-recursive programming needs and a tremendous amount of software already exists and is publicly available in FORTRAN.

Here is a non-recursive FORTRAN program to compute factorials:

```
      PROGRAM FACTORIALS(INPUT, OUTPUT)

      INTEGER UPTO, RESULT, I

C UNFORMATTED WRITE FOR PROMPT
      WRITE *, 'Generate factorial for what number'

C FORMATTED READ
      READ (*,'I1'), UPTO

C CALCULATE FACTORIAL OF UPTO

      RESULT = 1
      DO 100 I = 2, UPTO
                RESULT = RESULT * I
100   CONTINUE


20    FORMAT (1X,C,I12)
      WRITE 20, 'The answer is', RESULT
      END
```

Forth

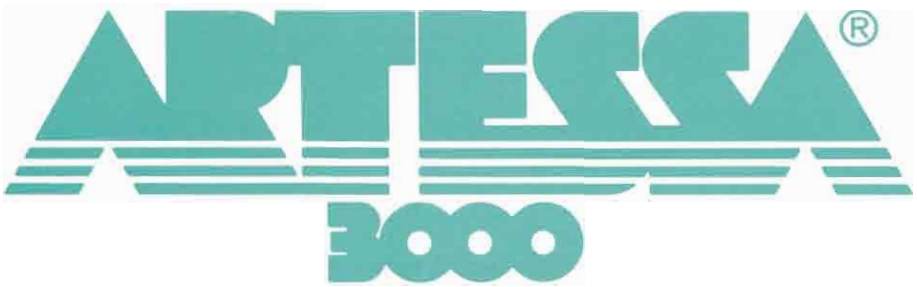
A part of a FORTH version of factorial is:

```
COMPUTEFACT  (assuming UPTO, RESULT and I are on the stack and that a function
              bring exists, N BRING bringing the nth element in stack to
              the top )

(       DUP 3 BRING DUP 3 BRING <= IF / stack looks like
                                        RESULT I UPTO UPTO I
                                        RESULT I UPTO (comparison result)
/
        ROT

        DUP 3 BRING * SWAP 1 +        / stack looks like
                                        UPTO RESULT I I 3
                                        UPTO I I RESULT
                                        UPTO I (RESULT * I)
                                        UPTO (RESULT * I) I 1
                                        UPTO (RESULT * I) (I+1)
/
(etc)
)
```

(The surgeon general cautions against the uninitiated programmers programming in FORTH, and non-programmers even thinking about programming in FORTH.)



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X WINDOW

More Than Just A Windowing System, Part 2

X

Ken Fullett

The X Window system provides a method for application developers to write display and vendor-independent windowing software in a networked computing environment. Before getting involved with X, it would be nice to know the degree of programming effort required. My goal is to give you a sample of what to expect if you decide to follow the X avenue.

This is the second article in a three-part series examining the X system as implemented by Hewlett-Packard on its hardware within the HP-UX operating system. Part One of the series provided an overview of X including the operating model, a brief introduction into using X, and the hardware requirements. In this and future articles, the view into the X Window will be explored.

What better way to show what it's like to program in the X environment than by examining a simple X program? The program will create a window on the screen that contains a 12-button keypad as shown in *Figure 1*. Using the left button of a two-button mouse, the user can "press" the keys on the keypad. The program is terminated by pressing the mouse's right button. When a keypad key is pressed, the program will print a message identifying the key that was pressed. Some generality will be achieved by allowing the number of keys and the labels on each to be changed.

Before we get started, it's important to note that the code we'll be examining is for version X.10 of the X standard. With the X.11 version, the function calls will change, but the concepts will remain the same.

THE PROGRAM, which is called keypad, will be a client process of the X server. Recall that the client process communicates with the X server by sending messages via an input and output queue (see *Figure 2*). The X server, sometimes called the display server, is responsible for managing a workstation's input and output devices including the keyboard, mouse and bit-mapped display. A client process will place messages into the output queue requesting resources and services from the X server. In turn, the X server will respond by placing messages into its input queue.

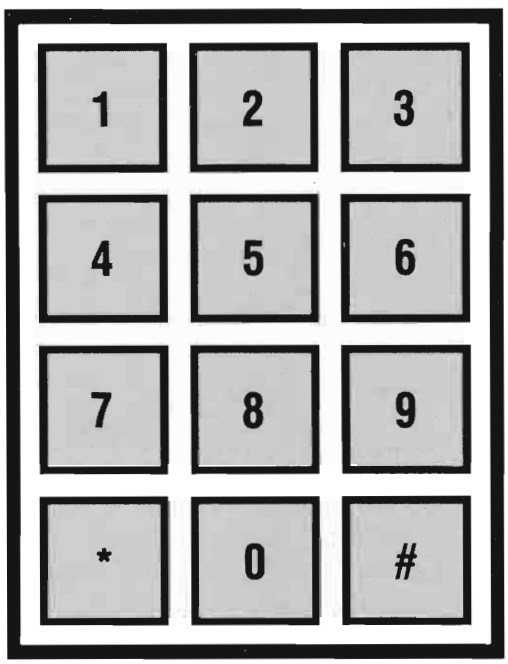
Since the X server is managing all the input devices (in the keypad case, only the mouse), the input queue will be the sole source of user input to the program. This suggests the structure of the program. It will consist of an initialization portion followed by an event loop. The event loop will wait on the input queue until an event is found, process the event, then wait again.

The first task necessary for generating the keypad is to request the server to create a window for the keypad display. The window is created using the function XCreateWindow( ) which requires, among other information, the size in pixels of the window. The window size determines the size of the keypad keys. In turn, the size of the keypad keys determines the size of the characters that are used to label the keys.

Unfortunately, the text sizes available on X server aren't infinite; there's a limited number of discrete character sizes available based on fonts. Therefore, the font is chosen first, which in turn will be used to define the keypad key size and ultimately the window size. The font size is given in units of pixels and is obtained from an X function.

Using the font size (height and width), the keypad key size can be calculated. The keys are assumed to be square and the distance between keys is set to one quarter of the key size. Once

FIGURE



the key size and spacing are determined, the window size can be calculated based on the layout of the keys.

This approach causes the size of the keypad to vary with display resolution. Given two monitors with the same physical size, the keypad will be larger on a display with lower resolution. This ensures readability on lower resolution displays; however, it also could cause a window to require more screen area than is available.

A designer must be cognizant of this to maintain a program's usefulness, either by using smaller characters or rearranging a window's contents. For example, there's a program provided with X called bitmap whose window doesn't fit on a medium-resolution display, making its use difficult.

Every window within the X system is subject to manipulation by the user. The user is free to move, resize, iconify and shuffle the keypad window among the others present on the screen. The keypad window can be placed behind other windows or changed to an icon.

When the keypad window is made visible again, the X system doesn't retain the contents of the window. The burden is placed on client process. Whenever a window is exposed, the X server will place, by request, an ExposeWindow event into the client's input queue. The client must detect this event and redraw the contents of the window.

It's convenient to treat the keypad as an object with a finite number of states. Once a font has been chosen, the keypad geometry, which includes the width, height, key size and spacing, can be determined. The structure _keypad_info of *Program 1* defines the

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variables necessary for drawing and monitoring input of the keypad. The use of each is explained briefly in the program and will become apparent later.

The keypad is implemented using the function keypad( ) that's guided by three messages. The message NEW causes keypad( ) to create a window and draw the keypad based on the keypad_info structure. A message of DRAW instructs keypad to redraw the contents of an existing keypad. When an event is passed to keypad, the message EVENT causes keypad to examine the event to determine if any action is necessary. The program code for keypad( ) and its supporting functions is shown in *Program 2*.

The main( ) function of the program is shown in *Program 3*. The first task is to establish communications with the X server using the function XOpenDisplay( ). This creates the input and output queues allowing subsequent requests. The function error( ) is a simple error-handling function that prints its string argument and terminates the program.

Once the connection with the server is established, the keypad_info structure is stuffed and the function keypad( ) is instructed to create a keypad.

Finally, the event loop is entered, but first the X server must be told what event types are needed using the function XSelectInput( ). If a mouse button is pressed while the mouse cursor is positioned within the keypad window, a ButtonPressed event will be sent that includes the coordinates of the mouse cursor. When the button is released, a ButtonReleased event is generated. As explained earlier, if the X server needs us to redraw the contents of the window, an ExposeWindow event is placed into the output queue.

The importance of this program structure is that additional keypads can be created by duplicating the keypad_info structure and calling the function keypad( ) with the NEW message. Each instance of the keypad is unique because it's drawn in a window with a unique window ID. Pop-down menus, single-line text editors or similar input facilities can be designed using this approach.

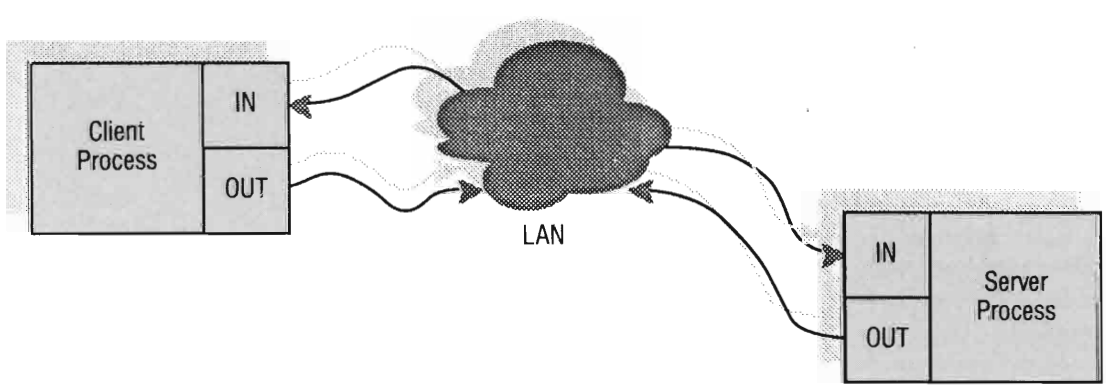
However, much more should be done before this program is practical. This includes providing an icon and cursor, handling window resizing, using color, and a more intelligent redraw.

TO PRESERVE REAL ESTATE on the screen, a user may wish to replace a window with an iconic representation. The user is free to "iconify" a window at any time using the window manager (remember, the window manager is simply another client of the X server); other client programs have no control. If an icon isn't provided to the window manager, a default icon will be used. At worst, this could be a small square. At best, it may be a rectangle with the name of the program. A better icon is one that truly represents a program's function.

To provide good user feedback, the shape of the mouse cursor should change when it's positioned within the keypad window. The default mouse cursor is a large X, not very appropriate for the keypad. A different cursor shape, perhaps a finger, may be defined and specified with requests to the X server.

A problem related to the window manager is its freedom to resize any window at will. For this program, if the window is made larger, the keypad only

FIGURE 2



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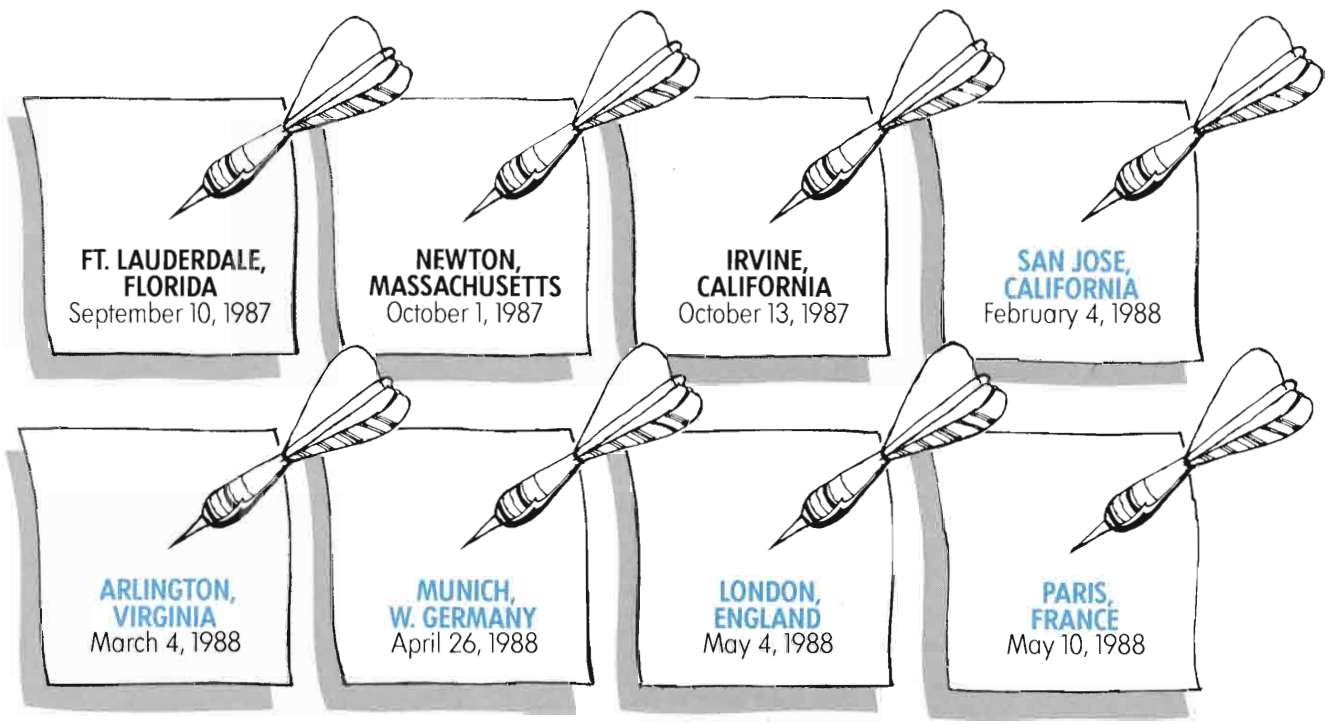

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will occupy the upper left corner of the window. If the window is made smaller, some of the keypad keys won't be visible. To fill the window with the keypad, different size fonts and keys would be needed depending on the size of the window.

Redrawing the entire keypad every time an ExposeWindow event occurs is easy, but not necessarily the best method if the image is more complicated. If one pixel in the corner of the keypad is covered and uncovered, the program will redraw the entire window. Ideally, only the erased portion of the keypad should be redrawn. The expose event contains the information necessary for achieving this.

Because X is controlling the user input and output devices, the program code relating to the X Window system is entirely for user interfacing. Admittedly, if you want to design your own user interface, you write the code once and use it over and over.

The example shown here uses the lowest level of the X system. It's expected that various vendors will build toolkits to provide a standard user interface using the basic X functions. HP has provided a user interface library called Xray that includes pop-down menus and other tools necessary for obtaining input from a user. This toolkit, which will be examined in the next part of this series, still requires a fair amount of programming effort to use.

Other toolkits are being developed by vendors contributing to the X standard; however, they're presently not available in the official HP version of X. The power of the X concept makes much of the extra programming worthwhile. Both a better user interface and multivendor display capability are achieved at the same time. X really is in its infancy, as far as a standard goes. As it grows up, it's natural to expect many tools that aid the program developer including extensive libraries and screen design programs that let you draw your screen instead of writing the code.

—Ken Fullett is a scientist in the Transponders Dept., Comsat Laboratories, Communications Satellite Corporation, Clarksburg, MD.

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Program 1.

```
/* include file keypad.h */

#define BRUSHWIDTH 2    /* line thickness around each keyboard key */

/* message types for keypad object */
#define NEW 1
#define DRAW 2
#define EVENT 3

struct _keypad_info
    {
    FontInfo *font_info;    /* pointer to X font info struct */
    int nrow;               /* number of rows in keypad */
    int ncol;               /* number of columns in keypad */
    char **labels;          /* pointer to ragged array with labels */
    Window win_id;          /* id of window from XCreateWindow() */
    int win_height, win_width;  /* size of window in pixels */
    int key_size;           /* height and width of each keypad key */
    int key_space;          /* spacing between keypad keys */
    int key_area;           /* used to determine which key pressed */
    int pressed_key;        /* index of a key that is pressed */
    };
```

Program 2.

```
#include <stdio.h>
#include <X/Xlib.h>
#include <string.h>
#include "keypad.h"

#define MAX(a, b)   ((a) > (b) ? (b) : (a))

extern int error();     /* reports error and does and exit(1) */

/*****************************************************************/
void stuff_vertex(x, y, flags, vertex)
    int x;
    int y;
    int flags;          /* instruction as to how point is handled */
    Vertex *vertex;     /* X defined struct for point */
    {
    vertex->x = x;
    vertex->y = y;
    vertex->flags = flags;
    }
```

Program 2. . . . CONTINUED

```
/*****************************************************************/
int draw_rect(win, x, y, width, height)
    Window win;     /* destination window of rectangle */
    int x, y;       /* upper left corner of rectangle */
    int width;
    int height;
    {
    Vertex vlist[5];    /* five points to draw rectangle */

    /* calculate and stuff each point */
    stuff_vertex(x, y, 0, &vlist[0]);                   /* upper left */
    stuff_vertex(x + width, y, 0, &vlist[1]);           /* upr right  */
    stuff_vertex(x + width, y + height, 0, &vlist[2]);  /* lwr right  */
    stuff_vertex(x, y + height, 0, &vlist[3]);          /* lwr left   */
    stuff_vertex(x, y, 0, &vlist[4]);                   /* upper left */

    XDraw(win, vlist, 5, BRUSHWIDTH, BRUSHWIDTH,
          BlackPixel, GXcopy, AllPlanes);
    }
/*****************************************************************/
int range(n, min, max)
    int n;
    int min;
    int max;
    {
    /* make sure n is between min and max */
    if (n < min)
        return (min);
    else if (n > max)
        return (max);
    else
        return(n);
    }
/*****************************************************************/
int keypad_draw(keypad_info)
    struct _keypad_info *keypad_info;
    {
    int x, y;                   /* working point pair */
    int row, col;               /* position of key within keypad */
    int nlabels = 0;            /* label index */
    int text_height_center;     /* offset to center text in height */
    int text_width_center;      /* offset to center text in width */

    XMapWindow(keypad_info->win_id);    /* have X-server draw window */

    /* calclate text height placement */
    text_height_center =
        (keypad_info->key_size - keypad_info->font_info->height) / 2;

    /* draw each key and write its label */
    for (row = 0; row < keypad_info->nrow; ++row)
        {
        for (col = 0; col < keypad_info->ncol; ++nlabels, ++col)
            {
```

Continued.

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Program 2 . . . CONTINUED

```
            x = keypad_info->key_space + col *
                (keypad_info->key_space + keypad_info->key_size);
            y = keypad_info->key_space + row *
                (keypad_info->key_space + keypad_info->key_size);

            draw_rect(keypad_info->win_id, x, y,
                keypad_info->key_size,
                keypad_info->key_size);

            text_width_center = (keypad_info->key_size
                - XStringWidth(keypad_info->labels[nlabels],
                keypad_info->font_info, 0, 0)) / 2;

            XTextMask(keypad_info->win_id, x + text_width_center,
                y + text_height_center,
                keypad_info->labels[nlabels], 1,
                keypad_info->font_info->id, BlackPixel);
            }
        }
    return(0);
    }
/*****************************************************************/
int keypad_new(keypad_info)
    struct _keypad_info *keypad_info;
    {

    /* calculate keypad key size and spacing */
    keypad_info->key_size =
        MAX(2 * keypad_info->font_info->height,
            3 * keypad_info->font_info->width);
    keypad_info->key_space = keypad_info->key_size / 4;

    /* area is used to determine mouse position on event */
    keypad_info->key_area = 5 * keypad_info->key_space;

    /* calculate window size */
    keypad_info->win_width =
        (keypad_info->ncol * keypad_info->key_size) +
        (keypad_info->ncol + 1) * keypad_info->key_size / 4;
    keypad_info->win_height =
        (keypad_info->nrow * keypad_info->key_size) +
        (keypad_info->nrow + 1) * keypad_info->key_size / 4;

    /* Request server to create absolute sized window */
    if ((keypad_info->win_id = XCreateWindow(RootWindow, 10, 10,
            keypad_info->win_width, keypad_info->win_height, 5,
            BlackPixmap, WhitePixmap)) == NULL)
            error("XCreateWindow");

    keypad_draw(keypad_info);
    return(0);
    }
/*****************************************************************/
int keypad_event(keypad_info, event)
    struct _keypad_info *keypad_info;
    XEvent *event;
    {
    int key;
    XButtonEvent *bevent;   /* used to cast event structure */
    int row, col;       /* cursor position in key matrix */
    int half_key_space = keypad_info->key_space / 2;

    /* make sure event was generated within keypad window */
    if (keypad_info->win_id == event->window)
        {
        switch (event->type)
            {
        case ButtonPressed: /* mouse button pressed */
            bevent = (XButtonEvent *)(event);

            /* check which mouse button pressed */
            if ((bevent->detail & 3) == RightButton)
                return(EOF);
            else    /* calculate which keypad key pressed */
                {
                col = (bevent->x - half_key_space)
                    / keypad_info->key_area;
                col = range(col, 0, keypad_info->ncol - 1);

                row = (bevent->y - half_key_space)
                    / keypad_info->key_area;
                row = range(row, 0, keypad_info->nrow - 1);

                /* store the pressed key in structure */
                keypad_info->pressed_key =
                    col + keypad_info->ncol * row;
                }
            return (0);
        case ButtonReleased:    /* any mouse button released */
            key = keypad_info->pressed_key + 1;
            keypad_info->pressed_key = 0;
            return(key);        /* return previously stored key */
        case ExposeWindow:      /* window uncovered */
            keypad_draw(keypad_info);
            break;
        default:
            break;
            }
```

Program 2 . . . CONTINUED

```
        }
    return(0);
    }
/*****************************************************************/
int keypad(msg, keypad_info, event)
    int msg;
    struct _keypad_info *keypad_info;
    XEvent *event;
    {
    switch (msg)
        {
    case NEW:
        return(keypad_new(keypad_info));
    case DRAW:
        return(keypad_draw(keypad_info));
    case EVENT:
        return(keypad_event(keypad_info, event));
        }
    }
```

Program 3.

```
#include <stdio.h>
#include <X/Xlib.h>
#include <string.h>
#include "keypad.h"

#define NROW 4              /* number of rows in keypad */
#define NCOL 3              /* number of columns in keypad */
#define KEYPAD_FONT "timrom12b"

extern int error();
extern int keypad();


/*****************************************************************/
main(argc, argv)
    int argc;
    char *argv[];
    {
    struct _keypad_info keypad_info;
    XEvent event;       /* X defined event structure */
    static char font_file[24] = KEYPAD_FONT;
    static char *labels[NROW * NCOL] =
        {
        "1", "2","3","4","5","6","7","8","9","*","0","#"
        };
    int key;            /* index of keypad key pressed */
    int not_done = 1;       /* loop flag */

    /* establish communications with the X-server */
    if (XOpenDisplay(NULL) == NULL)
        error("XOpenDisplay");

    /* get font information and put into keypad structure */
    if ((keypad_info.font_info = XOpenFont(font_file)) == 0)
            error("XOpenFont");

    /* initilize the keypad_info structure */
    keypad_info.nrow = 4;           /* number of rows in keypad */
    keypad_info.ncol = 3;           /* number of columns */
    keypad_info.labels = labels;    /* text to appear on each key */

    keypad(NEW, &keypad_info);      /* create instance of keypad */

    /* Catch the desired Events */
    XSelectInput(keypad_info.win_id, ButtonReleased | ExposeWindow |
        ButtonPressed);

    /* event loop. wait for event and process until exit */
    while (not_done)
        {
        XNextEvent(&event);     /* wait for event */
        switch (key = keypad(EVENT, &keypad_info, &event))
            {
        case 0:         /* keypad handled any processing */
            break;
        case EOF:       /* keypad detected right mouse button */
            not_done = 0;
            break;
        default:        /* a key was pressed on keypad */
            printf("keypad key %s pressed\n", labels[key - 1]);
            break;
            }
        }
    return(0);
    }
```

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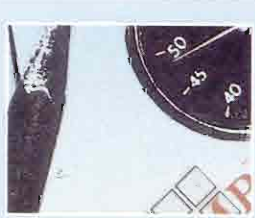
INFORMATION PERFORMANCE

Data: A Necessary Evil Or A Corporate Asset?



INFORMATION PERFORMANCE

Kathy McKittrick

From the time when merchants first began selling their wares on street corners, companies have been making decisions based on experience in the marketplace. With the growth in company sizes and the advent of computer technology, much of the information that these decisions are based on are "locked" inside computer systems.

But the sheer volume of data that's captured as business transactions occur makes it difficult for even the most advanced database systems to provide timely information on an as-needed basis.

As computer systems developed, we became increasingly caught up in the activity of capturing information. Transaction throughput seemed to be the only concern when DP staffs were budgeting for software development or hardware purchases.

Somewhere along the line, we forgot one of the primary reasons for capturing that data: not collecting receivables or paying bills, but using that data as a source of knowledge to draw upon when making decisions about directions in the marketplace.

INFORMATION MUST BE CAPTURED before it can be disseminated. The capturing of information requires the intervention of human beings; those same human beings who are requesting the system and either directly or indirectly paying for it.

There's a lot of energy and enthusiasm that goes into record layouts, screen design and user interfaces. Report formats also are developed, but even shops that are proactive and advanced enough to prototype a system for user review rarely go beyond transaction screen reviews.

As a result, reporting becomes an "afterthought," the last step in the system development cycle, typically assigned to junior programmers. The benefits of a system that most directly will affect management and their long-range decision-making are given a relatively low priority.

Another contributing factor to the failure of adequately defining and ultimately providing useful information to management, is that user management often has a difficult time defining what they need.

It's difficult for someone without a technical knowledge of the design of a system to understand what the possibilities are. They tend to rely on the reports that they currently are getting (either from a current system or from information that's compiled manually) to provide a model for what they request from the new systems. Sometimes they'll request enhancements to these reports as a part of the new system, but rarely do they have the knowledge to let their imaginations run wild.

Often, reporting requirements are met only after a lengthy, "iterative" cycle of requests. User management doesn't know what they need until they don't get it. The results often are that many reports developed during system development aren't as useful as they could be.

Discrete Information

There's a tendency to lump information into various categories. Terms like "management reporting," "online inquiry," "summary reporting" and "exception reporting" often are used to describe the different types of inquiries that are required within a system. One common element to all of these requirements is that a manager typically needs a specific piece of information when referencing a report or screen.

Take as an example a recent conversation

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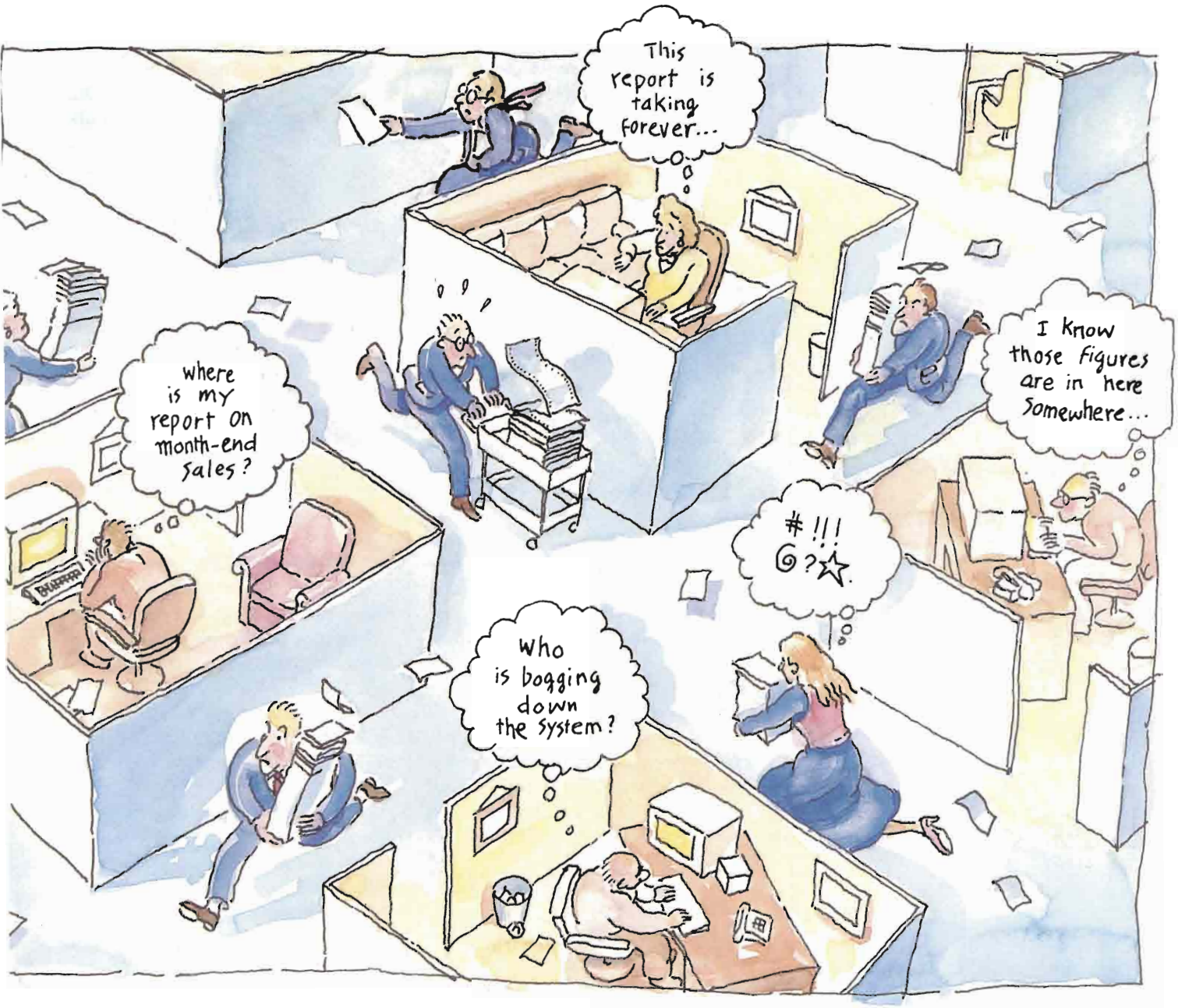

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I had with a DP manager at a manufacturing company. As we were touring the facility, we were discussing the issue of exhaustive reporting versus selective reporting. The DP manager commented that the reports provided to sales management in his company were all exhaustive reports. They had no need for immediate access to specific information.

A few minutes later we passed the desk of a sales manager who was leafing through an 80-page report, looking for the piece of information that he needed at that moment. In fact, the sales manager did need very selective information. Unfortunately, he manually had to search through an exhaustive report to find it.

Responsible MIS departments try to make the online versus batch decision based on need as much as possible. If a particular type or form of information is required only on a monthly basis, a batch report is a viable and responsible solution.

If, on the other hand, the information is needed on an ad hoc basis, every attempt will be made to provide that information online, at the fingertips of the user requiring that information.

Unfortunately, other factors come into play when evaluating this need. Some user requirements that would best be met by providing online instant inquiry simply aren't possible due to the overhead that it requires to process the request.

Take that sales manager at the manufacturing company as an example. He may have needed to find out how many units of a given product line sold in a given time period. In order for the computer to process that request, it would have to read through many records checking for a given product line and date. That simply wouldn't be practical in an online environment.

So, the MIS department provides the best solution possible — a monthly report summarizing sales on a quarter-to-date basis. Although this proved to be cumbersome for the sales manager, it was indeed the best solution that MIS could provide.

Perhaps the best way to measure the value of information is to measure the cost of not having the information available.

Timely Information

Let's suppose MIS instantly could provide the sales manager with current sales information in an online environment. What would the value of that information be?

It's difficult to assign a dollar value to instant, accurate information. Obviously, it must be done on a case-by-case basis.

In the case of our sales manager, he was preparing for a meeting where he would be asked if a certain product line should be discontinued, whether more or less inventory on that product line should be produced and, in general, what response in the marketplace was to the line.

Based on the report he had in front of him, he had no way of knowing that during the three weeks prior to the meeting, sales had increased as the market became aware that his company was offering the product. As a result, he reported to the operations manager and the president that current levels of pro-

duction were adequate.

To make a sad story short, the result was that the company sold out of that item within the next week, customers became irate when the product wasn't delivered and they started buying from a competitor.

Perhaps the best way to measure the value of information is to measure the cost of not having the information available.

How can MIS best exploit information "locked" inside the system? Clearly, there's no single answer. Solutions to maximizing the value of data must be weighed in terms of cost/benefits. Let's examine some of the information "problems" that need to be solved and some proposed solutions to those problems.

Summary Reporting. These are reports where detail information is unnecessary, but the "bottom line" or aggregate information is required. When the president of the company wants to reference information on revenues on a month-to-date or quarter-to-date basis, he or she wants to look at a bottom-line figure, not the details.

One of the best ways to provide this information is through the use of historical databases. Periodically, information from the online transaction database is accrued and written to a separate database. Where it took thousands of records to record detail information in the transaction database, the informational database can summarize the information in a few dozen records.

Cost: One obvious cost is the resources needed to design and develop the database, the programs to download data and the report programs to retrieve, format and print that data. Remember, however, that this is a one-time cost versus the recurring cost of basing decisions on old information and exhaustive reads of detail information to provide what quickly becomes untimely data.

Another cost is the machine resources to download the data periodically. This cost can be minimized by indexing the criteria in the transaction database that will be used to select

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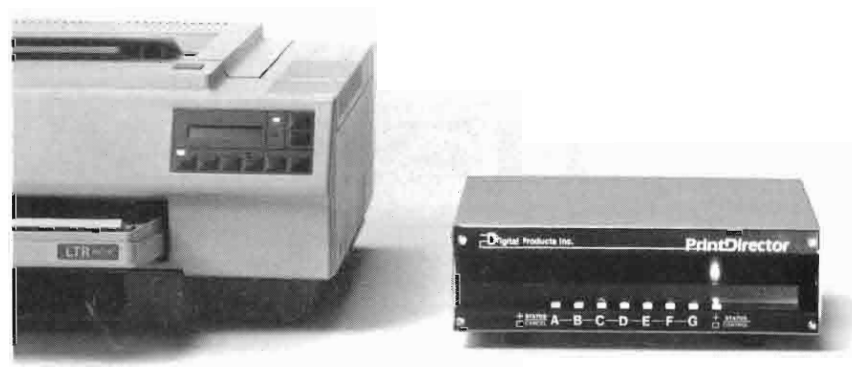

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records for extraction to the history database.

By eliminating serial or lengthy chained reads when querying the transaction database, this approach still will cost less than trying to obtain summary reports from the detail transactions. We'll talk more about indexing strategies later.

Benefits: By reducing the system resources used to report aggregate information, the processor and I/O channels are freed up to perform other jobs, or to run summary reports more often. Most importantly, management has current information on which to base decisions.

Exhaustive Reporting. This type of report requires exhaustive reading of data in order to print all records in a file or data set. Examples would be an inventory catalog or mailing labels for a mailing to all customers.

There's no single answer to satisfying all user requirements for information retrieval. Each requirement must be evaluated closely before applying a solution.

When you must read every second in a set, one block of records is read at a time. For example, in a data set with 400,000 records and a blocking factor of two, 200,000 disc I/Os would be performed to read this set. In order to reduce the number of I/Os, thereby speeding up reporting time, there are products on the market that will perform reads using larger blocks.

SUPRTOOL (Robelle Consulting, Ltd.), for example, will read 28,732 bytes of information for each disc I/O. The block read then is broken down into individual records in memory. Assuming that the record in our example above was 256 bytes long, *SUPRTOOL* would read 112 records for each physical disc I/O. The extraction done by a regular serial read, therefore, at two records per disc I/O would take 56 times longer than *SUPRTOOL*.

Cost: The cost associated with this solution is the price of *SUPRTOOL* and a very small learning curve associated with using the product.

Benefit: There will be a significant reduction of I/O resources to get an exhaustive report run, freeing up system resources for other jobs.

Exception Reporting. This type of reporting requires lengthy chained reads or even serial reads where a program or report writer selects certain records for printing, based on criteria specified by the user or program. Unlike a summary report, detailed information

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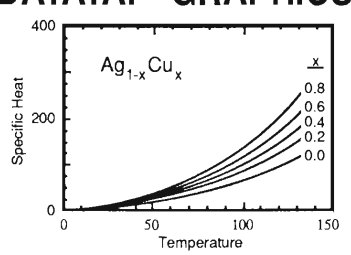

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from selected records is required.

The sales manager discussed earlier needed this type of report so he could find the required information quickly, without searching through a multiple

Information must be captured before it can be disseminated.

page report. But he also needed timely information, something that his DP department didn't think they could provide.

When selecting a relatively small percentage of records from a data set based on multiple selection criteria, IMAGE and KSAM offer very limited options. If at least one of the fields used as selection criteria is a key (or path in IMAGE), records can be selected based on that criteria fairly easily.

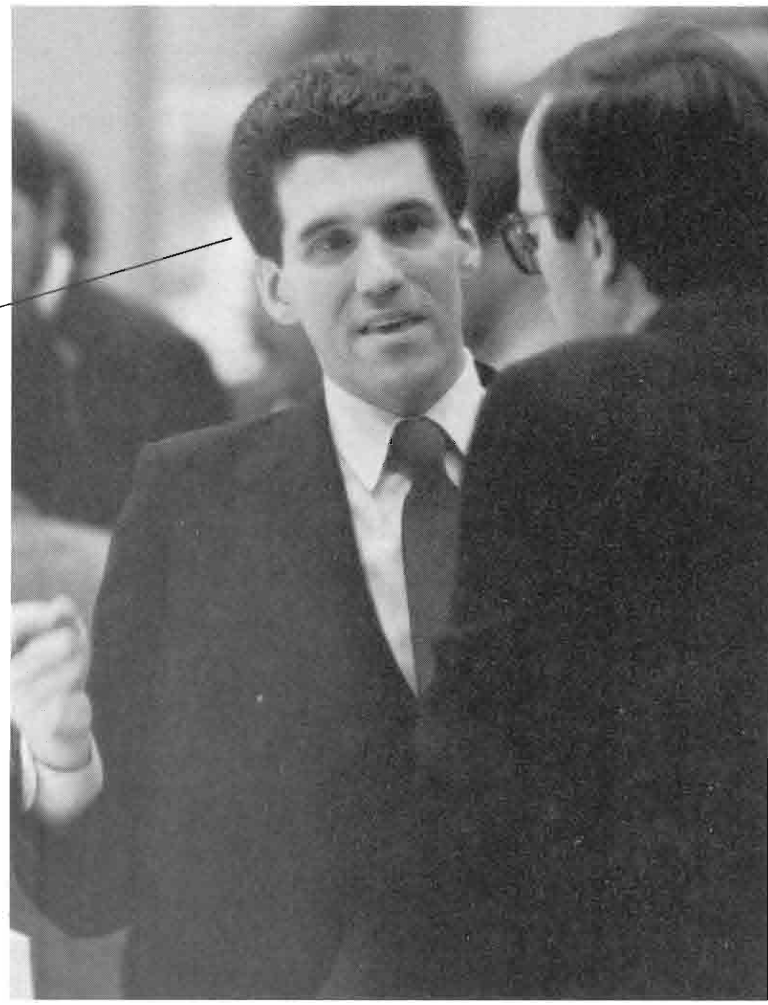
Additional selection criteria, however, requires that the program or report writer read each of those records to look for matches on additional criteria. If chains are long, this can take significant time. If there are no paths for the selection criteria, a more time-consuming serial read is required.

I've heard many comments about report writers being system "hogs." In fact, most of them aren't. It's the limited data access method that they're forced to use that causes poor performance.

OMNIDEX (Dynamic Information Systems Corp.) is a product that eliminated this problem. By using sophisticated indexing techniques (a combination of Btrees, inverted files and intelligent memory management), lengthy chained reads and serial reads are eliminated.

The system overhead and length of time it takes to produce a report is based on the number of records selected, not the number of records in the chain or data set. For example, in our data set of 400,000 records with a blocking factor of

"Our order processing must be more competitive."



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two (requiring 200,000 disc I/Os to perform a serial read), if 500 records are selected, a lot of unnecessary disc I/O is performed.

With *OMNIDEX* retrieval, selecting and reporting that same 500 records would require approximately 750 I/Os. The extraction done by a regular serial read, therefore, would take 260 times longer than *OMNIDEX*. For example, if this report took two hours and 20 minutes without *OMNIDEX*, it would run in 53 seconds with *OMNIDEX*.

Cost: The cost associated with this solution is the price of the product and training of DP staff to make use of it. Application changes may be necessary, but these often are minimal.

Benefit: There will be a dramatic reduction of I/O resources required to select information, offering managers the information they need, when they need it, with a positive impact on system performance.

This type of data retrieval must be high performance by virtue of the fact that it's available online. The use of keys and search items are employed where possible. The problem is that very little flexibility is offered to the user in finding the information required. For example, when a customer calls to check on a shipment, the shipping clerk may have to ask the customer for his account number in order to provide the information. This is the last thing an irritated customer wants to hear.

Sometimes KSAM is used to provide partial lookup by company name. But even KSAM falls short when the user entering the partial key doesn't know how that company name was input, or exactly how it's spelled.

Keyword retrieval is the best solution to this problem, as it allows the use of any combination of words or values to select records. For example, if a company's name is typed into the company name field as "THE JIM FORESTER COMPANY," that company's record can be located instantly using any of the following selection criteria:

"Forester Company"
"FOR COMPANY"
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"The Forest Company"

and so forth. The same sophisticated indexing techniques used by *OMNIDEX* to provide high-speed selections in reporting environments are used to provide keyword retrieval capabilities within IMAGE databases through the indexing of each individual word in a field.

This flexibility in online inquiries by customer name or product descriptions offers enhancements to users involved in sales, customer service, accounting, personnel, etc., to any user trying to find information quickly.

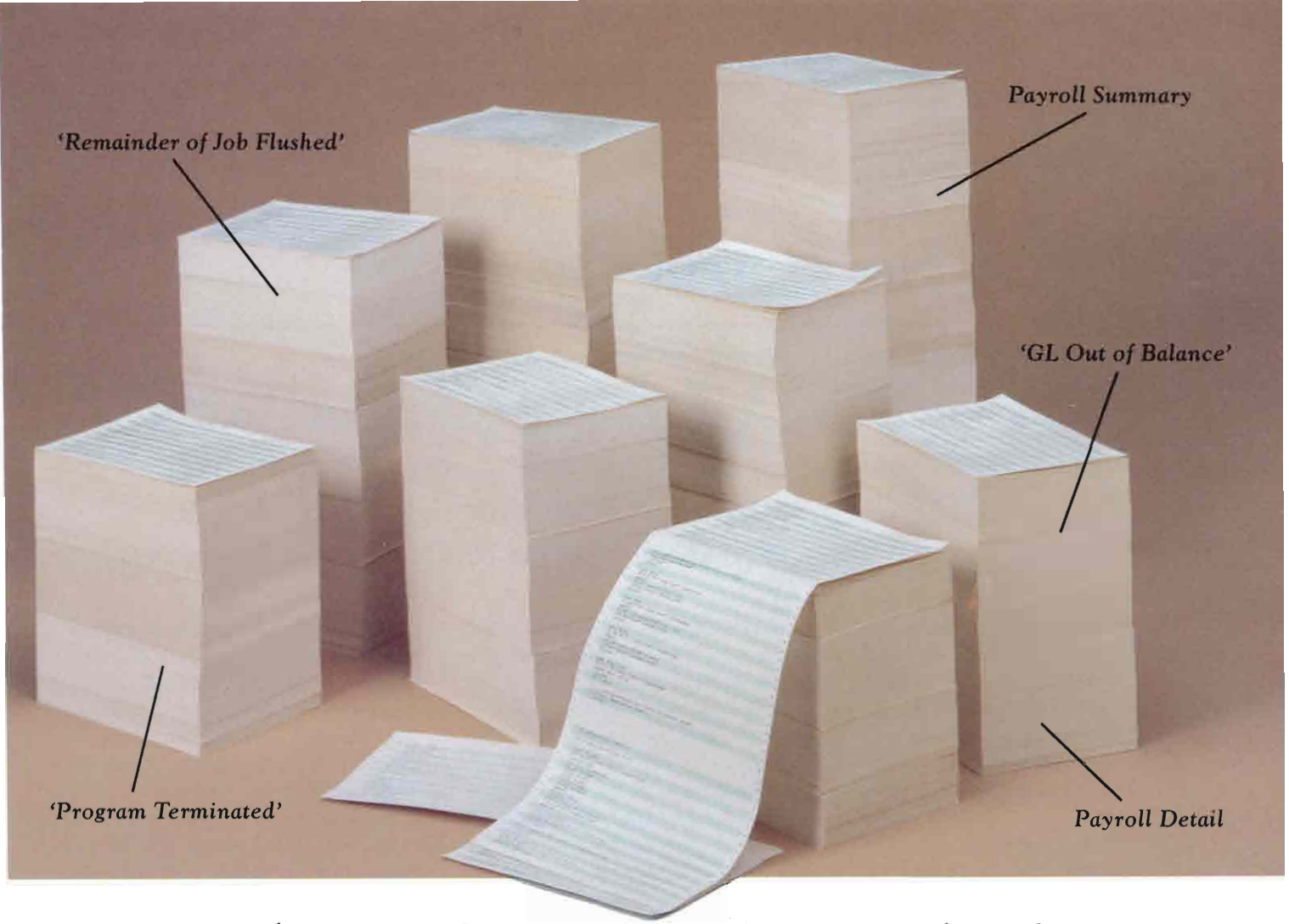
Cost: Same as above.

Benefit: Vast improvements in the flexibility that users have in finding information that they need at their fingertips are possible.

Customer service improves and users can service more customers on a daily basis.

THERE'S NO SINGLE ANSWER to satisfying all user requirements for information retrieval. Each requirement must be evaluated closely before applying a solution.

Recognizing the value of fast, flexible information retrieval is the first step that DP shops must take in providing not just good, but the best database performance possible. —*Kathy McKittrick, Dynamic Information Systems Corp., Denver, CO.*



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Ashley Grayson and Carolyn Meskell

The Latest *Word*

Two old and reliable friends are back, both better than ever. HP's Vectra personal computer returns as the Vectra ES, a faster and generally niftier packaging of one of the best 286-based PCs around. The same can be said of Microsoft's new 4.0 release of Microsoft *Word*.

Substantially faster at doing the advanced word processing and page layout it does best, *Word* 4.0 contains a mix of significant new features, subtle enhancements of existing capabilities and only a few clunkers. With *Word* 4.0 and the new Vectra ES, you can tackle virtually any DTP job.

The Vectra is a good basis for DTP for two reasons. First, as an excellent general purpose 286 PC, it will support almost every bit of software and add-in board developed for PC DTP. HP's product line is geared to support the needs of desktop publishers with advanced products such as the ScanJet scanner and enhanced LaserJet II. HP also has made a commitment to encourage the development of DTP software with companies such as Aldus (*PageMaker*), Microsoft (*Word*) and QMS (*PostScript* for LaserJet II).

The reviews coming in on *Word* 4.0 have a surprisingly uniform tone of, "Finally *Word* has delivered the features necessary to be approved (by this reviewer) as a great word processor . . ." Such reviews detract from the value of the product because they omit the significant point that *Word* always has been the best choice for serious word processing and desktop publishing applications. The current features enhance the value of *Word* because they build so well on the underlying structure that always has been there.

Word always has been a good investment, because it provides a seamless environment from word processing through complex page formatting.

Let's see why *Word* provides so much to both the private and office publisher.

Observation #1. All word processing and desktop publishing activities fall into two distinct categories which are temperamentally and functionally different: writing and layout.

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Style sheets contain information such as page layout, document structure and typography. Page layout information includes specifications for margins, headers and footers, placement of page numbers, etc. It details the physical constraints of the printed page. Document structure information defines how the content (i.e., paragraphs, headings, footnotes, etc.) will appear in the finished document.

Typeface and point size may be declared for each text item in the document. These are the Division, Paragraph and Character style types. Business letters, action memos, proposals and even complete books and manuals can be structured with style sheets. An author then can work with a key to the style sheet and easily format the document while writing it. Conversely, any material written as a simple text file can be post-formatted just as quickly by someone who knows *Word* and the structure of existing style sheets.

It's sad to say, but probably less than 25 percent of the organizations and individuals who use *Word* get the full use out of style sheets. Part of the problem with *Word*'s style sheets is awareness. They solve problems that most people don't encounter until they're designing quite complex documents. Operationally somewhat daunting, they've had to be defined in an environment similar to the programmer's edit-compile-output loop.

Word 4.0 adds a "record" capability; anyone can use simple formatting commands to make the document "look right" then store the pattern as a style sheet. This is the best example of a *Word* 4.0 feature that builds on existing value.

Another very practical feature in *Word* 4.0 is a subtle extension of the SEARCH and REPLACE commands. All word processors support searching for text (and replacing it) within the con-

Microsoft *Word*
Microsoft, Inc.
16011 NE 36th Way
P.O. Box 97017
Redmond, WA 98073-9717
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tent of the document. *Word* 4.0 adds the ability to search for and optionally replace style types. It always has been possible to completely revamp the appearance of any number of documents simply by redefining the style sheet definitions. Now it's possible to selectively convert paragraphs, words, even single characters from one style to another.

Observation #2. Most people don't need full desktop publishing capabilities for 90 percent of the documents that could benefit from better layout. However, most of the content of any desktop publication will be derived from or through existing word processing sources.

Word always has been a good investment, because it provides a seamless environment from word processing through complex page formatting. The second most common source for material used in desktop published documents is spreadsheets. Now *Word* 4.0 also will merge files from *Lotus 1-2-3* (v. 1a and 2, Lotus Development Corp.), *Multiplan* (Microsoft) and Microsoft *Excel* (for Windows) directly into a document. This feature really is useful because it also allows the imported spreadsheet information to be updated if the underlying spreadsheet changes prior to publication. A simple *Word* command will update previously imported information with the current spreadsheet contents. This can be done selectively or automatically for multiple spreadsheets.

Note: You still have to edit your text if you've drawn conclusions that no longer match the data. *Word* isn't smart enough to revise your conclusions. If you want to quote figures from the spreadsheet in the body of your *Word* document and have them automatically track the changes made in the spreadsheet, import a single cell at the desired location. Be prepared to do some fiddling around with formatting and hidden text, however.

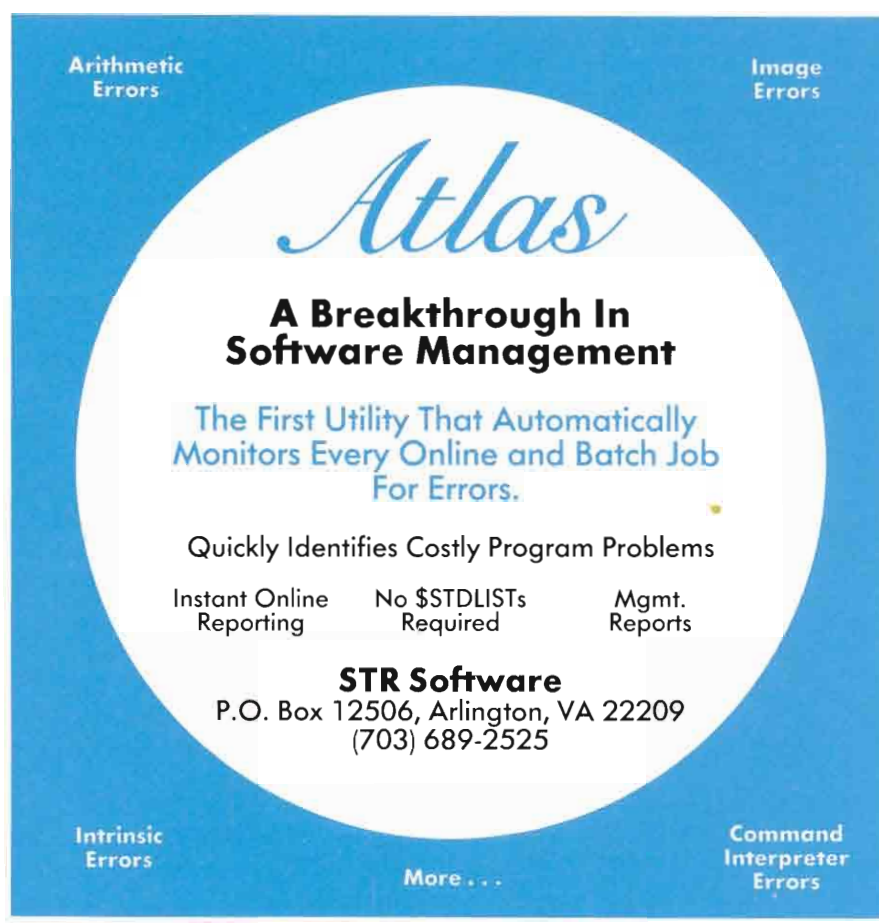
Word imports paragraphs and requires the spreadsheet area to be delimited in your document by a paragraph end. Perhaps it's best to think of it as a method of updating TABLES rather than particular values.

A similar problem exists when inserting images in a *Word* 4.0 document. This new feature allows externally defined images from Microsoft *CHART*, for example, to be placed in a document, but only in the context of a "paragraph."

Total free-form blending of text and graphics still requires *PageMaker* or Ventura *Publisher*, but with this release, Microsoft has taken a big step toward closing the gap. For those documents that require blending of words and tables or figures, the *Word* approach offers more flexibility than the DTP packages.

Observation #3. No desktop publishing package provides the superstructure on which to build a publishing procedure. Part of this is the fault of DOS, which is only a program loader stuck on top of a file manager. Part of it is due to the DTP developers' focus on the technology of publishing at the expense of the process of publishing. The result is that no DTP package provides a mechanism for managing the procedures required to produce a publication. For example, it's great to be able to merge graphics and text, but once a document has been created, no trail exists to say where the pieces came from.

Word 4.0 takes one small step in the right direction with summary sheets. These unobtrusive little documents tell you things that DOS won't, such as who



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SUPRTOOL

Best of FCOPY, QUERY, and SORT

Time This Simple Test

Compare FCOPY and SUPRTOOL:

```
:run fcopy.pub.sys
>from=catalog.pub.sys;to=tempc;new
>exit
```

FCOPY will copy from 100 records per second (Series 37) to 400 per second (Series 68). Now try SUPRTOOL.

```
:run suprtool.pub.robelle
>input catalog.pub.sys;output tempc;xeq
>exit
```

SUPRTOOL will copy 2500 to 6500 records per second (37 to 68): 16-25 times faster.

Powerful Selection Criteria

FCOPY allows only one test criterion; QUERY doesn't work on files, and both are slow. SUPRTOOL reads files or IMAGE datasets remarkably fast, and can select on any valid type, combining numerous tests with AND and OR. You can check for patterns, tables of values, bit values, and even for today's date.

```
>table tab1,a,file,in.data
>if $lookup(tab1,a)
```

New for 1987

SUPRTOOL is even faster than before at executing complex IF commands. SUPRTOOL can now remove duplicate records from the output file. Use IF date=$today to check a date field for today's date. Sort according to Native Language Support using SET NLS.

SUPRTOOL is compatible with Turbo IMAGE. The license fee is $3000, including one year of service. No charge for trial.

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wrote the manuscript that's in the file, who edited it and when, the full title of the document and even a few comments. They serve the function of 3 x 5 cards clipped to a paper manuscript. Implemented as part of the new "Document Retrieval" menu, they're available if useful and go away if your application doesn't require them. Unfortunately, they're hidden in the Library menu rather than the transfer Load/Store menu where they'd get more attention.

A related feature is the implementation of revision bars in *Word* 4.0. They tend to be a bit intrusive while still in the creative loop with a manuscript, but are a definite plus in maintaining continuity on a large project.

These have been just three examples of how *Word* 4.0 addresses some of the critical areas of desktop publishing and renews its position as the best desktop publishing application that's never called one. But there are other areas in which 4.0 excels.

Speed

We're sure the roar of complaints about slow speed in earlier versions (especially in paging up or down through a document, and in it being possible to overtype *Word* and have to wait while it talked to itself) reached all the way to Redmond. Thankfully, they heard. *Word* 4.0 is significantly faster at doing everything than all previous versions.

Running *Word* 4.0 on an 8 MHz Vectra is equivalent to running *Word* 3.11 on a Vectra ES. The combination of *Word* 4.0 and the Vectra ES is too fast for a human operator to notice. In addition, it's possible with *Word* 4.0 to adjust the speed of the cursor; now it literally flies.

Better Use Of Printers

Word always has been acclaimed for its exhaustive support of printers, especially the HP LaserJet family. With completeness, however, came complexity as users tried to cope with a dozen different drivers for the multitude of font media: cartridges, downloadables, etc. *Word* 4.0 introduces a new library of one-to-many PRD files that will control multiple font cartridges. This is a welcome improvement, but a few operational glitches have been introduced.

All previous versions of *Word* required setting the page length to 10.5 inches for LaserJet printers. *Word* 4.0 *requires* the "proper" length of 11 inches be specified for the LaserJet II. This is clearly spelled out in an Errata sheet in the installation diskette pack, but will cause untold confusion in the office if the users aren't told. In a shop with both LaserJet II and older LaserJet printers, a style sheet will be required for each printer or the length will have to be manually adjusted each time a file is printed on a different printer.

Word 4.0 also officially supports *PostScript* printers. This is just in time for the upcoming *PostScript* controller for the LaserJet II. If you can't wait, plug in your Apple Laserwriter Plus or typesetter. We were printing documents designed for a LaserJet Plus on an Apple LaserWriter Plus in less than 10 minutes. Just specify the POSTSCRP PRD driver and edit your style sheet character types to the built-in PostScript fonts and it's done.

Along with other printer enhancements is the support of printers that support line draw. Paragraphs now can have boxes or vertical bars drawn around them. Special borders even can be previewed on the screen. This is nicely implemented and works the way you'd want it to, expanding the box if the paragraph grows, shrinking it if material is deleted.

Macros

For those who will turn any application back into a programming language, *Word* 4.0 introduces a rich macro facility. Macros allow you to capture a series of keystrokes and play them back upon striking a "hot" key. Macros can be a real help when performing the repetitive tasks required when reformatting files from other word processors, but we've rarely needed them over several years of heavy use.

As an example of how silly macroitis can get, a recent magazine article ex-

plained how to use macros to implement *WordStar* (Micropro International) commands under *Word* and *WordPerfect* (WordPerfect Corp.). This is like buying a thoroughbred racehorse and breaking its legs so it will ride like the pony you had as a kid.

"Improvements" We Didn't Like

Changing features that folks have gotten used to is a bad idea. It's like coming home to find your wife wants you to call her by her middle name. For example, in previous versions, pressing the function key, F9, would select a sentence so it easily could be moved or deleted. In *Word* 4.0, that key marks a whole paragraph for selection. Selecting a single sentence now requires holding down the shift key and pressing F7 or F8.

Also, previously, the Command line contained a mysterious command called "Alpha." Its function was simply to return you to the body of the document if you had pressed Esc and entered the menu by mistake. Now Alpha is gone and you must lift your hand from the main keyboard to press Esc again to return to the body of the document. We've heard Microsoft had complaints about Alpha, so perhaps we're the only ones noting its passing.

Word always had one inconsistency. Arrow keys were used to navigate within the text window, but tabs were used to move within the command bar. To see optional choices within the command bar, left and right arrows were used. No longer. Arrow keys now consistently are used in both windows. The F1 function key calls up command alternatives. This is annoying until you get the hang of the new system, but seems worth the effort. The improvement in table definitions and tab setting is so dramatic it entirely justifies this change.

Last, but certainly not least, Microsoft modified the spelling checker. It always was one of the most outstanding features of *Word*. Now it's merely OK. The spelling checker used to check the entire document then bring up any misspelled or unrecognized words in alphabetical order. Now it checks single words and selected sections on request, but is clunky on doing the whole document. It scans down the document until it encounters the first misspelled or unrecognized word and continues through the document sequentially thereafter. That isn't so bad, but combined with the new Correction feature, it seems frustratingly slow.

Previously, you could choose to correct a misspelling two ways: by retyping it (then *Word* checked to make sure the new spelling was in the dictionary and made the replacement), or, for those who really can't spell, by directing *Word* to look in the dictionary and bring back what it thinks you meant. Now when you choose Correct, *Word* automatically looks in the dictionary and brings back what it thinks you might mean. Only if the word isn't on the list are you given the opportunity to retype it.

For non-spellers, the new arrangement may be a bonus, but to those of us who can spell, it feels slower to be forced to twiddle our thumbs while *Word* checks all possibilities. However, before deciding to write off the new spelling checker in favor of running *Word* with a different spelling checker (which you now can do), the new spelling checker has one really good new feature: It's now possible to spell check a single word or paragraph by selecting it while still in the document. Oh well, you win some, you lose some.

Several other enhancements deserve mention. A document's word and line count now are computed whenever repaginate is requested. Previously, word counts were done during a spell check. Repaginate is dramatically faster than ever, too!

Word now can produce a table of contents directly from headings, with-

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MiniSoft, Inc.
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MiniWord is currently available for the HP3000, HP3000 9X0, VAX, HP9000, HP9000 8X0, HP1000, HP150, HP110, Integral PC, Vectra PC, IBMPC, and Apple Macintosh.

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out the use of codes and hidden text. When run under Windows, *Word* supports the clipboard via a glossary entry. The math facility now supports parentheses and operator precedence.

WORD 4.0 IS BETTER than ever. At $75 per copy for registered owners of previous editions, it's the best software bargain of the year. It runs like a top on even a small Vectra and fully supports all models of the LaserJet family. Even with a CGA monitor you can turn out good-looking documents on a basic LaserJet. With an enhanced video system like the Vega Deluxe (Video Seven, Inc.) and a Multisynch Touch Monitor (Microtouch Systems, Inc.) you can see much more of your document.

Word 4.0 requires about 1.3 MB of hard disc. This is about a quarter of a megabyte more than version 3.1, but the spelling dictionary is larger. The whole thing should fit on one of the new HP 1.4-MB floppies used on the portable Vectra.

Plan on some training if you want to convert an entire office staff to 4.0. Previous upgrades added features that could be ignored by those who didn't care about them. *Word* 4.0 redefines some of the interface. Also, because you can customize the screen more than ever before, you may not always see the same screens every time you switch computers. An hour's briefing session will eliminate a lot of frustration. *—Ashley Grayson is the founder of ADG, a marketing services organization based in San Pedro, CA, not San Diego as previously printed. Carolyn Meskell is a market researcher and editor at ADG.*

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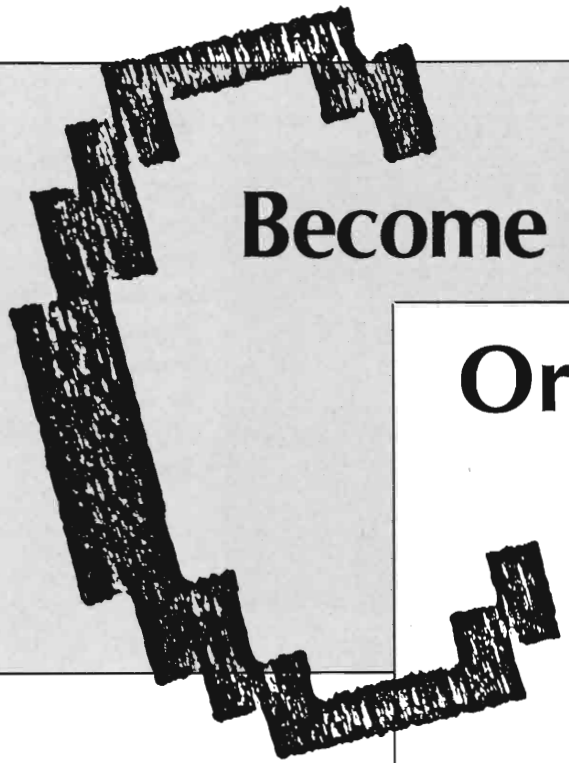

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Continued from page 23.

RS/1 Options Announced For HP 9000 Series 300

BBN Software Products has announced four software options for its RS/1 data analysis package to run on the HP 9000 Series 300. These options ($1,000 - $6,000) include QCA, a quality control package; the RPL Toolkit, a programming aid for RS/1 application development; Graphic Writer, a document development system; and CLI, a host-language interface that allows users direct access to RS/1 files from applications written in the C programming language.

RS/1 software provides comprehensive statistical analysis, data management, modeling and graphics capabilities. The system also includes RPL, an integrated programming language for custom application development.

The QCA option to RS/1 software provides a full range of quality control and manufacturing application functions including control charts, inspection sampling plans, custom charts, process capability studies and trend analysis. It helps engineers gain understanding of process variability, automate routine monitoring tasks and perform in-depth analysis of quality control data.

The RPL Toolkit includes automated procedure editing and loading, runtime profiling, indexing and cross-referencing, batch loading of group and public procedures and code preprocessing.

Graphic Writer allows users to produce technical reports and documents, combining text with RS/1 tables and graphics. The package includes formatting functions and can incorporate RPL statements and procedures. In addition, output can be previewed on terminals before printing.

CLI provides an efficient way of reading data from HP test equipment directly into RS/1 files. With CLI, users of HP's data acquisition and quality control equipment now will have fast data access for performing RS/1 data analysis.

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

Enter 911 on reader card

RS/1 software, BBN Software Products' data analysis and graphics package, is now available for users of the HP 9000 Series 300.

Kemp Software Enhances MasterOp/3000

Kemp Software Systems has released Version 3.350.87 of MasterOp/3000, a flexible operations monitoring/scheduling system available for the HP 3000. The package can schedule jobs, programs, XEQ files, MPE commands, MasterOp/3000 commands and UDCs.

MasterOp/3000 ($4,490) also can schedule events by more types of system events, in addition to being able to schedule according to date, time, logical device and job dependencies. MasterOp/3000 allows the user to write customized scheduling dependencies based on practically any system event that's recognizable by HP 3000 software. It also can schedule according to the value of one or more JCWs.

An enhanced Process Handler is now included in MasterOp/3000, allowing greater communication between MasterOp/3000 and son processes. It lets the user create "background" processes such that, when any command is prefaced by the character the user associates with that program, the command is sent to the "background" program for processing. MasterOp/3000 can accept commands from son processes via the Mail Intrinsics.

Version 3.350.87 contains a GOTO command that may be used within XEQ files. When combined with the MasterOp/3000 IF command, it adds new dimensions of flexibility and decision-making capabilities.

There also is a new SPOOK interface. This allows the user to manipulate input, output and text files grouped by any combination of the following: DFID, job number, name, device, rank, priority, number of copies, space, owner, number of lines, label, time and date. Also, a new STDLIST command allows the user to text the last job that logged on with a given job name, eliminating the need to manually search all $STDLISTs for the proper one. MasterOp/3000's networking (both intersystem and intrasystem) ability also has been enhanced.

Contact Kemp Software Systems, 6546 Hollywood Blvd., Suite 201, Hollywood, CA 90028; (213) 464-8381.

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Printer Plot Converts HPGL To HP PCL

James Associates recently introduced its Printer Plot, a new routine contained in the Series 200/300 Utilities Pac software package. Printer Plot converts HPGL graphic files to HP PCL (printer command language) and plots them on the CRT or any HP-compatible dot matrix or laser printer. Plotting is done at the full resolution of the printer, 300 dpi in the case of the LaserJet, rather than as a simple screen dump program.

Printer Plot ($95) allows laser printer users to spend less time and achieve better results than with a plotter. It runs under BASIC, PASCAL or UNIX. The package is available for the HP 9000 Series 200/300 computers and other workstations.

Contact James Associates, 1525 East County Road 58, Ft. Collins, CO 80524; (303) 484-5296.

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SAS System Expanded For PCs, MS-DOS

SAS Institute Inc. recently began shipping a new, expanded version of the SAS System for personal computers. The new release includes enhancements to previous SAS software for PCs and extends support to MS-DOS.

The SAS System for PCs ($495 per workstation) includes three new products:

- *SAS/GRAPH is an information and presen-*

tation graphics tool that offers the same graphic procedures for the PC that SAS software users currently receive with the mainframe and minicomputer versions of the software.

- *SAS/FSP is a complete information processing system with full-screen data entry, editing, querying and letter-writing tools.*
- *SAS/AF is an interactive-applications development facility for building front-end menus, computer-based training and online help systems. It offers users a fast, easy way to drive SAS System applications and gives novice users the ability to run sophisticated applications.*

The SAS System for PCs is written in C and represents the next generation of SAS software. The next major versions for mainframe and minicomputers will use the PC implementation as the porting base. The new release also features enhancements to products currently available to PC users.

Contact the Software Sales Department, SAS Institute Inc., SAS Circle, Box 8000, Cary, NC 27512-8000; (919) 467-8000.

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Versatec Plotters Prices Start Under $20,000

Versatec has announced a new series of electrostatic plotting systems with prices starting under $20,000.

The new 8500 series accepts 906/907 and HPGL data formats. It was designed to replace pen plotters in applications requiring high throughput or fast turnaround and is targeted at workstations and PCs used in MicroCAD applications.

Two models are available in the series. The 8524 ($19,900) plots on 24-inch wide media and the 8536 ($24,900) on 36-inch wide media. Both plot with 200-ppi resolution at one inch per second. An E-size drawing (24" x 44") can be plotted in less than 45 seconds.

Targeted at CAD users, the 8500 series is both hardware and software compatible with 906/907, and HPGL pen plotter data formats. Popular application software packages such as AutoCAD, VersaCAD, DataCAD and MicroCADAM are a few of the many packages available that support the 8500.

Versatec's RS-232C serial interface accepts vector data up to 38.4K baud transfer rate. The plotters also can accept data via a Centronics parallel interface. Both allow easy connectivity to workstation platforms such as Sun, IBM, DEC or Apollo.

Contact Versatec, 2710 Walsh Ave., Santa Clara, CA 95051; (800) 538-6477, in California (800) 341-6060.

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EEsof Introduces E-Syn 2.0

EEsof recently introduced E-Syn 2.0, a computer-aided program used in designing lumped and distributed low-pass, high-pass, bandpass and bandstop microwave networks. It's useful for synthesizing broadband matching circuits as well as filter, transformer, multiplexer and singly terminated networks, and includes Chebyshev, Butterworth and elliptic (both equal-ripple and maximally flat) response characteristics.

E-Syn 2.0 ($5,000) features a true distributed-element synthesis capability and a response window added to both the lumped and distributed main screens for analyzing the specification window's parameters. Three new commands are included in the option's window: Redundant TRL specifies whether or not redundant transmission lines are allowed in the network, series stubs specifies whether or not series stubs are allowed in the network (in the auto mode only), and TL length selects the output format as the electrical or physical angle or length of distributed elements.

Two new parameters are part of the unit's window: K-EFF specifies the effective dielectric constant of the transmission media, and conductance units are for analyzing admittance. The numerical accuracy of the program is improved, making E-Syn 2.0 a more powerful, valuable circuit-design tool.

E-Syn is available on the HP 9000 Series 300 (HP-UX); IBM PC XT, AT and compatibles; DEC VAX/VMS; and Apollo (Domain-IX).

Contact Donn Mutch, EEsof Inc., 5795 Lindero Canyon Rd., Westlake Village, CA 91362; (818) 991-7530.

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Palantir Confirms Windows 2.0 Compatibility

Palantir recently announced the compatibility of all Palantir Windows Office Automation products with Microsoft Windows 2.0.

The current version of each Windows product works under Microsoft Windows 1.0 or higher, Microsoft Windows 2.0 and Microsoft Windows 386. This announcement was made in conjunction with the release of Microsoft Windows 2.0.

Since all Palantir Windows Office Automation products are compatible with Windows 2.0, no update is required.

These products are a complete line of integrated office automation applications that can share text, data and graphics with each other. All products have similar interfaces that allow for easy learning, thereby reducing training time.

Currently available products include: Windows Spell, Windows Filer, inTalk, WinTime, NetTime, WinScan, WinText, WinCalc, Wingraph and WinFonts.

Contact Palantir, 12777 Jones Rd., Suite 100, Houston, TX 77070; (713) 955-8880.

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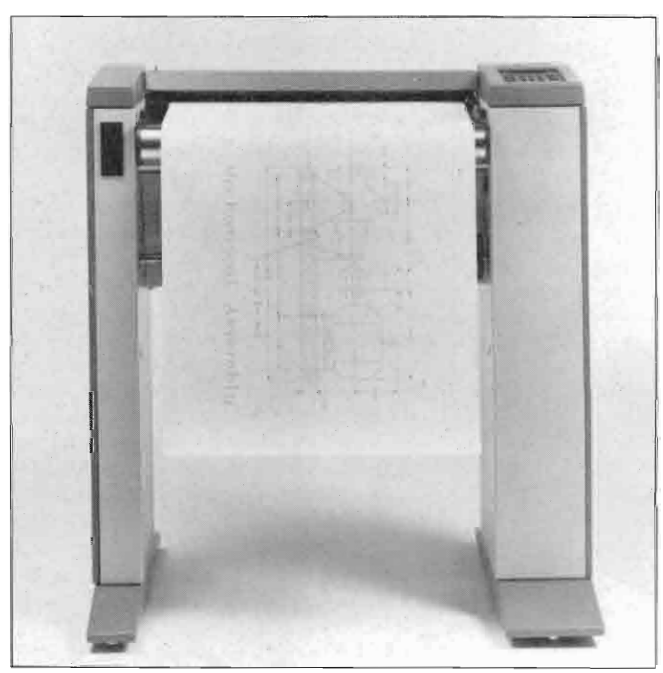

Versatec's 8500 series of electrostatic plotters are priced starting under $20,000.

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Taurus Announces MPE/XL Emulator

Taurus Software has announced CHAMELEON, an MPE XL emulator available on the classic HP 3000. CHAMELEON gives the classic HP 3000 the look and feel of the 900 Series machines.

CHAMELEON can be used as both a migration tool to the 900 Series and an application builder for MPE/V machines. CHAMELEON allows the classic HP 3000 users to take advantage of the new extensions to MPE previously available only on the precision architecture machines. The extensions include command programming, which allows quick development of applications such as menus and application security systems. Instead of spending hours using standard programming languages or 4GLs, applications take minutes to create.

CHAMELEON is useful for shops that plan to migrate and wish to start the migration process and train personnel immediately. During parallel operations, CHAMELEON allows the porting of applications back to the classic HP 3000 without having to change JCL streams, UDCs or command files.

CHAMELEON is also useful for shops that don't have immediate migration plans. These shops can't take advantage of MPE XL functionality without the cost of a 930 or 950. Contact Taurus Software, 770 Welch Rd., Suite 3A, Palo Alto, CA 94034; (415) 853-6893.

Enter 900 on reader card

Key Systems Enhances Prospecting Plus

Key Systems has enhanced, rebundled and repriced its Prospecting Plus sales support software. The package runs on laptop, desktop and multiuser PC computer systems.

Enhancements include immediate access to the file by company name, contact individual's name, telephone number and follow-up date. This means a calendar or tickler file is dynamically created as the prospect record is changed and information that previously required a several-minute computer search now brings the record right up.

Also included is pop-up scripting to prompt sales personnel with product information, selling ideas and good answers to objections during telephone sales calls. The ability to include special bids, quotes and comments in form letters and keep fingertip access to this information on the prospect's record is another enhancement.

Users have easier control of records selected for telemarketing follow-up, the ability to support multiple printers and simplified procedures to move records from laptops in the field back to computers at headquarters.

Prospecting Plus ($495) has been rebundled to include all optional features in the basic package. The Bulk Mail Manager and automatic Telephone Dialer were add-ons previously; now they're included. A six-user local area network or UNIX multiuser system lists for $1,485. Up to 75 users and 99,999 prospects can be supported on a system.

Contact Key Systems Inc., 512 Executive Park, Louisville, KY 40207; (800) 223-5637 or (502) 897-3332.

Enter 907 on reader card

C Compiler For HP 3000 Enhanced

Corporate Computer Systems has enhanced its CCS/C 3000, the C Language Compiler for the HP 3000, to give C programmers the extra productivity and testing tools they need. The CCS/C 3000 package now includes the ANSI- and Spectrum-compatible Compiler, relocatable Library Manager, CVIEW, multiwindow symbolic debugger, CCS/MAKE and CCS/GREP.

CCS/MAKE and CCS/GREP are utilities modeled after the UNIX commands of the same name with enhancements to extend their capabilities in the HP environment.

CCS/GREP (Get Regular Expressions and Print) enables programmers to search large collections of files and find out information that's vital for bug fixes or long-term support. GREP can be made to search files based on a list of file names specified in the command itself or another file. In addition, files can be specified by using a file mask.

Using expert systems technology, CCS/MAKE reads a knowledge base of information that describes the user's application, its modules and the methods used to combine the modules, making the finished application. CCS/MAKE then is used by the programmer to fabricate the application from its component parts.

Both CCS/MAKE and CCS/GREP may be used with any compiler, word processor or fourth-generation language supported on the HP 3000. CCS/MAKE maintains all types of systems including relocatable binary libraries, executable programs, USLs, SLs and RLs.

Corporate Computer Systems' Path Flow Analysis feature is an optional, sophisticated testing technique that insures users of having a thoroughly tested C-based applica-

tion, and is divided into two phases — static and dynamic analysis.

In the first phase, the static phase, CCS/C 3000 compiles one or more modules and assigns unique numbers to each logical path through the source code. During its second phase, dynamic analysis, an extra data segment is initialized which will be used to hold the path-flow data. The user then may run any number of text cases against the application. Another utility will write the information from the extra data segment into a data file and then return the segment. The data file is used later to generate a number of reports.

Contact Corporate Computer Systems Inc., 33 West Main St., Holmdel, NJ 07733; (201) 946-3800, FAX: (201) 946-7167.

Enter 908 on reader card

HP Upgrades InkJet Personal Printer Line

Hewlett-Packard recently announced changes to its QuietJet Plus, QuietJet and ThinkJet personal printer lines that are designed to provide increased versatility and reliability.

The HP ThinkJet printer ($495) and HP QuietJet printers ($599—$799) provide applications ranging from word processing to graphics and spreadsheet generation for business or technical professionals.

A new plain-paper print cartridge expands paper options for business and technical users, and provides an additional print mode for near-letter quality (NLQ) output. Switch-selectable NLQ-printing capability, performed with no decrease in print speed, is built into the HP ThinkJet printer.

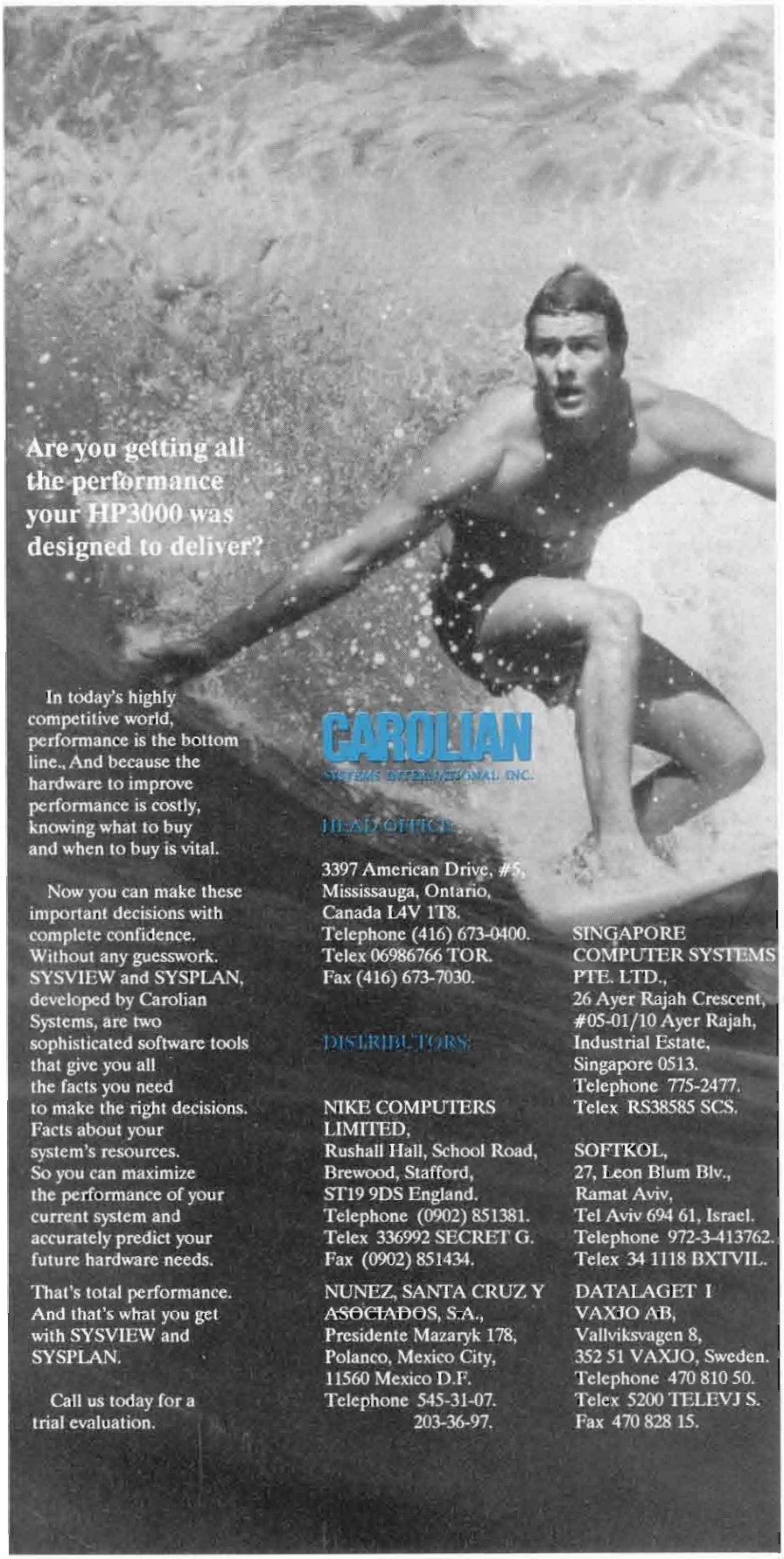
Special paper for the ThinkJet and QuietJet printers are no longer required, as customers now can choose from a variety of common printer paper. However, for highest print quality or graphics, HP continues to offer the existing print cartridge for HP JetPaper.

The new cartridge also improves pen reliability by reducing startup clogging. Coupled with previous print-cartridge improvements and overall printer performance, the HP ThinkJet printer now has a reliability of 60,000 hours mean time between failures (MTBF).

Other HP inkjet printers include the new HP DeskJet printer ($995), which provides laser-quality output and the HP PaintJet color-graphics printer ($1,395) introduced last August.

Contact Hewlett-Packard, 3000 Hanover St., Palo Alto, CA 94304; (415) 857-1501.

Enter 909 on reader card



ENTER 216 ON READER CARD

New Module Released In Training Series

Innovative Software Solutions Inc. recently released "Programming in COBOL on the HP 3000," the newest module in its TeachMe/3000 computer-based training series for the HP 3000.

The new module ($750) is intended for COBOL programmers who are new to the HP 3000 environment. It concentrates on HP's implementation of both the COBOL'74 and COBOL'85 standards on the HP 3000.

The module features many programming examples and is accompanied by the TeachMe driver program and an online tutorial module on the many uses of TeachMe/3000. Topics are directly accessible through keyword commands.

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

Enter 918 on reader card

Small UPS Provides 12-24 Minutes Backup

Clary Corporation has announced a small but powerful new Uninterruptible Power System (UPS) that provides 12 to 24 minutes of online backup for multiple LAN fileservers.

The ONGUARD PC System 2400 ($1,490) is the smallest online, sinewave UPS of its capacity on the market. Its fifth-generation high-frequency MOSFET PWM design results in the highest reliability and quietness, along with the lowest output distortion available.

The PC System 2400 measures 9.8″ x 5.9″ x 15.7″ and weighs 39 pounds.

The PC 2400 provides 2800 watts of peak repetitive power for primary loads, as well as 480 VA of isolated, conditioned power for secondary loads such as printers, modems and remote screens. Two sets of AC power receptacles are provided for a total of five loads — three primary, two secondary. All five sockets are controlled by a system ON/OFF switch.

The new PC System 2400 offers MOSFET-implemented Pulse Width Modulation technology, quiet operation free of ferro-resonant components, true sinewave output with less than five percent harmonic distortion, fast recovery from abrupt load changes, UL and FCC design and more.

The ONGUARD PC System 2400 provides a useful status display panel where five sequenced LEDs indicate the percentage of available load being powered. A red LED indicates an approaching overload condition. Another sequence of five LEDs indicates the percentage of battery backup power remaining during a power loss and the lowest level shows a red LED. When a power loss occurs, a clear audible alarm sounds.

Other status indicators tell the user the utility power is present and that the PC 2400's DC-to-AC power inverter is operating.

Contact Stewart Nowak, Clary Corp., 320 West Clary Ave., San Gabriel, CA 91776; (818) 287-6111.

Enter 929 on reader card

TOPHAT-OPS Fulfills Restaurant Needs

Top Hat Systems, Ltd., a supplier of vertical-market computer software for the food service industry, recently released TOPHAT-OPS software, designed to fulfill all the back-office operational needs of restaurants.

TOPHAT-OPS ($995) specifically handles the business needs of fast-food, cafeteria and table-service restaurants, and contains all the necessary components for restaurant accounting, cash flow and operations management, including multicompany general ledger, accounts payable, multistate restaurant payroll with tip calculations, inventory control, purchasing, profitability analysis, etc.

Additionally, the inventory control supports multiple inventories at multiple sites and the payroll process supports multiple-wage rates and departmental reporting.

Various components of the TOPHAT-OPS system can be used in standalone mode or integrated for a full data flowing system. It also supports data entry from the TOPHAT-OPS touchscreen point-of-sale terminals and also can function within the TOPHAT-OPS complete floor management local area network.

TOPHAT-OPS is supported for use on any PC-compatible computers operating under MS-DOS or PC-DOS. The hardware must have a minimum of 512K RAM and a tractor-fed printer supporting 132 columns in either a normal or condensed print mode. Hard-disc capacity is required.

Contact Top Hat Systems, Ltd., 2422 Rand Morgan Suite E, Corpus Christi, TX 78410; (512) 241-6110.

Enter 930 on reader card

Microsoft, Alis Expand MS-DOS

Microsoft Corporation and Alis Technologies, Inc. recently announced first-quarter 1988 availability of an Arabic version of Microsoft MS-DOS.

Arabic MS-DOS includes all the functionality of MS-DOS version 3.3 plus a powerful arabization layer and the new Microsoft Arabic MS-DOS Manager user interface. It uses Alis's advanced PLASMA technology (Presentation Layer Algorithm for Screen Management Arabization), which means that Arabic MS-DOS handles all specific difficulties of the Arabic language in a transparent way. It takes care of the right-to-left writing direction, includes an automatic context analysis mechanism that finds the correct shape of each letter, and provides special processing of Hindu numbers required by Arabic users.

Arabic MS-DOS allows users to run existing, Latin-only applications with Arabic data in a straightforward manner. The user interface of Arabic MS-DOS, entirely localized for Arabic, along with the entire context-sensitive help system, is provided by the new Arabic MS-DOS Manager. It comes with a group of Arabic printer drivers for various dot matrix and laser printers. The user's manual also has been translated and adapted for Arabic MS-DOS.

Contact Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 90873-9717; (206) 882-8080, FAX: (206) 883-8101.

Enter 931 on reader card

Image Acoustics Releases CIR

Image Acoustics, Inc., has released the Ac Circuit Analysis Program, CIR. It runs on HP's Series 200/300 desktop computers operating under HP BASIC 5.0.

CIR ($295) uses an admittance matrix algorithm to obtain voltage solutions at the element nodes for a current or a derived voltage at the input. The output voltages can be obtained at single nodes or as differences, ratios and products at desired node sets allowing the evaluation of voltage drops, power and impedance throughout the circuit. Editing features in the program allow simple input and easy updating of the data file.

There's a selection of eight elements and sources to represent the desired network including resistors, inductors, capacitors (with dissipation), actual and ideal transformers, transmission lines, current and voltage-controlled current sources. Both linear and semilog graphics or tables are available for amplitude, phase and real and imaginary output with dumps to printer or optional plotter if desired.

Contact Image Acoustics, Inc., P.O. Box 6, N. Marshfield, MA 02059; (617) 834-6376.

Enter 935 on reader card

Palantir Releases Fifth OA Series Product

Palantir recently announced its fifth product under the Microsoft Windows Environment. WinGraph is a business graphics program that automatically generates charts and graphs from numerical data. Chart styles such as bar, stacked bar, staggered bar, 3-D bar, line, line fill, curved line, pie, marker and high/low are included. WinGraph accepts DIF, WKS and ASCII files, and writes TIFF, CUT, DXF and HPGL files.

Many of the graph styles can be displayed horizontally or vertically with options for color, grid, style, legends, scale and screen position. Data or attributes can be copied from one graph to another with the Merge commands. The user also can use the Merge commands to delete graphs and add, subtract, multiply and average data sets. Customized style sheets can be created by saving display formats independently without data. This makes creation of graphics for the "weekly report" as easy as entering the latest numbers.

WinGraph ($195) features a slide-show program that permits images to be displayed in sequence. Each image presentation may be manually triggered or automatically timed. WinGraph also will print the slide show for meeting handouts.

Contact Palantir, 12777 Jones Rd., Suite 100, Houston, TX 77070; (713) 955-8880.

Enter 933 on reader card

TProver Improves AI Techniques

Conversion Systems Incorporated recently announced a new step in artificial intelligence, TProver.

TProver is a problem-solving environment and theorem prover with an automated reasoning system. The highly interactive system can be used to answer a variety of real-world problems, from solving simple story problems to proving advanced mathematical theorems.

TProver ($2,500 - $12,000) uses advanced AI techniques and contains a PROLOG-like subsystem for unlimited expandability. It runs on HP 9000 Series systems under HP-UX.

Contact Jeff Anderson, Conversion Systems, Inc., 3401 W. Devon Ave., P.O. Box 597190, Chicago, IL 60645; (312) 390-8849.

Enter 932 on reader card

Microtek Offers Two Printers For HP 3000

Microtek Systems International, Inc., an independent dealer of new and pre-owned HP, Wang, IBM and DEC computer hardware, has added two Fujitsu M304X Series printers for the HP 3000 to its product offering.

The M3041 and M3043 offer print speeds of 600 lpm and 1200 lpm and have built-in diagnosis, a low (55-db) sound level and a maximum of 6,000 hours MTBF.

Both models include a built-in HP-IB interface and 90-day warranty. A power stacker is standard on the M3043.

Contact Microtek Systems Intl., Inc., 8370 Dow Cir., Cleveland, OH 44136; (216) 234-8040.

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Star System Uses MS-Windows On Vectras

Structural Measurement Systems Inc. (SMS) recently announced the availability of the STAR System, one of the first engineering packages using the Microsoft Windows operating environment for the Vectra ES, ES/12, RS/16, RS/20 and compatibles.

The STAR System (Structural Testing, Analysis and Reporting System) is a mechanical computer-aided engineering (M-CAE) software system for use in testing and analyzing the dynamics of mechanical structures; i.e., solving noise, vibration and failure problems. The program uses vibration data acquired from a test structure as input, and identifies the modes of vibration of the structure from this data. The modes of vibration then are displayed using the real-time, animated display capability of STAR.

STAR was designed to operate in the Microsoft Windows environment and takes advantage of all Windows features including icons, drop-down menus, multiple windows and dialog boxes. Windows allows you to work with multiple applications and quickly switch between STAR and other applications such as Write and Paint programs. Any STAR graphics display or data table conveniently can be "cut and pasted" into other Windows applications programs.

The STAR System is comprised of STARMODAL, STARSTRUCT, STARVIEW and STARTEST.

STARMODAL is a modal analysis system that integrates state-of-the-art curve fitting, powerful structural graphics (STARVIEW), plus the data acquisition capability of transferring and saving data acquired with an FFT analyzer (STARTEST).

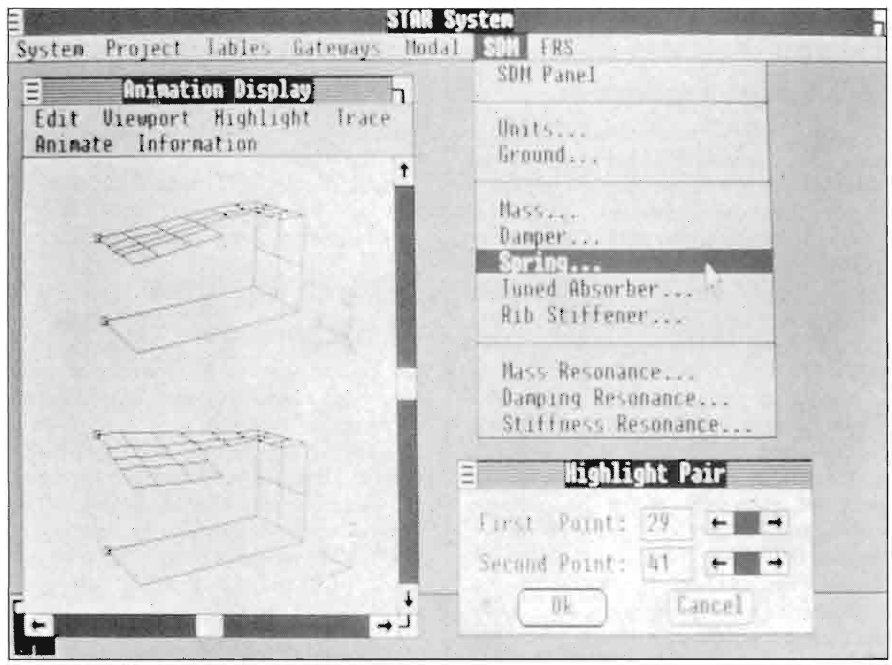
STARSTRUCT is a full-featured structural analysis system that integrates the modal analysis capability of STARMODAL, plus Structural Dynamics Modification (SDM0) and Forced Response Simulation (FRS) on a Vectra or compatible.

STARVIEW is a structural dynamics display station. It transforms a Vectra or compatible into a low-cost structural dynamics viewstation by providing high-quality graphics tools for viewing modal data from a variety of modal and finite element sources.

STARTEST is a computer-aided measurement acquisition system that includes the complete capabilities of STARVIEW, plus the ability to transfer and save data acquired with an FFT analyzer.

Contact Structural Measurement Systems Inc., 651 River Oaks Pkwy., San Jose, CA 95134; (408) 263-2200.

Enter 913 on reader card



SMS Inc.'s STAR System will use Microsoft Windows on the Vectra line.

IDE Integrates With Interleaf

Interactive Development Environments, Inc. (IDE) recently announced an interface to Interleaf's Technical Publishing Software (TPS). The interface is incorporated into IDE's Software through Pictures, an integrated set of software products for the analysis, design and prototyping stages of the software development cycle.

IDE's interface is based on a library of abstract definitions describing IDE objects, and another library of templates, both general and conforming to specific industry standards. These templates conform to certain standard page layouts, including typeface, point size and positioning of headlines, columns and footnotes. These templates include the 30-40 templates that conform to DOD-STD-2167, the military standard for mission-critical computer systems.

IDE's target markets include aerospace and defense. Most of the software developed in these industries is used for mission-critical applications.

IDE's link to Interleaf's TPS consists of the interface library, plus a program filter that translates the abstract definitions of IDE objects, and the templates, into a language that Interleaf understands.

IDE's interface library is available as an upgrade to existing Software through Pictures. It will be integrated into the next release of Software through Pictures. IDE products run on all major workstation environments including Hewlett-Packard, Apollo, DEC and Sun Microsystems.

Contact Interactive Development Environments, 150 Fourth St., Suite 210, San Francisco, CA 94103; (415) 543-0900.

Enter 936 on reader card

ESP Automates Employee Stock Plans

ShareData recently announced ESP (Employee Stock Purchase), a software package designed to automate qualified employee stock purchase plan administration.

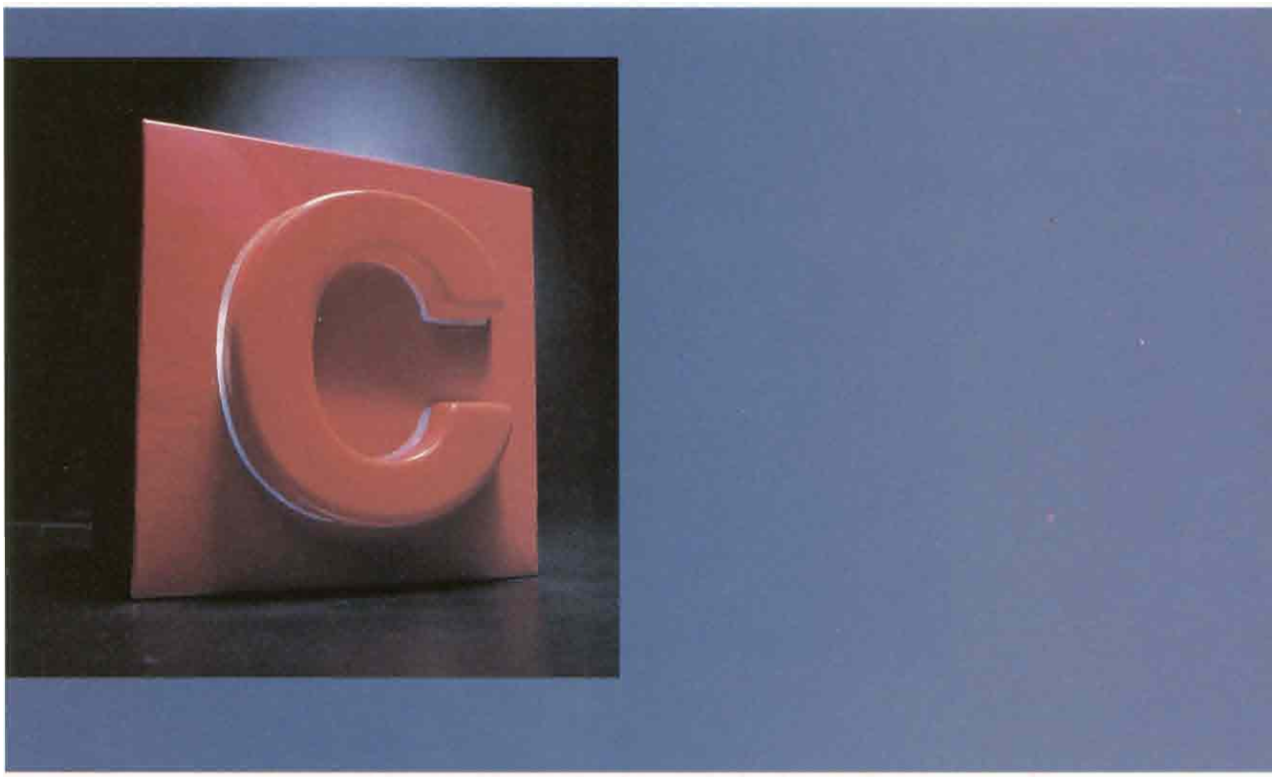
ESP ($5,000), which operates on any PC-compatible, allows you to download employee contributions from the payroll system. At this point, ESP automatically processes purchase calculations, generates employee information transmittals and prints certificate issuance instructions for the transfer agent.

By supporting Same Day Sale programs, ESP reduces transfer agent fees. The system also offers the advantage of immediately calculating the company's tax benefit when employees sell shares through these programs.

Contact Cheryl Breetwor, ShareData, 333 W. Maude Ave., Sunnyvale, CA 94086; (408) 746-3666.

Enter 937 on reader card

Porting your code is a little chancy If your C compiler's not strictly ANSI.



Why program in C? Because it's got a powerful preprocessor and an extensive runtime library? Because it combines the structure of a high-level language with the power of an assembler? Because that's what all the top programmers want to use?

All these are persuasive reasons. But there's one factor that really tips the scales. Portability. That's the ability to run software written on the HP3000 on other systems, including HP Precision Architecture machines. To ensure portability, a C compiler must adhere strictly to the proposed ANSI standard for the language and libraries. C/3000™ does exactly that.

A successful compiler must also interface smoothly with the architecture of its host system. Here too, C/3000 shines. C/3000 produces standard USL files and provides unrestricted access to the MPE file system and intrinsics.

Complete ANSI compatibility in a true HP3000 compiler. With C/3000, there is no compromise.

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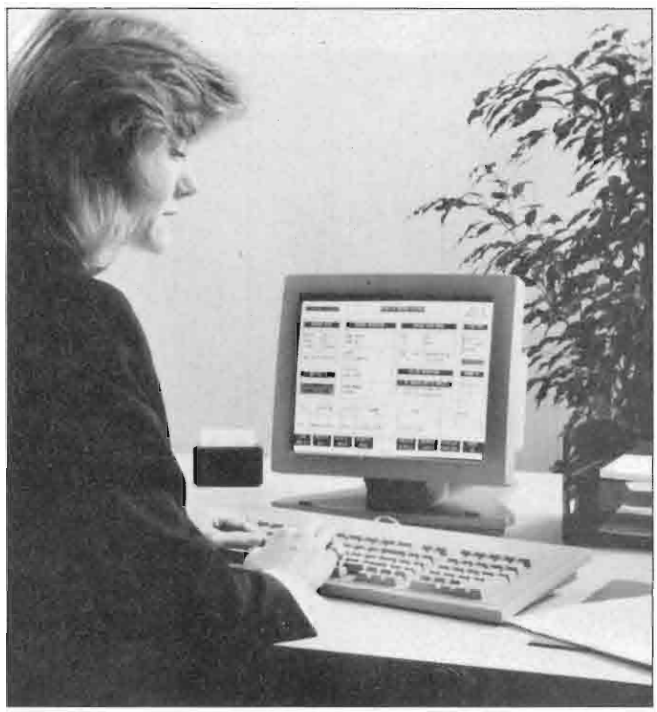

Cumulus Technology's first product is a letter-quality alphanumeric terminal that features a 15-inch flat screen, paper-white phosphor, 75Hz refresh rate, and built-in desk accessories.

Cumulus Unveils First Product

The first in a family of letter-quality alphanumeric display terminals priced competitively for terminal-intensive applications has been introduced by Cumulus Technology.

The HCT ($795) is designed for users of HP computers and is suitable for block mode and forms cache applications. It completely emulates HP's 2392/A and 2394/A terminals, and is compatible with HP's 700/9x series. It achieves sharp resolution through optical ergonomic features including a 15-inch paper-white flat display screen, a 75Hz refresh rate that eliminates flicker, and large characters custom designed to be easily read.

The 15-inch display offers approximately 90 square inches of viewable area, representing a 40 percent increase over competing terminals. The paper-white phosphor screen gives the black-on-white effect of type on a piece of paper.

Built-in desktop accessories include a calculator, calendar, personal file system and notepad. A Help key retrieves instructions for using the desktop accessories.

The HCT also includes a battery-operated clock, eight pages (16K) of nonvolatile memory and 16K of display memory, which can store 10-12 typical forms in forms cache applications.

Other features include an 80- or 132-column display, a keyboard that is key-for-key identical to the HP 2394A, built-in tilt and swivel and dual printer ports.

Contact Cumulus Technology, 2650 East Bayshore, Palo Alto, CA 94303; (415) 856-8800.

Enter 919 on reader card

Idek America Introduces High-Resolution Monitor

Idek America, Inc., has announced the new Idek SPECTRASYNC 1437 Color Monitor providing fully automatic frequency scanning from 15.5 to 37 kHz horizontal, 50 to 90 Hz vertical.

SPECTRASYNC 1437 automatically adjusts the aspect ratio (horizontal/vertical dimensions and position) to preset values. Thus, the monitor always will have the desired size image on the screen regardless of the scanning frequency, and circles always will be displayed as true circles.

High-resolution graphics are provided using IBM, CGA, EGA, PGC, VGA and MCGA graphic standards. The monitor will accept TTL digital or analog video inputs.

SPECTRASYNC 1437 ($849) provides graphics resolution of up to 800 pixels x 600 lines. Seven switchable text colors are available via a combination of three front panel RGB pushbuttons. When all three buttons are in the off mode, a monochrome display with gray shades results. Other front panel controls include power on/off with indicator, contrast and brightness.

A mode switch is provided at the rear of the unit for selection of the input from the analog or digital connector. Two video sources from a digital output controller and analog controller can be connected to the monitor and selected by the mode switch. The mode switch allows the choice of a TTL 8-, 16- or 64-color mode to best suit the installed graphics card. Rear controls also are provided to make final adjustments to a displayed image for aspect ratio (horizontal position and width, and vertical position and size).

Contact Idek America, Inc., 204 S. Olive St., Rolla, MO 65401; (314) 364-7500.

Enter 938 on reader card

Kentek Introduces Two Page Printers

Kentek Information Systems, Inc. recently introduced the K-2 + and K-3 electronic page printers with 300-dpi print resolution.

The K-2 + prints at 15 ppm with a rated monthly output of 40,000, maintaining throughput speed, even for complex jobs. The K-3 prints at 24 ppm with a rated monthly output of 80,000 and is specifically targeted toward the printing needs of computers in clusters and networks.

The K-2 + ($8,970) and K-3 (under $12,000 in standard configuration) emulate the HP LaserJet Plus, Diablo 630 and Plot 10, and also use the Kentek Command language. The K-2 + 's internal 5¼-inch, high-density disc uploads customized data to the printer's memory, including up to 30 font sets and macros of all types, including forms, signatures and logos. Both printers include RS-232C and RS-422 serial and Centronics parallel communications interfaces. Dataproducts parallel and video interfaces can be added to the K-3.

The K-3 features a job recovery function that allows users to reprint the page stored in the printer's memory in the event of a paper jam or other printer error. Unlike other printers, the K-3's bit-mapped page remains in the internal memory until it receives a signal indicating paper exit from the printer.

The K-3 controller uses 1 MB RAM and a Motorola 68000 microprocessor that produces two all-points-addressable, full-page bit maps to ensure rated printer speed. The printer provides full-page, full-resolution graphics, image rotation, text and graphics merge in portrait or landscape format.

Contact Kentek Information Systems, Inc., 6 Pearl Ct., Allendale, NJ 07401; (201) 825-8500.

Enter 939 on reader card ■

Remember how computers remembered? Mercury delay lines? Punched cards with 90 columns and round holes? Hand-wired magnetic cores? In case your memory needs refreshing, The Computer Museum would like to share its memories with you.

The Computer Museum Memory Poster
We have created a limited edition, 20"x32" poster of the picture shown below. Printed in full-color, it includes an identification key to help you recall the memories you've forgotten. To get your poster, along with an information kit on museum membership, exhibits and activities, send a tax-deductible contribution of $25 or more to:
Memory Poster, The Computer Museum,
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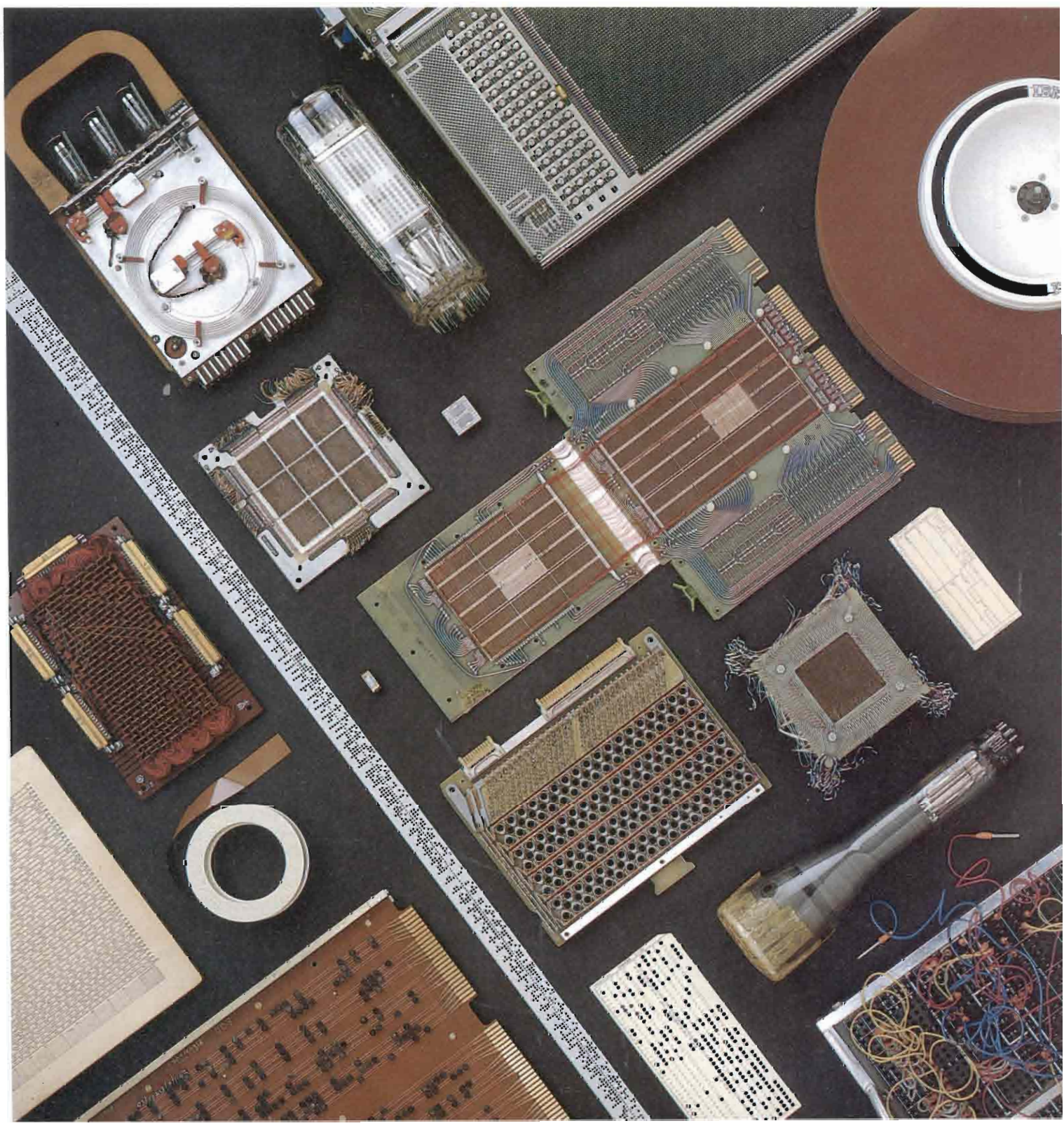

KNOWING THE RIGHT MOVES

In today's rapidly expanding and highly competitive computer marketplace, making the right move in equipment and service options takes careful strategy. Sometimes, buyers "Play it safe" by purchasing well known, high quality products from the manufacturers, and end up paying royal prices.

HyPoint Technology chose to concentrate our expertise on Hewlett Packard and their high quality 3000 series. By offering previously owned HP equipment, often more reliable than brand new components, at costs of up to 50% less, we are leading our customers to make the right moves. And this equipment is guaranteed eligible for maintenance.

When you buy direct from HyPoint Technology, you are guaranteed to get quality selection, fast delivery, and performance you can depend on. Add this to our low price and professional service and you come up with a winner, every time.

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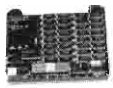
Correction

The article, "System Resource Planning: Taking Out The Guesswork" (December 1987, p. 60), was written by Dale Folkins and submitted by Teresa Brzozowski. Dale, who is presently working for Hewlett-Packard in Knoxville, TN, wrote the article while he was employed by Carolian. For more information on this topic, contact Teresa Brzozowski at Carolian Systems, (416) 673-0400.



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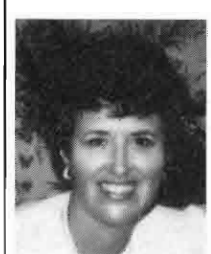

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[MARCH]

8: "Adager Internals" presented by F. Alfredo Rego of Adager, 6:00 p.m., Beverly Hills Ramada Hotel, 1150 S. Beverly Dr., Los Angeles, sponsored by the Greater Los Angeles Users Group (GLUG). $25 attendance fee includes presentation, dinner, informal discussion. Contact Vesoft, Inc., 1135 S. Beverly Dr., Los Angeles, CA 90035; (213) 282-0420.

16-18: Desktop Presentations: Computers Reach for New Media, The Fairmont Hotel, San Jose, CA. Contact Jean O'Toole, CAP International, One Snow Rd., Marshfield, MA 02050; (617) 837-1341.

20-24: NCGA '88, Anaheim, CA. Ninth annual conference and exposition of the National Computer Graphics Association. Contact NCGA, 2722 Merrilee Drive, Suite 200, Fairfax, VA 22031; (800) 225-NCGA or (703) 698-9600.

25: SCRUG (Southern CA Regional Users Group) Seminar on HP Computer-to-Computer Networking Capabilities, Fullerton, CA. Taught by Peter Hansen of Hughes Aircraft. To cover the networking of CPUs on the HP 3000, HP 9000, HP 1000, Vectra and Macintosh. $125 fee includes lunch and course notes. Contact Karen Zimmerman, SCRUG Office Manager, P.O. Box 84219, Los Angeles, CA 90073; (213) 453-5664.

28-31: 16th Annual Interface '88 Conference and Exposition, McCormick Place, Chicago, IL. Also, World Congress on Computing (WCC). Sponsored by McGraw Hill's *Business Week* and *Data Communications* magazines. Over 400 exhibitors will display communications and computer-related products and systems. Interface Conference will focus on network design-implementation-management issues and trends. Call (617) 449-6600.

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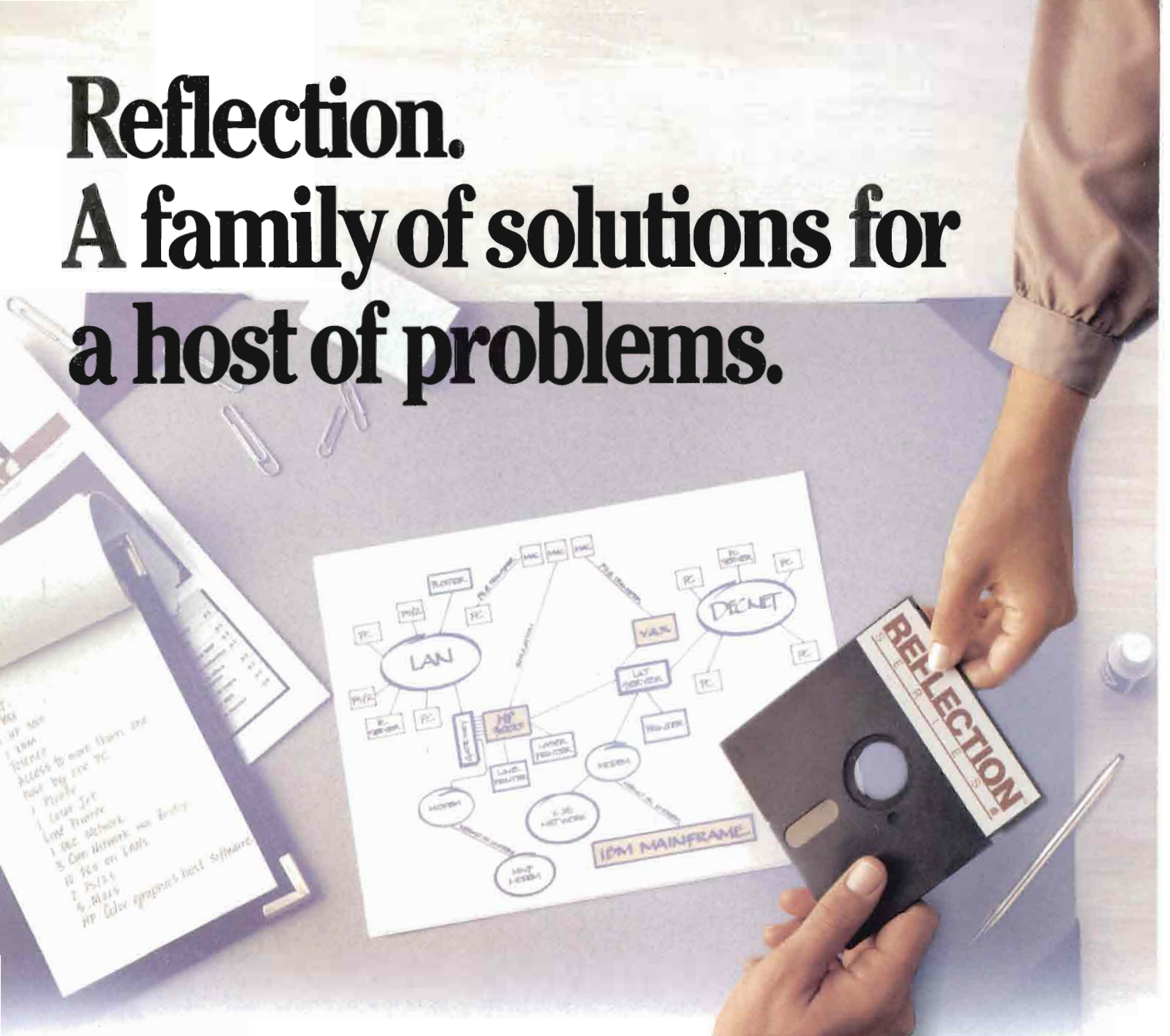

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