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DECShell

JULY ■ 1988

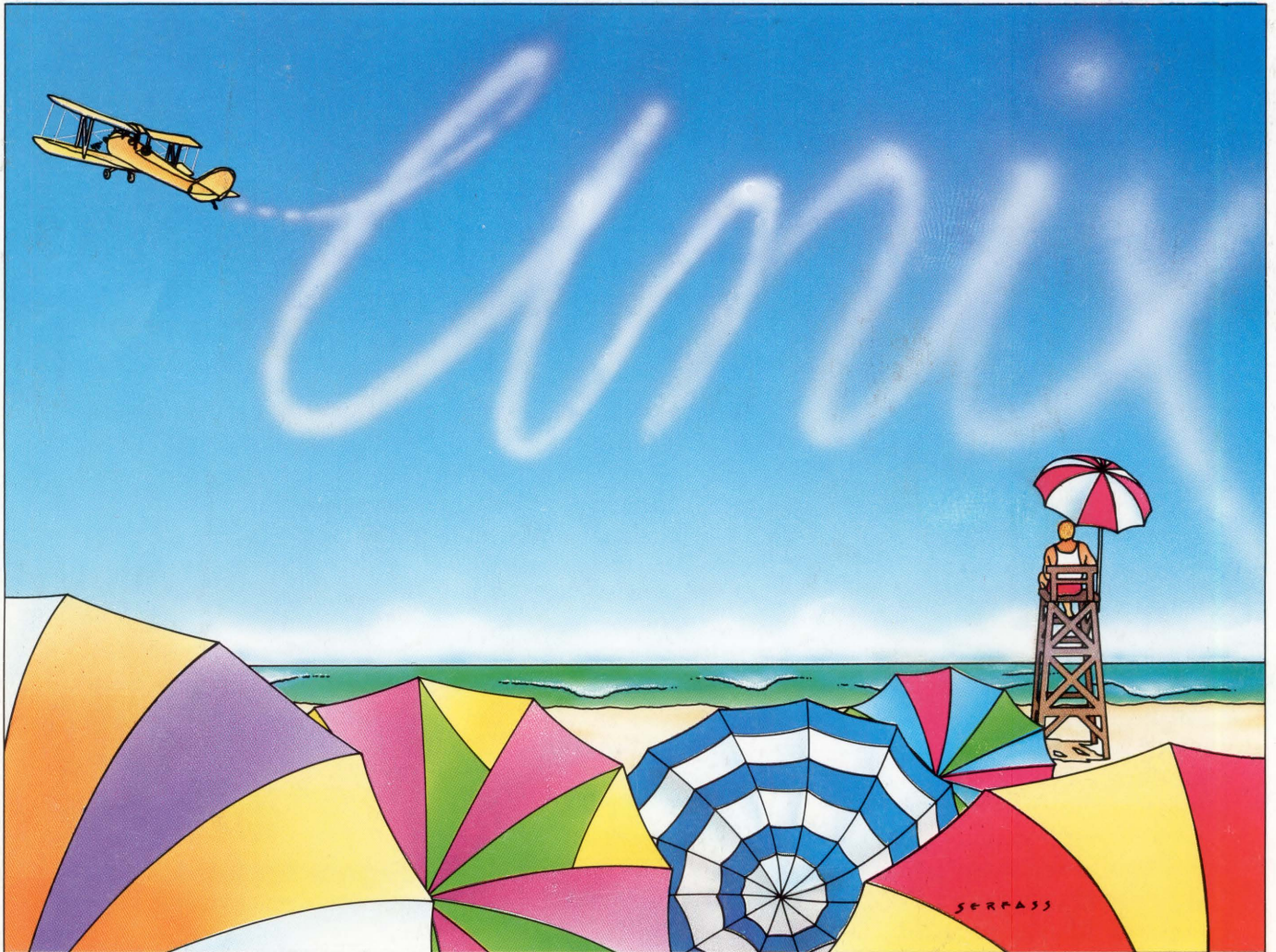
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- SQL For Portability And Integration
- VMS/UNIX Data Sharing Techniques
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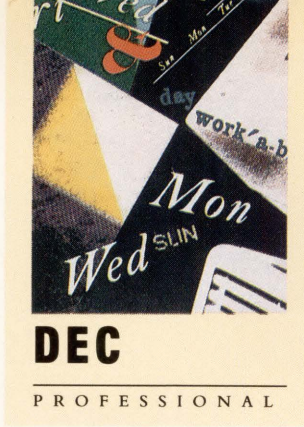
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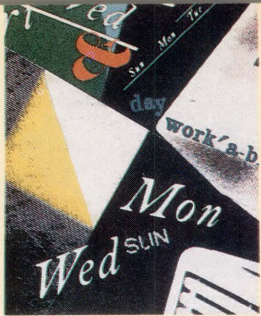


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ON THE COVER:

This month's cover is the work of Pennsylvania-based airbrush artist Jim Serfass.

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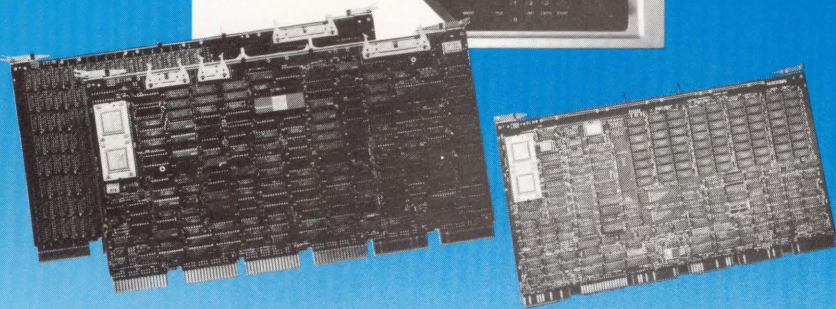
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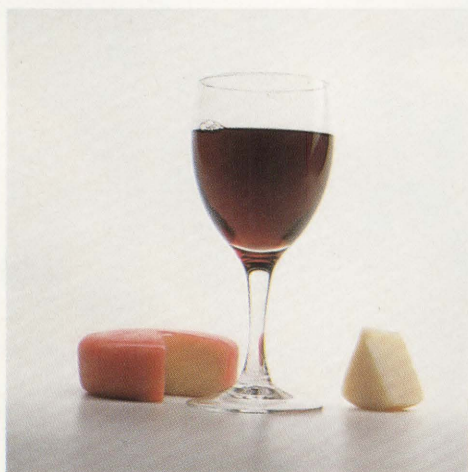
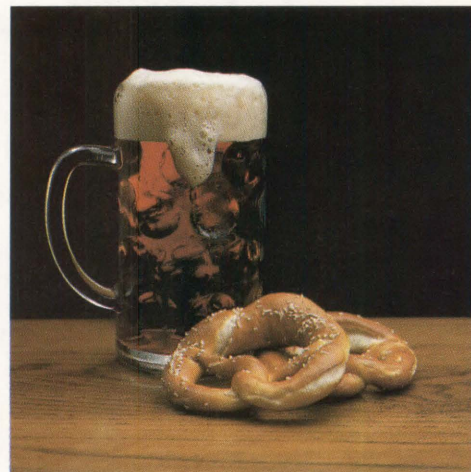
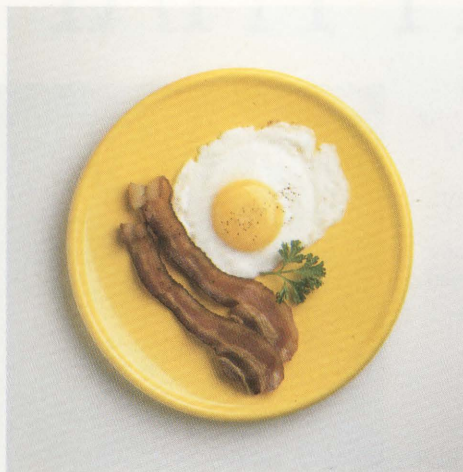
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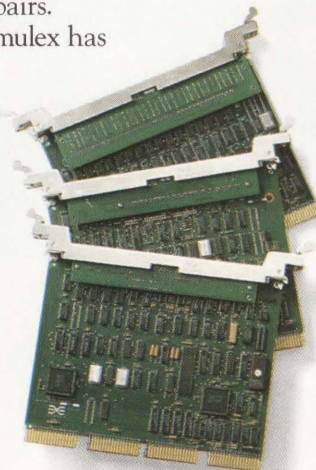


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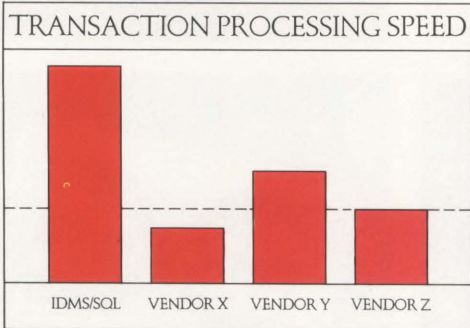
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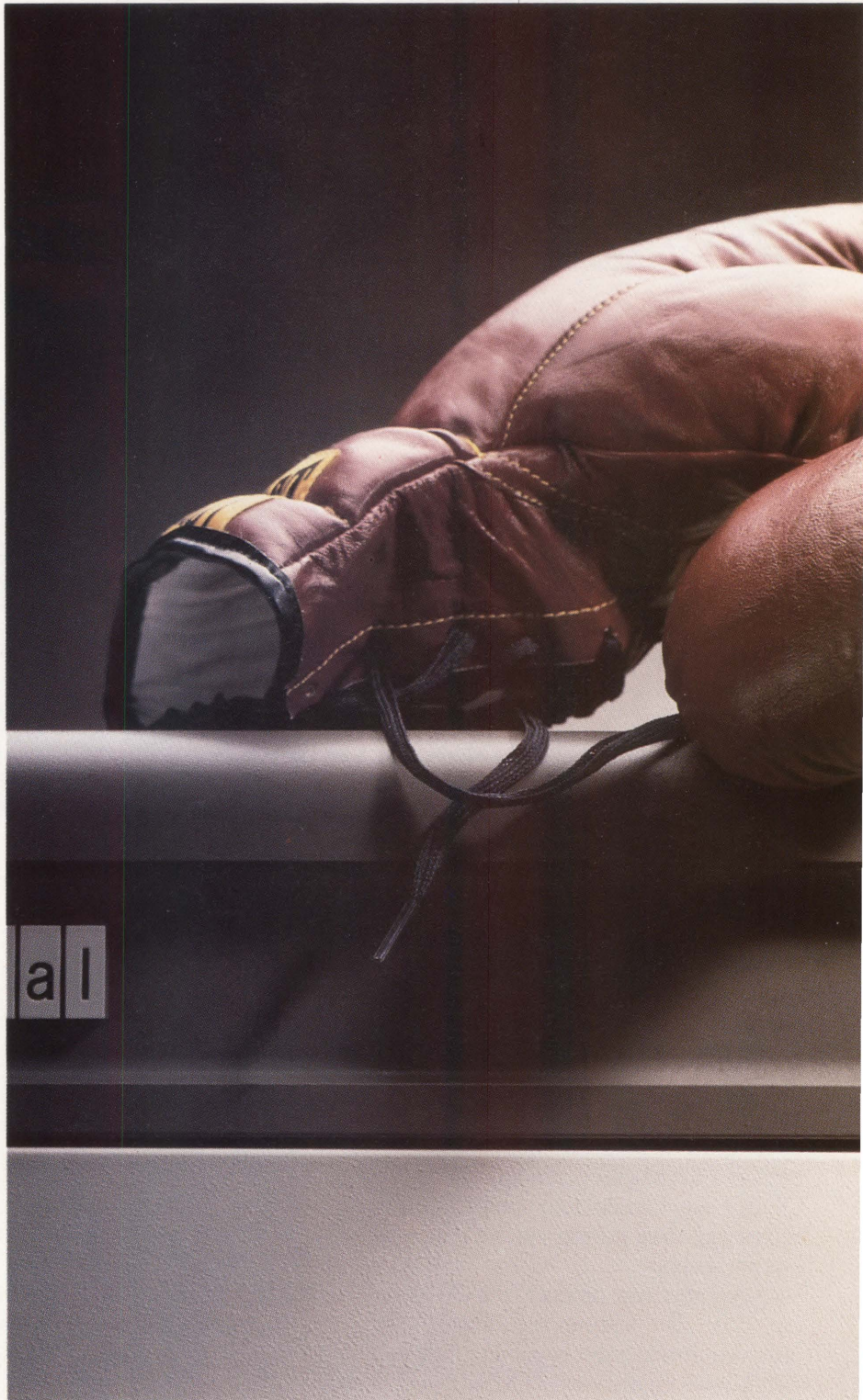


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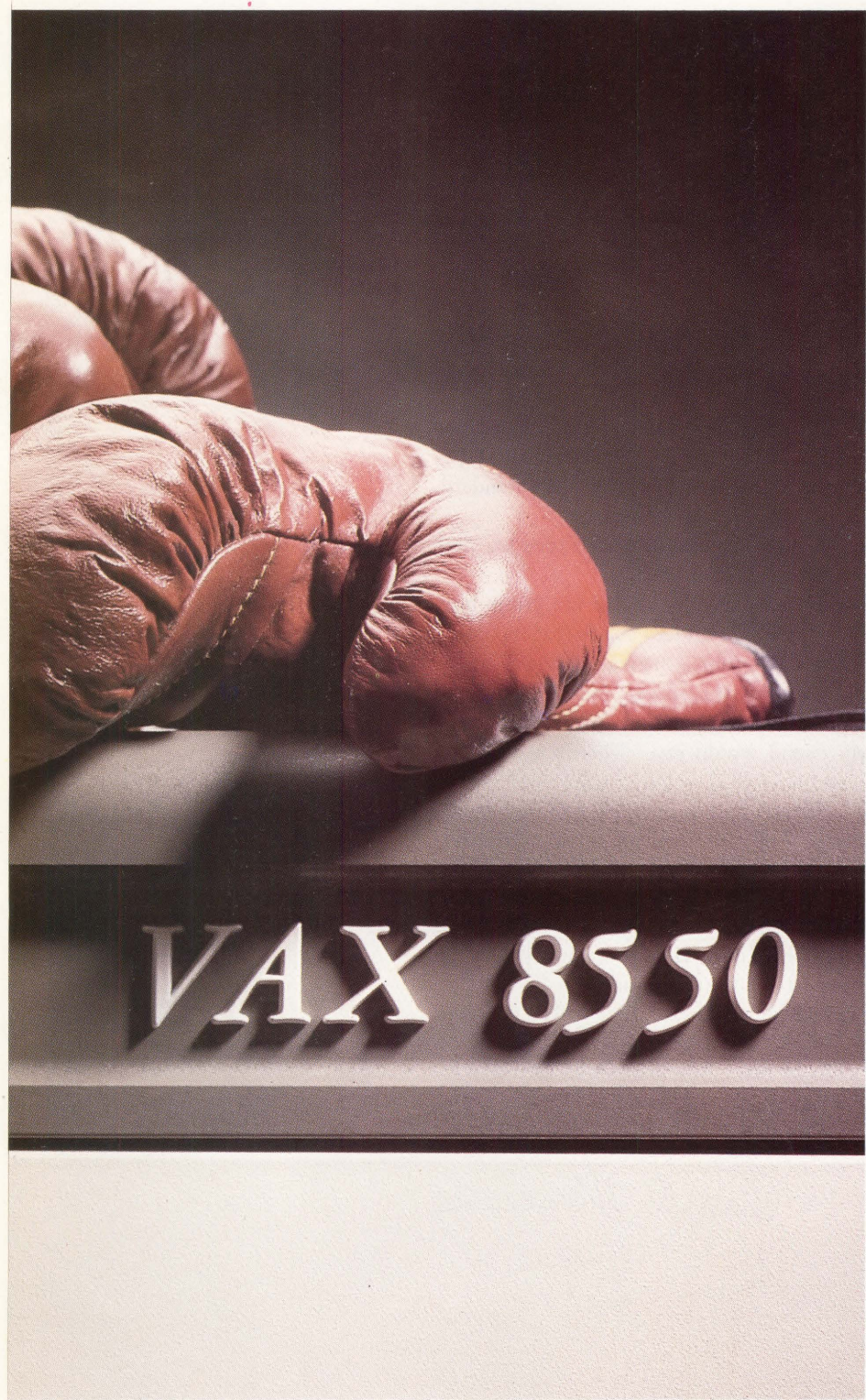
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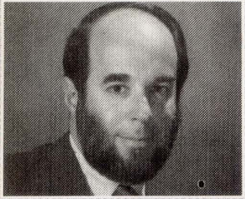
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Carl B. Marbach

UNIX Wars

In the beginning, AT&T conceived and delivered an operating system. However, unlike DEC, HP, IBM and others who developed proprietary systems, AT&T freely licensed UNIX to anyone who wanted it. Vendors, without the need or ability to develop their own operating systems, used

UNIX as their native system. As a result, many UNIX platforms (computers) became available, allowing buyers to pick and choose (depending on the specific hardware functionality), knowing that the UNIX software would run.

AT&T offered UNIX on its own systems, but because it allowed others to use it, AT&T was viewed as a father figure who could be trusted with the UNIX crown jewels.

At first, UNIX existed on smaller manufacturers' platforms, but later it was adopted by DEC as ULTRIX, HP as HP-UX, APPLE as AUX and IBM as AIX. But just as UNIX was developing into a standard, AT&T threw a monkey wrench into the market. By forming an alliance with SUN, AT&T moved from an enlightened despot to a formidable competitor, and the independents became nervous.

Would they continue to be licensed to use the latest version of UNIX? Would AT&T release one version to the world and keep another version for its own use with SUN? As a result, DEC, HP, IBM and other independents have formed a group that they say will set the UNIX standard, not AT&T.

The independents feel they must do this to protect the position of UNIX. If they let AT&T take UNIX private, they stand to lose their investments in this standard.

AT&T, however, feels like it has borne a child, only to be told by an outside group how to raise it. AT&T gave us UNIX and now someone else will set the standard and decide its future.

If there is a war that results in a split between these two groups, the real loser will be the users of this fine operating system, which has given us some real hardware independence and freedom, along with the opportunity to coin a new word — interoperability — a thought impossible without a standard system like UNIX. My friend would say, "There's a deal here somewhere."

In labor relations, we often resort to a mediator, someone without prejudice for either side and with everyone's best interests at heart. In international relations, neutral third parties have often helped settle disputes. We don't need a totally independent standards setting body for UNIX; that would be unfair to AT&T who conceived of the whole thing. But, if a company chooses to compete with AT&T, it can't use that hold on UNIX to unfair advantage.

Why not appoint a group of independent arbitrators from our industry to allow both sides to submit their ideas and determine the best compromise for the community?

A war benefits neither side. We need to work it out intelligently so that there will be no losers.

Carl B. Marbach



20 GIGS FOR YOUR VAX RIG

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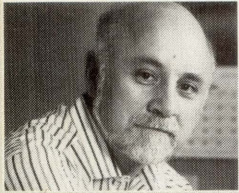
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EDITORIAL

Dave Mallery

Survival In The 1990s

There's an old adage that says if you have lots of medium-sized problems and can't get them cleared up, get yourself a really big problem and stand back.

I believe that the recent shotgun marriage of IBM, DEC and Hewlett-Packard is a perfect example. They all had mid-sized problems: specifically, they were engaged in guerrilla warfare in each other's mid-range systems, but the possibility of losing UNIX to AT&T and Sun was so awful that they banded together to defend their turf.

All platitudes and truths about the primacy of VMS aside, UNIX is critical to survival in the 1990s. I can see future systems that will have both UNIX and VMS user interfaces and calling standards (maybe SAA compliance as well). A major computer vendor without a UNIX in the 1990s is in trouble.

DEXPO Cincinatti

The DEXPO Cincinatti show was memorable for a few things: The first non-memory non-licensed BI board was there, and a tape coupler from MegaTape using lifted DEC chips had to be the star of the show.

Just as we note the marriage of convenience between IBM, DEC and Hewlett-Packard, we also note an "affair" among System Industries, Clearpoint, MegaTape and perhaps others, banding together to share technology and other resources to bring a true third-party BI corner to the market.

There's a distance to go between supplying lifted chips and a true "clean room" clone of the BI chip and corner. The engineering required is enough to strain the resources of any company, but perhaps if a number of third-party vendors could rise above their guerrilla war for a while and focus on a larger problem, the market will be well served.

Just as an unencumbered UNIX is crucial to the survival of major vendors in the early 1990s, a viable BI clone (in lieu of licenses from a willing DEC) is critical for the survival of third-party vendors.



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CIRCLE 121 ON READER CARD

LETTERS

IEEE TREATY

I read with interest your editorial, "A Summit, But No Treaty" (April 1988). There is one misstatement that needs correction. The POSIX standard is being developed by the IEEE P1003.1 Standards Committee, not by X/Open. X/Open is a consortium of computer manufacturers.

Heinz Lycklama
/usr/group Technical Committee
Santa Monica, California

THE ULTRIX STRATEGY

I am concerned about the user community's perception of ULTRIX. In the wake of the formation of the Open Software Foundation (OSF) and the recent cover story on Ken Olsen in *Business Week*, Digital's UNIX strategy has been needlessly maligned. Indeed, its entire distributed processing strategy was raked over the coals in *Business Week*.

While criticism of Digital's late entry into the workstation market and its need to begin competing in CPU price/performance is valid, any malign-

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ing of its UNIX strategy is unfounded. What do people expect? After all, the company is here to sell VMS.

Ken Olsen is fond of repeating a little-known fact about his substantial commitment to ULTRIX — Digital is the number one vendor of UNIX systems. It will probably stay that way for some time, particularly if the VAXSTATION can overtake Sun.

Business Week suggests that Olsen fears open systems. But the week the article was published, Digital, along with IBM, Apollo, HP and others, formed the Open Software Foundation, which will standardize on IBM's AIX. Digital is also a founding father of X/Open, which is pushing the POSIX standard.

Olsen knows that Digital will profit more than anyone else from open systems. That's because a multivendor environment means an increased role for distributed processing and Ethernet,

on which the company's betting the ranch. If ULTRIX is not a pure UNIX, OSF will make all UNIXs equal.

Jim Christopher
Buckingham, Pennsylvania ■

CORRECTION

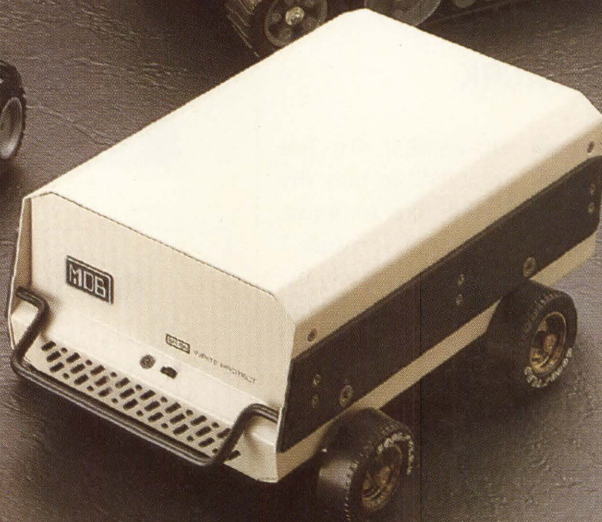
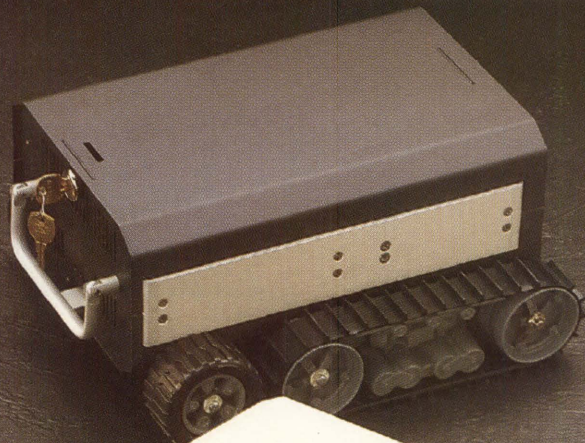
In May Bookshelf the *Digital Technical Journal* was reviewed. The address and price that were given are incorrect. For further information, contact Will Buddenhagen, Digital Press, 12A Esquire Rd., North Billerica, MA 01862-2587; (800) 343-8321. The price is \$16 each.

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USER GROUPS

If you have an active user group, *DEC PROFESSIONAL* would like to be informed of your meetings, technical sessions and seminars. Please contact the Editorial Offices at 921 Bethlehem Pike, Spring House, PA 19477.

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HOOKING A PC TO A NETWORK

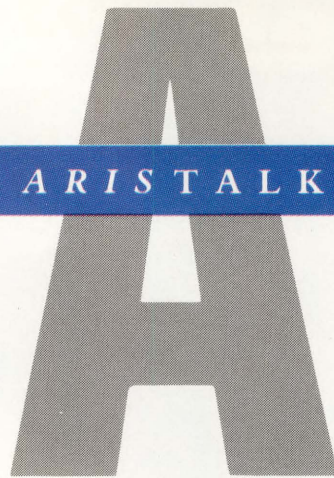
QUERY:

Eric S. Dungan (SIG 24/MESS 151): I'm trying to hook up a PS/2 60 into my DECNET network. I'd like to know what Ethernet boards and software I need to accomplish this. I'm mainly interested in transferring information from my VAXCLUSTER to the PC and vice versa. I have a line on Etherlink MC boards from 3Com and would like to know if there are any other boards that will accomplish it. Also, do I have to use DECNET/DOS and will it work with a third-party board like 3Com's?

REPLIES:

Kevin Verble (SIG 24/MESS 154): I know DECNET-DOS supports the 3Com and MICOM Ethernet boards. I don't know how a PS/2 would fit in with either DECNET-DOS or the Ethernet boards. You also can use synchronous DECNET. We did file transfer testing over a DEPCA Ethernet board connection and a 9600 null modem cable connection using DECNET-DOS. The Ethernet came out approximately 10 times faster. Other than the speed, you can't tell the difference.

Ken Miglionico (SIG 24/MESS 155): There are several boards/software available to do this: CommUnity-DOS from TCI (Ethernet board), another from 3Com and DEC's DEPCA board. Others are RAF from Datability Software Systems and Mobius from FEL Computing. We chose the DEC solution of the VMS/DOS/Server with PCSA software. We're only in the infancy of this project, but initial results are promising. Keep in mind that some of these products are file transfers and don't address VT com-



How To Use Aris

If you're a subscriber to *DEC PROFESSIONAL*, you can call up our VAX and log into ARIS, Our Automated Reader Information Service. In ARIS, you can download programs from this publication, communicate with our editors, request a change of address, find additional information about advertisers, order books and back issues, check the guidelines for submitting articles, take a peek at our editorial calendar for the year and communicate with other VAX users.

To log in, you'll need your subscription number from your mailing label. Set your terminal to seven data bits, one stop bit and space parity, or eight data bits, one stop bit and no parity, and dial (215) 542-9458. Baud rates: 300, 1200 or 2400.

Recent Changes

As a *DEC PROFESSIONAL* subscriber, you can download any of the programs marked with an ARIS symbol in *DEC PROFESSIONAL*. You can access programs from *VAX PROFESSIONAL* only by also subscribing to that publication.

When you're in ARIS and don't wish to return to the Main Menu after each operation, you now can use the new BRIEF mode. It turns off the menu display after you get into ARIS. To turn it on, type BRON from the Main Menu; to turn it off, type BROFF.

XMODEM is available.
KERMIT is available.

SIG Identification

The SIG categories referenced in this month's *ARIS*talk are:

24PCs
43Editors (EDT, TPU, etc.)

patability, E-MAIL and some other features. The DEC software lacks none of these and uses existing VAX disks as the storage medium; therefore, your PC can be diskless (except for a floppy for uploads), and you can use your VAX/xxx as a file server for the PC software and the data files.

EDT PROBLEMS/VMS 4.6

QUERY:

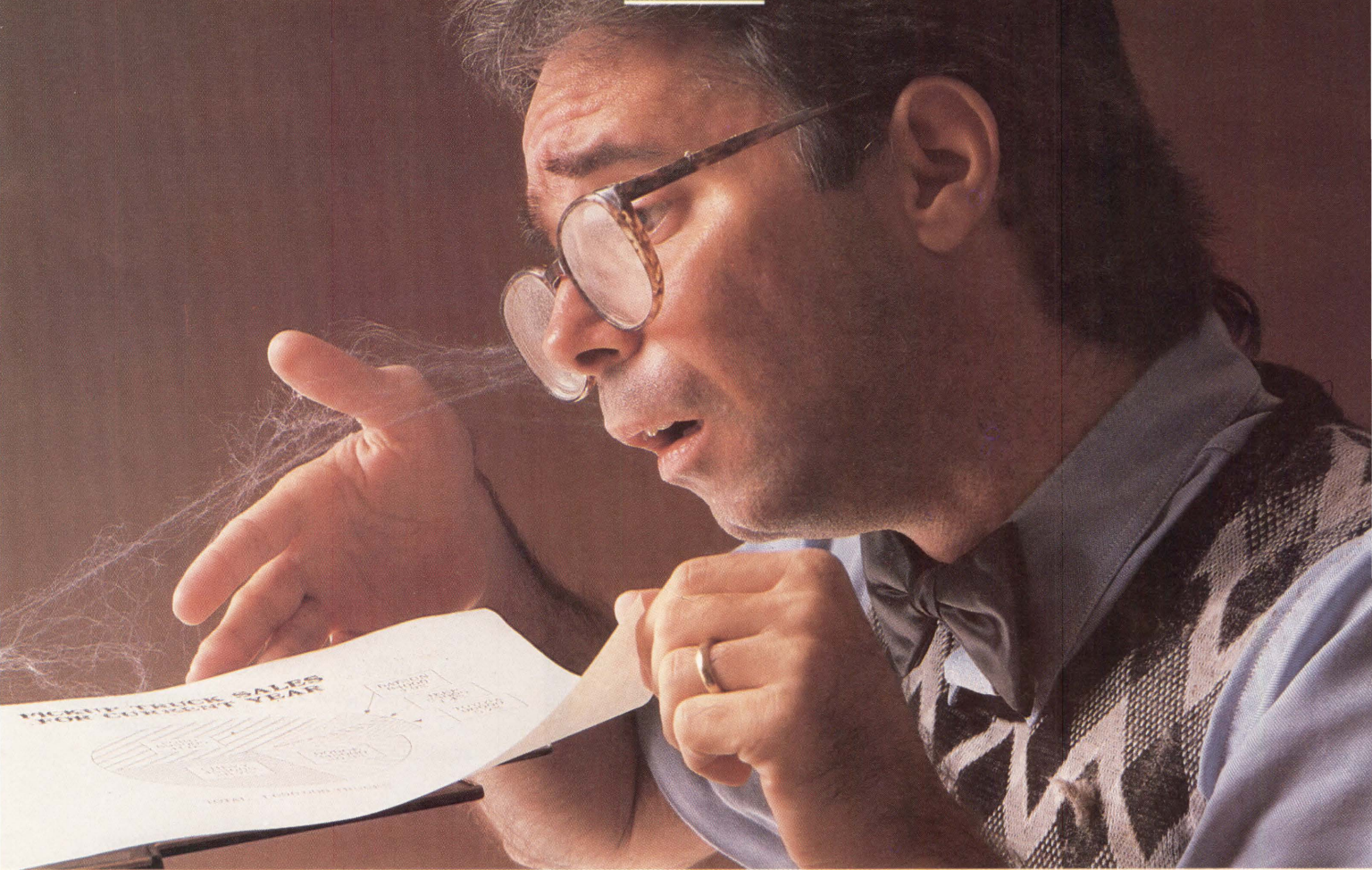
Nora Miller (SIG 43/MESS 174): I upgraded my MICROVAX II to VMS 4.6, and EDT isn't working properly. Using KP1 to move one word at a time, the cursor stops at colons, brackets, equal signs, etc., while skipping over the beginning of a word preceded by a tab. Worse, when the cursor's on the last word in a line, pressing MINUS to delete a word deletes the word, the EOL character and the first character on the next line. This isn't how EDT works on my 785, even under VMS 4.6. It's driving my users crazy. Has anyone had this problem? I've asked DSIN about it but haven't heard yet.

REPLIES:

Jonathan M. Prigot (SIG 43/MESS 175): Because you say it occurs only on the MICROVAX and not the 785, I suspect someone may have implemented a systemwide EDTINI.INI file.

Nora Miller (SIG 43/MESS 177): This shows how blind we can be. I've been trying to resolve this EDT problem and discovered that the word entity had been redefined. I was positive that my .INI file was the same as on the other machine where EDT still works. Then, just for fun, I looked at the .INI file. It was different! It must have come with the upgrade. I renamed it out of the way,

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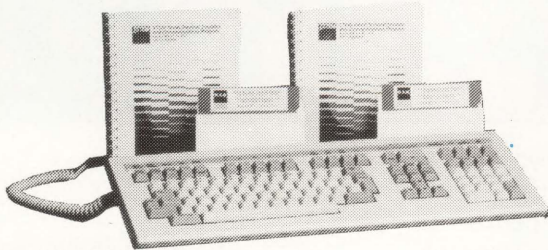
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and sure enough, EDT works like the old editor I know and love.

Thanks for the suggestion, Jon. I plan to ask at DECUS if this file came with the distribution, and if so, why.

PCs ON PCSA

QUERY:

Ken Miglionico (SIG 24/MESS 149): I'm currently installing PCs on ThinWire Ethernet running under VMS/DOS/Server software and PCSA software, not just file transfer. The vendor recommended a Wyse PC/AT compatible. No way! It must be an IBM or a VAXMATE. The documentation is poor, the system is complicated, and it must be managed by a knowledgeable person. However, when up, it's an impressive system. All software and data files reside on the VAX. The PC accesses everything through MS-WINDOWS via the VAX disks.

My system manager left for another position in the middle of the installation. Is there anyone who has been through this and can provide some help? There aren't many sites using this, and getting tips is difficult; even DEC has difficulty. I'm searching for a new system manager and would like to have some expertise available when he comes aboard.

REPLIES:

Bill Mayhew (SIG 24/MESS 150): Version 2 of the PCSA software is supposed to include considerable improvements in the areas of documentation, performance and functionality. That leaves out cost, but PCSA is virtually free if you have DECNET.

Phil Galka (SIG 24/MESS 156): I understand part of what you're doing. We have the IBM PCs connected throughout ThinWire Ethernet. We also have been successful with disk server under DECNET and DECNET-DOS. The big problem with DECNET's implementation of virtual printer is the reference of an IBM PC device, NPRN.

Most PC software won't see this as a valid device, and you must use the PC, print to a file and then type file.txt > nprn.

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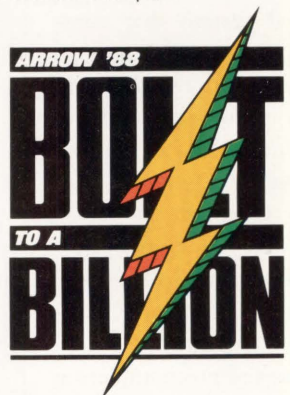
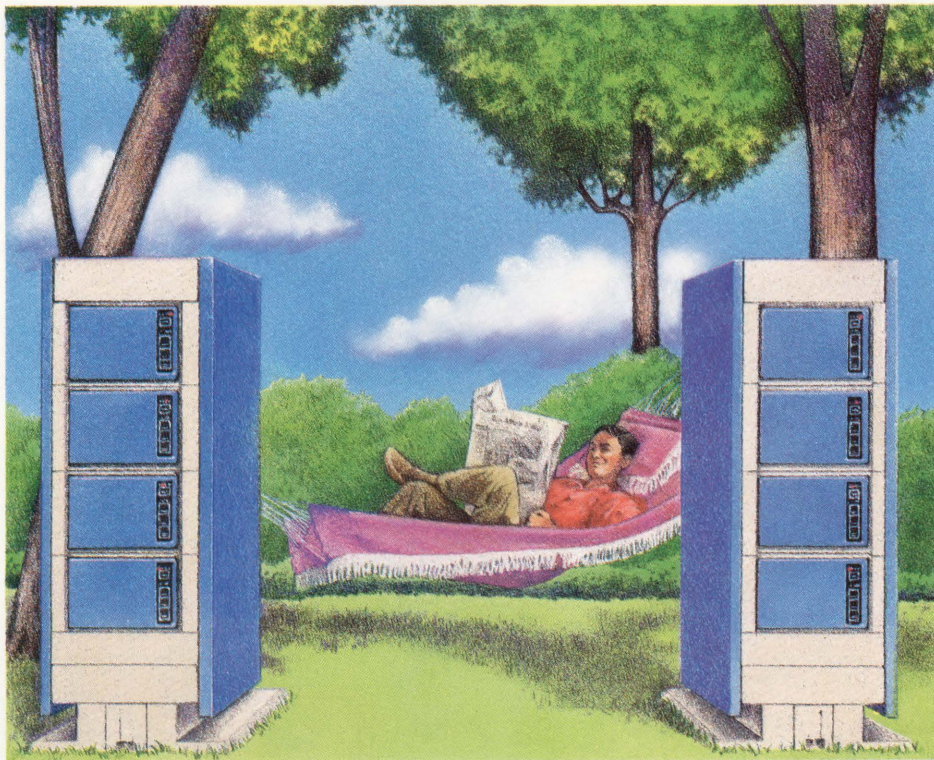
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The Search For Spock

AI Database Query And Reporting Language Accesses VAX/ORACLE

Version 1.0 of Spock, a VAX/VMS information retrieval system that combines a natural-language front end with the ability to access information from distributed DBMSs is being shipped by Dynamics Research Corporation (DRC). Spock is an acronym for System Protocol for Online Communication of Knowledge, although system analysts and programmers at DRC constantly refer to the software as *he*.

Spock translates structured English-language queries into Oracle, routes the request to the appropriate database, joins data received from disparate databases (if necessary), then displays the information on the workstation screen in a format suitable for printing or filing. To the user, it doesn't matter which databases Spock decides to access; it effectively looks like one large database.

Spock's reading comprehension is semantically oriented, and its recognition process consists of 3,000 separate modular rules. The modules are organized in layers, each making use of knowledge gained in the adjacent layer.

Common natural-language user queries might look like:

>SHOW ME WHAT YOU KNOW

The software's response would be to show a list of tables it can access.

>TELL ME ABOUT EMPLOYEES IN L.A.

would release a list of last names and job titles, or if desired, an employee code number.

>SHOW THEIR SALARIES

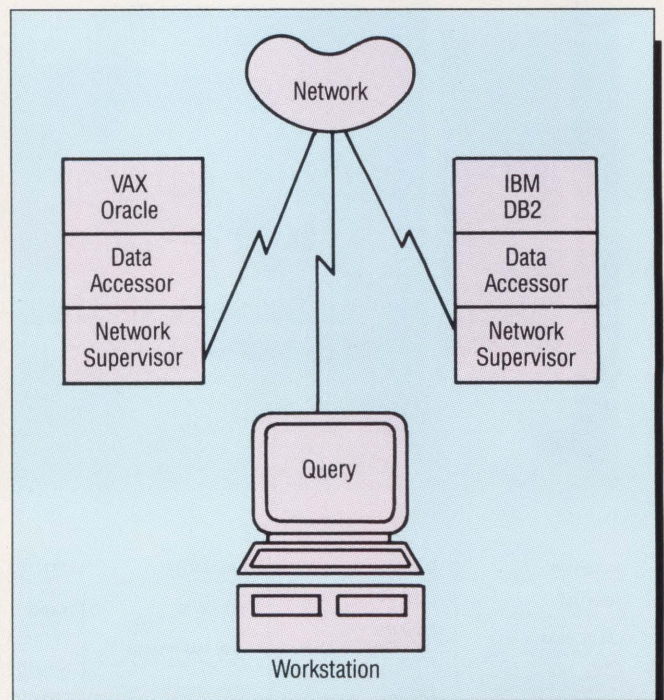
would generate the same list with an added salary column. The salaries might be pulled from a different data-

base than the field office data.

Spock is programmed extensively to recognize user-input spelling and syntax errors and to store the last 20 queries in a window to rerun results quickly. It also can comprehend and respond to reflexive queries — those using pronouns that refer to previous queries — by "learning" from information it retains.

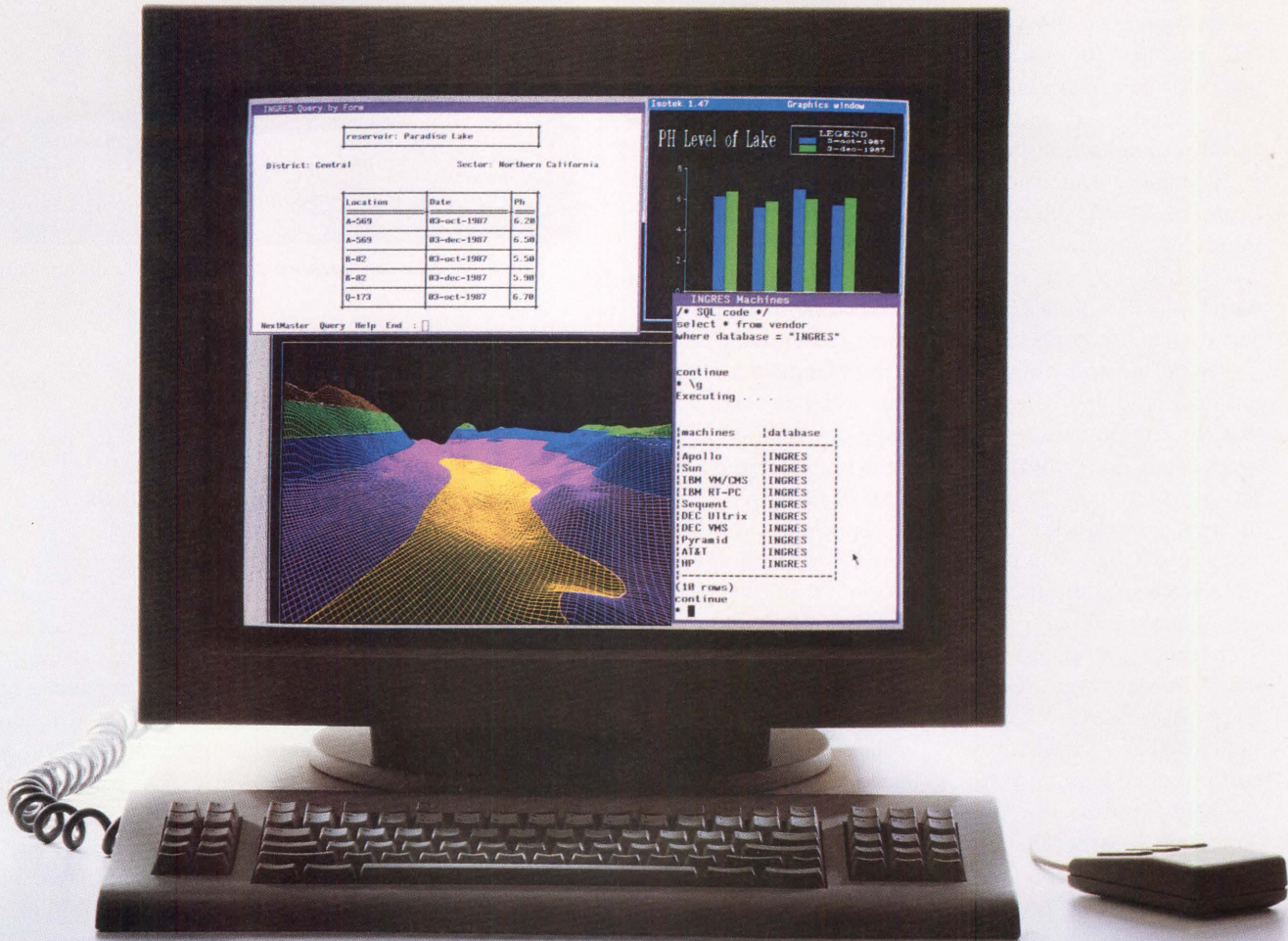
The three primary software components of Spock are:

1. A workstation definer that resides on an 80286-class (PC/AT or PS/2) workstation. This manages the natural-language interface with the user.
2. A data accessor that resides on the host, handles communications with the host DBMS and extracts information from databases. It



Through software located on the workstation and host, queries are routed transparently to distributed databases.

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essentially translates sub-queries into host DBMS calls and searches for IDs. As many as 10 workstations can communicate with the data accessor simultaneously.

3. A Remote Data Access Protocol (RDAP) network supervisor, also residing on the host, that directs query traffic and sends the accessed data back to the workstation.

RDAP is Spock's internal protocol, a global language that the components use to speak with one another. It acts as a translator between the user and Spock, Spock and the database language, and Oracle and the user.

When installing Spock, it's necessary for the user to "teach" the software vocabulary that's specific to the site's databases in order to customize the system for specific application requirements. According to DRC, you should anticipate that building this personal data dictionary will be an ongoing, evolutionary process. The same front-end screen that's used to issue a query also is used to teach Spock or to ask it to explain its environment. Security can be established by a system manager at the database, table or field level.

The system can expand in two ways: by adding more complete Spock systems on a network or by adding server hosts to the network. The system doesn't pass data through a central hub, as in a star-shaped system. Rather, optimal data paths are determined by cross-system joins between data accessors responsible for talking to dif-

ferent databases.

Although Oracle is the distributed DBMS currently supported by Spock, DRC intends to add Ingres and DB2 to the list and to add Sun and Macintosh workstations as front ends.

DRC designed the program, its first foray into the commercial market, after becoming extensively involved with AI languages interfaces and software architecture, while developing engineering systems for the Department of Defense.

Spock is priced incrementally depending on the size of the CPU hosting Oracle. For example, a workstation definer, data accessor, and RDAP network supervisor cost up to \$6,000 with a MICROVAX II host, less for sites with more than five workstations. The total price then ranges from \$10,000 for a VAX 11/750 to \$35,000 for the VAX 8800, 8974 and 8978. Installation, customization, training and documentation are available as extras, as is an optional PC/AT demo disk that DRC will configure with the data structures of potential customers.

The workstation half of the program is shipped on 1.2-MB floppy disks and the VAX half on tape.

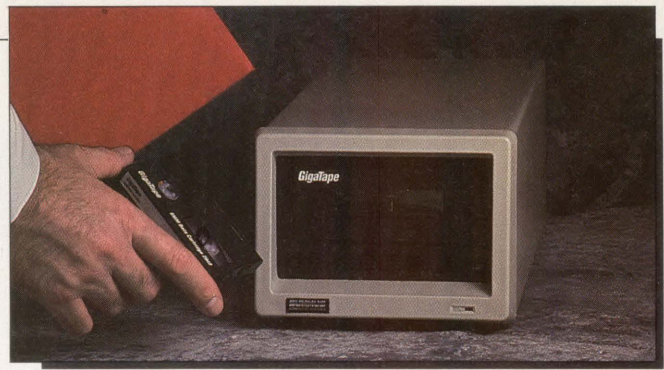
For further information, contact Dynamics Research Corp., 60 Frontage Rd., Andover, MA 01810; (617) 475-9090.

Circle 563 on reader card

Oracle Corp., Davis Dr., Belmont, CA 94002; (415) 598-8000.

Circle 564 on reader card

—Evan Birkhead



The GigaTape can back up 2.33 GB of data on one cartridge.

GigaTape Answers Data Storage Problems

SUMMUS Computer Systems Delivers Improvements In 5 1/4 Inch Format

Recent studies of fixed or primary mass storage for mini- and supermini-computer systems indicate that the average disk capacity exceeds 600 MB per system. With a projected growth rate of 40 percent per year, the average system mass storage capacity has left present day cartridge and reel-to-reel tape subsystems far behind. In many large systems, complete backups aren't being accomplished and can cause system failures.

Helical scan digital tape technology offers many advantages over stationary head recording. It has experienced an orderly growth pattern parallel to the optical disk in both hardware and media. With the new innovations in helical scan digital tape technology, SUMMUS Computer Systems of Houston, Texas, has targeted the 8mm cartridge market with the GigaTape drive. It's capable of backing up 2.33 GB of data on one cartridge and is designed within the industry standard 5 1/4-inch form factor.

With the GigaTape, an

error correction code (ECC) is employed to ensure data reliability. The ECC can correct a burst as long as 264 bytes in error and as many as 80 additional at random errors in each data block. The ECC is capable of multiple bursts in random error corrections. It's effective against the kinds of error patterns characteristic of cartridge tape subsystems.

Read, write and servo heads are mounted on a drum, which rotates constantly at 1800 rpm, resulting in an effective head-to-tape speed. Actual tape movement is less than 0.5 inches per second. The GigaTape operates as a 819-track, 150-inch-per-second tape subsystem, is software transparent and works with all DEC utilities.

A standard one-year warranty is included. The list price for the GigaTape Q-bus subsystem is \$5,495.

Learn more by contacting, SUMMUS Computer Systems, P.O. Box 820549, Houston, TX 77282-0549; (713) 589-9772.

Circle 580 on reader card

—Suzanne Garr



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Some offers are just too good to pass up. Especially when they guarantee that a terminal will never go down. At least, not at your expense.

Every Esprit Opus terminal comes with the industry's first and only 24-hour replacement service—ESPRIT EXPRESS—free for a full year. So you'll never be burdened with the cost and headaches of the old type of warranty.

It's just one of the benefits of the best buyer protection plan offered by a terminal manufacturer today.

Heading the Esprit Opus family is our newest and most advanced terminal, OPUS 3n1. The epitome of connectivity, it can communicate to almost any host with its resident ASCII ANSI and PC-Term emulations. And connect to two hosts simultaneously thanks to Esprit's dual port capability and all-in-one keyboard.

Add PC-like "Express Windows", Virtual Terminal and ANSI.SYS modes, and an ultra sleek, ergonomic design that

earned our entire OPUS family an Industrial Design Excellence Award, and it's easy to see why OPUS 3n1 will soon be on the most wanted list for multi-user systems running under PICK®, UNIX/XENIX®, VMS/ULTRIX®, VPIX, PC-MOS/MULTI-LINK®, MUC-DOS® and Novell.

For the complete lowdown on the high-performance OPUS 3n1 and the rest of our OPUS terminal family, call Esprit toll free: (800) 645-4508. In NY: (516) 293-5600. We'll make you an offer you can't refuse. And if you're a VAR or OEM, Esprit will show you how our Profit Assurance Program is something you won't want to live without.



Esprit Systems, Inc.,
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CIRCLE 256 ON READER CARD

Network Systems Offers Networking Integration

HYPERCHANNEL-50 Connects Systems From More Than 30 Manufacturers

Time was when each computer installation carried hardware from only one vendor. As computers became specialized, a site might purchase a Cray for complex computations, a VAX for database processing and a Sun workstation for technical development. How could all these computers share information?

One answer is the HYPERCHANNEL-50 network from Network Systems of Minneapolis, Minnesota. For instance, although DEC has a network, it doesn't allow effective communication with Data General, Hewlett-Packard, Apollo or Sun. In engineering facilities, DEC isn't found alone, but various other minicomputers and CAD systems are used. HYPERCHANNEL-50 offers this diverse system integration and is backed up by NETEX software products.

Usually, when you connect a DEC with an IBM, system performance plummets. Using HYPERCHANNEL, the communication can accommodate up to 20 Mbps per DEC communication with the IBM mainframe. Files can be transferred and processed rapidly.

According to Craig Frane, product line manager for HYPERCHANNEL, it has three primary attributes:

1. High performance — The HYPERCHANNEL-50 net-

work consists of adapters that connect computers to multidrop coaxial cable data trunks. Each trunk operates at a fixed transmission rate of 50 Mbps. Each adapter can attach up to four independent network trunks, with rates up to 200 Mbps, and one computer.

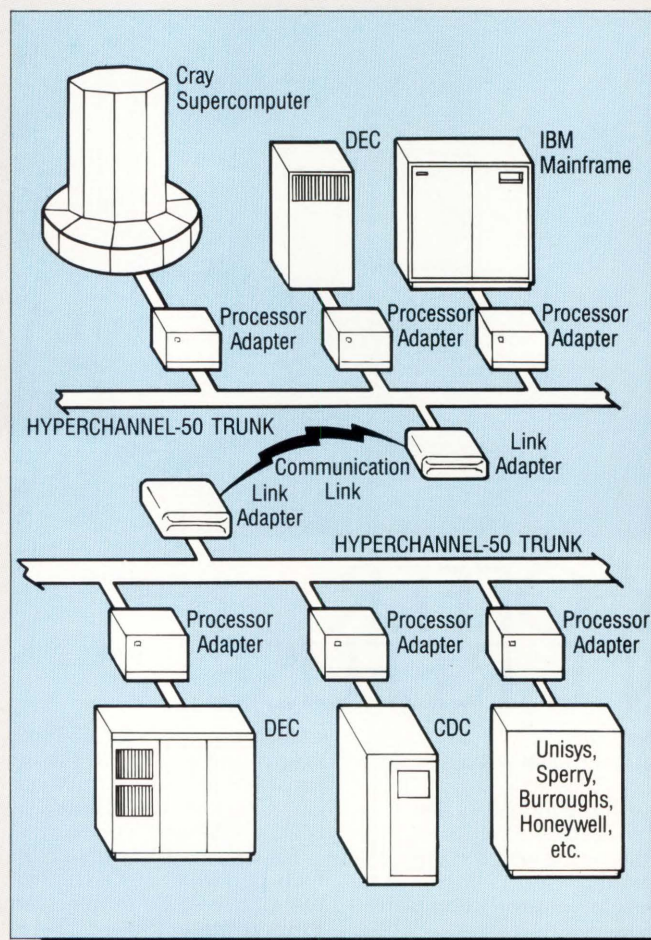
"Bulk data oriented," explains Frane, "it transfers large files easily. It permits CPU-to-CPU traffic."

2. Machine connectivity —

You can connect hardware from more than 30 computer manufacturers, using more than 40 operating systems, including DEC, IBM, Honeywell, Unisys, Burroughs, etc.

3. Link adapters — Link adapters connect HYPERCHANNEL-50 networks across high-speed telephone lines, satellite links or microwave facilities. A HYPERCHANNEL network also can be set up locally.

"We're the only company in the industry that offers all three attributes," stresses Frane. "The competition may offer only one or two, but Network Systems gives one-stop shopping."



Example of a HYPERCHANNEL-50 network configuration.

A typical configuration costs about \$40,000. This could be using HYPERCHANNEL-50 to connect a mainframe onto a network; one Cray, IBM and four VAXs; or the network onto a satellite.

Looking for enhancements to maintain its market position, Network Systems announced its HYPERCHANNEL-DX in May for shipment beginning in October.

In addition to offering higher performance, it will accommodate standards, including TCP/IP, OSI and Ethernet, through its open architecture. Future plans include adding DECNET and Token Ring.

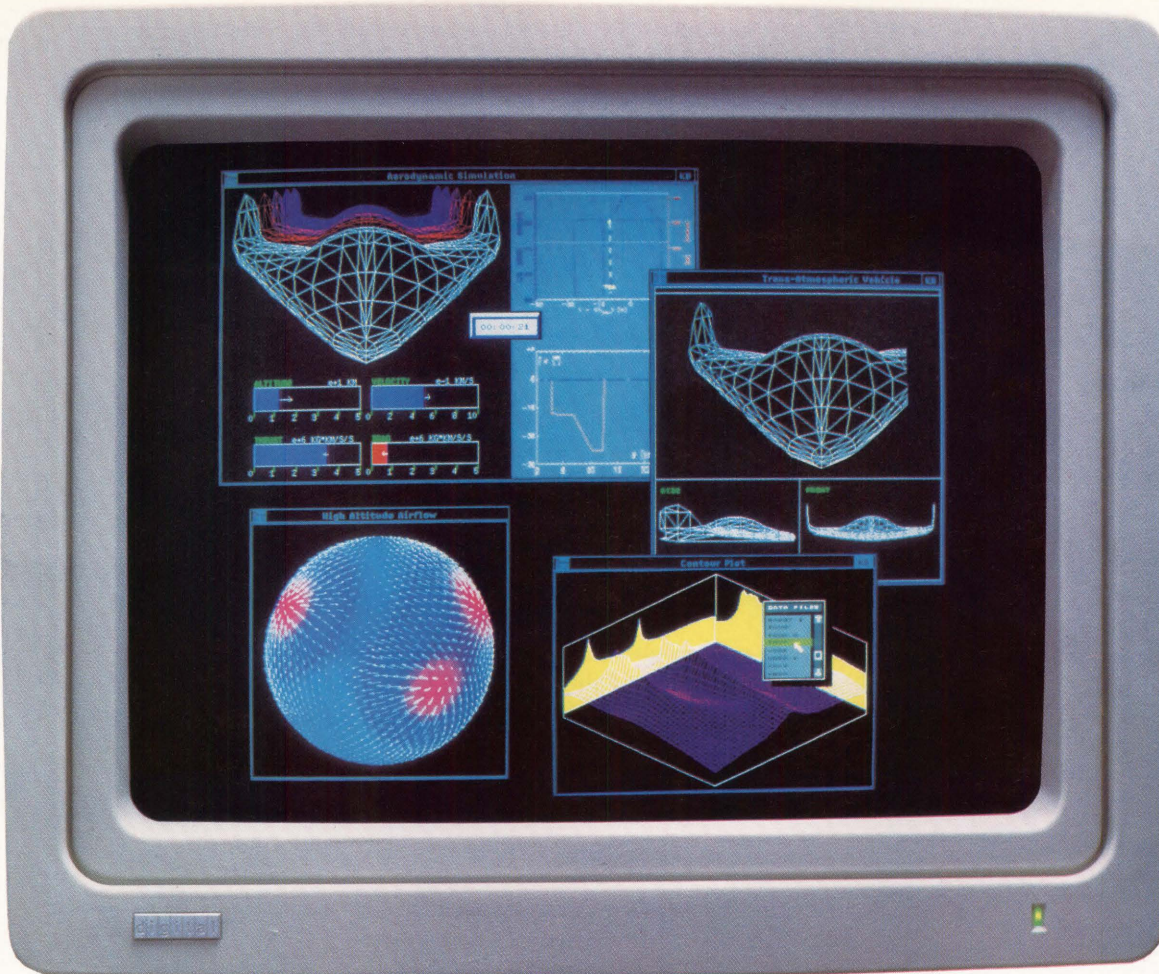
For example, suppose a customer with four VAXs attached to a HYPERCHANNEL-50 wants even more performance but doesn't want to buy another HYPERCHANNEL. He wants a solution that gives each VAX unrestricted access to the trunk.

The answer is a HYPERCHANNEL-DX, configured with four-port DMA interface HYPERCHANNEL trunk interface and buffer memory up to 16 MB, to eliminate port contention and back-down. Depending on the options selected, prices for the HYPERCHANNEL-DX units range from \$30,000 to \$100,000.

To find out more, contact Network Systems Corp., 7600 Boone Ave. North, Minneapolis, MN 55428; (612) 424-4888.

Circle 561 on reader card

—Karen Detwiler



Multiple graphics windows and multiple views are shown in this aerodynamic simulation application. One view is dedicated to rapid updates of data, shown as a strip chart. This view is selectively updated as data changes; the model's view is updated only when the application requests the update.

Software simulations may be disabled on a per-view basis, providing rapid view update.

Pop-up menus and custom cursors are created using GFX-4000's raster operations.

GFX-4000™ from Precision Visuals

Graphics Software Tools for Technical Workstations

The Product GFX-4000 is a high-performance graphics software tools package for application developers. With functionality drawn extensively from the proposed PHIGS* standard, GFX-4000 is enhanced to improve control over functions like windowing and viewing. Our software is optimized for VAXstations to get the most from your hardware.

The Performance GFX-4000 is built for speed. Pictures can be modified quickly using the quick update viewing feature. Graphic information can be sent directly to the screen using temporary data structures, rather than accessing central structure storage. Structures are "posted-to-views," saving time by updating views of the same graphics structures independently. Raster operations are also available to store and manipulate images.

The Integration GFX-4000 will fit your current and future programming environments. It's tightly integrated with the VWS (also known as UIS) window manager, giving the application full control over window management. A forthcoming release will provide

easy application transition to DEC Windows. GFX-4000 supports the CGM standard so you can exchange pictures with the outside world, and you can display your images on most hardcopy devices.

GFX-4000 supports VAXstations running VMS (including models 2000, II, II/RC, II/GPX, 3200, and 3500). Written in 'C', GFX-4000 allows programmers to use either 'C' or FORTRAN subroutine interfaces.

The Features Hierarchical Structures and Structure Editing ■ Multiple Graphics Windows Within a Single Process ■ Multiple Views Per Window ■ Nameset Filtering for Selective Display/Suppression of Graphics Elements ■ Presentation-quality software fonts, in addition to support for hardware text ■ PHIGS standard graphics primitives plus added 2D/3D planar and 3D shell primitives ■ Extensive user support is available through Precision Visuals' telephone HelpLine service and local technical support engineers.

The Applications Software developers use GFX-4000 in a variety of graphics applications, such as

data analysis, data display, process modeling or control, molecular modeling, manufacturing simulation, ME, EE and AEC CAD, and earth sciences.

The Offer To qualify for a free demonstration copy of GFX-4000 or to get complete technical information, phone Chris Logan at 303/530-9000. If your software project requires graphics on a VAXstation, give us a call!



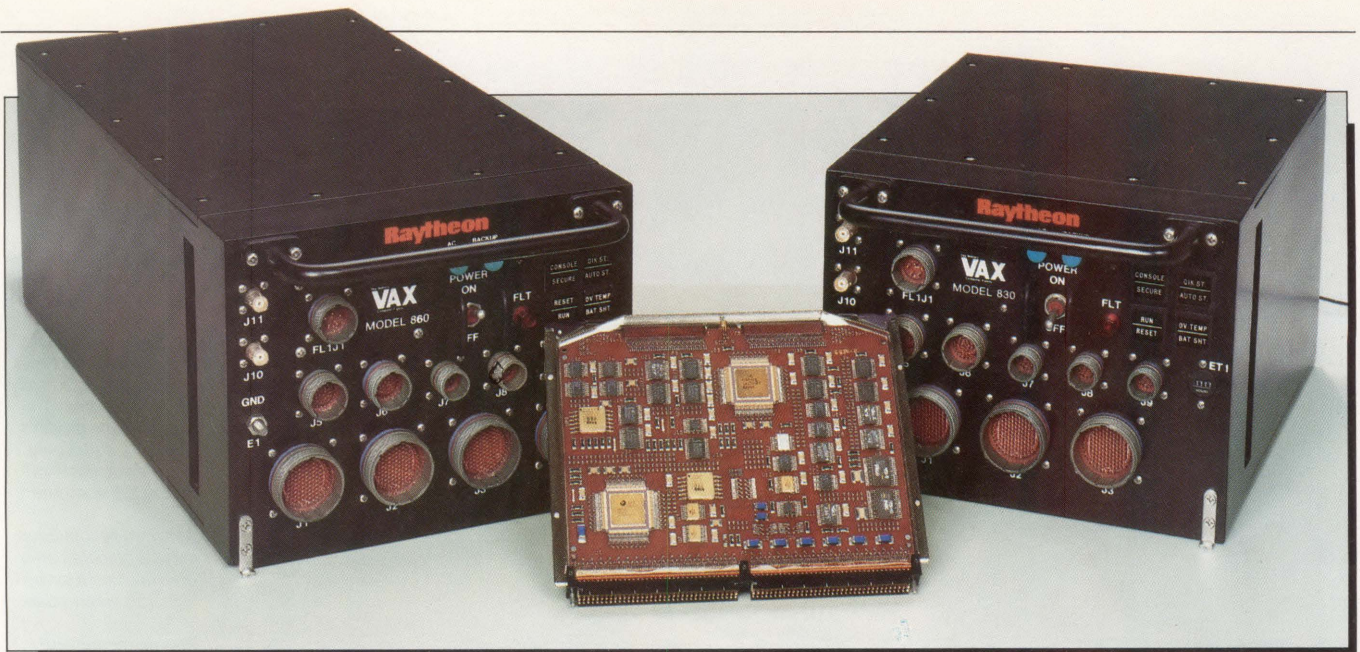
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Fax: 303/530-9329

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Phone: 49-69/6 66 65 97 Telex: 176 997 150
Fax: 49-69/6 66 67 38

Precision Visuals International Ltd.
United Kingdom
Phone: (0895) 35131 Telex: 51826715
Fax: (0895)72299

*Programmer's Hierarchical Interactive Graphics System
DEC VAX, VAXstation, and GFX-4000 are registered trademarks of Digital Equipment Corporation and Precision Visuals respectively



Raytheon models 860, 830 and 810 are military adaptations of the VAX 6200 computer and feature symmetric multiprocessing operating system, VMS V5.0.

Models 860, 830 And 810 Join Raytheon's Family Of Mil-Spec Computers

*Raytheon's Militarized VAX Computers
Provide Solutions For The DoD's
Aerospace And Defense Needs*

Raytheon Company of Lexington, Massachusetts, has unveiled its family of compact computers for military use, built according to military specifications (Mil-Spec) to withstand the extreme conditions of the battlefield; i.e., cold temperatures and radiation. Raytheon models 860, 830 and 810 have adapted the advanced designs of the 6200 series of high-performance, mid-range VAX computers.

The militarized VAX computers are targeted for a broad range of embedded real-time applications in aerospace and defense sys-

tems. Each of the Mil-Spec computers is a militarized copy of the VAX 6200 and is software-identical to existing and future commercial VAX computers. The computers are available in three environmental options: standard temperature (0 to 55 degrees C), extreme temperature (-54 to +71 degrees C) and radiation hardened.

The superminicomputer, model 860, is 0.88 cubic feet, 75 pounds and dissipates an average of 200 watts. The computer can be configured with 1 to 3 CPUs, providing a throughput of 2.5 to 7.1 mips, and is available with 16 to 48 MB of internal memory. A diag-

nostic processor connects to the board level diagnostic subsystem via an independent test maintenance bus and displays status on the module and front panel. The computer accommodates up to six I/O modules, covering a range of peripheral and DoD standard interfaces.

The minicomputer, model 830, features high-performance, 32-bit wide CPU with onboard 256-KB cache, 16 MB of RAM, and capacity for up to three I/O modules internally, plus optional I/O expansion. Model 830 is 0.59 cubic feet, weighs between 44 and 60 pounds and ranges in power from 139 and 242 watts.

The single board computer, model 810, boasts a high performance of 32-bit wide CPU, 512 KB of static RAM and 256 KB of ROM onboard. Memory expansion is available via RAM modules on a dedicated memory bus.

The 810 model is compatible with DEC software tools and compilers including Ada. There's real-time system support by VAXELN operating system. The 810 is a conductor-cooled, surface-mount technology module.

The computers use CPUs that are based on the CVAX chip set. These CPUs work together under the operating system approach known as symmetric multiprocessing. They combine compact size and low power requirements while meeting the rigorous specifications of the military user.

The Mil-Spec computers, models 860, 830 and 810, range from \$185,000 to \$500,000 based on throughput, memory, I/O and environment options.

For more details, contact Raytheon Co., Equipment Division, 528 Boston Post Rd., Sudbury, MA 01776; (617) 443-9521.

Circle 578 on reader card

—Suzanne Garr

It's just a matter of time. And money. You want to save the former. And make the latter. Terminals on your shop floor will help you do both—by extending your computer power to where the action is. 🟡 Obviously they can't be ordinary terminals. Shop-floor terminals have to be "hardened"—built to withstand the hostile environment. But at the same time they have to provide top performance, reliability, and value. 🟡 That's what you'll find in the Hardhat Series from GraphOn. Anything but ordinary, Hardhats provide the best DEC and Tek alphanumeric and graphics emulations—as well as all the other features of our full line of monochrome terminals—protected to NEMA-12 by our special no-fan, no-maintenance enclosures. And sealed Hardhat keyboards are full-function, full travel—and full feel. 🟡 Face it. You're going to put terminals on your shop floor. So get the ones that fit your needs. Phone GraphOn today and we'll bring you a Hardhat to try on. 🟡 1-800 GRAPHON.



GraphOn

CIRCLE 265 ON READER CARD



Face it.
You're going to put terminals
on your shop floor.



PLANTRAC/VMS Project Scheduler Aids Mega-Planners

Computerline's Decision-Support Environment Based On Database Manager

Software is becoming increasingly advanced in the world of project management systems. Sophisticated applications that look like VAX programs are running on micros. And, more important for the DEC market, powerful versions that tap the extensive resources of the VAX are starting to emerge.

Computerline Inc., a London, England-based mainframe and VAX service bureau, entered the project management market with PLANTRAC, a package for IBM PCs and compatibles in 1980. In 1987, with more than 2,000 PC users, Computerline applied its VAX expertise to move PLANTRAC to the VAX in BASIC.

Construction compa-

nies were early users of the system, picking up the advantages of the Critical Path Method (CPM) theory early on. Wally Pears, Computerline's founder and president, is a recognized CPM expert.

Companies involved in planning huge projects that require managing several subprojects, resources and budgets simultaneously, should benefit the most from PLANTRAC/VMS. In fact, these three aspects of planning comprise the organizational columns at the system's front end. A fourth column is for system variations, such as calendars and printing and plotting parameters. The theory behind the system's planning methods is to thoroughly correlate data

in its relational database to help project developers make informed decisions. For example, it's capable of determining resource leveling (how the allocation of resources affect project deadlines) or load leveling (how the number of workers and amount of work they can take on will affect deadlines).

Information is stored in multiple forms, to adjust for various start-dates and deadlines of subprojects. There are several user-selectable reporting options to accommodate this. The Report Writer has two selection screens, and reports can be sequenced according to priority, duration, etc.

Report files can be generated one at a time or batched. The software provides three formats for visually displaying schedules and other reports: the Precedence Diagramming Method (PDM), the Arrow

Diagramming Method (ADM) and bar charts.

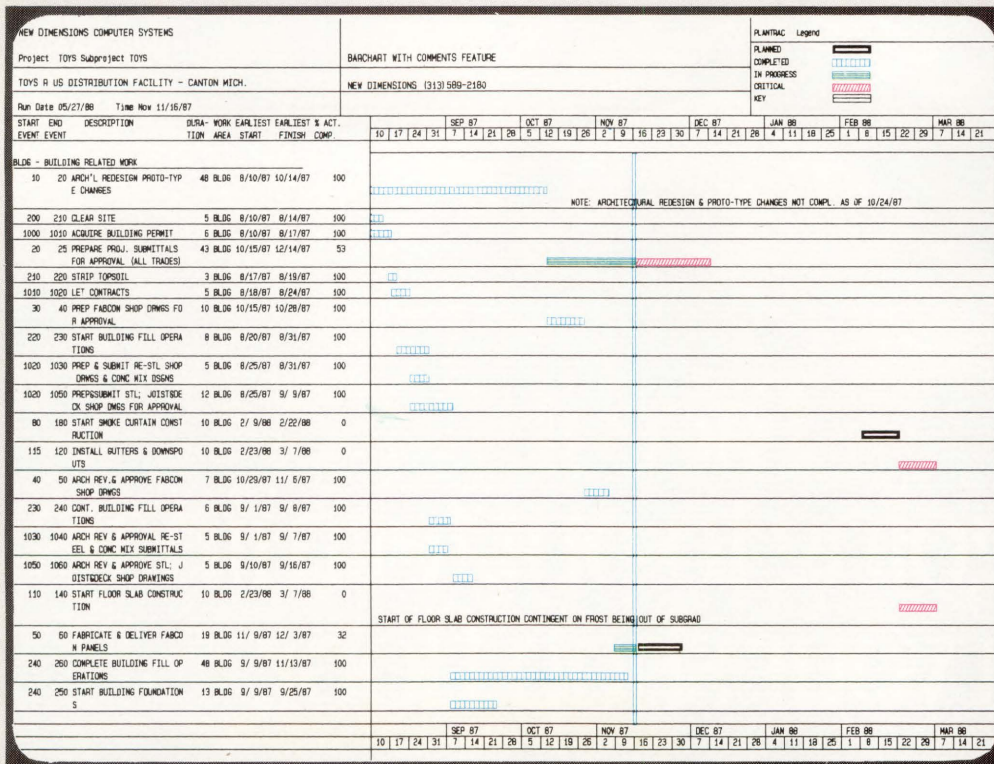
This year, Computerline integrated another facility, EASYPLAN, into PLANTRAC. "With its graphical front-end, EASYPLAN lets someone who isn't familiar with project management or PLANTRAC sit down with a computer and draw a logic diagram on the screen," explains Luis Gonzales, who's responsible for planning and tracking the certification of testing equipment at General Electric's Neutron Devices Department in Largo, Florida. "In the past, a manager would sit down with me and plan a schedule; then I would input the schedule into PLANTRAC. Now with EASYPLAN, the manager can build his own project plan."

A utility called OPEN-TRAC allows PLANTRAC/VMS users to extract data from ASCII files in other software packages, including 20/20, Oracle and Rdb, or transfer files to other databases and applications. Menus guide you through record selection and allow any field or combination of fields to be transferred, in any order.

Prices for PLANTRAC/VMS vary according to the number of users, while some software modules can carry an additional cost. Increments include a three-user license priced at \$5,995, a 10-user version at \$14,995 and a 25-user system at \$25,000.

For further information, contact Computerline Inc., P.O. Box 308, 52 School St., Pembroke, MA 02359; (617) 294-1111.

Circle 562 on reader card
—Evan Birkhead



PLANTRAC's color-coded legend specifies proposed and actual project lengths and deadlines.

Introducing the Ditto 320XL...

With More Than 15 Major Improvements over The DEC VT320* ... Perhaps DEC Should Be Emulating Us!



If you're looking to upgrade your DEC environment with a new terminal, don't settle for the limited features and functionality of the DEC VT320. The Ditto 320XL from Networx Data Products Co. has all the features of the VT320 plus over a dozen major improvements, including a 70Hz refresh cycle flicker-free screen, 2 standard and 6 optional pages of memory, an 80-132 column switchable "hot key", and 64K expandable firmware memory for custom OEM applications. And with our optional graphics upgrade (not available on the DEC VT320), you can create incredible graphs, charts, plots and drawings... without disturbing any of the 320XL's alpha-numeric features.

Even with all these extra features, the Ditto 320XL comes with a price tag that's hard to beat. And the Ditto 320XL is backed by a full, one-year nationwide service warranty. Another \$49 buys you a 3-year extended warranty available

directly from Networx.

Why settle for less. See why DEC users are calling the Ditto 320XL video display terminal the best value in today's market. For more information and spec sheets, write or call Networx today at 1-800-531-0019 or (516) 864-5800 within New York State. FAX 516-864-5875.

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CIRCLE 235 ON READER CARD

*DEC VT320 is a trademark of the Digital Equipment Corporation

Uniplex Emphasizes Integration And Multiuser Environments

Uniplex Business Software Executes Tasks Quickly And Efficiently

For some, combining word processing, spreadsheet, database and business graphics into a single package is impossible, but for Uniplex Integration Systems Inc. of Dallas, Texas, the task is simple. Uniplex has solved the demands of the working environment by developing Uniplex Business Software, which includes Uniplex II plus, V6.0 and two companion products, Uniplex Advanced Office System and Uniplex Advanced Graphics System.

Uniplex Business Software is available for VAX and MICROVAX computers running under the ULTRIX and Berkeley 4.3 operating systems. This single, fully integrated system means only one set of commands to master. And messages, menus, screens and softkeys are consistent across the entire system.

According to Steve Lee, APR, senior vice president of worldwide marketing, "DEC has driven the growth of departmental computing, and the increased penetration of ULTRIX and other UNIX-like operating systems among DEC installations makes it an attractive market for Uniplex."

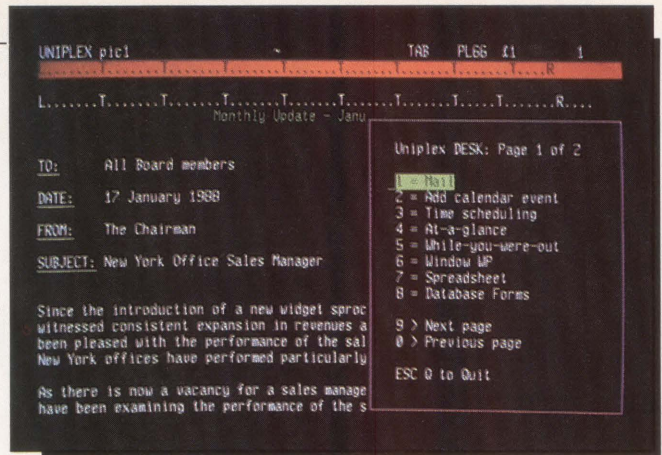
Uniplex II Plus, the base product, is a fully integrated, multiuser office system for UNIX-based computers, which combines word processing, spreadsheet and a

relational database into a single package. Uniplex II Plus also includes screen and menu-building capabilities and business graphics.

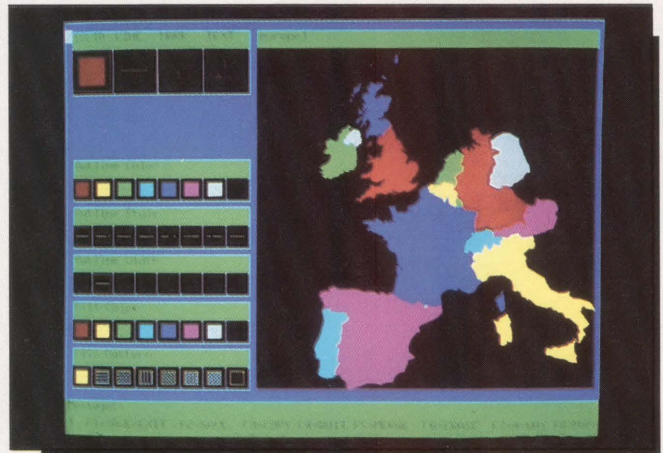
The ability to communicate information both within an organization and to the outside is crucial to today's office. Uniplex addresses this issue with the Advanced Office System, a companion to Uniplex II Plus. The Advanced Office System provides the necessary components for effective group working: electronic mail, time manager, card index, personal organizer and a report writer.

According to Xev Gittler, system programmer at MIT's Health, Sciences and Technology Department, "The Advanced Office System is the simplest for someone who has no documentation in front of him. This system enables him to hop right on our MICROVAX. We have 500 users in remote locations, making it difficult to teach them, so this package enables them to learn the system easily. For us, it's the most intuitive package."

Presentation is becoming an increasingly important factor in business communication. The Advanced Graphics System allows use with high-resolution terminals to offer a range of charts, graphs and freehand drawing capabilities with Presentation Graphics and Presentation Editor. All products are fully integrated at the source code level with



The Advanced Office System is accessible from any screen using a convenient pop-up window.



Uniplex Presentation Editor allows users to use freehand drawing and tracing ability to create eye-catching graphics. This map of Europe was traced in minutes, then each country was filled with a different color.

all functional areas of Uniplex software.

Pop-up menus, which can be accessed while in any component of the Uniplex package by pressing a single key, are the user's primary tools for navigating through the system.

An enhancement to V6.0 is the windowing feature that allows users to toggle between processes. If a user is in one window and wants to return to a preceding window, he can use the Escape XS function. If he needs to know what other processes are open, the Escape XP

function will list what processes currently are running. According to David Leoning, U.S. public relations director, "The windowing feature is a significant enhancement to V6.0."

Uniplex Business Software ranges from \$2,495 for Uniplex II Plus on a MICROVAX 2000 to \$61,185 for three components of Uniplex Business Software on a VAX 8800.

For further information, contact Uniplex Integration Systems Inc., Suite 1300, Glen Lakes Tower, Dallas, TX 75231; (214) 373-4971.

Circle 579 on reader card

—Suzanne Garr

ARSAP™

VMS V5
COMPATIBLE

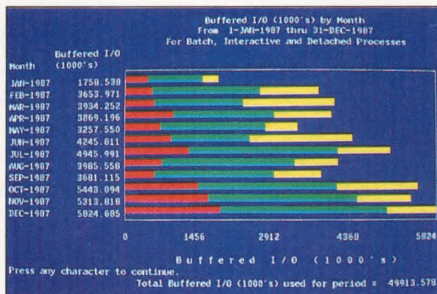
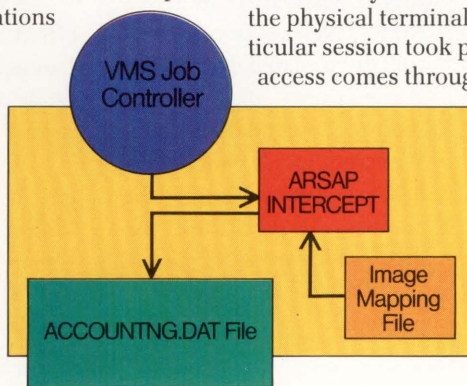
The system accounting product that stacks the DEC™ in your favor.

With ARSAP you can do it all. Everything from capacity planning to performance management to project accounting. ARSAP was designed to work with VMS, so you don't need to change your operating procedures to put this comprehensive system to work for you. And because of its exclusive options, ARSAP is the most efficient and powerful system accounting product available today.

Manage users and control project costs using ARSAP reports.

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Only ARSAP allows you to select and report on the specific applications you choose, instead of the familiar "all or nothing" alternative offered by other systems. This valuable option saves thousands of I/O's to your system disk and reduces the space requirements of accounting files by as much as 90%!



Analyze historical data to plan system resources required for future growth.

Disk Management and Global System Reporting aid long-term capacity planning.

With ARSAP, you can generate easy-to-read bar chart capacity reports for any accounting statistic available from VMS, including CPU time, memory utilization, buffered I/O's, direct I/O's, connect time, and more. And our disk management reports identify amount of space allocated to each user and total amount of free space remaining.

Terminal Reporting tracks usage for control and troubleshooting.

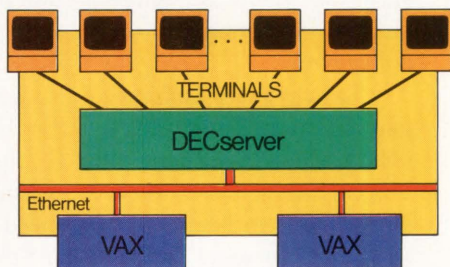
ARSAP's exclusive terminal reporting feature lets you track usage and locate the physical terminal on which a particular session took place, even when access comes through virtual terminals, Intergraph™ workstations or DEC servers (LATs).

Intergraph™ workstations or DEC servers (LATs).

Use "ARSAP Intercept" to automatically select image data for software reporting.

Get the details on ARSAP today.

ARSAP (version 6.0) is the product of 11 years of system accounting design. No other software package is better suited to your DEC system or your system accounting needs. Only ARSAP offers you a complete solution. For more information about how ARSAP can meet your needs call GEJAC today.



ARSAP gives you the "evidence" to effectively allocate limited hardware among users.

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I have these VAX/VMS systems:

of systems _____ Model #'s _____

ARSAP is a registered trademark of GEJAC, Inc. DEC is a registered trademark of Digital Equipment Corp. Intergraph is a registered trademark of Intergraph Corp.

Western Union Provides Insurance Communication

InsLink Enables Agents And Insurance Companies To Exchange Information

It's an understatement to say that the insurance industry is paper intensive. Consider all the rates, underwriting requirements, types of policies (life, health, property-casualty) available from thousands of companies. How's an agent supposed to remain aware of all this data?

Conversely, when a policy applicant is waiting for his new policy so he can drive his spiffy car out of the showroom, he doesn't want to hear about delays, while the insurance carrier asks the agent for additional information pertaining to the policyowner.

To help speed communications in the insurance industry, Western Union, of Upper Saddle River, New Jersey, plans to begin marketing in September a transparent electronic interface among agents and insurance companies. The interface is called InsLink.

Matthew Lampell, director for industry marketing at Western Union, sums up the system as "an application to transport data and information between the agent's office and the insurance office."

Here's how it works. Suppose a person wants a homeowner's policy for his new house. To apply for one, he goes to the XYZ Agency in his hometown.

The agent takes down the pertinent information

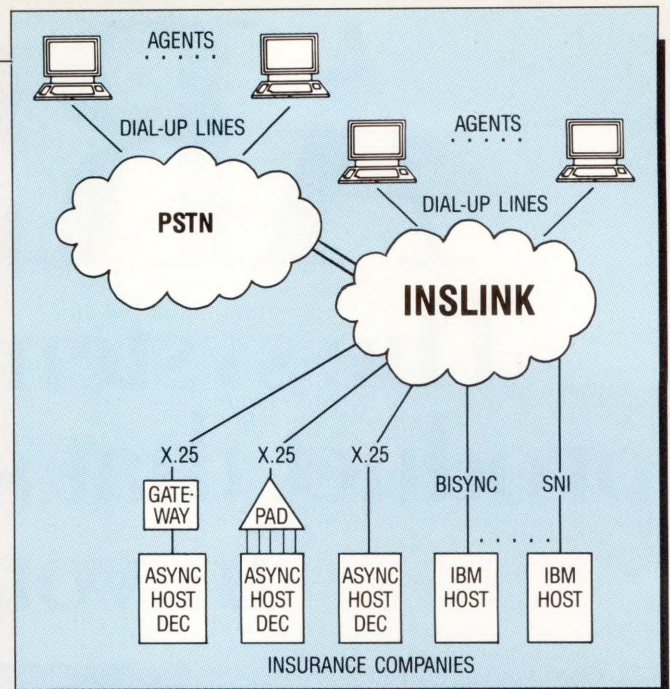
and sends it through InsLink to get rates from a variety of carriers. The agent decides that the applicant gets the best deal from an insurance company 1,000 miles away.

He submits the application through InsLink, which automatically translates the application into the standard format desired by insurance carriers. InsLink can send a message back to the agent, requesting additional information, and the agent sends the answer through InsLink. Then InsLink notifies the underwriter that the application has come in for review and approval. At that point, the policy is processed, and it's sent to the agent.

Information can be sent to the carrier by dial-in, scheduled delivery or a high-speed link between InsLink and the company mainframe and/or office messaging system. The method of delivery from InsLink to the company depends on the traffic level and can change as that changes. There also can be ASCII/EBCDIC translation.

Information can be sent to two different addresses at each company, one for policy type data and the other for text. It facilitates delivery direct to the correct system, which saves effort for the addressed company.

Furthermore, InsLink takes advantage of Western Union's myriad electronic services. For instance, a company with a proprietary system can communicate with



Western Union's InsLink provides communication and transmission of data among agents and insurance companies.

agents outside that system, and InsLink can provide these agents with the ability to reach other insurance companies. InsLink also permits electronic messaging to adjustors, reinsurance companies and others.

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For more information, get in touch with Western Union Corp., One Lake St., Upper Saddle River, NJ 07458; (201) 825-5000.

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—Karen Detwiler

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Data Sharing

in a

VMS/UNIX ENVIRONMENT

A LOOK AT various types of data sharing techniques.

BY ROBERT W. TAYLOR, Ph.D.

IF EVERY PERSON, program and organization were an island of information, users and corporations wouldn't want to share information. But, programmers work in teams, organizations are split into functional areas, large organizations are split into smaller units and laws require that individuals, organizations and governments keep records and share them.

Computing technology has changed radically during the last 30 years, and the definition of data sharing has changed, too. Data sharing used to mean all the applications that ran on a given computer could share common data. In today's environment, multiple workstations, minicomputers, large computers, from a variety of vendors

and using a variety of operating systems, need to share data.

The reason is the same as it was three decades ago: When everyone is working from the same set of facts, decisions are made faster and more accurately. How many times has your program failed, because someone changed the control block structure, the screen name or the file format, and you didn't find out in time?

Organizations do the same thing. Engineering changed a part number, but Purchasing didn't find out about it in time and ordered the wrong thing.

Mistakes cost time and money. Data sharing is the ability to have everyone working from the same set of facts, even in the face of distributed data ac-

cess and processing. Data sharing helps solve problems. Let's analyze the kinds of data sharing that are possible today and look at illustrations of their benefits.

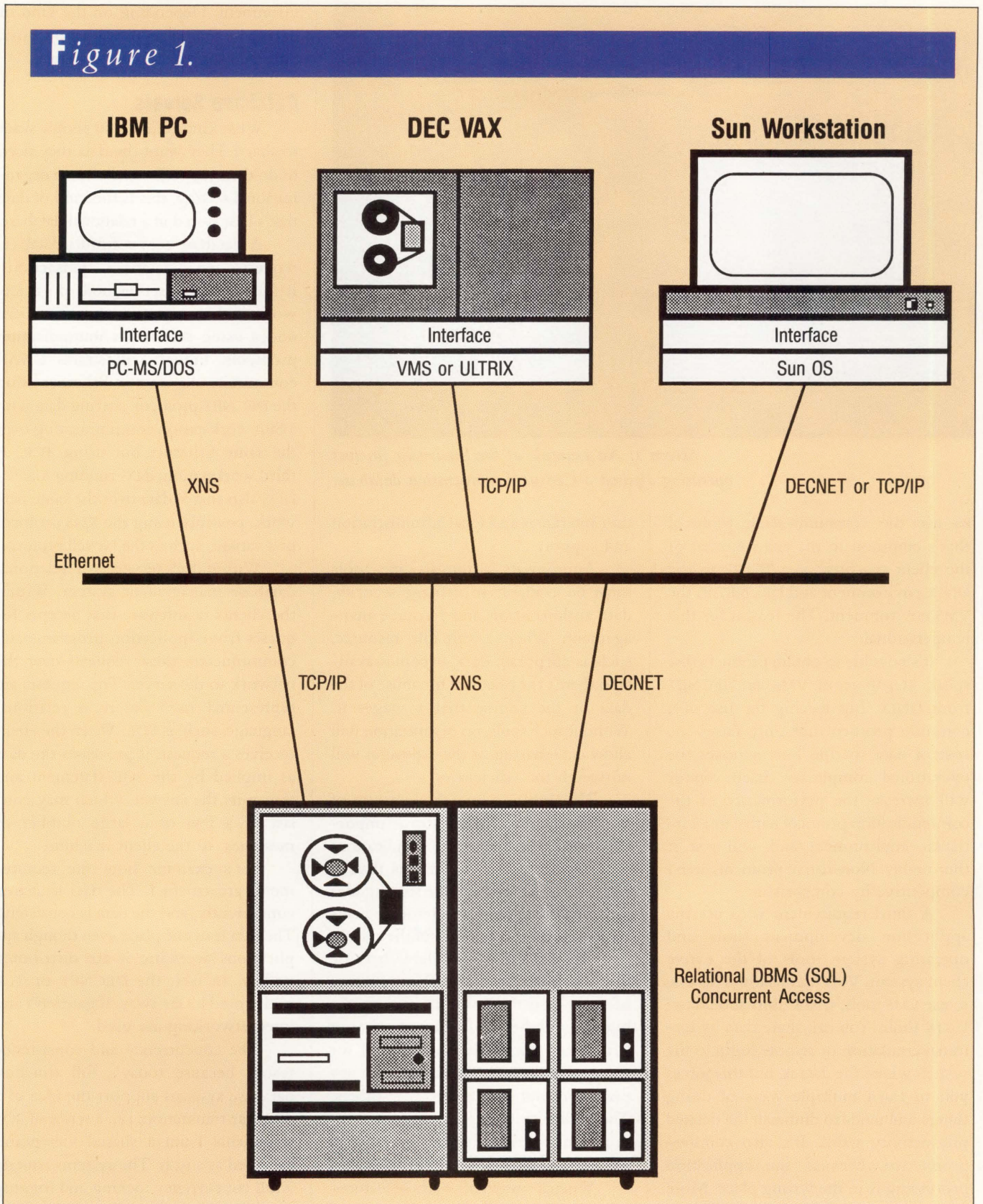
What's Required

Given a mixture of VAX machines, some running VMS and some running on ULTRIX, or a mixture of VAX/VMS with Sun workstations running the Sun OS variant of UNIX, what are some requirements and desirable features of this shared environment?

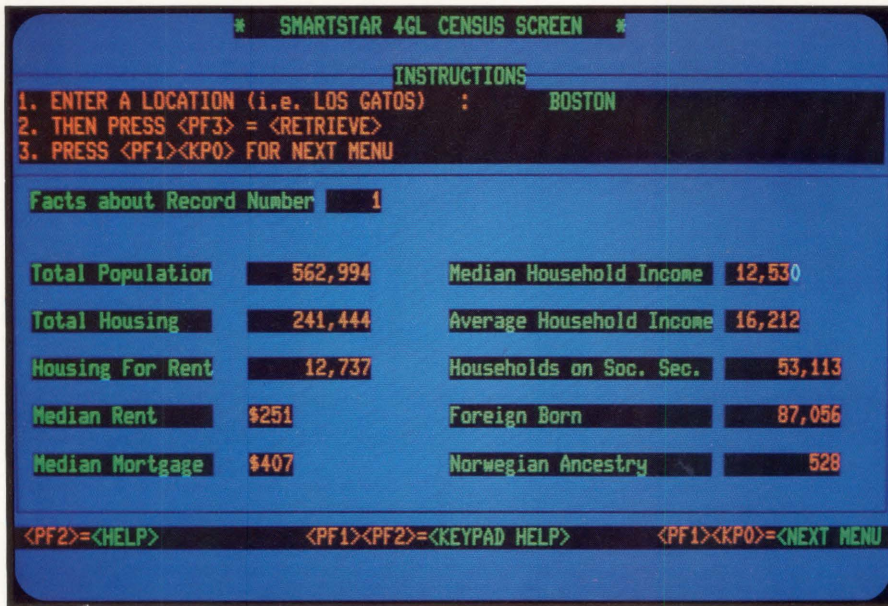
The first requirement is consistent, concurrent shared access to a common database. Response should be fast enough to accomplish useful work; otherwise the service won't be used.

A second requirement is to be able

Figure 1.



Data server architecture.



Screen 1: An example of the Smartstar product operating against a Census demonstration database.

to use the communication protocol that's common to the environment of the client machine; i.e., TCP/IP in the UNIX environment and DECNET in the VMS environment. The reason for this is operational.

It's possible to obtain products that speak TCP/IP from VMS or DECNET from UNIX, but forcing the use of a common protocol not only raises the cost of data sharing but increases the operational complexity. Each vendor will increase the performance of the communication protocol native to a particular environment and will test it thoroughly. Non-native protocols aren't competitive by comparison.

A third requirement is to use the application development tools and operating system tools of the native client system. VMS users should be able to use VMS tools; UNIX users should use UNIX tools. You can share data by terminal emulation or remote login to the system where the data is, but this forces you to learn multiple ways of doing things and tends to diminish the desired productivity gains. It's also counter-productive, because the application processing is in the wrong place. More applications are moving near the user. This allows sophisticated and friendly

user interfaces and local administration and support.

Appropriate administrative tools must be available to manage security, data authorization and resource management. When a valuable resource, such as corporate data, becomes available, there's the potential for abuse of the data or the engine that manages it. Without such tools, no organization will allow data sharing, as the exposures will outweigh the efficiencies.

The ability to tune the behavior of the data-sharing engine also is important. Inevitably, some of the applications will have response constraints that, if not met, will mean that the sharing idea can't be used. Tuning and resource management tools must be part of the system.

The data must be available, because if not, it will affect an entire community of users, and the more it's shared, the bigger will be its impact if it's not available. Lack of data availability for short periods isn't critical in some applications, but it's disastrous in others. The ability to configure and share redundant copies of the data go hand in hand with the data-sharing concept.

When a system offers these features, you can expect to realize the benefits of sharing data in a heterogeneous en-

vironment. Depending on the kind of data to be shared and for what purpose, different approaches are available.

Database Servers

What kinds of data do people want to share? They want the data they need to do their jobs effectively. In an organizational setting, this is the kind of data that's best stored in a relational database.

A database server fulfills database requests; i.e., database transactions. It functions as a server node on a network and communicates with client nodes using standard communication protocols. Figure 1 illustrates a VAX communicating over an Ethernet using the DECNET protocol, sharing data with a Sun workstation communicating over the same Ethernet but using TCP. A third workstation, a PC running MS/PC-DOS also shares data over the same network, possibly using the XNS protocol or a variant, such as the Novell protocol.

Within the server is a relational database management system. Within the clients is software that accepts requests from application programs and communicates these requests over the network to the server. The requests are represented in a common relational language, such as SQL. When the client receives a request, it processes the data as implied by the SQL statement and transmits the answer, which may consist of a few or a large number of messages, to the client machine.

Let's examine how the requirements are satisfied. The data is shared concurrently, and the data is consistent. The data is in one place, even though applications accessing it are distributed widely. In fact, the DECNET or TCP node could be far away, if gateways and internetworking are used.

The concurrency and consistency result, because today's full function database systems support the idea of a database transaction; i.e., a series of SQL statements from a shared viewpoint, executed as a unit. The systems contain a full concurrency locking and logging capability to ensure data consistency regardless of conflicts in access. The log-

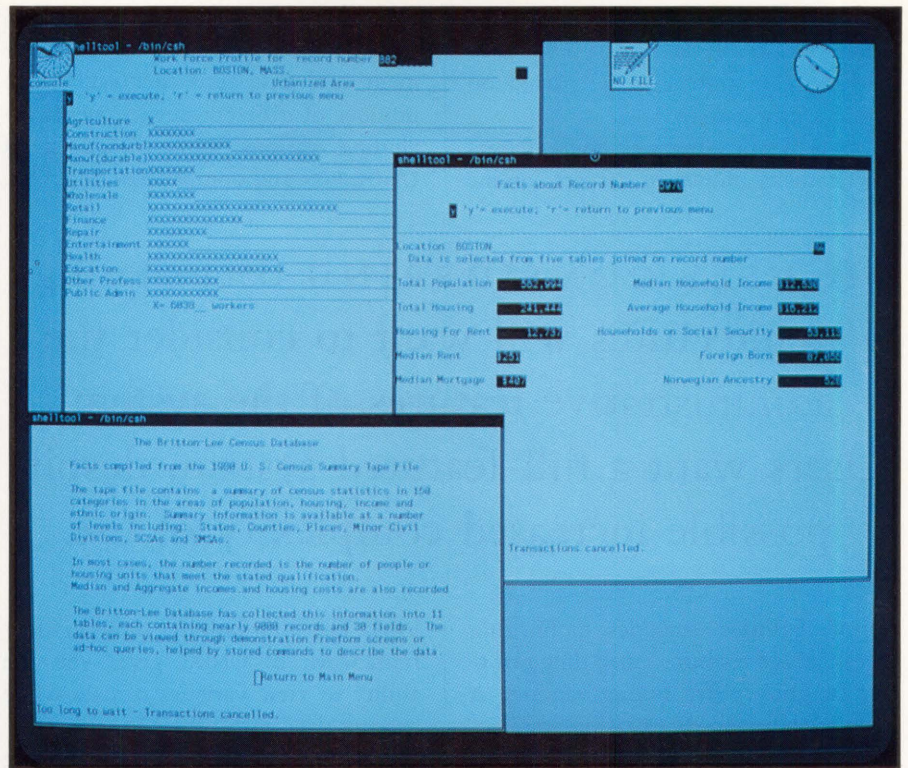
ging mechanism ensures database consistency even if there's a machine failure.

Database servers isolate the details of the communication protocols in a separate portion of the system hardware and software. By the time the database transaction request reaches the main database software, the details of how this request reached the server software have been stripped away. It's possible to use many protocols and different physical communication media while still retaining the ability to share.

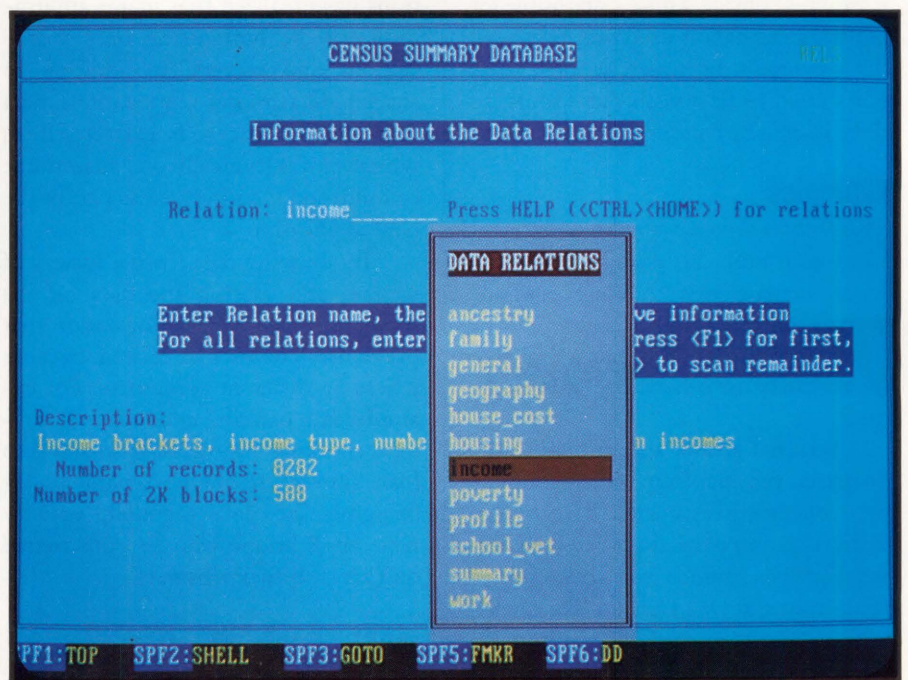
It's impossible to hide the nature of the client computer architecture from the server. Character strings are represented in different character sets (e.g., ASCII and potentially EBCDIC with IBM clients), floating point representations are different, and byte streams arriving from a client machine can reflect the byte ordering characteristics of the client (byte ordering in a VAX is different from an Intel 80xxx). The software has to be prepared to deal with these issues.

The software on the client side is running in the native operating environment of the client machine. To share data, it's necessary to have this software communicate through the Interface Library as shown in Figure 1. The entry points in this library allow SQL requests to be submitted, answers to those requests received, and status and exceptional conditions handled. There often are a number of utility tools provided as part of a standard package. Because of the high level of the SQL language and the rapid convergence of the ANSI SQL standard, it's not difficult to adapt a tool to this interface, provided it was built with a relational database in mind.

Administrative tools and availability features are paramount. The availability of these tools tends to vary from one vendor to the next, as that area isn't covered by the SQL standard. The SQL language provides GRANT statements for allowing certain users or user groups the ability to perform certain operations. The VIEW mechanism of the SQL language allows a database administrator to restrict a user from viewing or manipulating certain restricted columns,



Screen 2: Screen being developed using JAM, the JYACC Application Manager running on a PC.



Screen 3: Screen being developed using JAM, the JYACC Application Manager running on a PC.

and the restrictions can be on a value basis. Using GRANT and VIEW statements, restrictions can be placed on what a user can do.

Availability features, such as mirrored disks, duplexed servers, online

is Freeform from Dimension, a portable, screen-oriented application development tool that runs identically in a number of different environments including various implementations of UNIX, PCs and compatibles and VAX/

A file is a collection of data whose semantics are known to one of a few applications. The definition of the data is with the program that uses the data, not with the data and separated from any particular use. This is the difference between file and database processing.

File servers know about files; i.e., how to open them, close them, provide pages or records from them, etc. A file server generally doesn't know about the internal field structure nor whether there's a data manipulation language, such as SQL, that can be used to search for data by content. Searching by content occurs in the processing program, not in the file server.

File servers are useful when the unit of sharing doesn't depend on this knowledge of internal data structures or when there's little searching to do. For example, program libraries rarely are searched by content, and normally the whole program module is accessed by the loader. To maintain consistent, shared copies of program libraries, a file server is a perfect choice. Document libraries accessed by a word processor are accessed in their entirety, and there's little, if any, searching to do in the file server when accessing a document. A file server will do the job.

But when the unit of sharing is a piece of a database, there are different requirements. Usually, the size of the database is larger than the size of a file holding any particular program or document. If the system moved the entire table in a relational database across the network to the database search software running on the workstation, this would be slow and clog the network for other uses.

It makes more sense to move the database processing software onto the server. To do this, you must have knowledge of the data on the server, not in the applications. Even when the database software is moved to the server, it's important to minimize network traffic. Relational systems are the only kind of database software systems that fit this requirement. Previous database technologies were more navigational in that

A USER CONSIDERING data sharing architectures will want to consider the administrative features of the system. Users want a full-featured system, despite possible increased complexity of use.

dump facilities, statistics monitoring facilities and resource scheduling priority facilities, differ among vendors. A user considering data sharing architectures will want to consider the administrative features of the system. Users want a full-featured system, despite possible increased complexity of use. As data sharing becomes more widespread, it requires control. Those responsible for ensuring the data is used properly need these controls. Fortunately, most users don't need to deal with these tools, so their increased complexity is localized.

Examples

This section shows examples of different front-end tools accessing a database server concurrently. A static example, such as this one, fails to convey that the data updated by one client is available immediately to others, but this is the case.

Screen 1 shows an example of the Smartstar product from Signal Technology, operating against a Britton Lee demonstration database called the Census Database, which is a collection of facts from the 1980 Census. The screen is a combination of five separate relational tables, combining facts about Boston.

Screen 2 shows screens from the Census database running on a Sun workstation. The tool used in this screen

VMS. The multitasking, multiwindow framework of UNIX, gives you the ability to view varieties of data while sharing data with others.

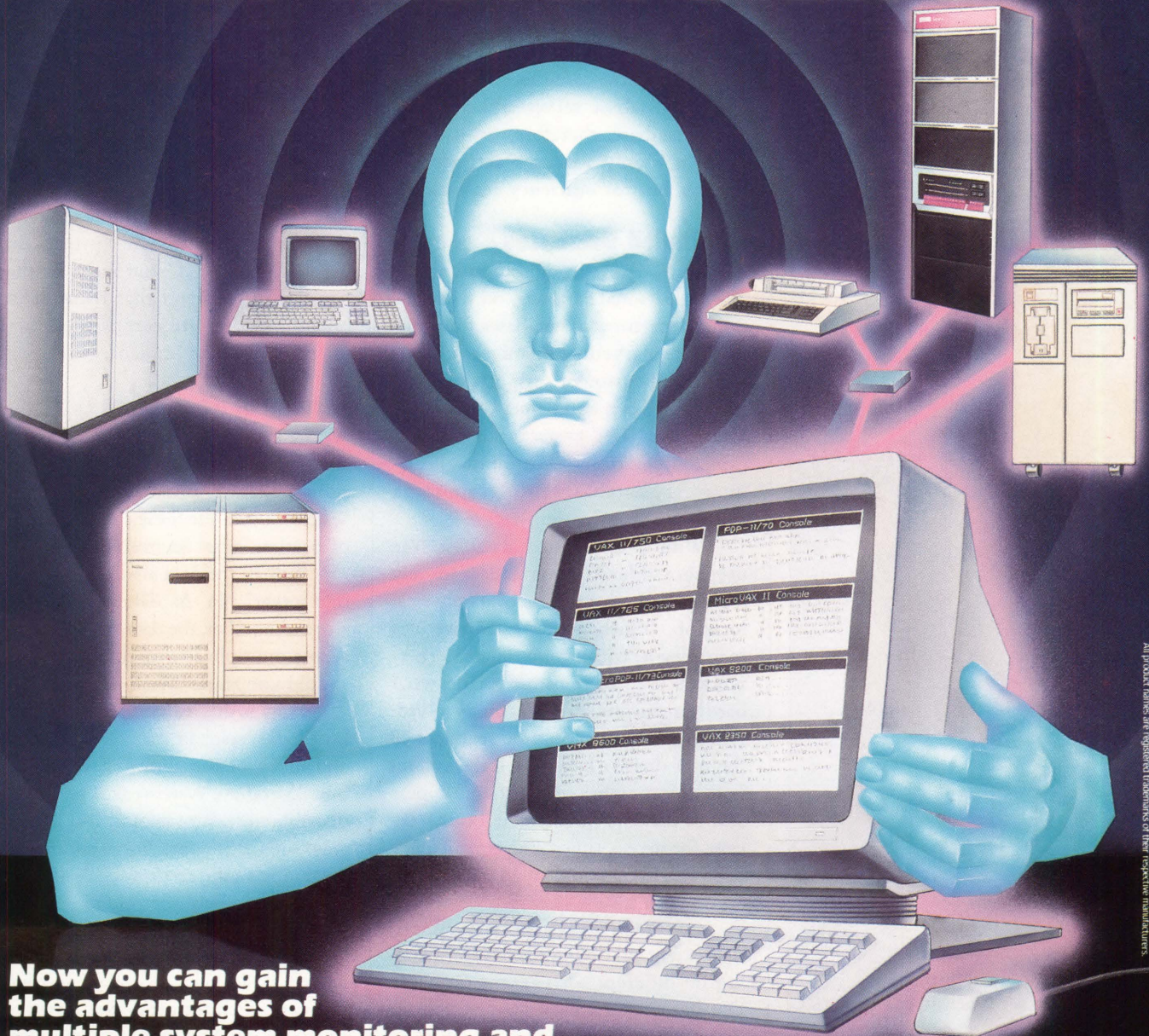
Screen 3 shows a screen being developed using JAM, the JYACC Application Manager running on a PC. As PCs and workstations have become widely used and networked, organizations have realized that major applications can be built using only workstations and servers. In addition to sharing data among workstations, data sharing allows data to be extracted from wherever it is (typically on a mainframe or mini) and incorporated as part of the new application.

By drawing data from a variety of sources and placing the data on the server, you can relate information that previously couldn't be related, because it was on different computers. For example, in a banking situation, the savings, checking, mortgage, trust and auto loan systems might be separated. By bringing the data together, entirely new applications can be constructed quickly and inexpensively.

What About File Servers?

How is data sharing using a database server different from using a file server? The answer lies in the kind of data being processed and the division of computer resource that results.

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users traversed specified paths to associate different parts of the database. Even now, such a mode of access has some appeal, as shown by the current popularity of hypertext systems.

But from a server architecture point of view, it would be an impossible situation to send a pair of network messages for every traversal across every link when searching for data. A way is

needed to express search requirements in an access path independent way, such that a relatively short message can trigger a large amount of processing on the server. SQL and the relational model fit this requirement exactly. No other database model has demonstrated its ability to do this at the same level. The concepts of database server and the relational database, therefore, go hand in hand, not only for user accessibility reasons, but for efficiency reasons.

Distributed Databases

Databases exist throughout any company in personal databases on workstations; departmental databases for functions like marketing, finance, manufacturing and customer support; regional databases when companies are regionalized; databases overseas for international operations; corporate headquarters databases for reporting regulatory information, etc.

With a distributed database, the user should have access to data for any legitimate use regardless of its physical location, which vendor's software is managing it, which communication network is used to transmit it, and what hardware incompatibilities are involved. Also, the access should be seamless so the user doesn't have to tell the system how to accomplish this; it should appear as if all the data were stored locally (except for access times and concurrency delays). This is a noble goal. Who could argue with it?

Of course, no system can do this to that extent. Various vendors are working on different parts of the problem. Database experts have defined various key points that they feel the ultimate distributed database should meet. There are difficult technical problems to be solved to realize this goal:

1. The various data dictionaries in a heterogeneous environment must be reconciled.
2. If data changes must be accommodated, rather than only queries, the system must handle advanced locking, deadlock detection and transaction commit protocols.

3. If there are multiple communication networks involved, there are the problems of administering a large, potentially multivendor network.

4. The problem of administering on a distributed basis all the access to various kinds of data, and the problem of predicting and controlling the impact on network and computer resources of all this unpredictable data access, are frightening to database administrators.

It seems that distributed databases are everyone's goal, but there are many lessons yet to be learned. I predict that users will proceed cautiously, as they come to understand that truly distributed databases are complicated, both for machines and humans.

Trends For The Future

We have seen examples of how data sharing is possible today. But, extensions are clearly possible and desirable. Who will provide these and what kinds of barriers must be overcome?

Will all the data always be on only one server? No. As databases grow in size and number, the data should be split across multiple servers and the servers should cooperate when necessary.

How is this different from a distributed database? In many ways it isn't, and many of the algorithms in distributed database systems will be used in distributed server systems. But in some ways, it's different. For example, the need to have the servers speak differing network protocols or able to deal with differing server architectures is less compelling than the need for the clients to speak different protocols and have different architectures. By having a relatively small (a few to a few dozen) server serving hundreds or thousands of clients, it's possible to blend the two technologies in complementary ways.

Another development that seems inevitable is that file servers and data servers will cooperate more fully than they do now. Whether file servers and database servers merge into a common server is a matter of technical debate at the moment. But the ability to combine relational data and other less highly

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structured data is desirable, and there are many advanced development projects exploring this.

The development of standards and

forts in all these areas. How fast these separate efforts are brought together depends on how quickly the user community demands that it happen. More

HOW IS DATA SHARING using a database server different from using a file server? The answer lies in the kind of data being processed and the division of computer resource that results.

open interfaces in the areas of computer-to-computer communication, database languages, operating system environments, data interchange formats and data dictionary representations are required to achieve the kind of data sharing users need. There are standards ef-

vendors are realizing that users want commitment to standards and open interfaces, but few vendors have committed to all the standards that will be necessary for ultimate data sharing.

There also will be a need for additional system integration. It's possible

for competing vendors to meet a given standard and still be unable to share data in a meaningful way. It's often in the interest of a given vendor to make it difficult for a customer to replace one offering with a competitive one. Thus, the role of the system integration company, specialists in making a variety of heterogeneous systems work together, will become more prominent.

Larger companies will take on this role themselves. Smaller companies will depend on vendors of packaged systems to work out these problems. The good news is that data sharing in a wide variety of environments seems unstoppable, and the end users will benefit. — *Robert W. Taylor, Ph.D., is senior vice president of Strategic Partnering at Britton Lee Inc., Los Gatos, California.*

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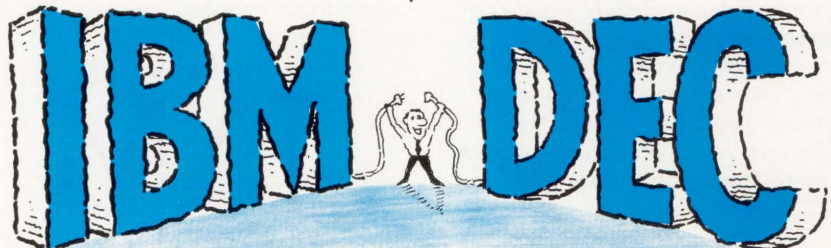
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THE 2.10BSD UNIX operating system offers

enhancements over 2.9BSD. BY DONNALYN FREY

THE COMPUTER SCIENCE RESEARCH GROUP (CSRG) of the University of California at Berkeley, recently released 2.10BSD, a new version of the 2.9BSD UNIX operating system for PDP-11 computers.

The 2.10BSD has been written as a basic port of the 4.3BSD UNIX operating system for PDP-11 computers. The CSRG chose to make 2.10BSD compatible with 4.3BSD to allow networking between the operating systems, and because 4.3BSD is a reliable, fast and efficient operating system. Compatibility with 4.3BSD also allowed applications to be ported easily and internetworked between the two operating systems. In addition, it's an inexpensive upgrade to the UNIX operating system for sites not running UNIX on their PDP-11 computers and is the fastest operating system available for the PDP-11 computer.

The 2.10BSD operating system was

written by Keith Bostic of the Computer Science Research Group of the University of California at Berkeley, and Casey Leedom of the California State University, headquartered in Long Beach. The two programmers wrote it in 10 months of intensive full-time effort, devoting three man-years of effort to the project.

New Features

The 2.10BSD has several new features beyond the 2.9BSD system. These features include 4.3BSD TCP/IP networking, a 4.3BSD source code hierarchy, 4.3BSD system calls, symbolic links, a random access memory (RAM) disk and many new peripherals. Supported networking hardware includes ACC and DEC/CSS IMP Interfaces, 10M bit/s Ethernet (for three different controllers), 3M bit/s Ethernet and Proteon PRONET. Serial line IP (SLIP) is also available. Net-

working support is available only for machines with supervisor mode and separate instruction and data space.

The 2.10BSD compiler has been improved to produce faster code and to handle more C functionality, including the void type, various unsigned bit fields and global structures with identically named elements. The 2.10BSD allows programs to have up to 15 text overlays, permitting much larger text spaces than previously possible. The 2.10BSD has benefited from the extensive work done by the CSRG with 4.3BSD to make the kernel code cleaner and the system faster and more efficient.

Providing 4.3BSD compatibility in 2.10BSD has many advantages for sites running 4.3BSD. The different operating systems now can run the same networking protocols and software and, with minimal changes, the same applications software. The list of changes made in

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2.10BSD to create this compatibility is extensive; here are some of the major changes:

1. All the 4.3BSD system calls, such as mkdir() and rename(), were ported to 2.10BSD. This also includes signal facilities, time-of-day calls, file locking, multiple groups and expanded ioctl functionality. This allows code written for 4.3BSD to run almost unmodified on 2.10BSD.
2. The 4.3BSD C library was ported directly to 2.10BSD. This allows code written for 4.3BSD to run unmodified on 2.10BSD.
3. Approximately 95 percent of the 4.3BSD application program suite was

ported to 2.10BSD, allowing 2.10BSD to handle programs that were written for 4.3BSD.

4. The addition of symbolic links to 2.10BSD provides 2.10BSD with environmental compatibility with 4.3BSD.

Besides making 2.10BSD compatible with 4.3BSD, its kernel speed was increased. Some of the major changes are:

1. Clists are doubled in size and faster. Clists are the structures that contain the characters entered through serial lines; e.g., from a user's terminal. The bigger structure allows the operating system to devote less time to copying and changing clists. The kernel routines that manipulate the characters inside the clists were completely revised for speed.
2. In-core copies of file system inodes now contain the access, modify and change times. This results in major speed improvements in programs, such as Make, that repeatedly access the modification times of files.
3. Process ID hashing was added. In 2.9BSD, the process IDs were stored in a large array. To allocate a new process

ID, or to find a current ID, the program had to step through this array, a fairly slow process. The 2.10BSD uses a hash table to locate current process IDs quickly and maintains a list of available process IDs for quick ID allocation.

4. New, fast routines were added for copying data in and out of kernel space. The 2.9BSD and other older versions of UNIX transferred characters one at a time to or from user space and required multiple subroutine calls per character. In 2.10BSD, transfers are done in large chunks. For large transfers, kernel mapping is altered to allow direct memory-to-memory copying.

5. Programs now are cached in memory. After a program is loaded into core memory, it's retained until that memory is required for another purpose. On PDP-11 computers with large amounts of memory, this results in speed improvements. A cached program begins running in approximately one-seventh the time required by previous UNIX versions.

The 2.10BSD UNIX operating system will run on most PDP-11 computers. Because of a much larger kernel and various data space and speed trade-offs, it's intended for use with the PDP-11 44/53/70/73/83/84. A minimum of 1 MB of memory is recommended for reasonable performance.

The 2.10BSD operating system from Berkeley CSRG is being distributed by the USENIX Association. The release isn't supported by the CSRG. However, updates to 2.10BSD may be forthcoming.

Although it's an unsupported release, users with technical questions on the 2.10BSD operating system can contact Keith Bostic of the CSRG by electronic mail at keith@okeeffe.berkeley.edu or by telephone at (415) 642-4948. *Author's note:* The author wishes to thank Keith Bostic of CSRG, who provided much of the technical information included in this article. —Donnilyn Frey is technical writer for Frey Communications in Fairfax, Virginia.

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The Sherrill-Lubinski Graphical Modeling System (SL-GMS 3.0) is an off-the-shelf software product designed to speed up your development of interactive graphics. With it you can build your own screens, displays or custom graphical interfaces.

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SL-GMS is fully compatible with standard graphics packages such as GKS, CGI, IRIS-GL, X Window and CORE, among others. Normally to exploit the versatility of standard packages a great deal of code has to be written to control the graphics functions at the low level. SL-GMS eliminates this step to give users unprecedented speed and directness. Without time consuming development or study of low-level graphics functions you can easily create anything from simple screens to fully articulated dynamic visualizations.

SL-GMS handles the tasks of creating, modifying, saving, filing and displaying graphics. All calls to standard display packages are made for you by SL-GMS.

Your screens can be driven from a great variety of data streams such as external real-time sources, direct conversational input, deeper underlying models, mathematical expressions and from SL-GMS scripts for quick design evaluation and simulation.

SL-GMS supports 2D modes of operation in an integer coordinate system. It has all standard graphics primitives, including splines and bit maps, and offers hierarchical models and groups.

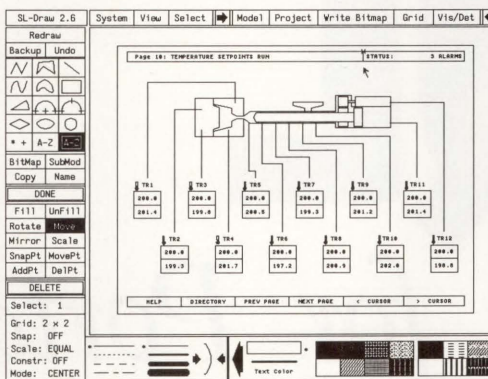
This high-level graphics management approach takes all the time and work out of handling graphical data objects. As a result you write much simpler programs to bring up screens, make changes and access objects by names you choose.

Using SL-GMS Development tools

The **Graphical Model Editor** (SL-DRAW) is shown above, composing a process visualization screen. SL-DRAW allows you to edit, modify, combine and file screen icons and objects which are supplied by SL-GMS—or you can easily create your own. By making appropriate menu selections or by drawing with the mouse, display screens are composed effortlessly. Attributes such as line style, width, and color may be quickly selected or changed. Objects can be moved, scaled, rotated, or mirrored. Libraries of user-defined graphics symbols may be created and referenced from many different screens.

In its dynamics mode SL-DRAW contains additional menu options which allow you to make direct associations between the iconic objects on a screen and variables in your data base. The coherent binding of icon to dynamic variable is instantaneous. The dynamic behavior of each object may be completely specified from the editor and is stored with the objects when they are saved on disk. From SL-DRAW you can also engage "GMD-run", a Preview Utility which lets you animate and evaluate your screen displays without leaving the editor. This entire construction process of your user-interface is completely codeless.

As an alternative The **Graphical Modeling Language Interpreter** (SL-GML), may be used to exer-



cise different screen scenarios. Using the simple SL-GMS command language, screen data files may be loaded and redisplayed. Sequences of attribute or position changes may be applied to objects by name. This allows you to experiment easily with the look and feel of graphics screens before binding the screens to your real-time program variables.

SL-GMS Run-Time Module

While written in C, SL-GMS is uniquely hospitable to other languages and code. It is extremely adaptable and its run-time module configured by development tools, is easily embedded, in part or in whole, in a user's application program. This module consists of elements from the **Graphical Modeling Function Library** (SL-GMF), which consists of all the functions needed to impart and alter the attributes of objects or icons you have created with SL-DRAW. The **Graphical Model Dynamics Library** (SL-GMD) contains a powerful set of procedures and functions to support the codeless binding of icons as they are created with SL-DRAW directly to application variables. The automatic invocation of these functions permits the change of any or all icon attributes, e.g., shape, appearance, size, color, position, orientation, visibility.

SL-GMD also allows formulas and expressions of variable combinations to control icons and displays.

Creating graphics display screens in this way eliminates the work necessary to attach even complex graphics to your applications. This is especially true if your requirement must maintain compatibility with graphics standards.

The system contains a separate object layer called SL-GWS—Graphics WorkStation function library—to ensure and simplify the transportability of SL-GMS to the widest variety of systems and devices.

SL-GMS Architecture

SL-GMS is a solid and robust environment. It is a true, object-oriented, integrated, coherent, hierarchical-modeling system with all its components—SL-DRAW, for example—built up from combinations of its own graphics primitives and from functions in the SL-GMF library. These functions are organized according to classes and subclasses.

SL-GMS has particular value to many

developers because of its strict underlying architecture, managed and controlled by the Object-Oriented Environment (SL-OOE). This is itself a library of versatile object-management functions, used within SL-GMS, and which is made accessible to interested users for application program development. SL-OOE also contains a program utility to define the user structural-framework and organize program code into strict hierarchical classifications. SL-GMS uses run-time class-information to provide the functionality present in object-oriented programming systems, such as messages to objects, dynamic binding, encapsulation, class inheritance, and so on. SL-OOE does not require the use of any language extensions or any special compilers.

Useful object management functions include: 1) an automatic facility for debugging and tracing function calls invoked on every object, 2) automatic archival and retrieval of arbitrary data structures, and 3) automatic "dumping" of object data.

SL-OOE together with (SL-GMF) can be seen as functionally similar to the emerging Programming Hierarchical Interface Graphics Standard, PHIGS. However, SL-GMS is much more extensible than PHIGS with the same functionality, and SL-GMS contains the editor SL-DRAW and the coherent-binding capability. But SL-GMS can easily interface to PHIGS through the SL-GWS layer for users with this requirement.

Complete SL-DRAW source-code is offered at a low price, so that you may customize the editor to your particular requirements. For example, you may want to change the layout of SL-DRAW menus, or offer a different set of attributes or primitives to the user.

License Prices and availability.

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SL-GMS	\$ 9,500	(SL-DRAW/GML/GMF)
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SQL

for Portability and Integration

STRUCTURED QUERY LANGUAGE provides a common language to access relational databases and offers portability for applications and data. BY SCOTT KITAYAMA

INTEGRATING APPLICATIONS AND DATA between VMS and ULTRIX operating systems has become an important issue for a growing number of users. DEC licensed ULTRIX to 15 percent of VAX machines in 1987, and the percentage is growing. Today, as many DEC engineers work on ULTRIX as on VMS.

The growth of ULTRIX and the popularity of UNIX are forcing users to look at the integration issue. A mixed UNIX/VMS site may be justified either as a transition phase or as a solution in itself when different machines serve different user needs.

Integration should be examined at

two levels: application portability and data integration. Differing machine architectures and operating systems require application portability. Often, portability is addressed only after the application is built with a specific environment in mind.

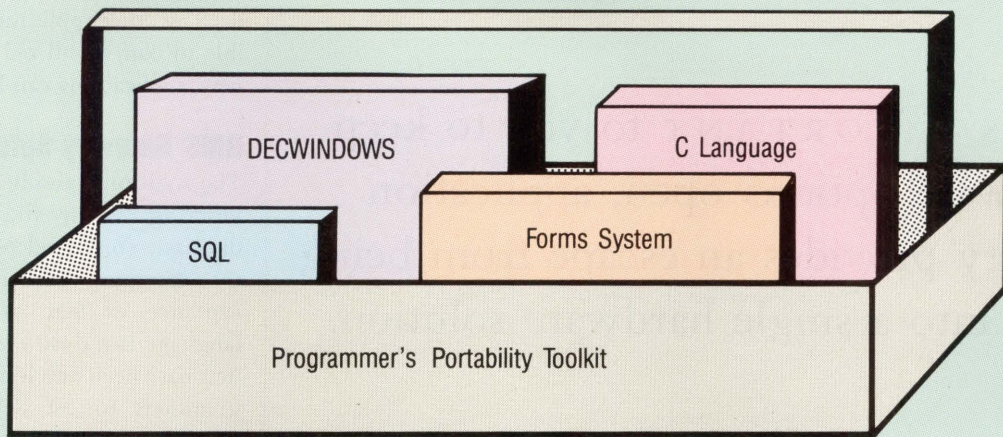
Determining portability in advance implies that trade-offs are necessary. For example, C language makes sense for a portable application but provides insufficient power to do input/output (I/O). In the VMS environment, developers commonly use C with RMS, the VMS record management access method that allows data to be stored as distinct

records and accessed through an ISAM index.

But RMS doesn't exist outside VAX/VMS machines and because using C alone is unpromising, the choice is to write all data access code from scratch or find tools as portable as C. The emerging solution is Structured Query Language (SQL). The same on all machines, it allows the application to access the database, which takes care of definition, storage, recovery and security, and allows multiple users to share data.

SQL shares many of C's characteristics. It's portable and powerful.

Figure 1.



Portable tools allow the programmer to write applications that can run on both VMS and ULTRIX.

Because of its popularity and that of databases, it's found on machines ranging from micros to mainframes.

Forms Systems

With SQL, the problem of better I/O handling is half solved. Forms systems address the other half; i.e., screen management tools required for user in-

terface. Again, the programmer must decide whether to use what the development machine provides or look for portability.

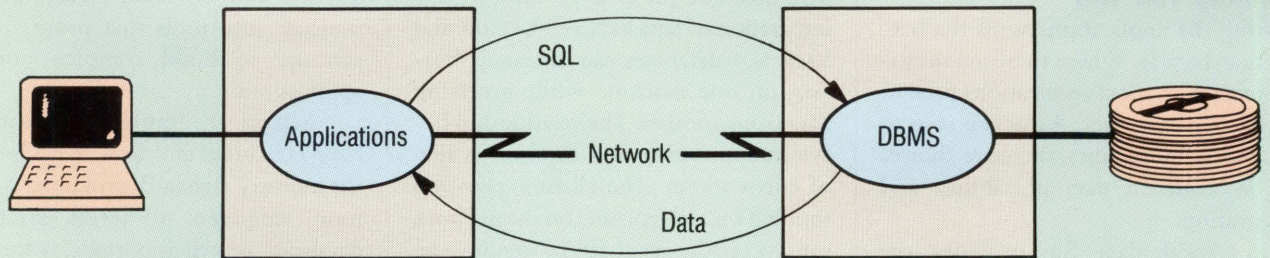
C doesn't provide a portable means of sophisticated screen management. FMS, TDMS and SMG system services do in VMS, as do TERMCAP and TERMINFO in UNIX. As with data management,

VMS and ULTRIX deal with screen management their own way and aren't portable to each other.

In the ASCII terminal world, a number of companies provide forms systems to both VMS and ULTRIX. How well do they integrate with C and SQL?

Most relational databases are provided with a forms package along with

Figure 2.



The architecture of SQL databases allows the separation of the application and the database. This allows the application to run on ULTRIX and get data from VMS or vice versa.

the SQL database. This is a convenient way to manipulate the I/O format without writing a great deal of code.

If the display is on a workstation, DECWINDOWS provides a good way of

is local. This makes the network transparent and allows applications on different machines to share data.

How can this be done while maintaining application portability? In VMS,

IF IT'S IMPORTANT to you to keep hardware options open, application portability provides an escape from being locked into a single hardware solution.

handling bit-mapped display. DEC has decreed that the X Window System will be window manager for VMS and ULTRIX and that the DECWINDOWS toolkit also will be available for both environments (see Figure 1).

Writing portability applications requires some choices to be made in advance. Standard tools provided on one system may not exist on another. Portable tools are available but usually not from the hardware vendor (a way to prevent users from switching to different machines).

If it's important to you to keep hardware options open, application portability provides an escape from being locked into a single hardware solution.

Winning The War

Porting the applications wins the battle, not the war. Where there are multiple machines, most applications need to access or share data. As in the case of application portability, there are choices to be made in data portability and integration.

A local data file provides the simplest case for integration and portability. But applications call for data that must be accessed remotely or shared with another machine. From the application programmer's standpoint, the best solution is to assume that the data

clusters allow machines to access the same disks. Disks are shared among machines, and any machine can access any file as if it were local. In the ULTRIX and UNIX environments, the Network File System (NFS) has become a de facto file-sharing standard. NFS permits file systems from a remote machine to be accessed as a local disk.

Both clusters and NFS provide data location transparency and allow different machines on the network to share data. This provides great capabilities to the application programmer, because the network is transparent to you. Unfortunately, clusters support only VMS machines, and VMS files can't be accessed by NFS.

The SQL

SQL could be the best solution for the integration of data between ULTRIX and VMS. SQL databases can run an application on one machine while accessing data from another. The relationship between application and database is that of client server. The client/application running on any machine on the network can access the database by sending an SQL inquiry to the server machine. Because this architecture isn't tied to a specific operating system, it can work on any VMS/ULTRIX combination (see Figure 2).

Using the same code to access data

on local and remote machines solves both portability and network access problems. Although it may be a solution for new data, it's not convenient for applications where data exists in files used by other applications. It's not feasible to convert all old applications, so new applications can be portable.

RMS Gateway Solution

The solution could be to allow SQL to work against any file, not a relational database. This broadened access for SQL is an emerging technology. Because acceptance of SQL as a data access language is industrywide, some products have been developed allowing programmers to use SQL against non-relational databases, non-sequential and sequential files.

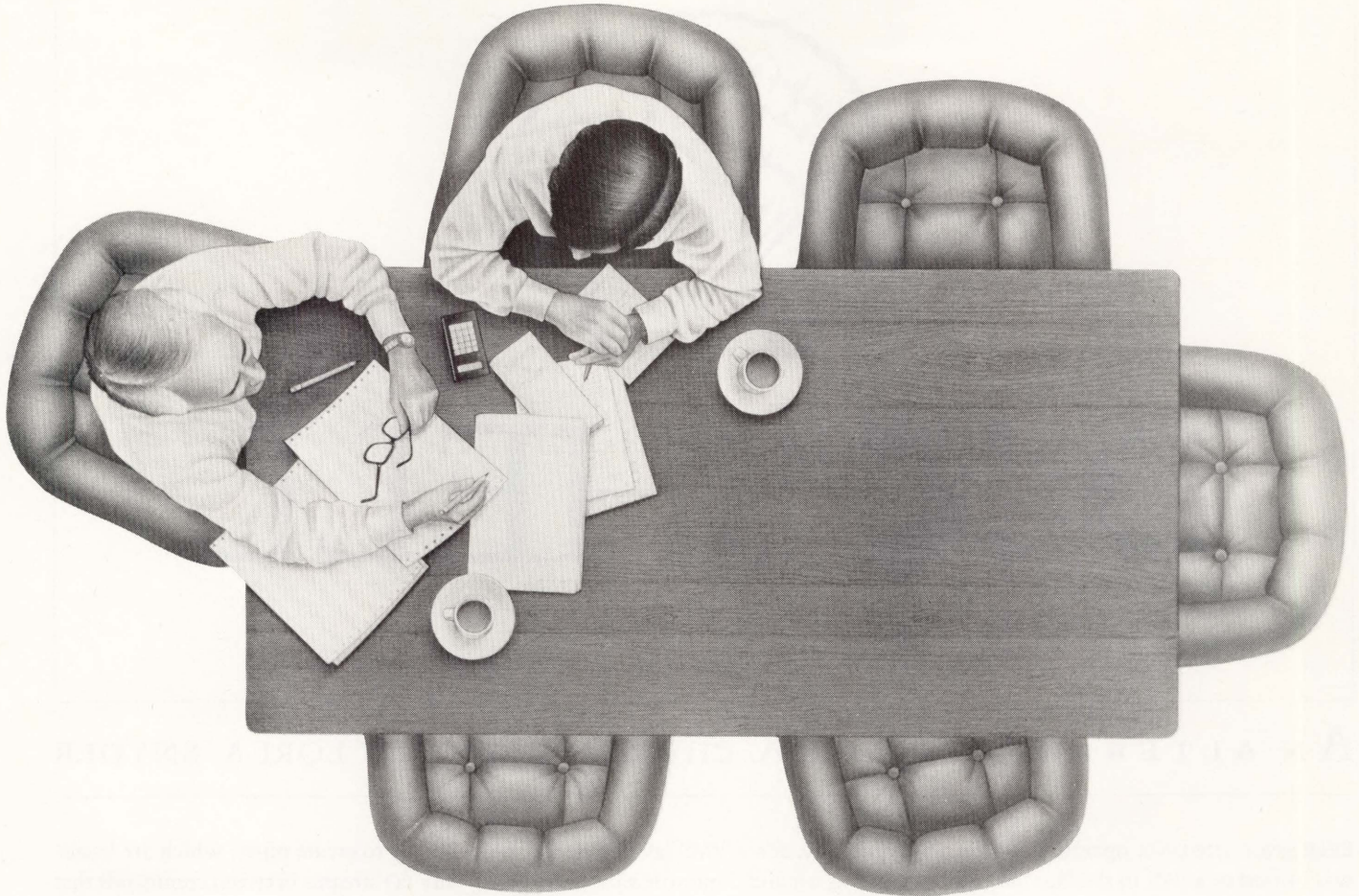
Gateway technology isn't a total solution, because it doesn't solve the user's need for data locking and security. SQL technology will grow more sophisticated and, in time, provide access not only to relational databases, but also to non-relational databases, indexed files, distributed database and abstract data types. Such advances result from the need for a standard way to access data.

Most large organizations have a mixture of hardware, such as micro-, mini- and mainframe computers that run various operating systems. The desire to have these components run the same software and share data fuels the demand for standards in operating systems, languages, databases and windowing systems. Such standards will translate into tools that programmers can use to build complex portable applications.

SQL is an example of what will happen in other tool areas. It has become the industry standard, providing a common language to access relational databases as well as portability for both applications and data. —*Scott Kitayama is UNIX product manager at Relational Technology in Alameda, California.*

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DEC/SHELL

AN ALTERNATIVE UNIX environment. BY LORI A. SNYDER

EVER SINCE THE UNIX operating system was ported to a VAX in the late '70s, the UNIX-VAX combination has been popular among UNIX fans. Unfortunately, for some of those fans, circumstances often dictate that a VAX run VMS, DEC's own proprietary operating system. DEC/SHELL provides an alternative to those UNIX devotees by emulating a UNIX-like environment under VMS.

DEC/SHELL essentially is a command line interpreter that provides a user interface like the Bourne Shell of UNIX version 7. It consists of more than 60 of the most common UNIX commands and utilities (see Table). Like the Bourne Shell, DEC/SHELL provides the Shell programming language, including structured constructs (e.g., While, If-Then, Case and For), I/O redirection, pipes and string substitution.

DEC/SHELL runs under the VMS operating system. In DEC's ter-

minology, it's a VMS layered product. Sold as a standalone software package, it requires the presence of the VAX C language and its Run-time Library on the host VAX. Each DEC/SHELL command invokes a standard VMS image that executes similarly to images invoked by Digital Command Language (DCL), the VMS command line interpreter.

As you might expect, DEC/SHELL commands execute slower than the same commands issued on a native-mode UNIX system (e.g., DEC's ULTRIX-32). Accordingly, DEC/SHELL was described by one reviewer as "competent but sluggish." On a more positive note, however, DEC/SHELL only requires about 2,000 disk blocks, an amount of space that wouldn't be missed on most systems.

Advantages

DEC/SHELL offers some distinct advantages over DCL. The UNIX Shell has the

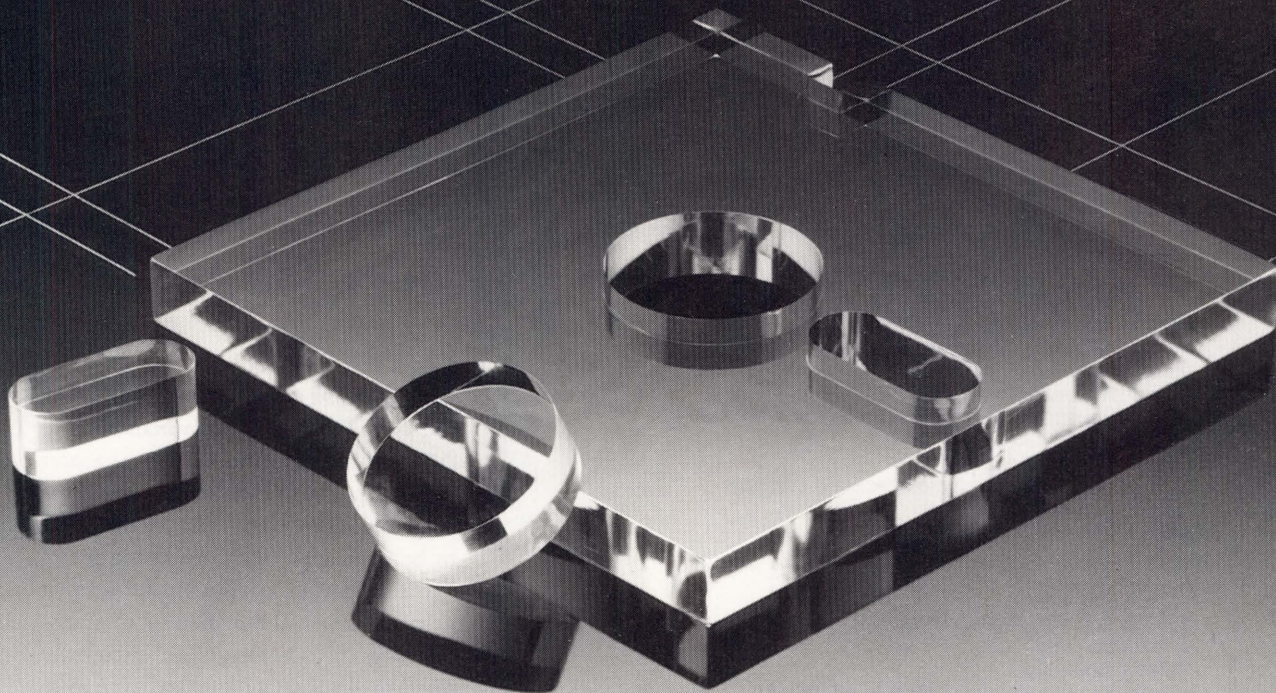
ability to create pipes, which are basically I/O streams between commands that allow the output of the first command to become the input to the next. DCL doesn't have such a capability.

Pipes allow you to create single line commands whose functions resemble that of entire programs. For example, a DCL user probably would have to write an entire program to implement the following command, which sorts a phone list, removes any numeric fields, puts the header Distribution on the printout and sends the list to the line printer:

```
sort +1 -2 phonelist | tr -d 0-9 | pr
-h Distribution | lpr
```

There are also several useful utilities that DCL doesn't offer. Some of these are **uniq**, which only writes the unique lines in a text file to the standard output; **grep**, a sophisticated search utility;

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Table.

Utility	Function
alias	Enables environment variables to be used as command synonyms
awk	A pattern matching language
basename	Removes file name affixes
cal	Displays a calendar
cat	Concatenate and display files
cd	Change working directory
chmod	Change mode of file; i.e., protection bits
chown	Change owner or group of file
cmp	Compare two files
cp	Copy file(s)
date	Display or set the system date and time
dc	Desk calculator
dcc	Maps applicable ULTRIX cc command line switches into VAX C and VAX Linker commands
dcl	Invokes the Digital Command Language (DCL) commands parser or creates a DCL subprocess
diff	Differential file comparator
diff3	Three-way differential file comparison
echo	Echo arguments
ed	Standard UNIX text editor
eval	Expands all command line arguments and executes the result as a command
exec	Executes a command and exits
export	Passes environment variables to programs and subshells
expr	Evaluates an expression
false	Returns a failure status value
find	Find files
grep	Search file for pattern
head	Print first part of file
join	Joins files according to specified relations
kill	Terminate a process
lex	A lexical analysis tool
login	Connects user's terminal to a system on the network
logout	Terminates an interactive terminal session
ls	List contents of directory
m4	Process macros for C and COBOL
mcr	Invokes the Monitor Console Routine (MCR) command parser or creates an MCR subprocess
mkdir	Create a directory
mv	Renames files and directories
nroff	Text processing package for formatting text files, which also includes neqn, deroff, tbl, col, colcrt, collpr and the ms and me macro packages
od	File dump
pr	Format and print file
ps	Process status
pwd	Print working directory name
read	Assigns the values of the next line read to the specified variable
readonly	Prevents existing environment variables from being reassigned
rm	Remove or delete files
rmdir	Remove a directory
sed	Stream editor
set	Sets shell flags or displays current environment variables
sh	Execute shell command script
sleep	Suspend execution for interval
sort	Sort or merge files
tail	Print last part of file
tar	Tape archiver
tee	Pipe fitting
termcap	An ASCII terminal database and associated routines that allow low-level terminal operations to be performed from an application
test	Condition checker
touch	Update last modified date of file

Continued.

Courtesy of Digital Equipment Corporation.

VAX DEC/SHELL utilities.

and **wc**, which counts the number of words, lines and characters in a text file. Fortunately, for the DCL user, many of the DEC/SHELL commands can be run under DCL, if they're defined to be foreign commands.

Conversely, DEC/SHELL users can elect to use DCL commands. Preceding

DEC/SHELL isn't intended for users who want full-blown UNIX.

a command with **dcl** causes DEC/SHELL to pass the rest of the command line to DCL for interpretation. Also, the user can type **set-d**, which causes any future command not recognized by DEC/SHELL to be passed to DCL for execution.

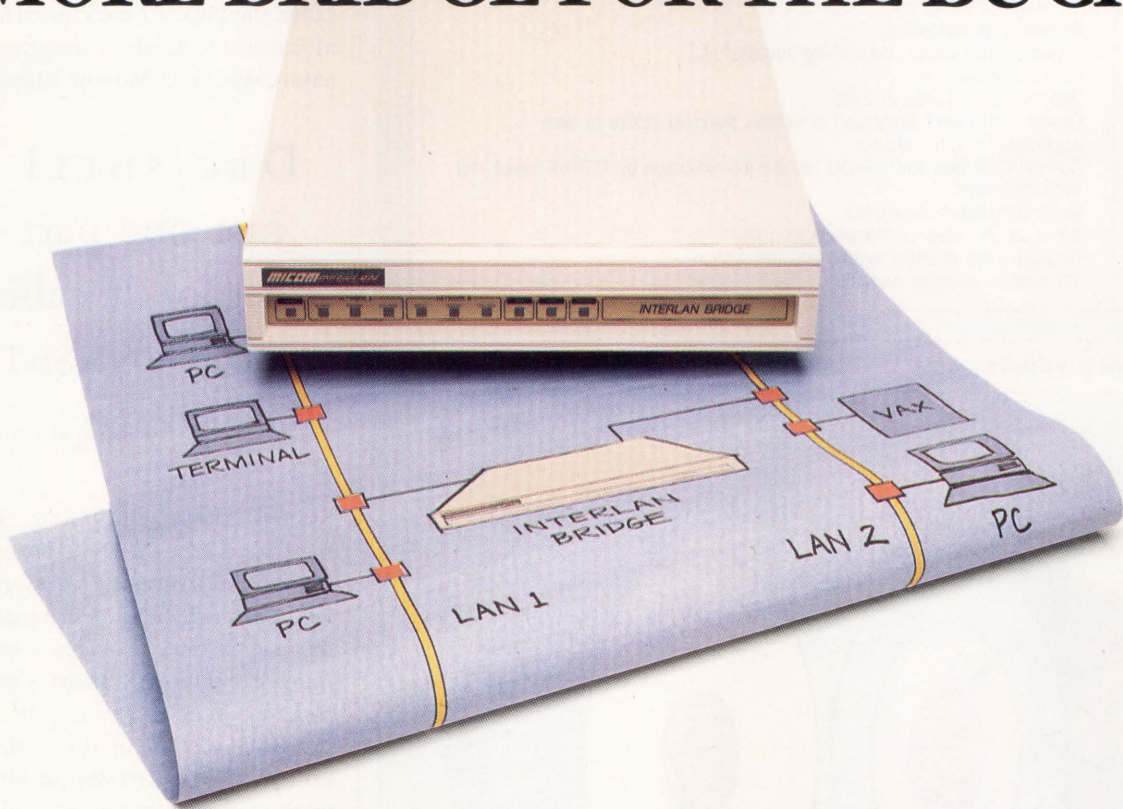
DEC/SHELL contains routines that help minimize the difficulty of transporting a C language program developed on a UNIX-based system to the VMS operating system. These routines enable the programmer to use UNIX filename syntax under VMS and gain access to system and process information in a more UNIX-like manner.

Finally, DEC/SHELL is a fully supported, fully integrated DEC product. New versions of DEC/SHELL are released at the same time as VMS updates. Software maintenance, which includes periodic updates and access to DEC support systems, can be purchased at a reasonable rate.

Target Market

DEC/SHELL is intended for use by UNIX fans who are forced, for whatever reasons, to work on a VAX running VMS. According to DEC, most DEC/SHELL customers fall into several categories. First are those users who only know UNIX but eventually will have to learn VMS. In this sense, DEC/SHELL is a valuable migration tool,

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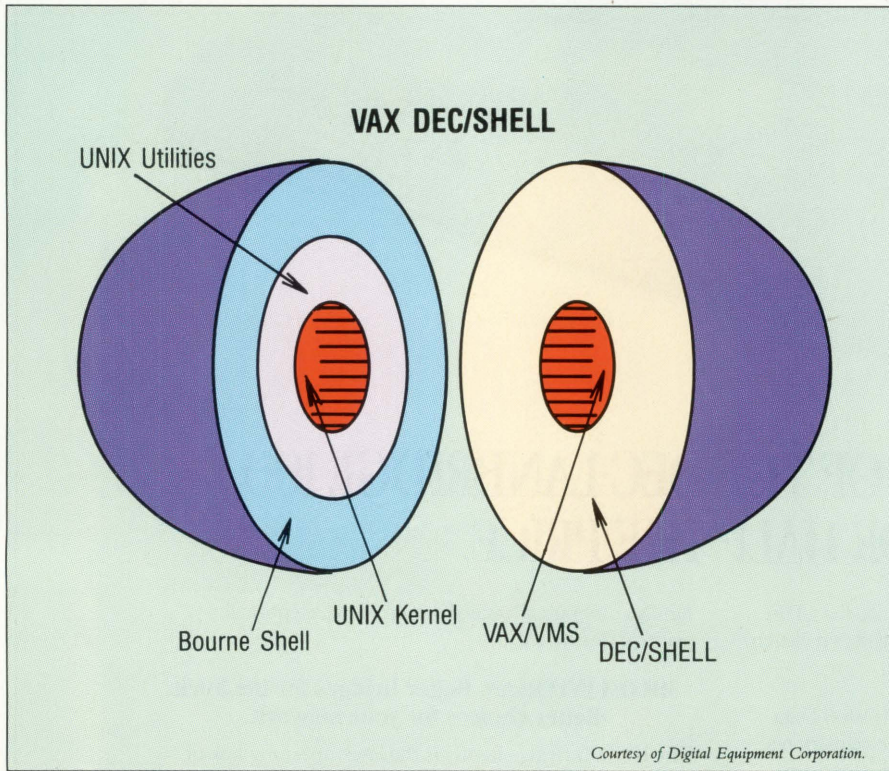
CIRCLE 140 ON READER CARD

Table... *continued*

Utility	Function
tr	Transliterates characters
true	Provides truth values; do nothing successfully
tty	Print terminal name
uniq	Report repeated lines in a file
units	Converts quantities expressed in various standard scales to their equivalents in other scales
uucp	Copies ASCII files and initiates remote job execution on ULTRIX-based and VMS machines
wait	Await completion of process
wc	Count words, lines or characters in a file
who	Displays a list of users logged into the system
yacc	Yet another compiler compiler

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VAX DEC/SHELL utilities.



Courtesy of Digital Equipment Corporation.

DEC/SHELL provides a familiar environment on VMS to the UNIX user.

for it enables them to be productive immediately.

DEC/SHELL also provides a means by which UNIX and VMS users can exchange information; in particular, UNIX tapes can be read under VMS by using the DEC/SHELL **tar** utility. DEC calls DEC/SHELL a coexistence tool.

Users who know both UNIX and

VMS and want to use both, find DEC/SHELL attractive, as it enables them to selectively use features of either operating system.

DEC/SHELL isn't intended for users who want full-blown UNIX. Not a complete implementation of UNIX, it's not intended to replace UNIX. DEC/SHELL doesn't include the UNIX

backup utilities **dump** and **restore**, for instance, as the VMS backup utilities can serve those functions.

Other Pieces Of The Puzzle

DEC/SHELL is just one part of a toolkit called the VNXSET package, which also includes DEC Code Management System (CMS), DEC Module Management

DEC/SHELL IS just one part of a toolkit called the VNXSET package . . .

System (MMS) and VAX C. Together these tools create a UNIX-like development environment under VMS. DEC/CMS, a file management and maintenance system, provides a capability much like the UNIX Source Code Control System (SCCS) utility. DEC/MMS is the VMS version of the UNIX **make** utility, which provides an automated method of updating source code if constituent modules are changed. Finally, VAX C provides the C programming language that's a standard part of every UNIX system.

DEC/SHELL IS A VALUABLE tool for increasing the productivity of a VMS-based organization that consists of some UNIX users. It can eliminate the frustration of UNIX users who don't know VMS and have to be productive immediately. Also, DEC/SHELL increases the productivity of an organization that contains both VMS-based and UNIX-based systems by facilitating information exchange between those systems. DEC/SHELL can increase the flexibility of the DCL user by making UNIX commands available to them.

ARTICLE INTEREST QUOTIENT
Enter On Reader Card
High 555 Medium 556 Low 557

"I'll call you right back."

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"It debugs in C like ECHO."

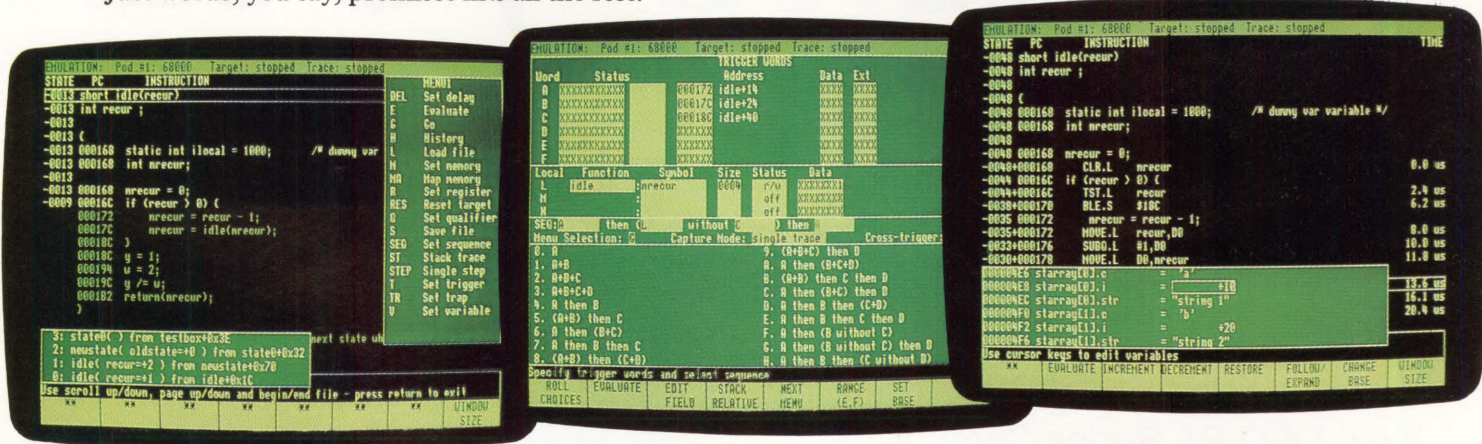
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Stack-Relative Trigger lets you trigger on the addresses and values of stack-relative variables—a "must" for effective C-debug where the address of an automatic variable is different each time the function is called and is determined at execution. Here, a read of the local variable "nrecur" is included in the trigger sequence.

TimeStamp™ and variable display are two further features that are a must for real-time C-debug. Note the display of two instances of a structure in array "starray." The contents of these structures, as for any C variable, can be changed right on the screen.



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MAGEN-ATION

By David B. Miller

Imagen Corporation's ImageServer XP Series Printers Combine Flexibility, Compatibility, Functionality And Speed In One Package.

Although desktop publishing and low-cost desktop laser printers have stolen the show in recent months, large laser printers, capable of high speeds and sophisticated abilities, are needed to tackle big printing jobs.

A recent entry into the high-end laser market is the ImageServer XP Series printers from Imagen Corporation. The entire line takes advantage of Canon's latest laser print engine, the LBP-SX, and is designed to handle larger, more complex printing tasks. Network ready, they're flexible units. A number of printer emulations are possible, and Adobe's PostScript compatibility is available.

Our test model 6320 boasted the following features:

1. The LBP-SX is capable of providing 300-dpi resolution, quiet printing (less than 57dB), a 35,000- to 45,000-page-per-month duty cycle and can handle various paper sizes and types.

2. Real-time rasterization, a feature that allows large numbers of pages to be held in memory, provides higher page throughput.

3. Print speeds of 20 ppm for our model 6320.

4. A separate image processor containing three 68000 series microprocessors, 5 MB of RAM, 2.5-MB bitmap memory, single floppy and a 20-MB Winchester hard disk drive.

5. An RS-232C port to connect a console terminal.

6. A number of host interface and protocol options, including Ethernet (TCP/IP), RS-423 (XON/XOFF, sequence packet, IBM 2780/3780), Versatec, Dataproducts and Centronics (standard ASCII or binary).

7. Emulations of the Diablo 630, Epson FX+, IBM 5152, Tektronix 4014 graphics terminal and IBM 1403 line printer. A bit array emulator also is included. Emulations may be mixed on the same page.

8. Single- and dual-sided printing, page reversal and multiple copy printing.

9. Three input paper trays, holding 2,500 sheets and two output trays, holding 1,700 pages maximum.

10. UltraScript, Imagen's PostScript-compatible interpreter, is installed automatically when the printer is configured. Imagen's own IMPRESS and DDL languages also are supported, making the XP line multilingual.

The 6320 is 64 inches wide, 26 inches deep, 56 inches high and weighs 431 pounds unloaded. Power requirements aren't unusual; any common grounded outlet will do. You also will need to find some space for the image processor, which is roughly the size of a full-sized PC/AT (without monitor) and for a video terminal, if you decide to dedicate one solely to the printer.

Daily operations, such as changing toner and paper, are easy to do. Everything is accessible up front. Clearing paper in the event of a jam is also simple, although it wasn't required often. The user manual is clear and has lots of good figures and diagrams.

Speaking TCP/IP And Other Prerequisites

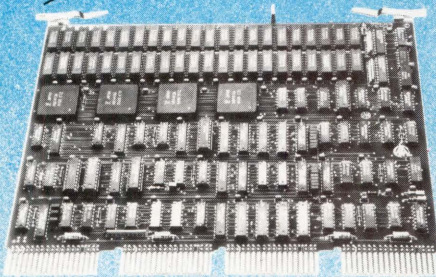
The 6320 isn't your typical plug-it-in-and-print machine. A number of configuration steps must be carried out and perhaps tried to get the proper setup for your site. Installation



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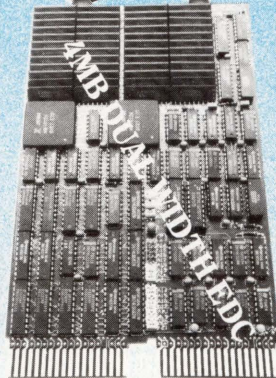
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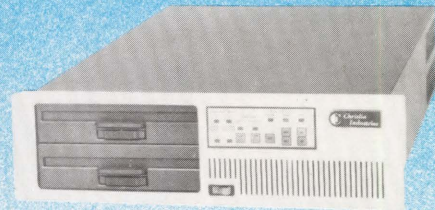


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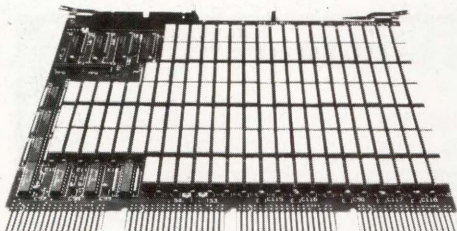
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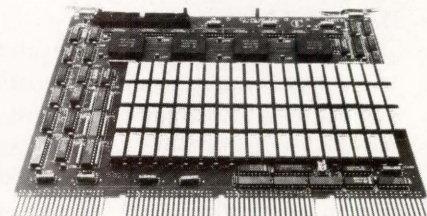
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The 6320 occupies the space of a copier. The terminal (not included) makes job control and configuration changes easy.



involves physically interfacing the printer to the host, configuring the image processor and installing on your VAX the IMPRINT command software, written by Kellerman and Smith of Portland, Oregon.

The first step, interfacing the printer to the host, simply requires a serial or parallel hookup, or you can choose, as we did, to hang your 6320 off your Ethernet as a node. Before using the printer, we installed TCP/IP software and the network hardware on which it runs. Imagen printers support both the Excelan and Wollongong Group network boards. We chose the Excelan board and EXOS TCP/IP protocol software for our site, installing the board in our MICROVAX II.

After the network equipment and software were installed and running (for us, no other devices used this protocol on the cluster), the next task was to configure the 68000 microprocessor-based image processor, which is a separate unit placed either on top or on the side of the printer.

Configuring the image processor

takes time, but the process is straightforward. It involves connecting a terminal to the processor's built-in RS-232 serial

port, initializing the internal 20-MB hard drive and copying the X320 system software and printer fonts onto it, using the supplied Disk Management software. Next, specify the appropriate parameters, chosen from the configuration menu (see Screen 1) by running the configurator, supplied on floppy disk.

Select the appropriate communications parameters, the type of print engine you're using, paper bin information, any system-wide default document control information and the desired UltraScript settings. If you can spare the terminal and leave it with the printer, the process of changing these settings later will be easier.

The initial image processor installation took 45 minutes; 90 percent of that time was used for copying the contents of the various disks (four system disks containing system software and the basic core-type fonts and eight more disks containing other font styles) to the hard drive. Changing settings later presented no hardships.

Also, you can get online system in-

The Configurator will display this menu of options:

Choose option:	to
spp:	select serial sequenced packet communications
serial:	select serial byte stream communications
cent:	select parallel byte stream communications (Centronics)
datap:	select parallel byte stream communications (Dataproducts)
vers:	select parallel byte stream communications (Versatec)
bsc:	select 2780/3780 binary synchronous communications
tcp:	select Ethernet TCP/IP communications
speed:	select console speed
X308:	select print engine type
X320:	select print engine type
doc:	select system-level document control information
test:	select test file printing at startup
ultra:	select UltraScript configuration
exit:	exit, updating configuration
reset:	reset all configuration information to default values
abandon:	exit, abandoning all configuration changes
help:	run through the configurator instructions

Screen 1: The image processor's configuration menu allows you to specify default communications, document control and UltraScript settings.

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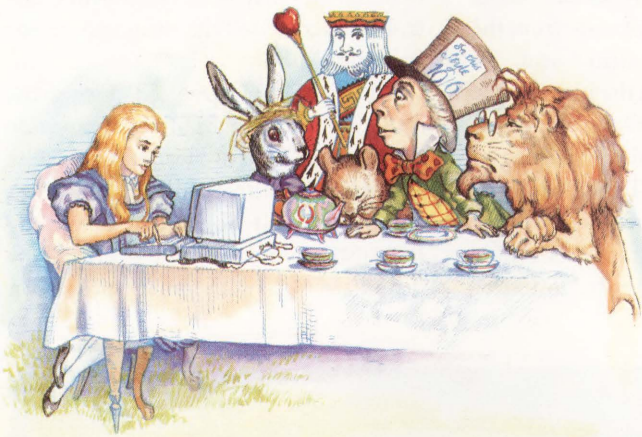
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CIRCLE 238 ON READER CARD

formation any time, if a terminal remains attached to the processor. A complete set of console commands is available to gain printer information, control jobs and manage the disk system.

The most cryptic part of the processor configuration was to derive the TCP/IP internet address. It was easier than we thought. Because we had no other devices running TCP/IP, we made the VAX address 1.1.1.1 and the printer 1.1.1.2. You have to obtain the Internet address of the nodes on your network first, then use one that doesn't exist on your network. Other than this step, we took all the TCP/IP defaults.

The final step involved putting up the IMPRINT software on the VAX end. IMPRINT works with VMS queue and print management to prepare files for printing on the XP series printers. Installing IMPRINT supplies the necessary

TCP/IP hooks to make printing possible. It also establishes a print queue and the IMPRINT command that's used in place of the VMS PRINT command.

Imagen-ation Running Wild

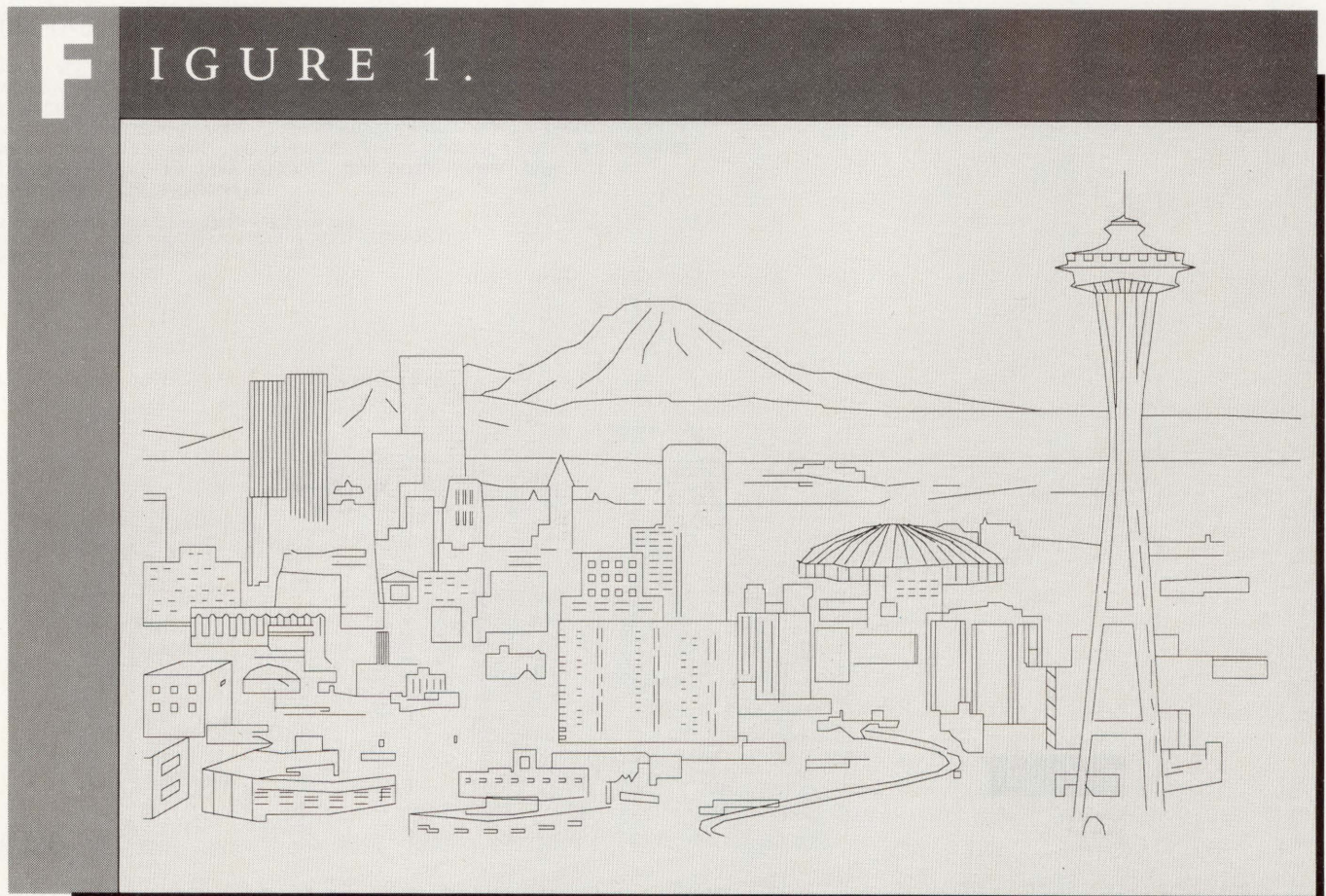
Using the XP line involves becoming familiar with its capabilities and how the IMPRINT software works with the image processor and VMS print services to format and interpret incoming files correctly.

The 6320's image processor obtains printing information, not only from the IMPRINT command line and its qualifiers, but also from the inclusion of an optional Document Control Header, which can be placed at the beginning of the file to be printed. This Document Control Header can contain some of the same information that the IMPRINT command qualifiers specify. IMPRINT

qualifiers (and Document Control Headers) can specify which printer you need to emulate, the number of desired copies, single or duplex printing, page orientation, type of forms and many other options.

A single job contains documents that can be printed with the same characteristics, and the IMPRINT command lists what all the needed settings do. Should you decide to print a mixture of documents in a single job, individual files may need Document Control Headers to tell the image processor to switch modes.

Defaults are specified during installation in the form of a system-wide Document Control Header. Generally, any print control information you specify in your document or via the IMPRINT command will override the defaults set up on the image processor.



This Tektronix 4014 graphics terminal file took one minute to process and print.

F I G U R E 2 .

Every entity in the data dictionary is described in detail; some or all of the effort involved in doing that can be done while working in one of the other Excelexator areas such as graph creation. You may also list, modify, delete, copy and rename entities by directly accessing them in the database. For such operations as rename, you have the option of globally affecting other records in the database in which the renamed entity occurs. This eliminates the need to change each entity occurrence manually. Changes made in the Excelexator data dictionary will then also be reflected in any graphs, screens and reports that contain that piece of information. Conversely, making changes, for example, changing the name of a module in a data flow diagram, will automatically effect changes to all data dictionary records that contain that object, a real time saver.

Excelexator tracks all relationships between entities such as those entities that contain other entities, graph objects that explode to other objects, the relationship between a report definition and the screen data file used to input test data and others. Additionally, audit attributes are recorded for each entity that lists the date of last modification (who, when), who created this entity, how many changes have been made to this entity so far and any locking mechanism currently in force. The relationship tracking and audit features help eliminate the confusion that arises when more than one person works on a project simultaneously and provides a good security mechanism to monitor access.

Another powerful data dictionary capability lies in its reporting features. The Report Writer allows you to obtain sorted and formatted listings of all or selected data dictionary records based on criteria you specify. The report feature greatly helps you check the database for completeness and accuracy and will help you plug up any holes you may discover in your project.

XLD INTERFACE - Since you may find the need to share project data or to allow access by fellow analysts to portions of a project's data, Excelexator's XLDinterface is needed to give you the control needed to track all such movement of data to those individuals.

Excelexator's Export and Import facilities allow you and members of your design team to copy all or parts of the project's dictionary to other projects. In addition, a Locking feature can be enforced whereby specified data dictionary records can be protected from accidental update by multiple users. A preview feature is included so that you can view the data records to be modified before actually operating on them.

In an environment where VAXstations are linked via DECNET or in a cluster situation, project data can be shared among multiple nodes across the network. RMS's record locking facilities ensure that multiple users cannot modify the same record simultaneously. The VAXstation release notes indicated that multiple user access of project data has limited protection at this point, but it should be beefed up in future releases. While multiple users cannot modify the same record simultaneously, they can modify related records and dictionary entities. Therefore, it is recommended that procedures be established that monitor and review a project's data regularly to ensure its integrity. Additionally, graph data CAN be modified by multiple users at the same time, since their storage scheme is different than that of the dictionary's records, so you have to be very careful that project graphs are complete and correct regularly.

Three levels of access determine the degree to which you can alter project data. READ users can really only look at data and not much else. In other Excelexator areas such as Graphics and Screens, a READ user can only perform operations resulting in output.

LIMITED users have a little more leeway including the ability to modify some of the project's data. A LIMITED user can perform just about any action on any record in the project dictionary as long as it is not locked

by another user.

The MASTER user is usually the project or system manager. MASTER users have all privileges. For large projects with many smaller sub-projects, MASTER access rights are usually given to each sub-project manager for the particular project section on which they are working.

ANALYSIS - Excelexator's analysis section provides you with the tools necessary to scrutinize your project design and the elements comprising it.

Graph analysis allows you to check for such trouble signs as omissions, redundancies and graph inconsistencies. A level balancing feature checks for consistency between data flows on one explosion level and the data flows on subsequent levels. An explosion analysis list all explosion levels (up to nine levels below the top) allowing you to trace all the connections and paths to and from various processes and entities on various levels. Excelexator never automatically changes anything about the system, it merely reports potential trouble spots and suggests how you may eliminate them.

Data dictionary items may be grouped together into what Excelexator terms "entity lists." You have a lot of control over what dictionary items are included in a particular group. For example, you may wish to generate an entity list containing record descriptions only. Or, you may need a list of all procedures within certain modules. Being able to narrow down the list of required items allow you to zero in on particular groups rather than having to search through a long list of entities, most of which may not be directly related to those in which you are most interested. The Report Writer feature mentioned in the section on the XLDictionary can be used here to generate hardcopy reports of the entities you select. The entities you select may also be analyzed as a unit and exported to other projects, making it easy to scrutinize selected groups of project data items and to share it with others.

HOUSEKEEPING - To maintain Excelexator and the projects on your system, you may from time to time need to access the Housekeeping function. Such operations as adding, modifying and deleting projects, backing them up, adding, changing and deleting users for projects and defining printer characteristics must all be done in the Housekeeping section.

The amount of control each individual has to carry out any of the above operations is governed by his access status. System Managers have primary responsibility to maintain Excelexator's environment in regard to available devices, system dates and the users of the system. Project managers exercise control of the project on the system and can add, delete or modify projects and any associated project parameters. They may also assign users to projects, granting them the access privileges discussed above in the section on the XLD interface. Regular users have restricted access depending on what the Project manager assigns each one.

DOCUMENTATION - The bane of any programmer's and analyst's existence, the longest four letter word in computing, documentation is often put off until the end of the project's design and is often not given the attention it deserves. Let's face it, writing documentation is BORING; besides, you know how the system works and can explain it to anyone much better verbally than in written form.

Unfortunately, you may not always be around to provide that information. People do leave and get other jobs, get sick and take days off, go on vacation, even forget! Documentation, therefore, is an important and necessary part of any system and cannot be neglected.

Fortunately, Excelexator takes some of the pain out of producing documentation. First, you draw a Document Graph, a tree-like diagram which depicts the documentation's overall structure and contents, similar to drawing a structure chart. This graph can be analyzed for completeness and

Two-up landscape mode is one of the many print options available in IBM 1403 line printer mode.

The capability of being able to specify document control information within each document gives you great flexibility and control over the printed result. Diablo-encoded documents can be followed immediately by Tektronix terminal graphics files, which then can be followed by PostScript-compatible files, requiring no physical reconfiguration of the printer. Supply the correct command qualifiers on the IMPRINT command line or within the file's Document Control Header, and you're off and running. Figures 1 and 2 illustrate

two print samples; Figure 1 is a Tektronix 4014 graphics terminal file, and Figure 2 is a portion of a file printed in IBM 1403 line printer mode, two-up with landscape orientation.

Regarding speed, we found the 20-pages-per-minute claim was accurate; a 513-page straight text document printed in 25 minutes. Tektronix 4014 files of approximately 70 blocks required a little more than one minute to print.

To test PostScript compatibility, we tried output generated by Microsystems Engineering's MASS-11 and MASS-11 Draw as well as a few small, PostScript programs. A 25,000-byte PostScript pro-

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gram required one minute to process and print. Initially, we had some difficulty with Postscript files not producing output unless /language = transparent was specified on the IMPRINT command

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line, but a new version of IMPRINT (2.0a) solved the problem.

Documentation is extensive. Included are an *Owner's Manual*, *Programmer's Guide*, *TCP/IP Guide*, IMPRINT command documentation, a manual for using the Image Processor and a quick reference guide.

Although the documentation is clear, it's not intended for novices. Inexperienced users probably will need additional assistance to become productive, as they may spend too much time reading about commands and qualifiers they'll never use.

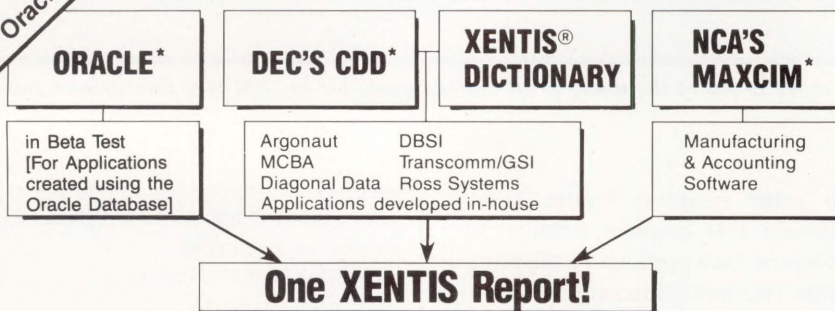
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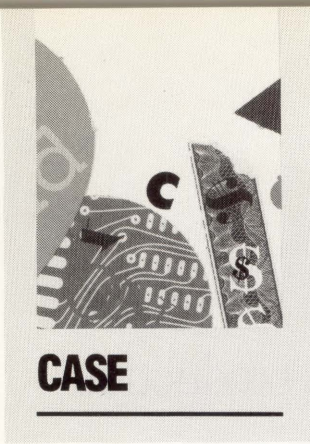
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By David B. Miller

**Index Technology's
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Implement Projects
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A significant case has been made for CASE tools in recent years, and products abound in the marketplace. All aim to make the job of the system analyst easier by providing the tools necessary to create, design and organize an entire system while at the same time supplying the mechanisms necessary to organize and track a project's multitudinous data.

Excelsator, from Index Technology Corporation of Cambridge, Massachusetts, is a tool designed to do just that. Its purpose is to allow you to design systems and organize all the data involved in a design project. It uses modern structured design techniques to let you create system graphs and charts, and to sample input screens and reports. Your design then can be analyzed for completeness and integrity. Changes and corrections that could require a lot of redesign effort can be made easily.

Requirements include a VAXSTATION with 4 MB of memory, 10 MB of disk space to run the product and an additional 1,000 blocks of disk space per project, VMS 4.4 or later and HCUIS 3.0.

Media is distributed on TK50 cartridges. VMSINSTALL is not used for the installation, but it's a straightforward process.

The Essential Excelsator

Excelsator's power can be realized by examining its major components and how they integrate to provide a high level of control over a system development project. For a descriptive illustration of these components, see Figure 1. In detail, these components are:

GRAPHICS — Six types of graphs are available:

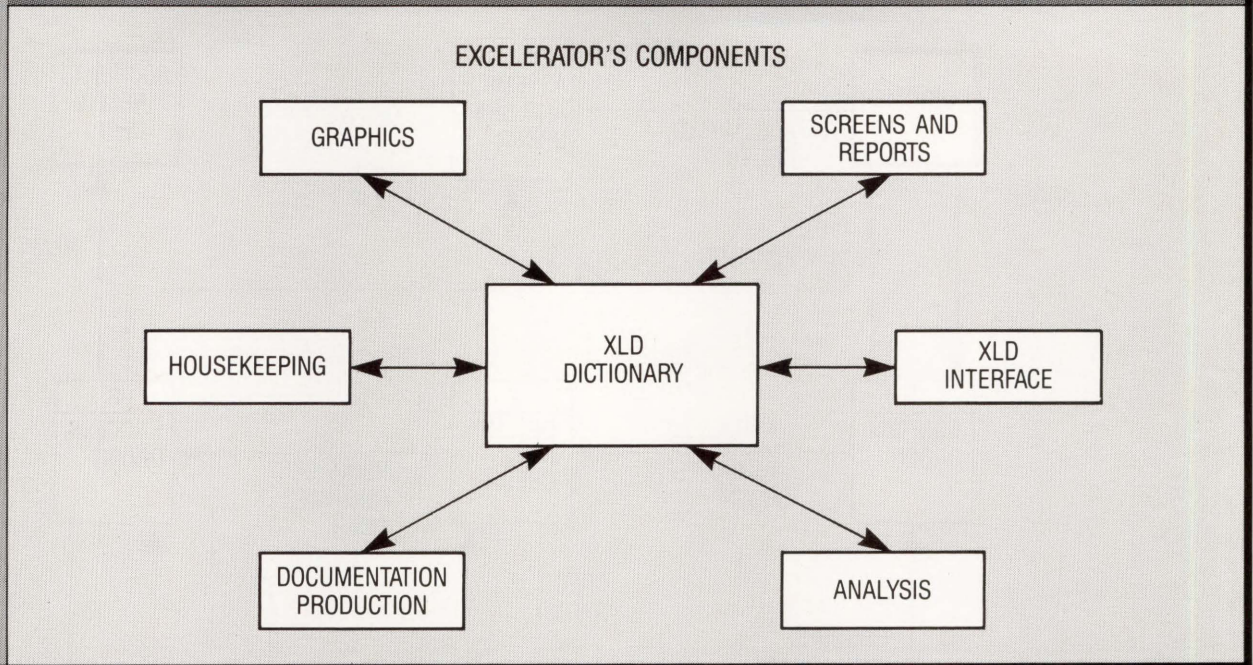
1. Data Flow Diagrams.
2. Structure Charts.
3. Structure Diagrams — to display a system's flow and provide various levels of detail relating to the procedures and data comprising the project.
4. Data Model Diagrams — that describe entities of data and their structure.
5. Entity-Relationship Diagrams — to provide detail on the movement and changes that data go through within any one procedural module.
6. Presentation Graphs — to allow you to present the overall system definition to users and management.

Graph methodologies follow the principles of current popular thinking on structured design. Data flow diagrams can reflect the Gane and Sarson or Yourdon techniques. Entity-relationship diagrams follow the Chen or Merise methods. Default graphing methods are determined at project definition by the project manager, but you can convert a graph



F

FIGURE 1.



created with one methodology to another. A sample graph using Gane and Sarson symbols is shown in Figure 2.

Excelerator provides all the appropriate symbols (processes, data stores, external entities, etc.) for the selected methodology. These symbols can be connected, moved, erased, labeled and printed. Up to 10 explosion levels of detail are provided; Excelerator tracks the relationships and connections between levels.

A powerful feature of Excelerator's graphics is its interface to the project dictionary. Every part of a graph can be described to the central project database at the time you create it. Rather than draw the entire graph first and then enter your data in the dictionary, this "record-as-you-go" feature prevents loss or unnecessary duplication of data.

SCREENS and REPORTS — Excelerator allows you to create input screens and output reports that can be used for prototyping purposes with management and end users. As changes are suggested, you can alter your screen and report designs. A sample data entry screen is shown in Screen 1.

Screens can be designed with appropriate

titles, field descriptions and characteristics (length, decimal places, data type, etc.) and display attributes, such as reverse video, underlining and flashing. Editing and scope rules also can be specified for input fields to cut down on data entry error. Screens also can be chained, if one isn't enough. As fields are defined, all information about them is recorded in the project dictionary.

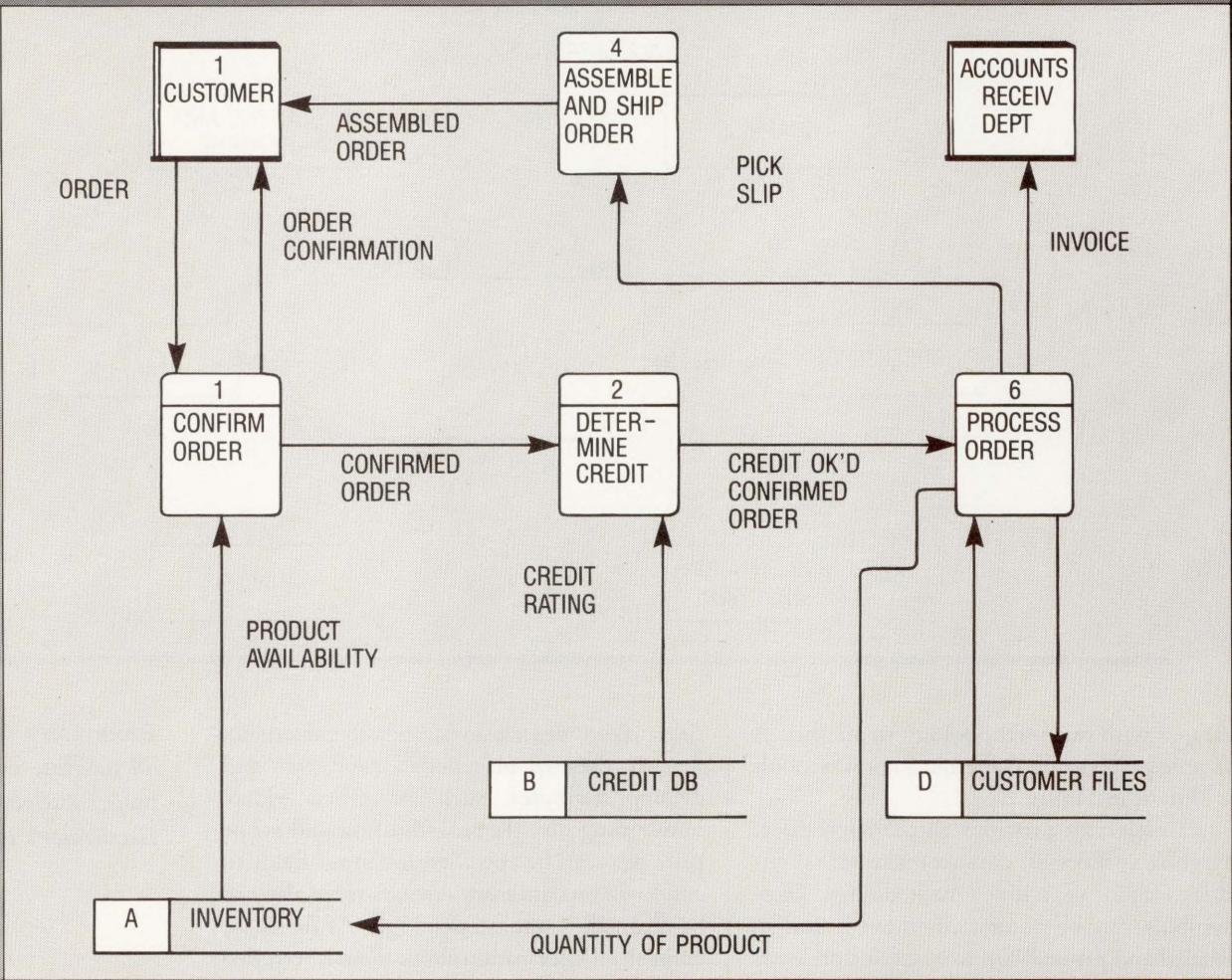
Screen and report design specifications can be translated to ASCII for integration with other computer systems. An appendix in the reference manual describes the format of the screen records in detail, so they can be translated properly back to actual screens on the target machine. Record layouts containing the fields and attributes used in screen and report designs can be generated in COBOL, PL/1, C and BASIC. These descriptions can be sent to disk files and included with program code.

XLDICTIONARY — Excelerator's data dictionary is the heart of the program. All information entered while working in other areas of Excelerator (e.g., Graphics or Screens and Reports) is collected in this central data repository.

Excelerator's components all interface with the project dictionary, Excelerator's core.

F

FIGURE 2.



A sample Gane and Sarson data flow diagram.

Data is organized into entity types, which are data records that share common characteristics. Data flows, data flow diagrams, record elements, screen designs and presentation graph objects are examples of Excelerator data entities. All entities are assigned a three-character code to make group operations on them easier.

You can work with entities by accessing the central database directly. Operations that affect entities (e.g., RENAME) allow you the option of globally affecting other records in the database in which the entity occurs,

eliminating the need to change each occurrence manually.

Changes made in the Excelerator data dictionary also will be reflected in any graphs, screens and reports that contain that piece of information. Conversely, making changes (e.g., changing the name of a module in a data flow diagram) automatically will effect changes to all data dictionary records that contain that object.

Excelerator tracks all relationships among entities, such as those that contain other entities, graph objects that explode to other objects, the relationship between a report definition and a screen data file, etc. Audit attributes that list the

date of last modification (who, when), who created the entity, how many changes have been made to the entity and any locking mechanism currently in force are recorded for each entity. These relationship tracking and audit features provide a security mechanism to disallow simultaneous record access.

Another powerful data dictionary capability lies in its reporting features. The Report Writer allows you to obtain sorted and formatted listings of all or selected data dictionary records based on criteria you specify. This allows you to

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B32	5	4.59	Y
F16	2	37.00	Y

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Order Taken By: DBM Marketing Rep: XYZ Problems: NONE

3 EXIT 5 CUT 6 PASTE 7 REGION 8 REPEAT 9 DELETE 1,10 BLOCK 10 FIELD

Screen 1: Sample screen designs can be used to prototype live systems.

check the database for completeness and accuracy and will help you plug up any holes you discover in your project.

XLD INTERFACE — Excelerator's XLD INTERFACE gives you the control needed to share project data among other users, copy data to other projects and track all such movement of data to those individuals and projects.

The Export and Import facilities allow you and members of your design team to copy all or parts of the project's dictionary to other projects. A Locking feature can be enforced to protect specific data dictionary records from update by multiple users. A Preview feature allows you to view the data records to be modified before actually operating on them.

In a clustered environment, project data can be shared among multiple nodes across the cluster. RMS's record locking facilities ensure that multiple users can't modify the same record simultaneously. The VAXSTATION release notes indicated that multiple user access of project data provides limited protection at this point but should be improved in future releases. Although

multiple users can't modify the same record simultaneously, they can modify related records and dictionary entities. Therefore, it's recommended that procedures be established to monitor and review a project's data regularly.

Three levels of access determine the degree to which you can alter project data. READ users can look at data but not do much else. While working in Excelerator areas such as GRAPHICS and SCREENS and REPORTS, a READ user can only perform operations resulting in output.

LIMITED users have freedom to modify a project's data. A LIMITED user can perform actions on any record in the project dictionary as long as it's not locked by another user.

MASTER users have all privileges. For large projects with many smaller subprojects, MASTER access rights can be given to each manager for his particular project section.

ANALYSIS — Excelerator's analysis section provides the tools necessary to scrutinize your project design.

Graph analysis allows you to check for symbol omissions, redundancies and graph inconsistencies. A level balancing

feature checks for consistency between data flows on one explosion level and the data flows on subsequent levels. An explosion analysis lists all explosion levels (up to nine levels below the top), allowing you to trace all the connections and paths to and from various processes and entities on different levels. Excelerator never automatically changes anything about the system; it merely reports potential trouble spots and suggests how you can eliminate them.

Data dictionary items can be grouped into entity lists. You control what dictionary items are included in a particular group. For example, an entity list can contain record descriptions only. Or, you may need a list of all procedures within certain modules. Narrowing the list of required items allows you to concentrate on particular groups of data records rather than the entire dictionary.

The Report Writer feature can be used to generate hardcopy reports of the entities you select. Entity groups also can be analyzed as individual units and exported to other projects, making it easy to share selected data with other analysts.

HOUSEKEEPING — Housekeeping functions allow you to maintain the Excelerator environment and the projects on your system.

The amount of control each individual has over Housekeeping operations is governed by his access status. System managers have primary responsibility to maintain Excelerator's environment in regard to peripheral devices, system dates and authorized users.

Project managers exercise control of the project on the system and can add, delete, backup and modify projects and any associated project parameters. They can assign users (authorized by the system manager) to projects, granting them required access privileges (MASTER, LIMITED or READ). The last group, regular users, possess restricted access depending on what the project manager assigns to them.

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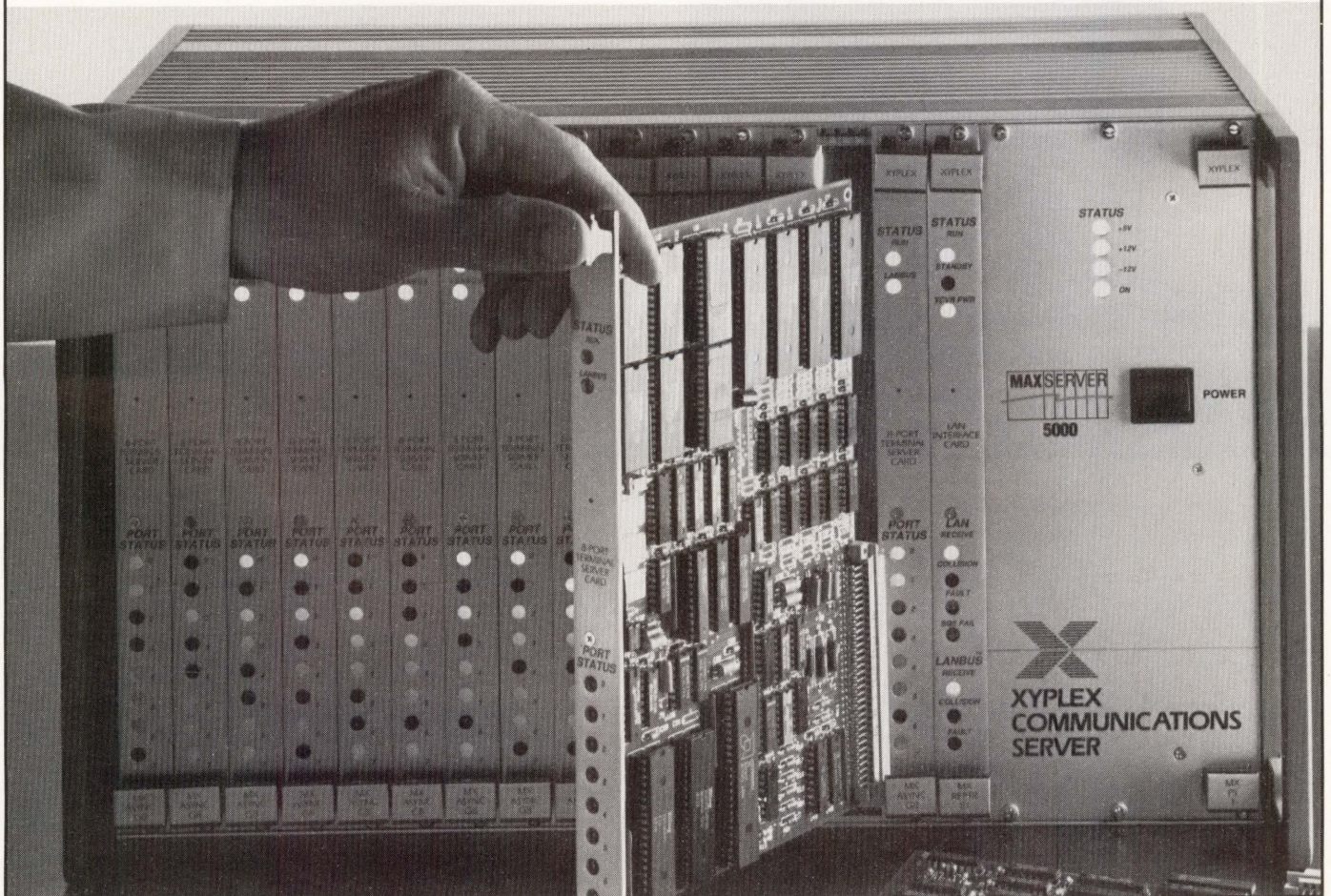
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Excelerator's documentation is extensive, as well as attractive.

DOCUMENTATION — Documentation often is put off until the end of the project's design and often isn't given the attention it deserves. Let's face it, writing documentation is boring; besides, you know how the system works and can explain it better verbally than in writing. Nevertheless, documentation is a critical part of any system and can't be neglected.

Fortunately, Excelerator removes some of the pain of producing documentation. First, you draw a Document Graph, a tree-like diagram that depicts the documentation's overall structure, content and flow, similar to drawing a structure chart. This graph can be analyzed for completeness and logical integrity before producing a final copy. When no errors are found in the document's graph, hardcopy can be produced.

Data for the documentation can be retrieved from the XLDICTIONARY entities (record layouts, screen definitions, graphs, etc.) and from ASCII text files created with a word processor. The order in which these parts are integrated into the final product is determined by your document graph layout.

It's not difficult to see the advantages in having this facility. Items, such as record descriptions and graphs, don't

have to be reproduced manually for the documentation; simply get the needed data from the dictionary. Text files can be created anytime you like and can be incorporated into the documentation wherever needed. The required Document Graph that you initially create helps you organize the flow of the major sections and think about the amount and type of documentation needed for the project.

Although documentation might remain last on your list of priorities, Excelerator's capabilities help alleviate the strain of producing it.

Additional Features

You've worked long and hard designing a system. But, you need to be able to recover data in the event of a crisis. You also need hardcopy of graphs and reports for presentation to management and users, as well as for your own records.

In the event of data corruption, Excelerator's FIXPROJ utility can rebuild the project dictionary and other important project files. A subprocess of FIXPROJ, CTRBLD, can be invoked directly to rebuild selected project files, if you know that only a file or two has been corrupted.

Excelerator

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Printing support includes the normal VMS print queue as well as printing to files. For graphics files, Excelerator allows you to create UIS metafiles that are in a format compatible with the VAXSTATION's RENDER command, or you can print directly to an LN03 or compatible laser.

Documentation

Excelerator's comprehensive documentation includes a *Reference Guide*, *User's Guide* and *Tutorial*. Because these were written with the IBM PC in mind, it's a good idea to keep the VAXSTATION addendum and Release Notes close by for reference, especially for such things as key locations and printing procedures.

Resist the temptation to use Excelerator as a graph drawing program; less expensive graphics packages can do that. Use Excelerator and all its capabilities to derive the maximum benefit for you, your management and end users. Excelerator provides the facilities to design a project correctly and completely from the start; it would be a shame to ignore those features.

Although Excelerator won't produce an expert system analyst from a junior programmer, it will go a long way in helping experienced system analysts concentrate on the real work of analyzing and planning, rather than wasting time worrying about clerical duties or lost and jumbled project data.

If you're fortunate enough to own a VAXSTATION and if you're looking for a solid, flexible and comprehensive CASE package with which to do systems analysis and design, take a look at Excelerator; you won't be disappointed.

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Token Recognition

Editor's note: The C language grammar is very elegant and quite unambiguous, particularly with regard to token recognition and parsing. In this installment, Mr.

Jaeschke explains tokens and their recognition and offers a few examples of unexpected problems.

A token is the basic element of a C source program. The complete set of C's tokens are keywords, identifiers, constants, string literals, operators and punctuators.

White space is used to separate tokens, although it isn't always necessary. (White space can appear inside a token only if that token is a string literal or character constant.) A close look at C's grammar shows that it's designed unambiguously. You can take an arbitrary correct program, remove all white space separating tokens, and except for some unusual circumstances, it still will compile. Examples in the grammar are:

```
for (exp1; exp2; exp3)
while (exp1)
switch (exp)
if (exp)
do ... while (exp)
```

In all cases, the expressions must be placed inside parentheses. These parentheses aren't part of the expressions but are part of the syntax of each of the corresponding statements. So, the presence of white space before and/or after the (and) tokens is immaterial. (Note that in **return (exp)**, the parentheses aren't required syntax of the **return** statement. Here, they are redundant grouping parentheses and are part of the expression.)

Another example of how the language design helps token recognition is with octal and hexadecimal constants. Only arithmetic constants can begin with digits, so the use of 0 and 0x (or 0X) prefixes is reasonable. (However, it's not known whether the sequence 012345678.9 is an octal or double constant until the digit 8 is seen, but that's a minor complication.) There's another way these constants could have been written, using a base suffix.

As a quick and theoretical question, if a parser sees the token 0, is that octal zero? It does have a leading zero. (Note that 0x and 0X aren't valid hex constants; zero must be written as 0x0 or 0X0.)

There are a few cases where you likely will get syntax errors or at least unexpected behavior, if all white space that

separates tokens is omitted from a program. So, for the most part, C is a free-form language where white space is optional. However, there are a few places where white space (or something else) is needed to help the parser recognize tokens as you intend. Let's look at some of these cases.

The Autoincrement Problem

A C translator must form the longest possible token it can. A token is terminated when either white space is found or the next input character can't be part of the token being formed. For example, if the input stream contains **doi = 10**, C must recognize **doi** as an identifier being assigned the value of 10. It can't interpret this as the **do** keyword followed by an assignment of 10 into the variable **i**. (If you're familiar with FORTRAN, you know it recognizes DOI=10 as the start of a DO loop.)

Consider the following example:

```
main()
{
    int i = 10;
    int j = 5;
    int k;

    /*1*/ k = i++ + ++j;
    /*2*/ k = i ++ + ++ j;
    /*3*/ k = i+++ ++j;
    /*4*/ k = i++ +++j;
    /*5*/ k = i+++++j;
}
```

Statement 1 is correct; the tokens are obvious. They are **i**, **++**, **+**, **++**, **j** and **;**, and the statement compiles without error. So does statement 2, because the extra white space doesn't change the tokens seen by the scanner.

In statement 3, the space between the increment and the binary add operators has been removed; however, the scanner forms the longest possible token sequence and correctly comes up with the same tokens as in the first two cases.

Statement 4 results in a compilation error concerning a missing lvalue. Let's look at the tokens found. They are **i**, **++**, **+**, **+**, **j** and **;**, which is different. The reason for the error is that the compiler sees the variable **i** with two postfix auto-increment operators applied to it; i.e., it sees **(i++)++**.

Now the result of the expression **i++** is the value of **i** before it's incremented. The important thing is that this expression generates a value, not something that has an address. Therefore, the expression **i++** isn't an lvalue; it doesn't

designate a memory location to which we can write, although **i** itself is an lvalue.

ANSI C has added a unary plus operator, just like unary minus, causing the above token sequence to generate the same error, because it sees `++(+j)`, a prefix increment of a unary plus expression. Because `+j` isn't an lvalue, it can't be incremented. Whichever way the grammar handles it, it's an error.

Statement 5 is parsed the same as statement 4, so it also generates a syntax error. Of course, a similar problem arises with `i----j` and `i++---j`.

The Pointer Problem

Another tokenizing problem can occur when dereferencing pointers as follows:

```
#include <stdio.h>

main()
{
    int i = 10;
    int *pi = &i;
    int j;
    int k;

    printf("Program start\n");

    j = 30/*pi;

    for (k = 0; k < j;
        printf("k = %d\n", k), ++k)
/* null statement */
        printf("Program end\n");
}
```

Here, we divide the integer 30 by the integer value pointed to by **pi**, namely, 10. This should assign 3 to **j**, and the **for** loop should run from 0 through 2, producing three displayed values of **k**. However, the output is:

```
Program start
Program end
```

The **for** loop doesn't seem to have been executed. See the problem? Just for fun, let's put the comment after the null statement, rather than before it. The source line now should look like:

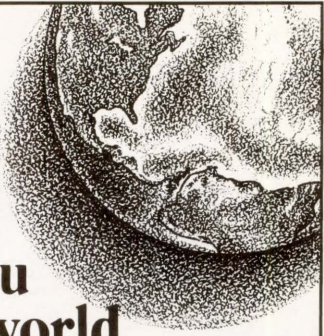
```
; /* null statement */
```

Now we get a syntax error. The compiler complains about the line:

```
printf("Program end\n");
```

saying that a semicolon was expected, yet the identifier **printf** was found instead. The problem lies with the source line `j = 30/*pi;`.

Let's look at the tokens seen by the parser. They are **j**, **=**, **30**, **,**, *****, **pi** and **;**. Actually, `/*` begins a comment, and the



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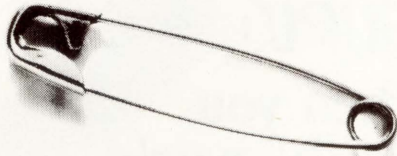
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matching end comment *****/ isn't seen until several lines later. Because C doesn't permit nested comments, no error is produced. The null statement causes the token sequence to be **j, =, 30** and **;** with the intervening comment being replaced by a space. So when the comment is moved, the semicolon becomes part of the comment, and the token sequence seen is **j, =, 30** and **printf**, which generates the syntax error because you never can have a identifier following a constant.

This problem can be solved by placing a space between the **/** and the ***** so they're seen as two tokens representing division and pointer indirection, respectively as follows:

```
j = 30/ *pi;
```

However, this can cause a problem in the future, if some unsuspecting maintenance programmer removes the space. A better solution is to use:

```
j = 30/( *pi );
```

possibly with a comment. This looks sufficiently unusual to attract attention. By using redundant grouping parentheses, we've forced the intended tokens to be recognized.

Building Tokens With Macros

Consider the following example:

```
#define A -1  
#define B 10  
  
int i = B-A;
```

If you run this through a preprocessor and look at the expanded code, you might see:

```
int i = 10--1;
```

and we would expect this to generate a syntax error, because we're trying to increment a constant and that's not an lvalue.

This doesn't happen if the preprocessor and compiler are talking to each other as they usually are in implementations. When processing C source, we have "phases of translation." This is a series of steps followed by the translator, and it dictates the order in which they must be performed. ANSI C has specified these phases in detail, because it's an area of significant differences between existing implementations.

According to the phases of translation, the source is broken into tokens before preprocessing macros are expanded, so the expression initializing **i** contains the tokens **B, -** and **A**. When the macro **A** is expanded to **-1**, the unary minus token is seen along with the constant one. There is no way the binary subtraction operator and the unary negation operator can be considered as the decrement operator, because the tokens already have been formed before the expansion. If you

preprocess the source and save the expanded code in a disk file, you'll get a syntax error when you compile that intermediate output, because the characters -- will be recognized as the decrement operator instead.

Over the years, some implementations have been extended incorrectly to allow tokens to be created as follows:

```
a/* */b
```

Here, the comment was replaced incorrectly by nothing rather than a space, resulting in the token **ab** being seen rather than **a** and **b**. ANSI C doesn't permit this but has recognized the possible need for building tokens during preprocessing. For this reason, ANSI C contains a special preprocessor-only operator **##**. This is referred to as the token pasting operator and is used as follows:

```
a ## b
```

The white space is irrelevant, and the two tokens **a** and **b** are interpreted as if you had written **ab** directly. The advantage of this is that **a** and **b** can be macros that expand to arbitrary strings that can be pasted together subsequently to form larger tokens.

The Mysterious for Loop

Consider the following, seemingly innocent program compiled and run with VAX C V2.3:

```
#include <stdio.h>
main()
{
    int i;
    printf("Let's loop a bit\n");
    for(i=-5; i<5; ++i)
        printf("i = %d\n", i);
}

Let's loop a bit
i = -1
i = 0
i = 1
i = 2
i = 3
i = 4
```

The output seems to be incomplete; the loop seems to begin at -1 instead of -5. (The starting point of your output may vary from that shown.)

Let's compile, link and run with VAX DEBUG included:

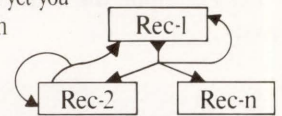
```
VAX DEBUG Version V4.6-9
%DEBUG-I-INITIAL, language is C,
module set to xx
DBG> g
Let's loop a bit
```

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```

i = -5
i = -4
i = -3
i = -2
i = -1
i = 0
i = 1
i = 2
i = 3
i = 4
%DEBUG-I-EXITSTATUS, is '%SYSTEM-S-NORMAL,
normal successful completion'
DBG> exit

```

With DEBUG, the program seems to be working. Let's take a look at the code generated in the listing file. The really important bit is:

```

for(i=-5;i<5;++i)
    subl2 #5,r2
    cmpl r2,#5
    bgeq sym.2

```

The subtract instruction `subl2` looks suspicious; it seems that 5 is being subtracted from register `r2` and compared with 5. Apparently, `r2` is being used to store the variable `i`, yet it's not being initialized to -5 as we requested. There's the problem. Let's compile the source again with an extra switch as follows:

```

$ cc test/standard=portable
# include stderr
%CC-I-NONPORTINCLUDE, #include of a library
module is not portable. At line number 6 in ...

extern volatile int noshare errno;
/* UNIX style error code */ %CC-I-NONPORTCLASS,
Storage class "noshare" is not portable. At line
number 9 in stderr.

extern noshare FILE *stdin, *stdout, *stderr;
%CC-I-NONPORTCLASS, Storage class "noshare" is
not portable. At line number 35 in ...

for(i=-5;i<5;++i)
%CC-I-ANACHRONISM, The "=-" operator is an
obsolete form, and may not be portable. At line
number 9 in ...

%CC-I-SUMMARY, Completed with 0 error(s), 0
warning(s), and 4 informational messages. At
line number 12 in ...

```

Bingo! “%CC-I-ANACHRONISM, The “=-” operator is an obsolete form.” The compiler has interpreted the characters `=-` as an operator, when no such operator currently exists in the C language, even though it did in the past. The following is taken from page 212 of Kernighan and Ritchie's *The C Programming Language*, referred to throughout this series as K&R, under the heading “Anachronisms:”

“Earlier versions of C used the form `=op` instead of `op=`

for assignment operators. This leads to ambiguities, typified by:

```
x--1;
```

which actually decrements `x` since the `=` and `-` are adjacent, but which might easily be intended to assign -1 to `x`.”

VAX C V2.3 still supports these old-style operators, even though they were considered outdated in 1978 when K&R was written. So the subtract instruction is correct; however, the problem is that `i` is an automatic variable and, therefore, has an undefined initial value. Subtracting 5 from an undefined value can result in a wide range of answers. If `i` became -1000, the loop would have run from -1000 to 59. If `i` started as -6, it would become -1, and the loop would run from that through 5. If `i` started out with a value of 11 or more, the loop never would be executed, because `i` already would be greater than 5.

Why does the same program work with DEBUG? That's a quirk of fate. The debugger seems to initialize the stack area where the automatic variable `i` lives, to zero. So the undefined initial value of `i` is zero, and `0 - 5` results in the same value as if you had assigned -5 to it. However, the subtract instruction still is generated, so you get the answer you expect.

To fix it, write the loop as follows:

```
for(i = -5; i < 5; ++i)
```

I've thrown in some extra spaces as well as the one required between the `=` and `-`. Because the C compiler is obliged to form the longest possible token it can, and a token can't include white space, the space between the `=` and `-` forces the compiler to see the assignment and the unary minus operators.

The `/standard=portable` switch is useful and I encourage you to use it. Many programmers compile using a command procedure, and they put this switch inside it on the compiler command line. However, it can generate noise (as shown) that's confusing and irrelevant. It complains about non-standard things that exist in the VAX C-supplied headers, like the `volatile` and `noshare` keywords, and the use of the VAX C `#include` syntax used for text libraries.

If you were porting the program, you wouldn't be porting the VAX C header `stdio.h`; a new version would be provided by the target compiler. So whether or not it contains non-standard stuff is irrelevant. VAX C doesn't recognize `stdio.h` as special; it's just another header possibly written by the programmer.

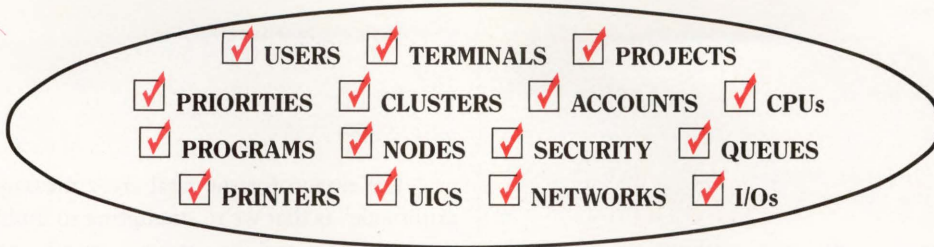
Even though this switch can generate a large amount of such irrelevant messages, it's worth the effort.

More Anachronisms

A related example follows. Again, it's a seemingly straightforward program:

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```
#include <stdio.h>
main()
{
    int i = 100;
    int j;
    int *pi = &i;
    j=*pi;
    printf("j = %d\n", j);
}

j=*pi;
%CC-E-INVPTRMATH, Invalid pointer
arithmetic. At line number 9 in ...
```

This time, an error results even without the standard switch. With the switch, the compiler generates the extra message:

```
j=*pi;
%CC-I-ANACHRONISM, The "==" operator is
an obsolete form, and may not be
portable. At line number 9 in ...
```

Again, the solution is to separate the = and * with whitespace:

```
#include <stdio.h>
main()
```

```
{
    int i = 100;
    int j;
    int *pi = &i;

    j = *pi;
    printf("j = %d\n", j);
}

j = 100
```

The reason for the fatal error message "Invalid pointer arithmetic" is that we're attempting to multiply a pointer with an expression, and it's a syntax error to involve a pointer expression in multiplication. The only arithmetic operations permitted with pointers are addition and subtraction of integral expressions, and the subtraction of one pointer from another pointer where both pointers are of the same type. Also, this only makes sense if both pointers point to elements of the same object.

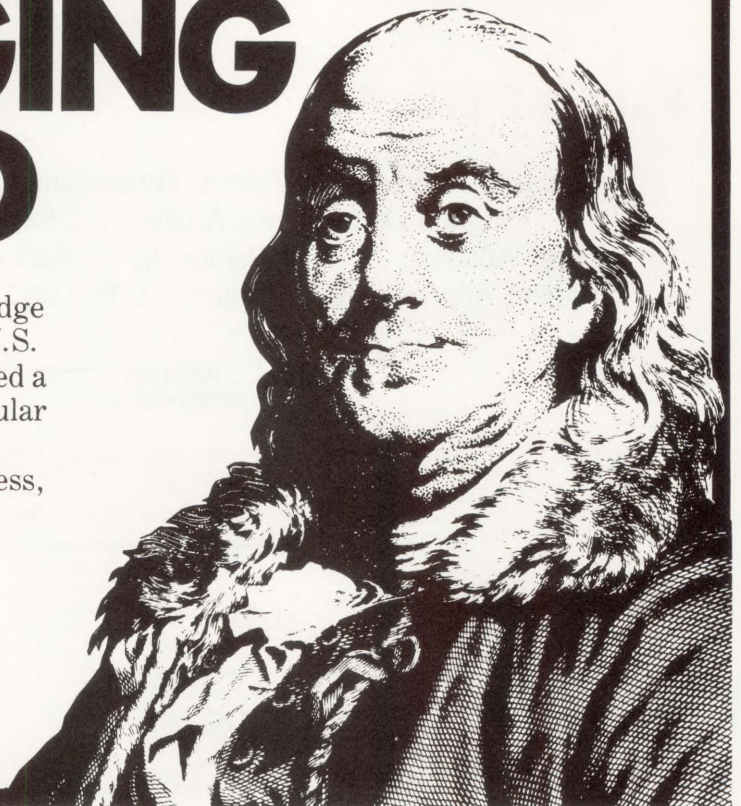
The complete set of compound assignment operators is +=, -=, *=, /=, %=, >>=, <<=, &=, |= and ^=. If you swap them around so the = is at the front, you have the complete set of old-style operators. VAX C supports them all, both old and new. —*Rex Jaeschke is an independent consultant, author and lecturer. He is the C language editor of DEC PROFESSIONAL and our representative on the ANSI C Standards Committee.*

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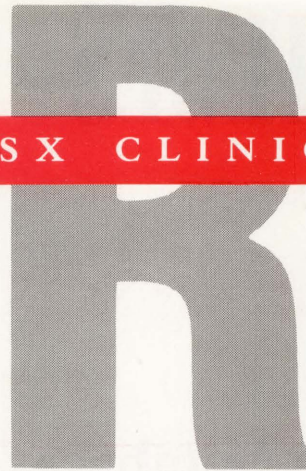
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RSX CLINIC



By James A. McGlinchey

NOT ANSI D FORMAT

QUESTION: *I PIPed some regular ASCII files to a mag tape using RSX-11M V3.2. When attempting to read them on VAX/VMS 4.7 using COPY, I received the error message, "Not ANSID format." What does this mean, and how can I get around it?*

REPLY: It means what it says: Your files on the tape aren't ANSI D format.

Several procedural errors could bring about this result. Did you SYSGEN your system with ANSI mag tape support? It was an option on your version. If not, go back and do another SYSGEN. Is the mag tape ACP (MTAACP and F11MSG) installed? If not, install both tasks with the INS utility and try again. Did you initialize the tape as an ANSI volume? If not, INI it. Did you rebuild your PIP utility with the ANSI mag tape FCS library? Your version requires this manual step. Go back to your distribution kit, and copy the necessary files to task build the PIP utility. Change the task-build command file to use ANSLIB.OLB, rather than SYSLIB.OLB, as its default library; then task build PIP.

It also could be a bug. RSX-11M V3.2 didn't produce a perfect ANSI D format

tape. It was the first version of RSX to support ANSI tape formatting. The permanent fix is to upgrade your system to the current version. I suspect, however, that you're married to version 3.2 for unmentioned reasons and must resort to the workaround: FLX. Actually, I shouldn't call this a workaround, because many RSX users prefer it to the ANSI format for mag tapes. Create a DOS-11 format tape with the following commands on your RSX-11M 3.2 system:

```
FLX MM0:/ZE(initializes the tape)FLX  
MM0:/DO = [uic]Filespec(s)/RS
```

It's that simple. Use the EXCHANGE utility on your VMS system to read the files from the tape:

```
MOUNT/Foreign MM0:  
EXCHANGE Copy MM0:  
  [*]*filespec(s)/Volume__format =  
  DOS 11 [ ]  
DISMOUNT MM0: ■
```

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The undertaking spans the VAX chip set, the Intel processor, three operating systems (ULTRIX, VMS and MS-DOS), all the workstation hardware and all the muscle in DEC's internal application development.

The reason for the commitment is simple: DEC feels that the X Window System and its subsequent extensions are the vehicles through which we'll make the final break from a timesharing world to a distributed processing world. It's betting its fortune on distributed processing.

In the near future, DEC workstations will be able to transparently access applications residing on other vendors' hardware, if they're also supporting an implementation of the X Window System.

X Version 11

MIT, the proprietor of the X Window System, is telling the world that the basic structure of the current X Version 11 is permanent. It will be tweaked, debugged and rereleased constantly, but it defines every aspect and technicality of a uniform programmer and user application interface.

For now, hardware from many manufacturers is being sold with the unvarnished X11 tape from MIT. DEC workstations running under ULTRIX, for example, have pure X today. But you can expect proprietary, platform-customized extensions to X11 from all

the major consortium members: DEC, IBM, Sun, Apollo, Hewlett-Packard, Tektronix, etc. Everyone seems to be shooting for release dates around November or December.

DEC's extension of X, tentatively called DECWINDOWS internally, will be

“

DEC probably can rest assured that few other vendors are trying to integrate X into three operating systems.

”

fully compatible with the original but will have operating-specific extensions and its own look and feel.

“DECWINDOWS is being integrated into all our operating systems,” explained Phil Auberg, DEC's VMS product marketing manager. DEC probably can rest assured that few other vendors are trying to integrate X into three operating systems. Currently, the VAX-STATION 8000 is the only place X11 is running under VMS. “Over the next several months, you can expect several updates,” said Auberg.

Now the sales pitches begin. Prepare for all the hardware vendors to tell you that their X11 has been optimized to be the fastest in the industry. Running on their hardware and operating system, it probably will be.

Building On X11

X is based on a client/server model, the W system, that was developed at Stan-

ford. The client requests graphics, and the server provides them. The server can be local or on a different type of CPU on the other side of the building; the user doesn't have to know. This allows applications to run on platforms where they can run best, rather than being restricted to the workstation.

The shipped data is converted into a protocol called X Wire, which is defined by MIT. It's optimized for 200 KB network transfer and any protocol (DECNET, TCP/IP or IPC) with a reliable byte duplex stream.

The X11 client application is made of several layers: The Xlib programming interface, which interfaces with MIT toolkits, which interface with high-level graphics (PHIGS, GKS, etc.), from which a look and feel can be developed. Basic dirty user interface extractions called widgets are provided in the toolkits. X Manager is a screen manipulator that allows you to lay out your own windows using a mouse.

X11's toolkit was lacking in X10; people had to write code directly to Xlib. This should spur the development of consistent user interfaces. X11 doesn't specify the look and feel of the user interface; it simply provides a set of tools with which to build one. The look and feel consists of how the graphics and icons align on the screen and how the toolkit gets called. (X10 also had an inconsistent user interface; different commands or different keys brought up different windows.)

DECWINDOWS

DEC already has developed its own toolkit extensions called DEC Toolkit that reportedly contains several ad-

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vancements over MIT's. DECWINDOWS also will consist of a set of core applications (e.g., clocks, calendars, etc.) that can be tailored to a user's professional needs.

Like all the platform vendor's versions of X, DECWINDOWS will maintain 100 percent compatibility at the X server/X client level. Above that, levels of software will be added, including one that adds an interface that can be integrated into VMS or ULTRIX.

To ensure that DECWINDOWS will be an instant success, DEC has provided many third-party software vendors, mostly official cooperative marketing partners, with advanced versions of the DECWINDOWS toolkit code, or at least "... with all the information necessary to move applications into this window-based environment," states Auberg. That way, with its usual flourish, DEC will be able to announce a large number of

compliant software packages with its first version of DECWINDOWS.

Marketing Considerations

Although many pricing and marketing decisions haven't been made by DEC, it looks like a new ball game for software pricing. Your average VAXSTATION, for example, might have one window running VMS, another ULTRIX, and a third a Cray application. How can you set prices for that? Won't everyone suddenly be running everyone else's applications?

There probably will be no separate order code for the X extensions. It should come integrated with the operating system, so there will be "... no added cost to customers buying applications," according to Auberg. Some industry analysts are speculating that you eventually will have to buy operating systems separately.

Fielding a question about standard

screen interfaces and Apple's copyright protection lawsuits, Auberg said, "We've gone to great lengths to be certain that it's specific to Digital and that we're not plagiarizing any other work."

Although it was too early to have conclusive benchmarks, Auberg predicted that X's performance under VMS and ULTRIX "... will be roughly the same."

Other Extensions: Masscomp

The new 6000 computers, a family of real-time UNIX-based workstations and minicomputers from Masscomp of Westford, Massachusetts, were released running MIT's X11, but Masscomp is busily putting the finishing touches on its own high-level extensions for the X toolkit.

Masscomp accompanied its 6000 series announcement with the release of version 4 of the RTU operating system, a flavor of UNIX that's capable of running in either the System V or Berkeley 4.2 universes. Its X extension eventually will interface with both.

Masscomp, which also works actively with MIT, says that the latest release of the X Toolkit includes a significant contribution of Masscomp graphics software. According to Masscomp's Richard Carling, who helped design the current X Toolkit and public domain extensions to the previous toolkit, one of the company's major goals in enhancing the toolkit will be to provide a widget editor that simplifies the creation of complex user interfaces.

Masscomp's version, due at the end of the summer, is currently in external beta test, said Masscomp's Graphics Software Engineer Sam Black. The extensions are mainly performance extensions. Some of them are an extension that adds use of data tablets; user-shared rather than network-shared memory; and an X Feed Fill that allows users to fill arbitrary regions.

"Performance will vary, based on which graphics you have," explained Black, "and there are slight considera-

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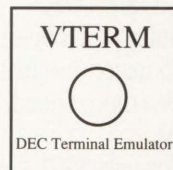
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tions in terms of the number of processors."

X Terminals

Neither DEC nor Masscomp will admit to having plans to manufacture a terminal specifically designed to handle X protocols, but a handful of third-party companies already have begun to introduce X terminals.

GraphOn Corporation is offering an X graphics terminal that runs over an asynchronous line and uses the host's server. Visual Technology Inc. also has become involved, introducing an X terminal at COMDEX last May. A few others have developed X servers in graphics accelerator cards that have the ability to accept high-level X protocols.

According to Brian Croxon, senior vice president of new products at Visual Technology Inc., its X terminal "... is a full, local implementation of the server portion of the X system." In other words, the X server is located in software on the terminal and theoretically can communicate with any host applications running on the network.

The terminal has ports for Ethernet coaxial and ThinWire, and an auxiliary

asynchronous port. The terminal's Ethernet flexibility allows you to use TCP/IP and other communications protocols in a local area network.

The porting process pulls in the application running on the client portion. Network services, which reside between the server and client, also can be accessed from the terminal. "Because the original concept of X was to provide a device-independent protocol, we haven't deviated from that," Croxon stressed.

He said that Visual is working indirectly with MIT's X Consortium to stay X-adherent (the Ethernet connection is X11.2) and proprietary extensions due from all the consortium's platform vendors will run smoothly. "We've left it open to add extensions when they're agreed upon," he explained. At press time, Visual hadn't decided which terminals the X terminal might emulate,

but Croxon said, "We'll do a classic terminal emulation as is standard in UNIX terminals."

Scores of other terminal companies inevitably will develop X terminals along the lines of Visual's or GraphOn's. Future versions could be tuned to specific environments and do X, Microsoft Windows and Presentation Manager. "The opportunity is one that is going to expand the market in the areas of terminals and PCs," predicts Croxon.

The market will expand in many directions. The magic will occur when all the X extensions communicate transparently across a multivendor network, with every vendor using another's implementations.

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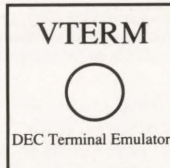
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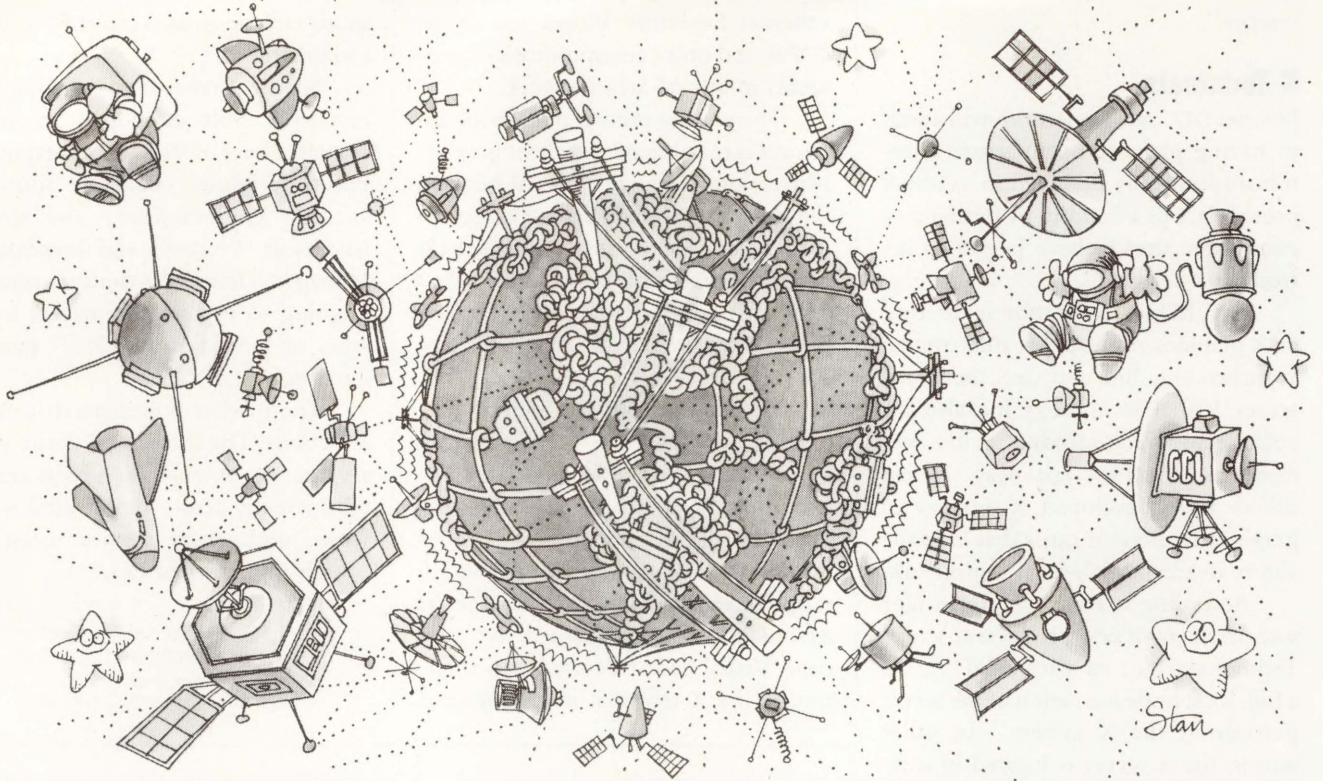
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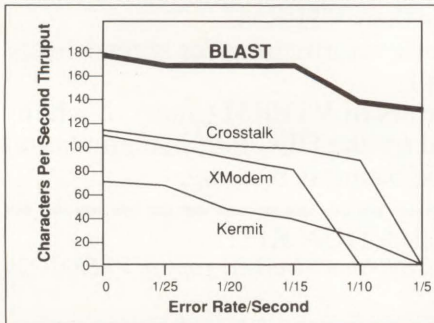


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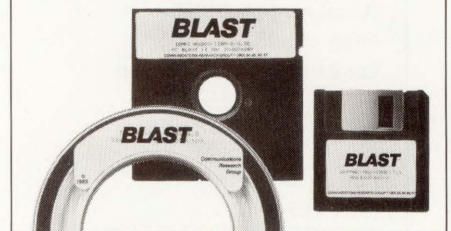
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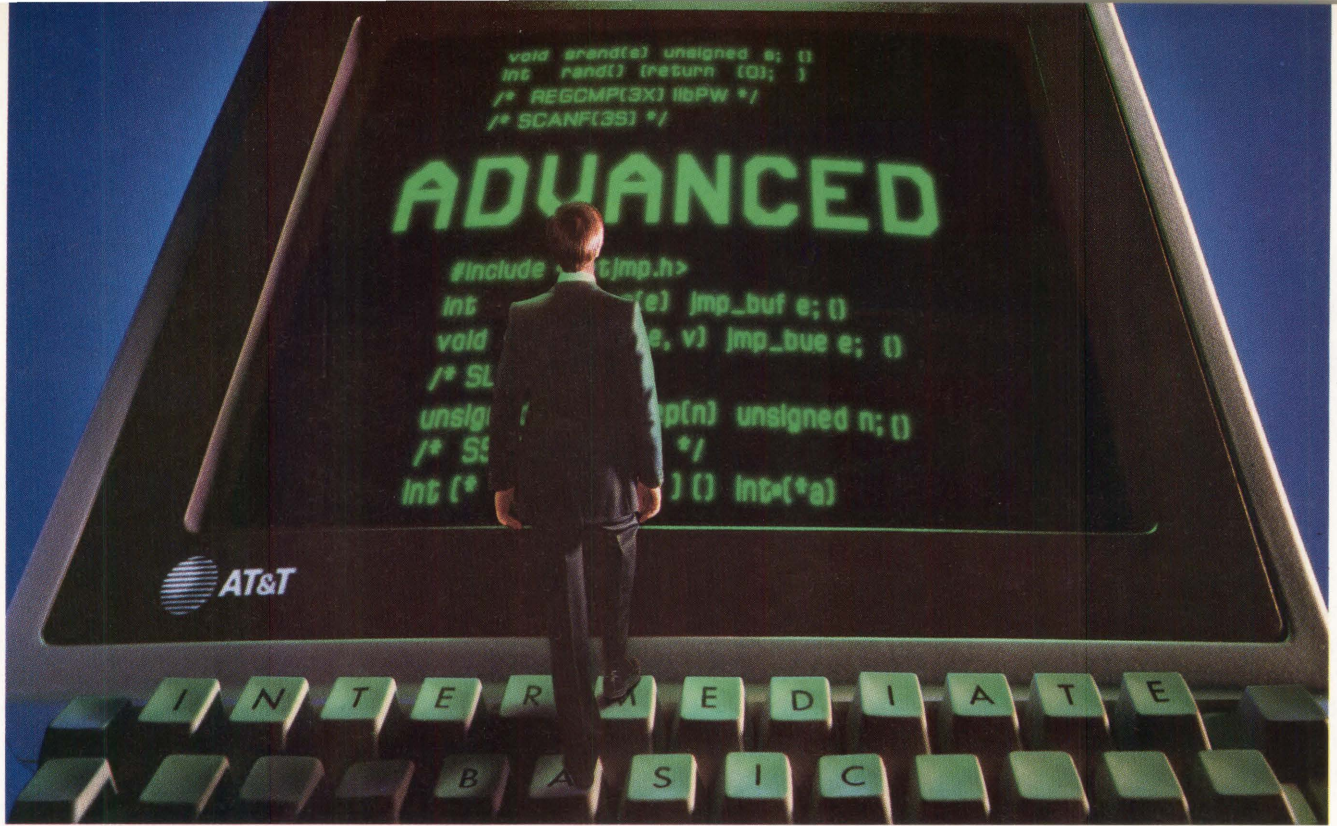
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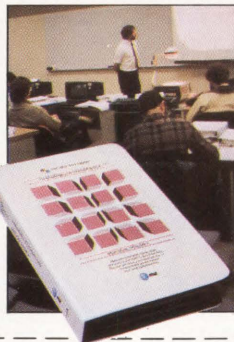
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Capacity Planning And System Design, Part 2

In "Capacity Planning And System Design, Part 1"

(May 1988), I suggested that larger, more accessible systems can be designed using DEC's Ethernet-based VAXCLUSTER technology, the Local Area VAXCLUSTER (LAVC). Let's now look at the capabilities and configurations of MICROVAX clusters.

After DEC's success with clustering large VAX systems and avid customer

interest, it made sense to push the same technology down to the MICROVAX line. DEC had done its homework; VAXCLUSTER technology is a logical extension of DEC's layered network design. A VAXCLUSTER is a software system built on resource managers and drivers. Further, cluster drivers are divided into port and class drivers. This strategy facilitates device independence. In other words, it doesn't matter what medium you use to connect your cluster members (VAX computers); simply write a

port driver to support it.

Big VAXCLUSTER systems use DEC's Cluster Interconnect (CI), which is a high-speed coaxial network. Each node has an I/O processor (CI780, CI750, etc.) that connects two communication channels (A and B) to a central hub called a Star Coupler. Although this same technology could have been implemented on MICROVAX systems, the cost would have been prohibitive.

DEC's solution was to use a communication medium that has been available all along, Ethernet. Like the Cluster Interconnect, an Ethernet controller is a high-speed communication processor that uses a coaxial wire as its medium. Small differences exist between the two systems: the CI has a 70-megabit bandwidth compared to Ethernet's 10, and an Ethernet controller has only one channel.

By using an Ethernet as a VAXCLUSTER communication channel medium, Local Area VAXCLUSTER systems forego the expensive hardware components, such as the Star Coupler, CI and HSC. Furthermore, multiple Local Area VAXCLUSTERS can use the same Ethernet; each is identified by a unique cluster number and protected by a cluster password. Each LAVC consists of two to 26 nodes, two of which can be boot nodes. A boot node is any VAX (except 11/725 and 11/730) or MICROVAX system that provides local storage services.

Clusters were born to share resources and build larger, more capable computer systems. As a side benefit, clusters provide greater accessibility to

T A B L E .

Number of concurrent users:	80
Types of users:	Programmers — 7 Managers — 21 Draftsmen — 2 Clerical staff — 32 Data entry personnel — 13 Accountants — 5
Major applications:	Word processing, electronic mail, database management, drafting, program development, spreadsheets, corporate accounting
Software Packages:	WordPerfect Office, Oracle, SAS, VAXnotes, Auto CAD, FORTRAN compiler, 20/20, and Down to Earth Accounting
Terminals:	78
Printers:	5
Computer environment:	Office building with computer room Five floors
Future expansion:	Ten data entry personnel (12 mo.) One accountant (6 mo.) Two programmers (18 mo.) One manager (12 mo.) Six clerical (12 mo.)

Requirements to perform a variety of applications.

data and computing resources. Most of these qualities are also characteristic of LAVC systems.

Just as diskless VAX systems boot from HSC controllers, diskless MICROVAX systems may boot from a boot node. To facilitate redundancy of resources, two boot nodes are used. Unlike HSC-based systems, LAVC disks can't be dual ported, and thus data availability isn't always guaranteed; i.e., if one of the two boot nodes goes down, the storage maintained by that system will be unavailable to the cluster. In a large Local Area VAXCLUSTER of say eight or more nodes, a second boot node is used to relieve the heavy disk I/O activity that would plague a single boot node.

Capacity Planning

The most important member of the LAVC is the boot node. This system must be capable of handling its own compute and I/O load and the disk I/O requests of the other cluster members. If your cluster's disk I/O demand of the boot node is light to moderate, the system will respond as if several additional users were on the system; CPU demand will increase. If the demand on the boot node's disks is heavy, interactive user response on the boot node will be degraded severely.

Remember that the I/O demand on a system will depend on that system's computing abilities and the throughput capability of its disk system. For instance, a heavy disk I/O load for a MICROVAX II with two RD54s would be a drop in the bucket for a MICROVAX 3000 with a pair of RA82s. In some configurations, you may find it beneficial to implement a boot node with no interactive users. The boot node then acts like an HSC, providing storage services for the cluster. In this way, the boot node can be tuned specifically for disk I/O, and superior performance would be achieved.

The other cluster members, which may be diskless, are used primarily as compute servers. Although it's possible to use diskless systems, designing this type of system will permit less than

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desirable performance characteristics. Page and swap file activity should remain on the local system; at a minimum, non-boot members should have a disk for page and swap file use. Also, there's no reason that non-boot members can't have local storage for user files.

Capacity planning for CPU performance and memory requirements should be performed on a node-by-node basis, as if each VAX in the cluster were a standalone system. Note that clustering consumes both CPU and memory resources for CPU-to-CPU communications. A good average is five percent to 10 percent of the CPU and about 500 pages of memory. The more cluster members you have, the greater the CPU demand from cluster overhead will be.

Storage capacity planning is computed on a cluster-wide basis. Remember, all storage resources are available to

each member of the cluster. Try to evenly distribute disk storage, and therefore disk I/O load, where possible. In the case of some systems, such as VAXSTATIONS and small MICROVAX 2000 systems, a completely diskless computer is practical and economical. Also, your application might demand little from the disk I/O system, so you might want a single boot node with all of the cluster's storage. These are the factors to investigate when planning a LAVC.

System Design

The Table shows the requirements for a sample system to perform a variety of applications. The LAVC excels at this challenge. Individual processors may be dedicated to the various types of applications, allowing the system manager to tune and tailor each system separately.

First, decide which processors can

be used to accommodate the workload. For example, programmers and draftsmen should have machines dedicated to their specialized needs. The draftsmen, for instance, may require a color VAXSTATION 2000 or a VAXSTATION II/GPX. With only single-user access, these VAXSTATIONS could be completely diskless.

The programmers, who tend to consume every available resource, should be segregated to their own system or VAXSTATIONS. A MICROVAX II, with a local disk for paging and swapping, would accommodate this task. A local disk could be used for program storage, as compiling and linking of programs is disk intensive.

The accounting department, with five accountants, lends itself to a tailored environment. A MICROVAX II or MICROVAX 2000 will work equally well; for the price performance difference, the

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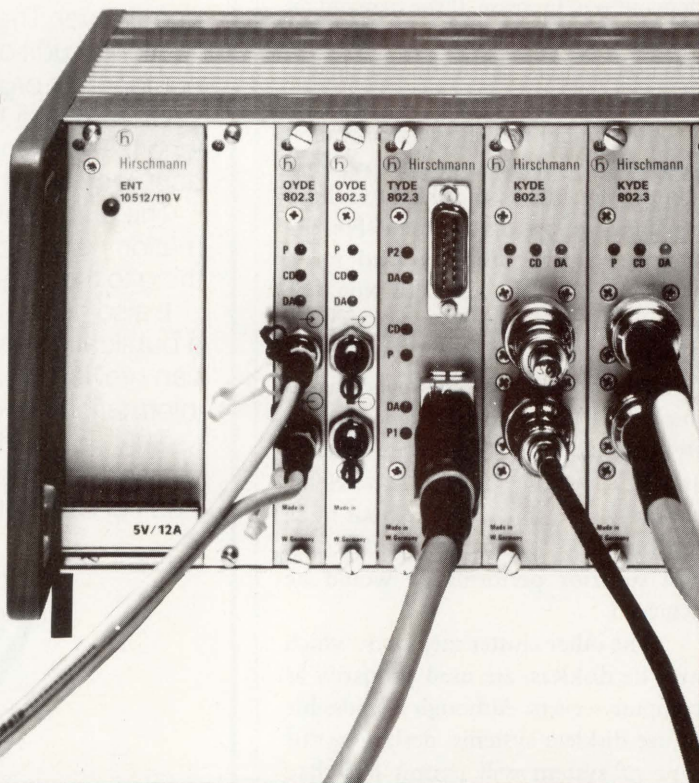
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MICROVAX 2000 would be the better choice. Because multiple users will be accessing this system, a local page and swap file disk should be used, such as an RD53 or RD53 equal. An expansion box wouldn't be required.

The data entry personnel will be performing transactions on corporate databases. This type of activity requires a dedicated system. Assuming growth, a MICROVAX 2000 wouldn't be suited to the I/O requirements of data entry and transaction processing. A MICROVAX II would fill the current requirement, but would accommodate only moderate growth. A MICROVAX 3000 configuration or several MICROVAX 2000s should be considered for this job. I recommend a MICROVAX 3000 system, as the storage for the databases then could be local, affording the system the best possible performance.

The most prevalent applications,

word processing and electronic mail, will be used by everyone in the corporation, primarily the managers and clerical staff. Additionally, the managers will be using the spreadsheet and analysis programs to generate reports from the databases created by the data entry people. Because this system will have the heaviest I/O demand, it should be your boot node. With the current number of potential interactive users (up to 53), consider the largest MICROVAX or even a large VAX system. A VAXBI system, such as an 8350 or 8530, would provide superior I/O bandwidth, so one of the smaller VAXBI systems might fit your needs.

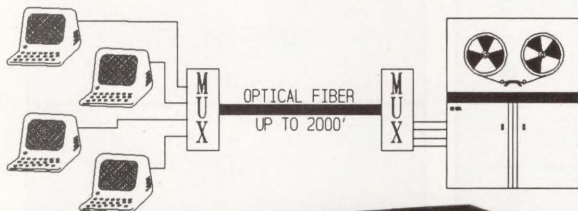
Terminal access to these systems is through LAT terminal servers. The terminal servers facilitate ease of wiring, multiple terminal sessions and connection to cluster nodes other than the primary one; i.e., if the accounting

MICROVAX 2000 goes down, the accountants can connect to the boot node. Using the DECSERVER 100/200s, 11 servers would be needed. Other equipment manufacturers, such as Emulex and Xyplex, also build LAT-based servers.

The majority of the cluster's storage will reside on the boot node, and you should have the cluster's backup medium. Don't underestimate the need of a cluster for high-speed backup. When you back up a cluster member's local storage across the Ethernet, you will be using the resources of two systems. The faster the backup, the better.

The most important thing to remember about designing a Local Area VAXCLUSTER system is that there's no right way to do it. Use your creativity to configure the system that's best for your application. ■

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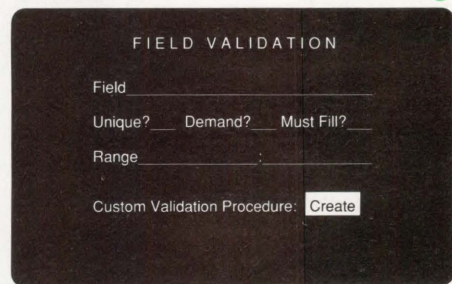


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TCP/IP For Network Services

One of the problems with networks is that there are

many different protocols and network types. The hardware choices are confusing enough, but software protocol suites that run over the various types of network hardware solutions can boggle the mind. Ethernet, for instance, boasts a vast number of protocol suites such as DDCMP, LAT, MOP, XNS, SCS, TCP/IP, VRP, NRP and a slew of other three-letter acronyms for various protocols that will solve the customer's problems.

Within the scheme of protocols, however, some rear their ugly heads, no matter how hard the industry tries to put them down or get rid of them. Consider one such suite, Transmission Control Protocol/Internet Protocol (TCP/IP).

Every other vendor of networks claims that its protocol is better and that TCP/IP is going away. Some point to the decisions made by the Department of Defense to migrate eventually to internationally recognized and standardized communications hardware and protocols, obviating the need for TCP/IP and eventually replacing it. Some view TCP/IP as a workhorse needing to be put to pasture.

Then there are the zealots, who think that the only communications protocol suite for use in the world is TCP/IP, and all others are fluff. These folks are dangerous, because they're vocal about TCP/IP.

Somewhere in the middle are those who don't know what to do with TCP/IP or, worse, don't understand its significance to networks. Unfortunately, these individuals are usually the managers of such diverse camps of at-

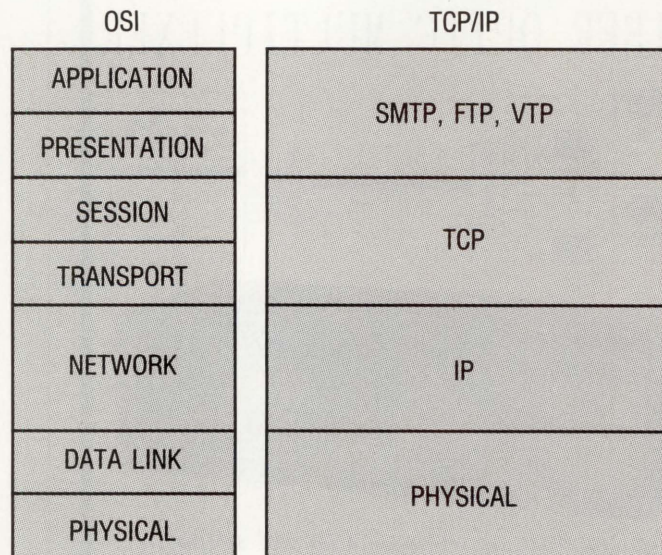
titudes and must make decisions on whether to use TCP/IP on a project or not. The answer is a clear, concise and to-the-point maybe.

Development

TCP/IP came about because of the various networking needs of the government. Developed at Stanford University by Vint Cerf and his associates, TCP/IP was created to satisfy the

need to interconnect various projects including computer networks and allow for the addition of dissimilar machines to the networks in a systematic, standardized manner. Although the smaller defense projects may not have warranted the use of TCP/IP for project aspects, edicts from various DOD sections forced many government contractors and in-house developed projects to use the suite to conform with DOD requirements.

FIGURE .



The OSI standard (left) is based on a seven-layer reference model that defines the functions required in a communications transmission and the relationship between them. In a TCP/IP configuration (right), the Transmission Control Protocol (TCP) component corresponds to OSI Layer 4 (Transport), while the Internet Protocol (IP) component, which is responsible for packet routing between networks, corresponds to Layer 3 (Network). The physical networks themselves, implemented as point-to-point (TTY Driver, HDLC) or bus-oriented (Ethernet) hardware, correspond to Layers 1 (Physical) and 2 (Data Link).

The TCP/IP suite isn't a single protocol. Rather, it's a four-layer communications architecture that provides some reasonable network features, including end-to-end communications, unreliable communications line fault handling, packet sequencing, internetwork routing and specialized functions unique to DOD communications needs such as standardized message priorities. The bottom two layers, collectively referred to as network services, (see Figure), provide for communication to network hardware. Network hardware used in the various networks throughout the DOD typically reflects the use of Federal Information Processing Standard (FIPS)-compliant network hardware (such as IEEE 802 series of LANs and other technologies including X.25).

The layer above the network services layer is known as the IP, or Internetwork Routing Protocol, layer. It's responsible for providing a datagram

service that routes data packets between dissimilar network architectures (such as between Ethernet and, say, X.25).

IP has a few interesting qualities, one of which is the issue of data reliability. As a datagram service, IP doesn't guarantee delivery of data; data concurrency, sequencing and delivery guarantee are the job of the Transmission Control Protocol, or TCP. TCP provides for error control, retransmission, packet sequencing and many other capabilities. It's very complex and provides most of the features of the connection to other applications on other systems.

To properly understand TCP/IP, it's important to know that it's not Open Systems Interconnect (OSI) compliant in implementation (although some argue that there are substantial similarities), and it's a unique network architecture that provides traditional network services in a way that can be overhead intensive in some implementations.

Most networks provide a connection mechanism to get from point A to point B. Other networks worry about how to get from node A on network X to node B on network Y. If a program wishes to send information from itself on node A to another node on the same network, TCP will provide the packet sequencing, error control and other services that are required to allow reliable end-to-end communications.

This doesn't mean that IP is required. In fact, some implementations of TCP connect directly to the network services layer and bypass IP. However, if a program on node A on an Ethernet wishes to connect to a destination program on node B on an X.25 network, an internet routing function is necessary to get data packets sent properly between the two dissimilar network services. IP would take the packet from TCP, pass it through a gateway that would provide conversion services and send it to the IP

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January 18, 1988

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9:00	3:00
10:00	4:00
11:00	5:00
12:00	6:00
1:00	7:00

Do: _____
Call: _____

Calendar Select Add Delete Month Exit

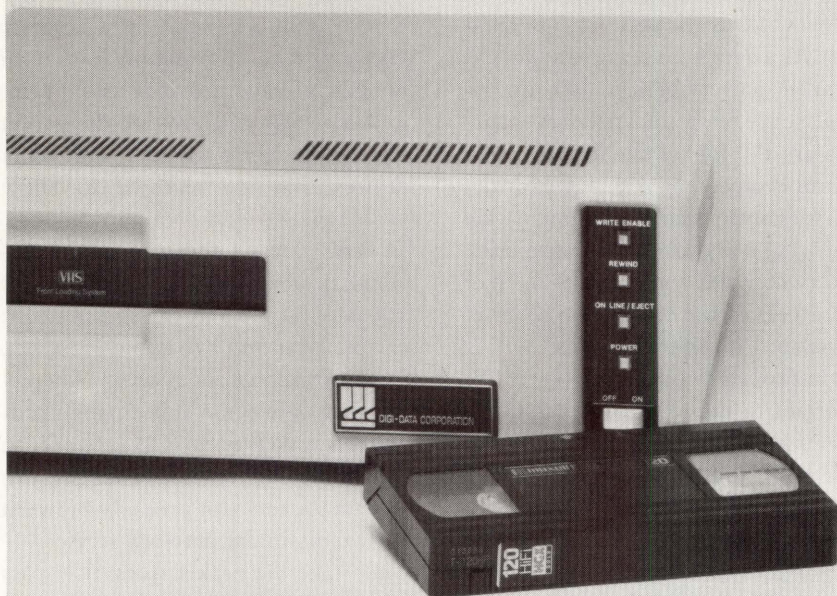
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layer at the remote node for delivery to the remote TCP layer and, subsequently, the destination program.

Connection Examples

For example, Program A on node ALPHA wishes to connect to program B on node BETA on the same network. Program A sends a data packet to TCP with the proper destination address. TCP encapsulates the data with the proper header and checksums in accordance with the services requested by the program and passes the TCP packet to the IP layer. IP determines, from network directory information, that the remote node is on the same network as itself and simply passes the packet through to the network services layer for local network routing and delivery.

In the case of different networks, here's what happens when Program A on node ALPHA on network X wishes to connect to program B on node BETA on network Y. Data is handled as above, but IP determines that the destination isn't on the local network. As a result, the IP layer in node ALPHA determines the best route to get to the remote node and sends the TCP packet to the next IP node in the path to get to the remote. IP doesn't care to which program the source wants to connect; it cares about the node to which it sends the packets.

IP nodes in the path from node ALPHA to node BETA examine the packet to determine the destination and forward the packet to the proper IP until it reaches the destination network IP. IP determines that the node is on its local network, and the packet is handed to the network services layer for the network on which BETA resides for delivery to node BETA.

After the packet is received at the final destination IP, it's passed up to the TCP layer, which breaks out the packet header to figure out which program on the destination node is to receive the data. First, however, the packet header is examined carefully to ensure that it has arrived in the proper sequence and that there are no special handling issues that need to be serviced. After TCP is

satisfied that everything is reasonable, the data is delivered to the destination program.

But, there are some implementation issues that make all of this complex. Because TCP and IP allow many service options such as message priority, security classification, data segmentation at the TCP level, packet segmentation at the IP level and other issues with which some network architectures, such as DECNET, need not concern themselves, there can be overhead associated with packet processing. As a result, TCP/IP performance varies from network hardware to network hardware as well as from machine implementation to machine implementation.

Now let's look at some of the specifics. One of the base problems that TCP was built to address is connecting from a specific program, node and network to a remote program that might not be on the same network as the

originator. A method of addressing nodes needed to be developed that identified a particular program on a particular node in a particular network.

One solution is to develop hard addresses for all entities on a particular network. Although this solves the problem, it's inflexible and doesn't provide an upwardly-flexible network architecture.

Another problem is that some networks have their own proprietary addressing scheme that must be considered, as TCP/IP is above the local network addressing scheme mechanisms in the network architecture and will need to use the local mechanism on packet delivery. To solve the problem, TCP/IP uses a three-layer addressing mechanism that allows for delivery of packets across dissimilar network architectures.

Connection Specifics

Each program (called a PROCESS in TCP) has a unique one-up address on

each machine. That unique local program address is combined with a particular node address to form a port. The port address is combined with the local network address, forming a socket. There can be many sockets on a TCP/IP network, but each one identifies a specific application on a specific node on a specific network. Through this mechanism, IP will get the packets to the proper node, and TCP will deliver the packet to the proper program on that node. Some nodes provide a standard process type (such as type 23 for remote logins) that are known to other network entities and that provide certain standard services. Through this mechanism, TCP provides a multiplexing capability for the efficient use of the network resource.

As with any network, two sockets must have a mechanism for connecting to each other. TCP provides this in various ways. One of the more common ways connections are established is via

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an ACTIVE/PASSIVE network OPEN. A PASSIVE OPEN is when a receptive socket declares itself to be open and available for incoming connections; this typically would be the mode used by something like a database server.

It may be set up in various ways.

ferred between them. TCP provides several mechanisms for data transfer; the two most popular are segmented data transfer and PUSH mode. Segmented data transfer allows TCP to send user data in chunks across the network. TCP can send the data in the most efficient

“
TCP provides the essential network connection and the data transfer features that a user needs to connect with a particular program on a remote system.
”

For instance, the PASSIVE OPEN can be *fully specified*, meaning that the socket issuing the PASSIVE OPEN tells the network which socket can connect to it, including security levels allowed and other related details.

In the *unspecified* PASSIVE open, the socket accepts any connection request from any remote socket provided the remote system requesting connection meets prescribed security and other criteria. In both types of network OPENS, the socket opening the network also can declare timeout values for all data received from the originator of the connection. This allows for the expeditious handling of data, provides a means by which old messages are handled in a reasonable fashion and processes correctly messages requiring special handling (in terms of time).

Another type of OPEN is the ACTIVE OPEN. Unlike the PASSIVE OPEN, the ACTIVE OPEN seeks a connection to a particular socket. An ACTIVE OPEN will be successful only if there's a cooperating and corresponding PASSIVE OPEN or other ACTIVE OPEN from the destination socket.

Data Transfer

After a connection has been established between two sockets, data can be trans-

ferred between them. TCP provides several mechanisms for data transfer; the two most popular are segmented data transfer and PUSH mode. Segmented data transfer allows TCP to send user data in chunks across the network. TCP can send the data in the most efficient manner for the network being used. Even if the user has transferred 25 blocks of user data to TCP, TCP may not send it all at once, opting to segment the data to provide optimal flow of data on the network.

Although this technique is great for data flow issues and network congestion issues, it can be troublesome for transfers in which the data needs to get to the remote system immediately. In such cases, the user can specify the PUSH flag. It forces TCP to send whatever has been passed from the user to TCP right away with no consideration for optimal flow control. Or, the user can specify the urgency of the data being transferred to keep the remote system on its toes.

The amount of data allowed to be sent from one socket to another is a function of the network and programs involved. Because TCP was developed with multiple network architectures in mind, it allows some level of link negotiation on connection and data transfer that provides for maximum buffer sizes (somewhat dynamically) and maximum buffer allocation.

To ensure that everything gets to its destination in the proper order, TCP provides packet sequencing services and error detection functions, using a 16-bit checksum in the TCP header area. TCP presumes the IP layer to be unreliable

and, therefore, contains a 96-bit pseudo-header in front of the TCP packet header that includes the source address, destination address, protocol being used and segment size. Through the pseudo-header, TCP protects itself from having the IP deliver the packet to the wrong place (or not at all) by misinterpreting TCP header fields. The checksum in the TCP header also includes the pseudoheader bits to ensure that everything is clean when it hits the remote side.

Link Shut Off

After the connection is established and all data has been transferred, the link can be shut down via user request. This is the clean way. It's possible that the link also can be aborted abruptly because of link drop or some catastrophic failure of the network or socket-to-socket linkage. TCP provides mechanisms to handle both situations. Issuing a CLOSE primitive tells the TCP that the user is finished with the network link and closes down the link by sending all remaining data in local buffers and notifying the remote socket that the sending user wishes to CLOSE the link.

The remote TCP socket notifies the user that a CLOSE has been issued. The user then can send any remaining data and issue a CLOSE to the sender. When the sender receives the CLOSE acknowledgement from the receiver, it sends a TERMINATE to the user and notifies the remote TCP that a TERMINATE has been issued. The remote TCP socket sends a TERMINATE to the remote user, and the link is closed completely.

If a network link abort occurs, for whatever reason, the ABORT primitive is sent to the remote TCP which tells the remote user that a TERMINATE has occurred. No more data of any kind is transmitted on the link and the link is closed immediately on both sides. A link termination of the ABORT kind isn't desirable, as data may be lost, and other

integrity issues may be involved.

The TCP need not be connected to an IP, although that's frequently the case. TCP provides the essential network connection and the data transfer features that a user needs to connect with a particular program on a remote system. Some companies use TCP as the protocol of choice when setting up simple direct-connect network connections (where the remote node is hard wired to the originating node) or when performing tasks such as downline system loading. In any case, TCP is a powerful and full-featured protocol that provides reasonable network services for user data.

Many times, however, just getting the data from one socket to another can involve the connection to various types of network technologies. A TCP packet coming in from an asynchronous link may need to be routed onto an Ethernet to reach its ultimate destination. Because of the need to connect and properly

route data through to its proper network and destination socket, the IP layer was developed.

IP Description

A datagram service, IP provides rudimentary internetwork routing services without regard to the destination program, TCP formats, error control, packet sequencing, etc. It gets the packet to the right network and, eventually, to the right node. Further, IP allows for expedited routing of packets that need to get to a destination quicker than other routine packets.

In many respects, with the exception of routing priority, IP functionality is similar to Ethernet packet handling. If a packet arrives that's damaged (there's an IP checksum), the packet is discarded. What's in the data field of the packet is of no interest to IP. IP could be sending a TCP packet or some other protocol for all it cares. As long as the

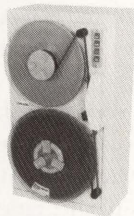
proper SEND (user sending to the network) primitive fields have been filled in, IP will send the packet on its way.

When the packet reaches the remote node, and the checksum figures out that it's OK, IP sends the packet to TCP (or whatever the receptor protocol is) via a DELIVER directive. If the packet gets trashed in the process of being delivered, so be it. If the packets arrive out of sequence, that's not IP's problem. If a packet is missing, IP doesn't care. IP gets the data packet (usually a TCP packet) from point A on network X to point B on network Y.

To provide the internetwork routing function, IP makes use of special nodes called gateways. A gateway, in IP terms, is a machine that allows two dissimilar networks to be connected to each other. The two networks can, but don't have to be, the same technology, as the IP operated above the type of technology being used and concerns

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itself only with virtual connection functions.

There can be a need to segment large messages from the upper software layers into sizes that are applicable to the remote network's allowances. To do this, IP will segment large messages into proper sized chunks (such as when going from 1,500-byte Ethernet packets to 128-byte X.25 packets) for the destination network and reassemble them at the remote destination IP layer before delivery to the user.

If a packet gets destroyed in the segmented message and the remote IP detects the packet loss, the entire segment is killed off by the remote IP. TCP would detect that a segment is missing and request a retransmission from the remote TCP for any missing packets. TCP has the option of forcing IP not to segment packets, but this usually isn't implemented, as it can cause routing problems where differing network technologies are concerned.

IP also provides for proper security classification of packets being sent to a remote site. If an intermediary gateway or network isn't at least the same security level as the transmitted packet, the packet won't be sent through that network. As a result, some strange routing of data can occur sometimes, as IP must contend with the problems of expeditious routing and security-oriented routing.

IP has some different terminology than that used in a network. In many networks, the concept of a *hop* is the routing of a data packet through a node on its way to its final destination point. In IP, a hop is when a data packet goes through a gateway to another network. Therefore, it's possible that a packet may wander through various nodes in a local network before it actually gets to the remote network gateway, depending on variables.

If the packet doesn't incur a route through a gateway, in IP terms, it hasn't incurred a hop. If it transverses through

two gateways, it would have incurred two hops on its path to the final destination.

Thus, TCP and IP aren't the same and can be implemented independent of each other for separate uses. However, they usually are both included in offerings from various vendors.

In any network architecture, the protocols and transmission methods aren't enough. Users frequently want and need utilities that implement the protocols in the network architecture to allow file transfer, program communication, virtual terminal support and electronic mail. Most TCP/IP implementations are the same, and a few standard applications exist.

Utilities

File transfer facilities usually are provided for by a File Transfer Protocol (FTP). It's a simple-featured file-moving utility that allows a record-oriented (one record at a time) transfer, a block transfer (which moves chunks of a file) or an image transfer (which doesn't look at the file contents). FTP knows about EBCDIC and ASCII (also NVT-ASCII) and can provide some rudimentary conversion facilities before a transfer begins.

As file systems are very complex, and the need for file transfer between systems is growing, FTP has evolved in some cases to special implementations that know how to convert specific file formats between certain types of machine architectures. This conversion facility isn't within the defined scope of FTP, but some vendors include the conversion features anyway. To transfer a file, the user invokes the host FTP utility; specifies file name, type (if necessary) and remote destination; and sends it off.

One interesting feature on some FTP implementations is the recovery facility. In the case of network failure, any transfers in process usually will have to be restarted from scratch. If the file is being transferred with FTP in block mode, the transfer can be resumed at a later time by specifying which block was the last transmitted. FTP then con-

tinues to send the file as if nothing had happened. This feature isn't available on all FTP implementations and has some host and remote system software considerations involved with it, but it's a useful feature to have when transferring very large files.

Another popular utility is TELNET. It's a virtual terminal facility that allows a user to connect to a remote system as if his terminal were hard wired to that remote system. Virtual terminals can emulate a wide variety of terminals, impractical on larger, complex networks. TELNET provides a basic protocol-handling facility and a negotiation facility that allows for the inclusion of different types of terminal protocols and signaling mechanisms.

Another popular utility is the Simple Mail Transfer Protocol (SMTP). It provides a mechanism whereby a user can specify a destination address (or addresses, if to more than one remote user), a particular path to follow (if desired) and a message. Like other electronic mail systems, SMTP provides for return receipts, forwarding of mail and other similar features. But, it isn't intuitive, and the routing issues can get strange. Yet, it's a useful utility and heavily used in the defense area.

Some TCP/IP vendors have made a living providing their wares to defense contractors and UNIX/ULTRIX shops that need to connect and communicate with their compatriots supporting TCP/IP. The way that vendors have implemented TCP and IP varies greatly, meaning that features and performance vary. Some vendors, such as Excelan, implement the protocol suite in a controller card, offloading the host from running TCP and IP programs and utilities while providing the necessary connectivity. This makes the overall system more cost-effective and less bogged down in the network mire.

Other companies, such as Wollongong, implement TCP/IP in software on the host. This degrades the host system, sometimes severely, but can function as

a true IP node, allowing simultaneous connection to various network technologies.

Each implementation has its benefits and drawbacks. The best one for a particular system depends on cost factors, system loading expectations and the number of different kinds of networks to which a site may be connected. Some vendors have introduced TCP/IP routers that allow IP services to different types of networks by connecting the networks through a dedicated IP router (sometimes referred to as an IMP) and allowing TCP messages to be created by a particular network protocol, translated into TCP and sent to a destination node.

The source node thinks that it's talking to a machine running the same protocol on the same network. In reality, the packet has been translated and set to the destination node on either the same or another network. Such routing and translation trickery is becoming

more prevalent in environments where TCP and other types of networking software exist.

TCP/IP's Future

In the quest to TCP/IP or not, the bottom line is, how long can it last? A few years ago, I would have said that TCP/IP would last a company for some years to come. Now that the Department of Defense will no longer require it, opting to go with OSI, it's not a safe bet for all sites. There are enough TCP sites installed that it would be foolish and expensive to convert them to something else.

The number of networked machines to appear by 1995 will far eclipse the number currently installed, making protocols such as TCP/IP a minority. I bet that TCP/IP will be around for a while to support current systems. As those systems move over to OSI, however, fewer nodes will be seen run-

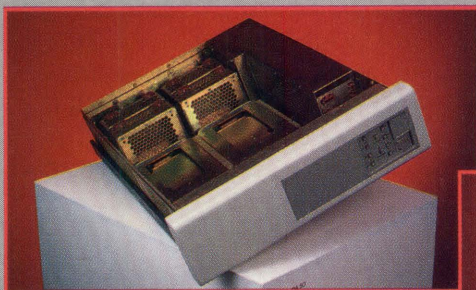
ning TCP or IP.

What would I do if I had to buy today? Buy TCP/IP, because it works and it's now. It will serve for the next two to four years and give the OSI packages some time to mature.

A nice side benefit is that the OSI transport service and TCP's capabilities are very similar, as are the OSI network layer routing service and the IP services. Further, TCP/IP prescribes standardized network hardware, so OSI-compliant hardware is a given in many TCP/IP environments, allowing a migration path to OSI at a future date.

TCP/IP is a serious protocol suite. It provides reasonable network services for most applications and is extensible, well documented and fairly straightforward to implement. It is capable of connecting dissimilar machines on dissimilar networks into one network. — *Bill Hancock is an independent systems and network consultant in Arlington, Texas.*

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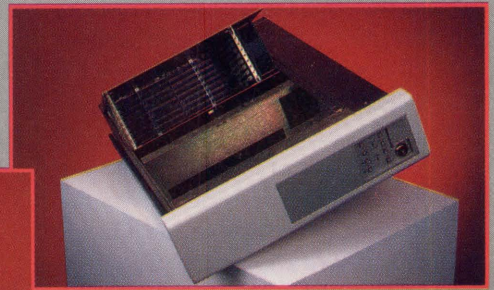
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CLUSTER CHRONICLES

Dave Mallery

Hardware Connection Considerations

Author's note: I must start this report with an erratum. In May, I

said that you could put a short stub on your ThinWire, keeping the tee connector behind a wall plate. Wrong! The Ethernet specification prohibits stubs. The wall plate configuration is only valid for a single stub coming from a DEMPR port. Thanks to the many readers who pointed this out.

I want to address a series of major problems we encountered connecting good hardware to a good network and seemingly breaking both.

Several major Ethernet products use the XNS protocol. There's an imbedded addressing scheme within this protocol. It's easy to choose the defaults (or for the vendor to choose them) and end up with conflicts on your net. It seemed that each time we added another product, the same thing would happen.

I'll describe our experiences with the Logcraft 386ware as an example. We've used Logcraft Cardware for several years now as an add-in board in our 750's UNIBUS. We were eager to try the Ethernet box in our new cluster. One of the main reasons was that the Cardware was only available on the 750, and the users had no control over which node they were entering.

After a short trial, we decided that the only way to really evaluate it was to convert our entire group of users to the new environment. As the song goes, "Ain't nothing like the real thing. ..."

The first problem we encountered was with the LAVC. Because the LAVC overhead makes huge demands on the DEQNA, the Logcraft software was timing out for lack of service. This

LAVC-specific problem was fixed almost immediately by the vendor.

Converting existing Logcraft users was fairly easy. The vendor supplies a

“

Another problem to overcome was the conversion of the Rainbow users to using print spoolers rather than their prized attached printers.

”

utility that converts the data from the previous disk format to the new format required by 386ware.

Converting our last few Rainbow holdouts proved more difficult. Most of the difficulty was in getting the files off the Rainbow and into the VAX intact. Wholesale copying of files can be accomplished with KERMIT. Then, on the

VAX side, we copied groups of files into the 386ware disks using Logcraft's utility.

Another problem to overcome was the conversion of the Rainbow users to using print spoolers rather than their prized attached printers. Now, their print output is in a single file, spool.lis, that's created by the procedure. When they leave 386ware, they can direct it to the local laser of their choice with a print command. Print file output is specified in the start-up procedure executed by the individual 386ware user. We developed a simple DCL menu for all users. They invoke it by giving a standard command. We've supplied the command procedure on ARIS.

The performance of the 386 is legendary. We have a large Lotus 1-2-3 model of our business that we've developed over the last five years. It is 400 down by AR wide. On the Rainbow, it took almost a minute to recalculate. Now on 386ware, the recalc time is less than four seconds. This time will vary slightly with the current load on the 386 drivers.



386ware features a shareable 386 CPU with floating point accelerator and memory. It's served over the Ethernet. Files are kept on any VAX node. Printing is done via normal VMS queues. The floppy is available to any user.

PROGRAM.

```

$ VER = F$VERIFY(0)
$!
$! 386WARE.COM : Setup and run IBM/PC Emulation for Logcraft 386WARE
$!
$!
$ SAVE_DEFAULT = F$ENVIRONMENT("DEFAULT")
$ ON WARNING THEN GOTO ABEND_PROC
$ ON CONTROL_Y THEN GOTO END_PROC
$!
$DISPLAY_MENU:
$!
$! Display options menu.
$!
$ TYPE SY$INPUT

                Logiccraft 386WARE Main Menu

1. Connect to Logcraft 386WARE.
2. Convert old CARDWARE disk to 386WARE.
3. Create new (empty) 386WARE disk.

$ INQUIRE OK "Enter selection (Q to quit) [1] "
$ IF OK .EQS. "" THEN OK = 1
$ IF OK .EQS. "Q" THEN GOTO END_PROC
$!
$ IF OK .EQ. 1 THEN CALL CONNECT_386WARE
$ IF OK .EQ. 2 THEN CALL CONVERT_DISK
$ IF OK .EQ. 3 THEN CALL CREATE_DISK
$!
$ GOTO DISPLAY_MENU
$!
$END_PROC:
$ EXECUTE RESET
$ SET TERM/INQUIRE
$ SET DEF 'SAVE_DEFAULT'
$ IF VER THEN SET VERIFY
$ EXIT
$!
$ABEND_PROC:
$ SET DEF 'SAVE_DEFAULT'
$ TYPE SY$INPUT

Please report the above error to the MIS dept.

$ IF VER THEN SET VERIFY
$ EXIT
$!
$CONNECT_386WARE: SUBROUTINE
$START_CONNECT:
$!
$! Connect to 386WARE.
$!
$ IF F$SEARCH("SY$LOGIN:386WARE.TMP") .NES. "" THEN -
DELETE SY$LOGIN:386WARE.TMP:*
$!
$ SEARCH_DIR = F$TRNLOG("SY$LOGIN")
$ SEARCH_DIR = SEARCH_DIR - "]" + ".386WARE]"
$!
$ OPEN/WRITE OUTPUT_FILE SY$LOGIN:386WARE.TMP
$ WRITE OUTPUT_FILE "$ SET VERIFY
$ WRITE OUTPUT_FILE "$ SET TERM/DEVICE=VT200/EIGHTBIT"
$ WRITE OUTPUT_FILE "$ SET BROADCAST=NONE"
$ WRITE OUTPUT_FILE "$ DEFINE/USER SY$INPUT SY$COMMAND"
$ WRITE OUTPUT_FILE "$ SRV SPOOL.LIS/NOQ/FLA/PR=LST1,-"
$ WRITE OUTPUT_FILE " SPOOL2.LIS/NOQ/PR=LST2,-"
$ WRITE OUTPUT_FILE " SY$386WARE:D386C/READ_ONLY/SHARE, -"
$ WRITE OUTPUT_FILE " SY$386WARE:NEWLOTUS/READ_ONLY/SHARE, -"
$ DOS_FILE_FOUND = "N"

```

```

$ WRITE SY$OUTPUT " "
$ WRITE SY$OUTPUT " "
$!
$386WARE_SEARCH:
$ DOS_FILE = F$SEARCH("'"SEARCH_DIR'".DOS",1)
$ IF DOS_FILE .EQS. "" THEN GOTO FINISH
$!
$ WRITE OUTPUT_FILE " '"DOS_FILE'/SHARE, -"
$ IF .NOT. DOS_FILE_FOUND THEN -
WRITE SY$OUTPUT "The following .DOS files will be used :
$ WRITE SY$OUTPUT " '"DOS_FILE'"
$ DOS_FILE_FOUND = "Y"
$ GOTO 386WARE_SEARCH
$!
$FINISH:
$ WRITE SY$OUTPUT " "
$ WRITE OUTPUT_FILE " /MEM=704/SER=MORDOR/HOT=26/CTRL_S/CTRL_Q/BRE"
$!/SERVER=MORDOR/CTRL_S/CTRL_Q/NOBREAK/CACHE/MEM=704/HOT=26/NOFLUSH"
$ WRITE OUTPUT_FILE "$ SET BROADCAST=ALL"
$ WRITE OUTPUT_FILE "$ SET NOVERIFY
$ CLOSE OUTPUT_FILE
$!
$ IF DOS_FILE_FOUND THEN GOTO BOOT_PC
$ TYPE SY$INPUT

```

I could not find any .DOS files in your directory. If you already have a .DOS virtual disk file, then it should reside in either of the following locations:

```

$ WRITE SY$OUTPUT " '"SEARCH_DIR'"
$ WRITE SY$OUTPUT " "
$ WRITE SY$OUTPUT " "
$ INQUIRE OK "Would you like to create a virtual disk now? (Y or N) [N]"
$ IF OK .EQS. "" THEN OK = "N"
$ IF .NOT. OK THEN GOTO END_CONNECT
$ CALL CREATE_DISK
$ GOTO END_CONNECT
$!
$BOOT_PC:
$ @SY$LOGIN:386WARE.TMP
$!
$END_CONNECT:
$ ENDSUBROUTINE
$!
$CONVERT_DISK: SUBROUTINE
$CONVERT_DISK_1:
$!
$! Convert an old CARDWARE disk to 386WARE.
$!
$ INQUIRE DISK_NAME "Enter the name of the disk file to convert"
$ IF F$SEARCH (DISK_NAME) .EQS. "" THEN CALL INVALID_FILE
$ IF F$SEARCH (DISK_NAME) .EQS. "" THEN GOTO CONVERT_DISK_1
$ DOSDIR 'DISK_NAME'
$ ENDSUBROUTINE
$!
$INVALID_FILE: SUBROUTINE
$ WRITE SY$OUTPUT " "
$ WRITE SY$OUTPUT "The file you specified does not exist!"
$ WRITE SY$OUTPUT " "
$ ENDSUBROUTINE
$!
$CREATE_DISK: SUBROUTINE
$!
$! Create a virtual disk
$!
$ SEARCH_DIR = F$TRNLOG("SY$LOGIN")
$ SEARCH_DIR = SEARCH_DIR - "]" + ".386WARE]"
$!
$ IF F$SEARCH("SY$LOGIN:386WARE.DIR") .EQS. "" THEN -
CREATE/DIR 'SEARCH_DIR'
$ INQUIRE DISK_NAME "Enter the name you wish to give to your disk "
$ DOSMAKE 'SEARCH_DIR' 'DISK_NAME' 5000
$ ENDSUBROUTINE

```

There are several options to further enhance that performance. There are drivers that can be put into Lotus 1-2-3 that accelerate the graphic performance of the product, both on regular terminals and on VAXSTATIONS.

We totally have converted both our previous Cardware users as well as our standalone Rainbow users to 386ware. We decided to capitalize on the investment by offering Lotus classes to the employees. These are well attended and suddenly, new Lotus applications are appearing throughout the company. It looks like we'll have to upgrade from the four- to the eight-user license soon. It's surprising, however, how many casual users can be supported by a four-user machine.

Now, back to the problems. As soon as we put the Logcraft onto the same Ethernet as the Xyplex, both XNSs stopped working. To fix it, we had to have the folks from Logcraft dial into the system and change around some XNS IDs.

As an aside, a few weeks later, we found ourselves with another XNS product, Mobius from FEL Computing. This is an Ethernet-based PC interface that can serve files to the PC from the VAX while also providing VT220-style terminal emulation. Fortunately, they

have prepackaged about six variations of the XNS, and we chose one that didn't conflict with the other two implementations.

Cluster progress report: We've decided to bring our Ethernet to California. We'll start by putting Xyplex gateways in front of a pair of Emulex modems. On the Spring House, Pennsylvania, end, we'll simply connect the gateway into our DELNI. The gateways intelligently will filter out only the California-bound traffic. On the Pasadena end, we'll connect the gateway to another DELNI.

Then we'll use a pair of cluster controllers and also connect into the VAX node as well. We're planning local dial-in lines for ARIS access in southern California and simply will connect the modems directly to a cluster controller. The limiting factor will be the 14.4 bandwidth of the phone line. The line is due soon. Stay tuned.

Part of the magic of this line is the cost. I found a carrier, Williams Telecommunications Group, that had pulled fiber through a network of defunct gas pipelines through the West and offered inexpensive coast-to-coast links. My line from Spring House to Pasadena on a one-year contract tallied \$1,100 per month. That's cheap. ■

Companies Mentioned In This Article

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Logcraft
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(603) 880-0300
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Lotus Development Corp.
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(617) 577-8500
CIRCLE 572 ON READER CARD

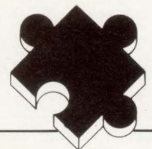
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PO Box 21348
Tulsa, OK 74121
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4. Message: Don't forget meetings at 7:00

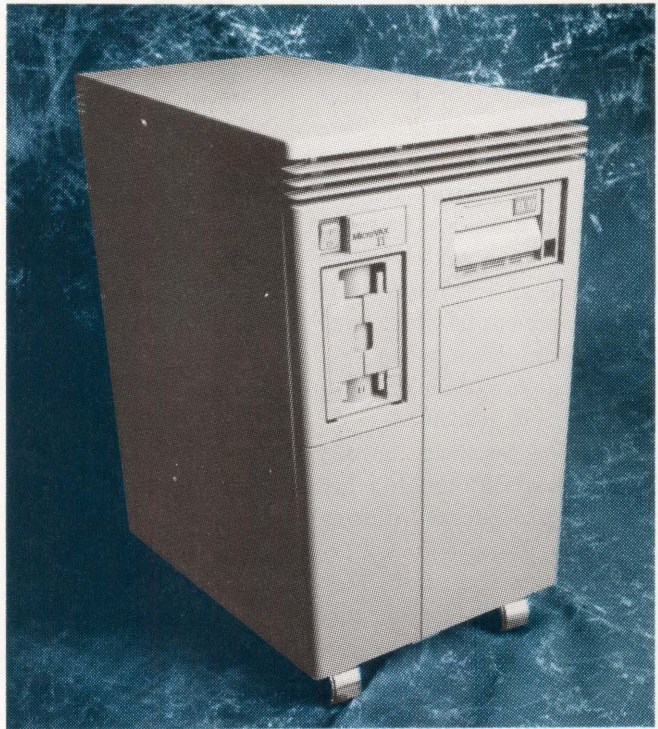
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A

DCL DIALOGUE

Kevin G. Barkes

Errors, Non-Errors And Errata

For the most part, DCL is a friendly environment in which to develop utilities. The command language interpreter excels in providing programmers with information about the environment in which their procedures execute. Even when DCL responds atypically to a command, simple workarounds are available.

Consider, for instance, the SET DEFAULT command. Although I had forsaken DCL procedures offering enhanced set default capabilities, I decided to create a procedure that would emulate the MS-DOS change directory (CD) command.

The challenge was to recover from a SET DEFAULT to an invalid directory. Normally after issuing a DCL command, you can determine the success of the execution by examining the value of \$\$SEVERITY.

Totally successful command executions place the value 1 in \$\$SEVERITY; commands which neither completely succeed nor fail (i.e., they terminate with an informational status) insert the integer 3 in \$\$SEVERITY.

I built the .COM file and was chagrined to discover it wasn't behaving properly; it appeared as if the value in \$\$SEVERITY was incorrect.

A test proved this assumption:

```
$ set def [-.qrk] (non-existent directory)
$ sho def
DISK1:[USERFILES.TEST.QRK]
%DCL-I-INVDEF, DISK1:[USERFILES.TEST.QRK] does not exist
$ write sys$output $severity
1
```

DCL's text of the severity level, "-I-", for informational, was correct.

Nonetheless, the value placed in \$\$SEVERITY was 1, indicating normal, successful completion, rather than 3, successful completion with informational.

An interesting discovery, it didn't solve my problem. The workaround was fairly simple, even though it made the procedure longer:

```
$! CD.COM
$ IF P1 .EQS. ""
  THEN GOTO B
$ IF F$PARSE(P1) .NES. ""
  THEN GOTO A
$ WRITE SYS$OUTPUT
  "'P1' is an invalid default."
$ EXIT
$ A:
$ SET DEFAULT 'P1'
$ B:
$ WRITE SYS$OUTPUT
  F$ENV("DEFAULT")
$ EXIT
```

There are only two active lines in the procedure. The first line after the

comment tests to see if P1 is blank; i.e., no default was specified. If the parameter is empty, the procedure branches to B: and displays the current default using the F\$ENVIRONMENT lexical function.

If P1 contains text, the lexical function F\$PARSE is used to test whether the specified default exists. If it doesn't, F\$PARSE returns the null string, and the procedure's error message is displayed. Otherwise, the procedure executes the set default command and displays the new default.

Using F\$PARSE has another benefit: Give it a bad default or incorrect directory specification, and it simply returns the null string. No error messages are generated, unlike SET and SHOW DEFAULT, which scream DCL bloody murder when bad data is passed to

PROGRAM.

```
$! REC.COM
$ SET NOON
$ IF P1 .EQS. "" THEN GOTO ZIPPO
$ IF F$SEARCH(P1) .EQS. "" THEN GOTO ZIPPO
$ ASSIGN/USER REC.TMP SYS$OUTPUT
$ APPEND/LOG 'P1' NLAO:
$ OPEN/READ IN REC.TMP
$ READ IN REC
$ START = F$LOCATE("(" , REC) + 1
$ VAL2 = F$LOCATE(" records" , REC)
$ REC_COUNT == F$INT(F$EXT(START , VAL2 - START , REC))
$ CLOSE IN
$ DELETE/NOCONFIRM/NOLOG REC.TMP;*
$ EXIT
$ ZIPPO:
$ REC_COUNT == -1
$ EXIT
```

them. This eliminates the need for using SET MESSAGE to inhibit unwanted error messages.

I need only CD in a set default utility, and I've included it here to show some of the ways to get around limita-

can be justified, because it performs a valid function.

The results of REC.COM's operation are placed in the global symbol REC_COUNT. The symbol contains either the number of records in the file

“

REC.COM is inefficient and kludgy, but it works and its existence can be justified, because it performs a valid function.

”

tions in DCL. (Please don't send me any more, unless you've developed a telepathic interface to the keyboard.)

Stupid DCL Tricks

This was the short title of my presentation at the Cincinnati DECUS Symposium in May, although the seminar officially was titled "Utility Development in DCL." This column's being written about a month prior to the event and (apologies to David Letterman) I'm busily putting the finishing touches on the DCL Lexicalthrillcam and trying to find a 50-foot platform from which to drop a DCL Dictionary.

"Stupid DCL Tricks" also will be an irregular feature of this column, and you're invited to send in examples of contorted uses of DCL to achieve otherwise practical goals.

There are two rules: The procedures must perform some useful function and must represent the simplest DCL solution to the problem.

For example, take REC.COM (see Program), which returns the number of records contained in a file.

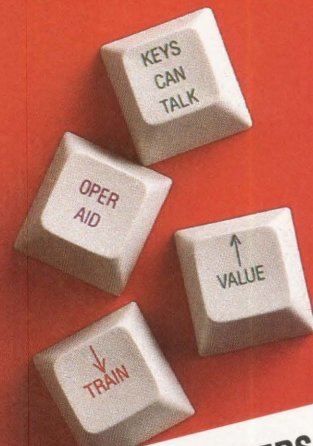
There's no direct way to obtain this information from DCL; the F\$FILE_ATTRIBUTES lexical can provide scads of data, but a file's record count isn't one of them. REC.COM is inefficient and kludgy, but it works and its existence

or the value -1, if the procedure failed for some reason. Additional error-checking can be added to bulletproof the procedure, but for our purposes it's sufficient.

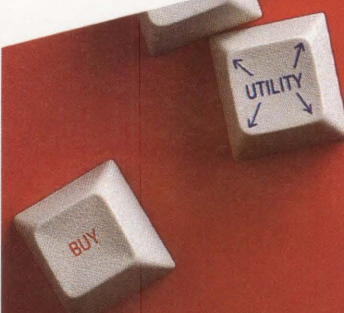
@REC FILENAME invokes the procedure. If the specified file can't be found or is an invalid file name, REC_COUNT is set to -1. Otherwise, use the APPEND/LOG command to append the file to the null device, and use the ASSIGN/USER to redirect the output of the file to REC.TMP. Next, read in REC.TMP and, using several lexicals, extract the number of records appended to the null file. The value is assigned to REC_COUNT, and the procedure performs clean-up prior to exit. About as elegant as an oiled duck, it works.

The VAX and Rainbow echomail areas on FidoNet have been humming along, and users have uploaded lots of useful utilities here at the SYS\$OUTPUT bulletin board system. First-time callers now have download privilege, so feel free to dial in and poke around. SYS\$OUTPUT (FidoNet 1:129/38) is up 24 hours a day at (412) 854-0511. Look for the online listing of DEC-related FidoNet BBSS or send a self-addressed, stamped envelope to: BBS List, Kevin G. Barkes Consulting Services, 4107 Overlook Street, Library, PA 15129. —Kevin G. Barkes is a specialist in VAX systems software, management, tuning and training.

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Identifiers In Function Prototypes

Editor's note: In April, our C language editor and representative on

the ANSI C Standards Committee, Rex Jaeschke, submitted the following paper, edited for publication, to the ANSI C Standards Committee, in Nashua, New Hampshire.

I've been using a number of compilers, including VAX C, that support function prototypes, and I've come across a potential problem regarding the naming of the optional identifiers in the prototype argument list.

These identifiers have their own namespace; they're known from the point of their declaration through the end of their parent prototype. Therefore, they can't conflict with other namespaces. However, the preprocessor doesn't know about C's identifier namespaces, and it looks for tokens that match its macro names, replacing them without regard for where they are in a C program, prototypes included. For example:

```
#define status 23

#include <stdlib.h>
/* which contains the prototype:

void exit(int status);

*/
```

generates a syntax error, because the prototype becomes:

```
void exit(int 23);
```

Another problem occurs when **status** is defined as follows:

```
#define status []

void exit(int status);

main()
{
    int i[5];
```

```
    exit(i);
}
```

Now the prototype is changed, so the call to **exit** is deemed to be correct, when it's really an error.

A programmer shouldn't be able to inadvertently or intentionally circumvent a standard header prototype. Prototypes in users' own headers or those

ANSI C Standard Meeting Report

At the December 1987 meeting in Austin, Texas, there was a last minute push to incorporate some kind of syntax within a prototype to indicate to a compiler that the incoming arguments didn't overlap. This was of particular interest to those members implementing on systems with vector processing hardware. Optimizers also were interested.

As a result, a palatable idea was proposed and many senior committee members worked into the wee hours over several days, drafting exact words. The proposal was to add a new keyword, **noalias**, that would be a type specifier like **const** and **volatile**. On the last day of the meeting, the **noalias** proposal was adopted, and we voted out the standard for its second public review for a two-month period.

Word of the new keyword spread throughout the C community, and loud objections began filtering back. The most noticeable objection came from Dennis Ritchie, the principal designer of the C language. He submitted a public comment saying that he didn't like our solution and also attended the Nashua meeting, his first.

He objected to the haste with which the keyword was added and didn't think it solved the problem. He also thought it incorrect to use a type specifier as the solution. His final statement was, "It must not survive."

Several others who had voted for it in December, spoke out against it in April, and, buoyed by Ritchie's persuasion, we voted **noalias** and its associated baggage out of the Standard.

This occurred on the first day of the meeting. The rest of the week was dedicated to sifting through several hundred pages of public comments. To expedite things, we broke into three- to four-person subgroups. Each group had to screen its set of issues, identifying those needing full committee attention. Although there were a few substantive changes to the draft, the largest number were editorial changes to both the draft and Rationale Documents.

At the end of the meeting, we voted out the draft for another two-month public review period. At the August meeting, we'll repeat the same process and the final Standard could be voted out at that meeting. Of course, we always could choose to make one or more substantive changes; in which case, the process begins again.

—Rex Jaeschke

For a copy of the latest ANSI draft and rationale documents, contact Global Engineering Documents Inc.; (800) 854-7179. Price: \$65.

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of third-party layered products are another matter.

Perhaps this is a quality-of-implementation issue, but the implementations I've been using are represented on X3J11, so I feel compelled to raise the issue. As I see it, the solution is to place two underscores (or one underscore followed by a capital letter) in front of all argument identifiers in the library prototypes throughout the draft Standard.

This should solve the problem, because implementers seem to be writing their prototypes using the same names as the draft (or at least they're using these as examples). Of course, they could choose to leave out the names altogether. Perhaps some words are appropriate for the Rationale Document as well.

Because we've explicitly reserved the namespace of identifiers beginning with underscores, we should follow our own advice. User and third-party product header writers can omit the names (preferable) or reserve the names they use. However, I expect the latter to be less than palatable by users porting code.

By the way, I believe the issue of style (i.e., making macro names all uppercase) is irrelevant, because we explicitly give the space of upper- and lowercase names without leading underscores (with noted exceptions) to the user.

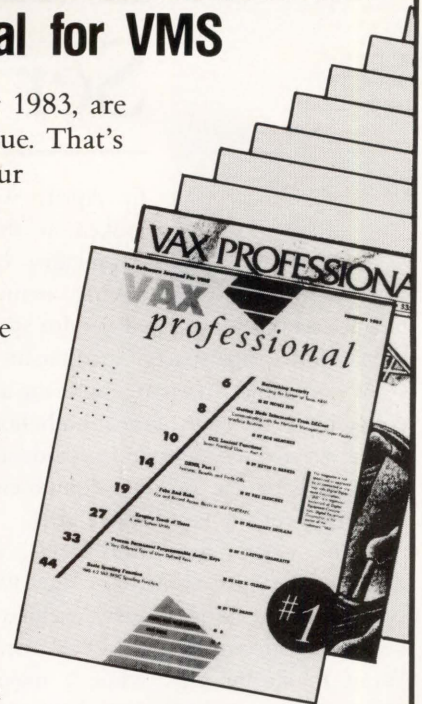
Author's Note: The committee agreed that it need not change the standard but should explain this possibility in the Rationale Document that accompanies the draft. The net result is that implementers shouldn't use identifier names that belong in the programmer's namespace. ■

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Ron Levine

DEC's After Your Service \$\$\$ Too

In April, we looked at the advantages of having maintenance services for mixed-vendor systems from third-party maintenance (TPM) companies. TPMs are capturing an increasing percentage of the multibillion dollar service revenues and provide an alternative to the original equipment manufacturer's (OEM) service arm.

The OEM, specifically DEC, is aware of the inroads made by the TPM companies on its previously exclusive system service turf. And, DEC isn't about to sit by idly, while a major revenue source is under attack.

In fairness, *DEC PROFESSIONAL* asked DEC if it would like to respond to the TPM article, and respond it did. DEC U.S. Field Service Management offered its side of the OEM versus TPM controversy.

Although DEC, like other OEMs, at first either refused to maintain non-logo products or serviced them at customer insistence, its attitude has changed. Now, DEC wants your service business, even if you have non-DEC equipment in your site environment, and it has taken steps to obtain it.

Doing Something Right

DEC bashing seems to be in style these days, according to one of my sources. Probably it's the mark of success. IBM has been a target of criticism for everything from product technology to software introductions, from pricing to policy. The industry analysts, consultants and trade publications like to fault anything and everything that comes from Big Blue. The fact that DEC is a

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target of many of these same reviewers is a mark of success; DEC is now in the same league as IBM.

Such scrutiny comes from market acceptance. Corporations don't purchase additional products from a vendor if past experiences have been negative. Obviously, IBM and DEC have a lot of satisfied customers.

Turning to field service, DEC's growth has been tremendous. Revenues increased 26 percent in fiscal 1987 over 1986. Customers served exceed 50,000. This kind of growth doesn't occur without customer satisfaction in both the product and service. DEC must be doing something right.

DEC Service Offerings

DEC has divided its field support services into a number of categories. Each of these services is available independently or as part of a total customer support package. In general, they are:

1. Network Design Consulting — This includes the planning, design and implementation phases of networking.
2. Site Design Services — This helps to determine proper power levels and distribution, air conditioning and other environmental requirements, site construction, size, clearances and other physical attributes. An AI-based software package is used as a support tool.
3. Installation Services — This places systems or equipment on site, provides

startup and trains operators.

4. Operational Support — This is DEC's major field service program. It can include network management, system series, system management, standard remedial services, disaster recovery and environmental services, including site audits.

System services can include customer use of an expert system (Digital Software Information Network [DSIN]); on-site repairs for critical applications (both hardware and software); an on-site account representative from field service; and telephone support (24 hours, seven days per week).

System management includes all system service, plus performance analysis and monitoring, proactive preventive maintenance and a designated account manager at the Customer Service Center.

Standard remedial services are hardware troubleshooting and repair, and hardware parts replacement.

5. Training — This provides complete end user courses for both hardware and software products.

6. Warranty — DEC warrants its entire product line for one year; this includes hardware and software, parts and labor.

DEC includes a defined escalation clause in all its service contracts, specifying actions that will be taken if a problem exceeds local level resolution.

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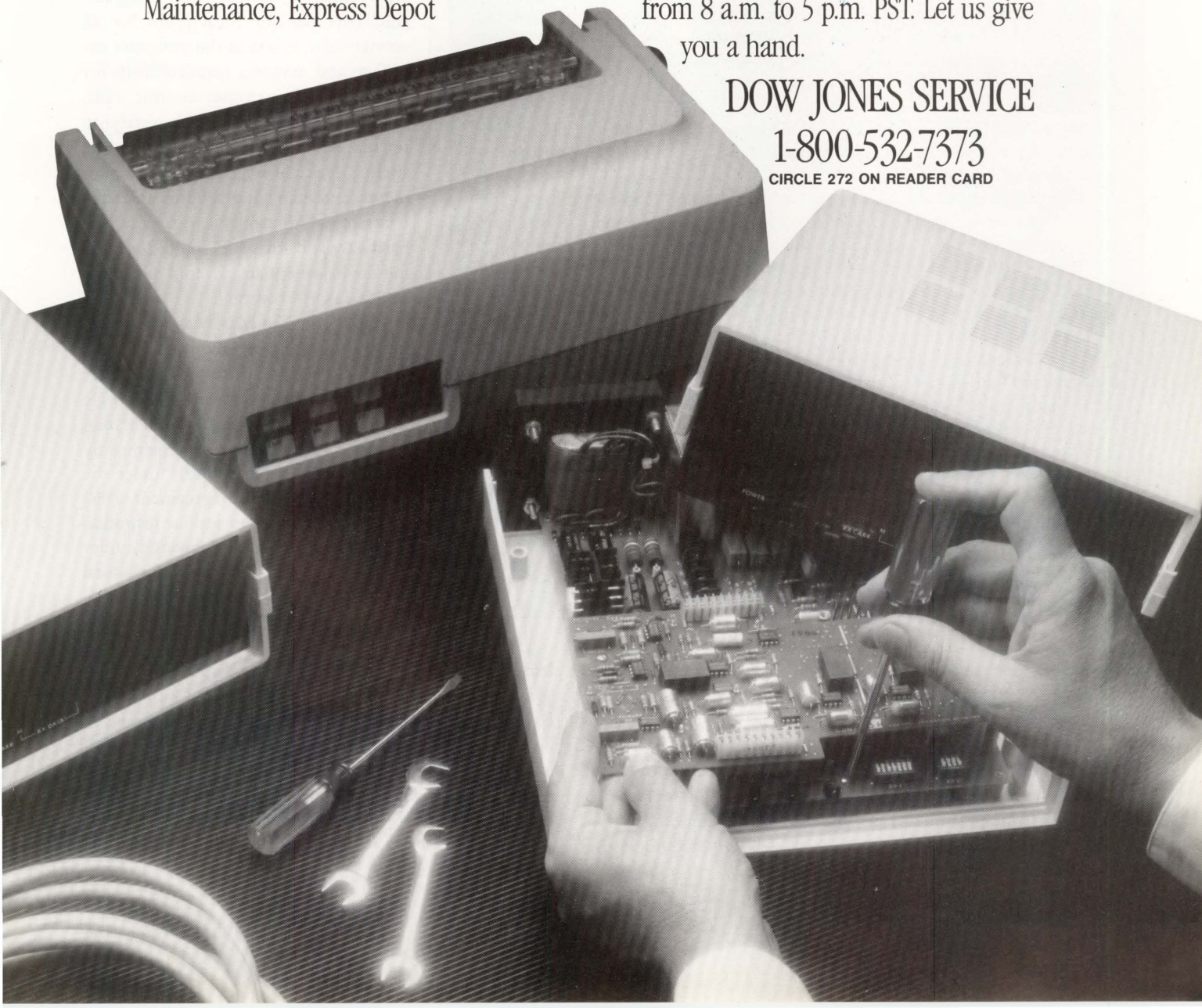
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The Parsing Group

In May, some of the biggest and best-known independent maintenance providers to the DEC user base met in San Luis Obispo, California, to map the future of the service industry. Companies represented included Control Data Corporation, General Electric, Grumman Data Systems, Maintech, Unisys, ESS, Douglas Computer International and British Columbia Telephone Company. The conference was created and chaired by Parse Inc. of Hudson, Massachusetts, an independent supplier of DEC-compatible diagnostics to the third-party maintenance (TPM) industry. It was convened to explore the possibility of forming a users group to cooperate in areas of mutual interest in the DEC services market.

Billed as the industry's first diagnostics standards meeting, this influential group expanded the agenda to include precedent-setting discussions on other subjects of importance to the independent service industry and its customers. Topics tackled ranged from parts availability to the impact of new technology, ethical standards in dealing with customers to the increasing difficulty in dealing with DEC. Lessening the independents' and users' reliance on DEC for technical drawings, manuals, parts and diagnostics was a major theme of the conference.

The keynote address, given by *DEC PROFESSIONAL*'s editorial director, Dave Mallery, set the tone of the conference by describing the changing role of support required to service customers today versus the traditional service call of 1980. Mallery also touched on new problems for the TPM providers as standalone DEC systems give way to networks and clusters encompassing hardware and software from multiple vendors, resulting in interconnectivity problems.

He assessed the increasingly rapid obsolescence of installed equipment, the proliferation of new machines and technologies, and the push toward interoperability and what this means to TPMs.

Other topics included legal issues and what to do as DEC moves to protect its territory. With annual service revenues for DEC-based systems projected at topping \$6 billion within five years, DEC will pull out all the stops to protect its business.

Paul Files, Parse's vice president of marketing, stressed that the purpose of the Parsing Group isn't to displace other established industry groups but to provide a forum where Parse's customers can talk to each other about marketing issues, technology, documentation, training, spares and other subjects of importance to the TPM industry. The group will serve as a mechanism for making its needs known to vendors who supply hardware, software and services to the independent maintenance industry. "The Parsing Group will discuss the issues we all need to understand if we are going to be successful in the marketplace," says Files.

Parse doesn't view its plunge into the DEC world as competing with DEC. Files stated, "We produce VAX software to sell into the TPM market. We are not competing against DEC, as it doesn't sell the independent vendors its established software packages. We are attempting to fill that void."

In closing, the conference attendees set the agenda for the next meeting, also to be held in San Luis Obispo, in October. All participants are preparing specific topics to be discussed at that time along with formal association creation plans.

Additional DEC resources are available at specific time intervals to back up the field personnel.

Mixed-Vendor System Servicing

An argument for using a third-party maintenance organization is its will-

ingness to service the complete computing environment. TPMs have no stake in any specific equipment brand, and, therefore, have no self-serving interests. They want your service business only and aren't interested in future sales of logo products.

DEC counters that it's also in the

service business. Approximately one-third of DEC's revenues and a larger percentage of profits last year came from the service sector. DEC doesn't want to lose this business to TPMs, and so it has implemented its own versions of third-party maintenance programs.

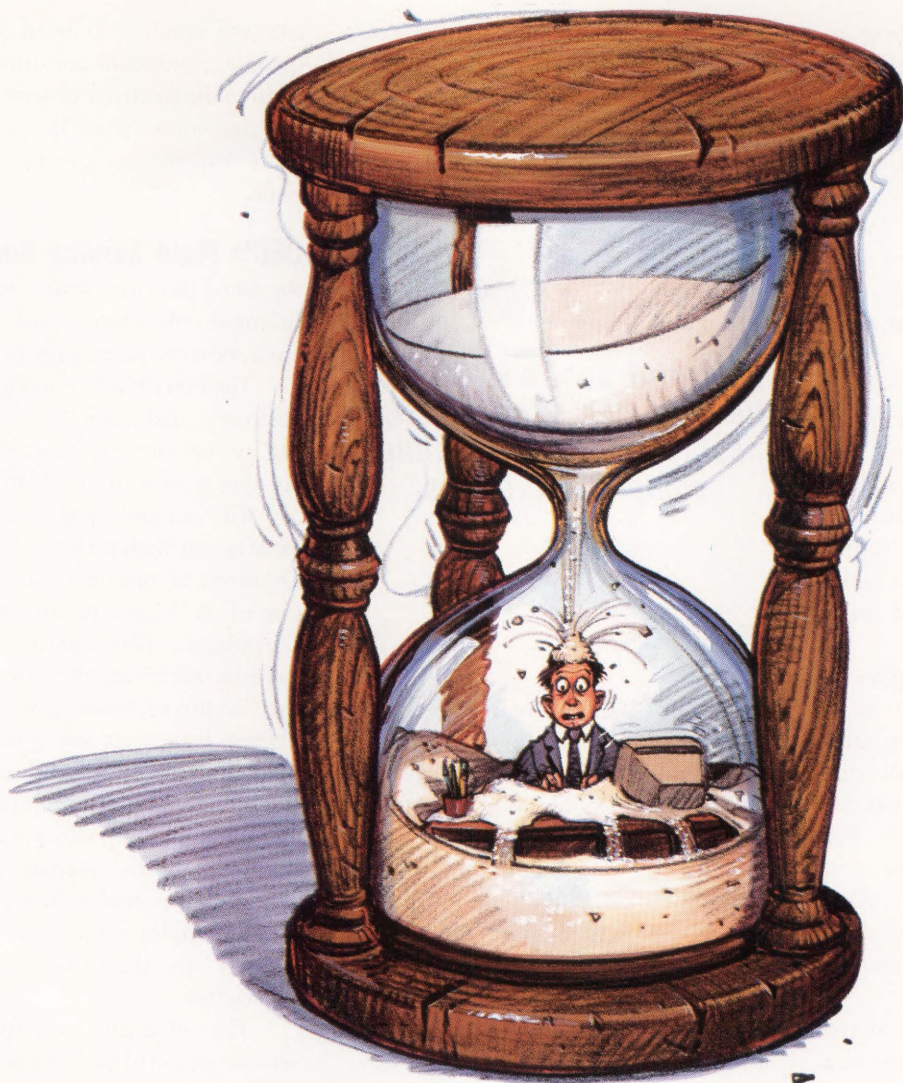
DECOMPATIBLE Service provides coverage of DEC and a large assortment of non-DEC equipment, residing on or networked to DEC systems. More than 200 non-DEC products from more than 50 vendors are supported corporate-wide. More than 1,000 non-DEC products are supported at local levels.

Another DEC program, NETSUPPORT Service, provides ongoing maintenance management to customers with multivendor computer network environments. Under this program, DEC becomes the focal point for all service calls; it acts as the customer interface and assumes responsibility for managing all customer trouble calls, tracking repair activities, verifying repairs, handling administrative issues, such as contract negotiations and payments, and managing vendors and subcontractors. All products (e.g., network, hardware and software) in the computing environment are covered under the NETSUPPORT contract.

According to Max Mayer, marketing and sales support manager for DEC U.S. Field Service, these programs offer the customer a cost-effective single source of service. With DECOMPATIBLE Service, all maintenance is performed by DEC's field engineers (FEs); under the NETSUPPORT service agreement, DEC manages vendor field service response. All parts and labor are covered under both types of contracts, providing a total system service approach without any unbudgeted surprises.

Tools For Field Support

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in its field support services. These include a \$50 million Customer Support Center (CSC), more than \$100 million spent developing diagnostics tools and a \$.5 billion spares inventory in the U.S. Each FE answering a Model 8000 product call carries an average of \$56,000 worth of spares. DEC has poured more than \$1 billion into its field operations.

Some of this new field technology includes the use of AI and expert system-based tools to replace remedial service with predictive maintenance. Using these diagnostic packages, DEC FEs can remove and replace modules and other system parts before they fail, thus providing service without waiting for customer downtime to occur (commonly known as uninterrupted maintenance).

The remote troubleshooting and AI combination ensures that when an FE arrives at a site for remedial maintenance, he knows which modules or components are probably the culprits and has the replacements with him. This becomes a quick-fix situation with minimum system downtime. Most hardware problems are resolved within two hours (on 8000 series systems, this is guaranteed).

Remote troubleshooting techniques also are effective in the software area. Approximately 90 percent of all software problems are resolved over the telephone via downloading of updates or patches.

DEC's Customer Service Centers (CSCs) provide centralized dispatch and support for users of DEC's services. For 24 hours a day, seven days a week, customers can call the CSC, talk to an expert and receive help diagnosing any system or network problem; e.g., compatibility, communications, hardware or

software. FEs at customer sites also call in when support is required.

The CSC also provides access to the DSIN. This is a series of online databases that the customer accesses for informa-

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The third goal was to have field service support DEC's corporate goal of selling complete solutions.

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tion. It's an expert system that employs an easy-access English inquiry methodology to acquire data on problems that have been resolved by others, or to use to look up subjects of interest.

Trends In Service

Trends in field service show that customers expect more total systems solution support from their field service vendors, according to Nicholas Houppis, DEC's PR manager for U.S. Field Service. "Remedial service is only one piece of customer support. There's a lot more to service than fixing a machine when it's broken," he observes. Complete hardware, software, network and operational support, along with system management consulting and training, are demanded by customers. Because of the importance of the network in corporate well-being, downtime can't and won't be tolerated; many customers already expect uninterrupted service, and it will become the norm in the near future.

Another trend is customer preference for contracting with a single-source service vendor. The customers prefer this, and vendors who aren't listening will lose marketshare.

Today, DEC is determined to be the quality provider of that single-source service at DEC-based sites; to that end,

DEC will continue to invest its resources (people, equipment and money) to remain in the forefront of service technology and innovation. To DEC, it's still, more than ever, a customer satisfaction issue.

DEC's Field Service Goals

We asked DEC to describe its customer-oriented objectives and goals. Its answers were direct and to the point.

The first objective was gaining total customer satisfaction, "... a good feeling by the customer toward DEC," according to one of DEC's managers.

The second goal was employee satisfaction within DEC's Field Service Division. According to Mayer, DEC has one of the lowest FE turnover rates in the industry. This enables the company to focus on serving the customer rather than on hiring, training and recruiting. "If you have a revolving door type of operation, the FE responding to a call is not as well prepared to quickly resolve a problem as an FE who's been involved with the specific customer or application over a period of time," he points out. So employee satisfaction is related directly to the goal of customer satisfaction.

The third goal was to have field service support DEC's corporate goal of selling complete solutions. This means field support instead of just field maintenance; providing the DEC service customer with all the tools needed for maximum efficiency. It includes predictive and preventive, as well as reactive and remedial maintenance; training for end user personnel; and assistance in planning, implementation, operation and support of the entire computing environment. DEC believes it does this better than any TPM company, and this approach to service and support sets it apart.

DEC also has set for itself a goal that concerns FE training. A program now under way will ensure that all FEs approach service from a system's view-

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FEs assigned to sites on a regular basis will be taught a basic understanding of the user's application.

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most problems today aren't isolated hardware or software failures but are caused by an integration of the two.

DEC Service

DEC is serious about its service business. Last year, service revenues made up approximately 33 percent of DEC's total income and more of its profits. Although getting into third-party maintenance probably was more of a defensive move than an assault on new territory, DEC is entrenched in mixed-vendor equipment servicing.

With corporate integration of systems taking place at a rapid pace, and the proliferation of multivendor networks throughout the business world, DEC must service non-logo products if it wants to hold onto its customer service base and extend its marketshare. But DEC isn't competing in the general TPM markets; it services mixed-vendor systems at DEC sites only, as part of its customer satisfaction policy.

DEC wants your service dollars. It's offering the type, quality and variety of field support services necessary to attract those dollars. As the OEM of the basic CPU and other system and network components, DEC service is a viable alternative to TPM vendors and another available option for the service purchaser. ■

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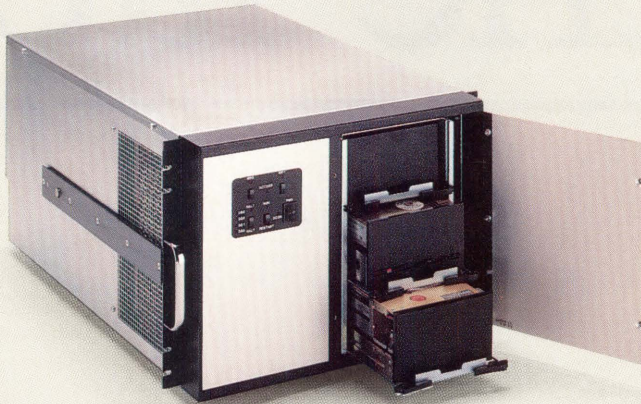
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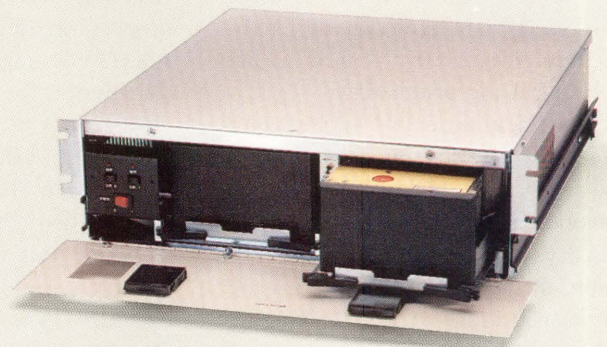
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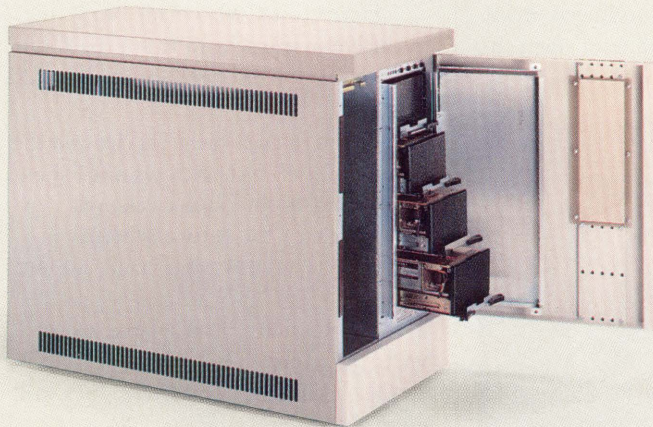
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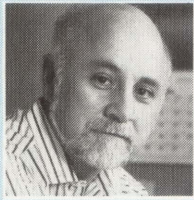
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CIRCLE 263 ON READER CARD

from the lab



Requiem



Dave Mallery

Our lives are measured in strange intervals. I'd like to share with you one that shaped my life and brought me to this day.

Historical note: PDP 11/70, s/n 5104 was installed by Dennis Faust of DEC Field Service and delivered to me on December 23, 1975. It ran 24 hours a day, seven days a week for 12 years and four months; that's 107,000 hours of non-stop service. Its original backplane, hanging on my wall, has a manufacture date of February 20, 1975.

Historical coincidence: I first met Carl Marbach when he came in from a snow storm a few days later to borrow a RSTS V5A distribution tape. Carl's distribution for his new 11/70 had the wrong boot block. Carl and I would like to thank DEC Field Service for the introduction. The rest is history.

The first "From the Lab" was written using this machine (see "Up the UNIBUS with Gun and Camera," *RSTS PROFESSIONAL*, Volume 2, Number 1). This seminal article convinced many people that it was possible to open the

cabinets without being struck by lightning.

Historical inevitability: OI' number 104 finally was replaced by an 8250 and decommissioned on April 22, 1988. The 8250 is already inadequate and being replaced by a larger VAX.

A Toast:

Here's to Ken Olsen, who had the guts and money to build this wonderful machine.

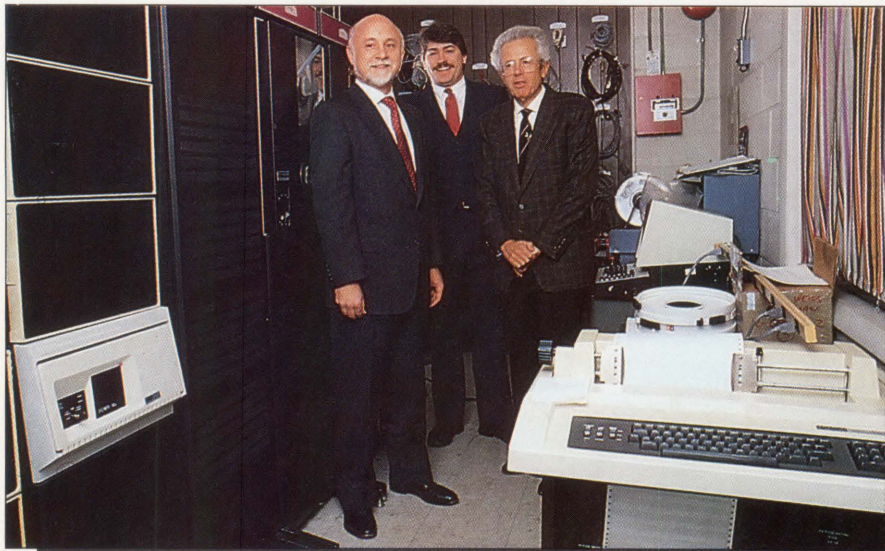
Here's to us, who made our livings in different ways from it and paid our bills to DEC while DEC built the VAX and VMS.

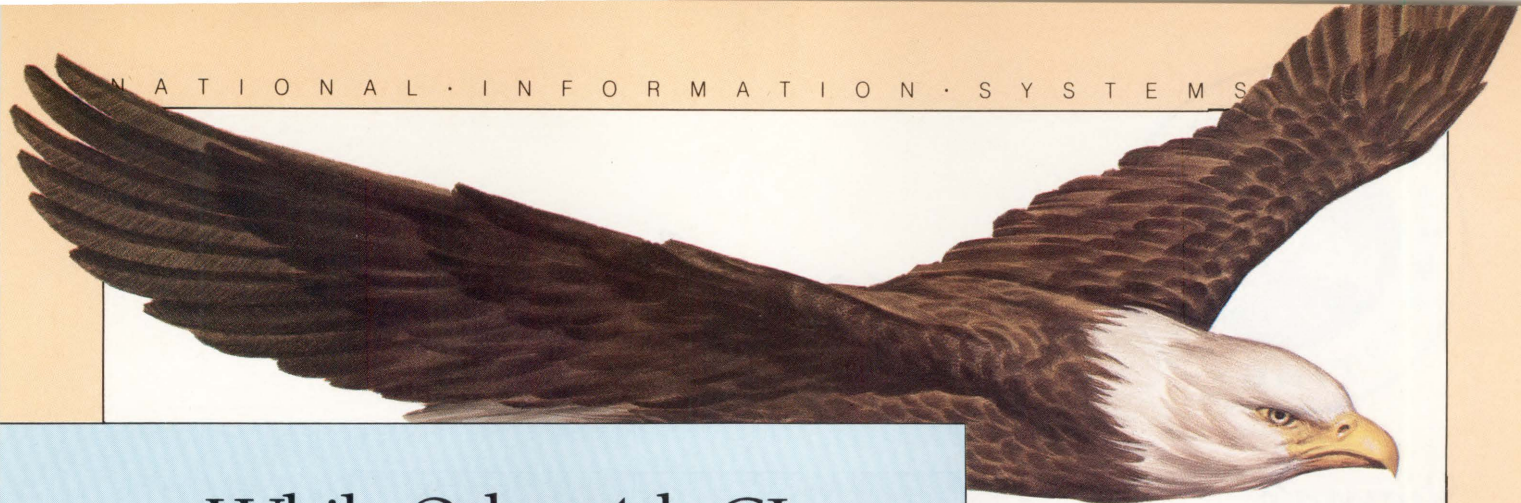
Here's to DEC Field Service and the dozens of its finest with whom I spent many long nights and weekends.

Here's to the future when:

1. System MTBFs approach 100,000 hours.
2. The Russians won't have to steal VAXs, just buy them.
3. Our childrens' childrens' toys still carry faint echoes of the DEC style of computing.

Twelve years later: Dave Mallery (left), Dennis Faust (center) of DEC Field Service and Harris Edelman, Dave's partner back then, pose with OI' number 104 for the last time.





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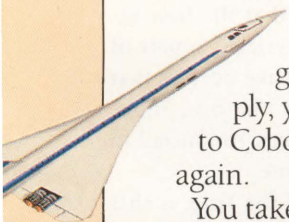
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CIRCLE 303 ON READER CARD





from the lab

Sigma's MICROVAX Expansion Box

Philip A. Naecker After you've owned a Digital MICROVAX in a BA23 cabinet with either the RD53 or RD54 disk, there are two things you might want: more expansion room and faster disks. With the vast array of Q-bus peripherals available at reasonable prices, you probably want to add more devices than your BA23 can handle. You might run out of a number of resources, such as backplane slots, bus loads, power, panel spaces or peripheral cavities. If you've been reading "From The Lab," you know that your MICROVAX will run faster and support a heavier load if you install any of the fast disks currently available.

The folks at Sigma Information Systems of Anaheim, California, pro-

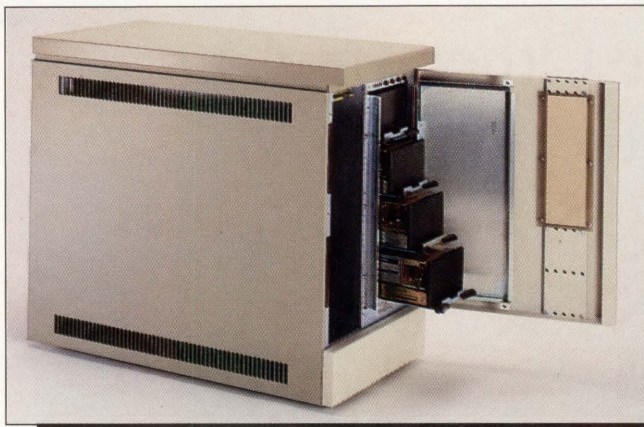
SA-H162

Sigma Information Systems
3401 E. La Palma Ave.
Anaheim, CA 92806
(714) 630-6553
Price: \$3,188.

CIRCLE 512 ON READER CARD

Control Data Corp.
8100 34 Ave., S
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CIRCLE 560 ON READER CARD



The SA-H162 comes with four B-size panel openings, a single A-size opening and a couple of extra openings.

vide a needed expansion path for your BA23 MICROVAX: an expansion cabinet especially designed to work with high-performance 5¼-inch ESDI disk drives. The SA-H162 provides eight additional Q-bus quad slots (16 dual slots) and mounting for four 5¼-inch ESDI plug-in drives. The H162 is configurable with a number of options, including cabling for the drives, an extra fan for each drive and a front panel for write protect. The cabinet tested in the Lab was fully loaded.

Your BA23-based MICROVAX probably is installed inside a plastic casing that acts as a floor stand or dust cover for a table-mounted machine. To use the SA-H162, slide your BA23 out of the case and into a slot on the left side of the H162. The BA23 is too heavy for this to be an easy procedure, but it's not complicated. Because the BA23 is unmodified by this procedure, it's still completely serviceable by your current field service organization.

Connect the new Q-bus expansion to your BA23 using a standard Q-bus extension cable that comes with the H162. This is a simple procedure that is well documented in the H162 manual.

The extension cable is passed through one of the A panel openings on your BA23 back cover. The back cover of the H162 includes a boot that fits over the BA23 panel slot, so the cable is protected as it leaves the BA23.

The H162 comes with four B-size panel openings, a single A-size opening and a couple of extra openings. You can use these panel openings with any device you install in the expansion backplane. In the Lab, we needed one of the openings to install the distribution panel for an RRD50 drive; we ran out of panel openings. Note that the new Q-bus is logically and physically a part of the old bus, so if you have devices that must be at the end of the bus, move them beyond any devices you install in the expansion backplane.

One advantage of the H162 is that you can order it prewired for four ESDI disks. In the Lab, we installed a CDC WREN-III ESDI disk drive (150 MB, less than \$10 per MB, and a 16 ms access time) and Sigma's ESDI controller, the SDC-RQD11-EC. Its controller works with the H162's front panel switches for

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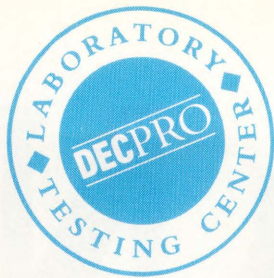
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CIRCLE 159 ON READER CARD



drive write-protect, and if you slip it into a slot in the expansion backplane, the cables from the drives connect easily. The SDC-RQD11 has 1 MB of cache and on-board formatting, test and verify logic.

The firmware is an easy-to-use menu, and we had no problem formatting our CDC drive as a DU-style MSCP device (it actually looks like an RA81 to the VAX). You also can use the firmware to create multiple logical drives on one physical drive or create shadow sets to protect against disk crashes.

To install a drive, remove one of the pluggable mounting brackets from the cabinet and screw your drive to the bracket. Set the address on your drive to seven, and remove the terminating resistor from the drive. Use the cables that come with the H162 to connect from the mounting bracket to the drive, and slide the bracket and drive in place. The pluggable connector on the bracket is Zero Insertion Force and rated for tens of thousands of connects/disconnects, so you easily can dismount your drive at anytime.

The drive gets its address from the slot you insert it in, so don't worry about conflicting drive addresses. Using a command procedure, you can teach VMS to use the volume name on the drive as the identification, so you could swap drives and reboot without even telling the VAX where the volume is located.

The H162 also makes it easier to work on your MICROVAX. The sides are removed easily (any 1/4-inch hex nut is for user access) and provide access to the drives and power supply inside the BA23. A door on the front of the H162 provides access to the BA23's power switch and the removable media. Another door inside the first provides access to the pluggable disk drives. The whole cabinet rolls on casters that keep the box low to the ground and stable,

but let you move it easily for working behind it.

There are more fans in an H162 than you had in your BA23, because there's an extra 400-watt power supply, which is a nice addition to your existing 240-watt supply in the BA23. By plugging in the disk bracket with a working drive, the fan for that drive cavity is powered up automatically, which is a feature that avoids running all the fans if you don't need them. The power supply sits in a special drawer at the bottom of the box, where the weight is distributed and the supply doesn't take up any footprint. The H162 power supply senses current in the BA23 and automatically switches itself on and off accordingly.

There are a few things that I thought could be improved in the H162. The position of the boot that covers the Q-bus extension cable conflicts with the standard location of the Ethernet port on a BA23. If it were moved to the lower panel slot, you wouldn't have to relocate the Ethernet port.

It would be nice to have a couple of unswitched or switched 120v receptacles on the outside of the box to plug my modem and similar devices right in with the CPU. A piano hinge on the expansion Q-bus would be good, so if I have a service loop on the module cables, I could swing the module chassis out to one side to avoid access from the back.

Some of the sheet metal parts of the cabinet didn't fit together well, which made removing and replacing the side panels an ordeal. Still, there's something about a nearly empty backplane and three empty disk cavities that make one's heart glad, and the performance from our new disk and ESDI controller is outstanding. Typical disk-intensive operations, such as system startup and log in, have been reduced in elapsed time by about 30 percent. Disk-bound operations, such as certain sorts, have been improved even more.

CompuServe Data's 1032/AF

Evan Birkhead Getting even thinner is the thin line

that separates the leading-edge methods of application development (i.e., CASE systems and fourth-generation languages). As the software evolution forges ahead, both techniques are converging on a common goal and methodology. They also have in common the quantity and complexity of code they can produce with a few keystrokes. The code that underpins some of these applications, which appears clean and simple from the top, is staggering.

1032/Application Facility (AF), from CompuServe Data of Cambridge, Massachusetts, is an add-on code generation module for software developers using the 1032 4GL/DBMS, which exemplifies this software evolution. The chaotic coding tasks that AF performs behind the scenes go unnoticed by the developer, except for some waiting.

Although not designed for high-volume transaction processing applications (CompuServe Data has higher performance systems for that), AF is a sensible answer for many end users, especially those with an aversion to SQL-style languages, those already running existing 1032 applications or those trying to increase the functionality of current applications written in COBOL, FORTRAN, C and other 3GL VAX languages.

If you understand application design logic, learning AF will be a

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BASEBALL	DEFINE OR MODIFY APPLICATION COMPONENTS	FR__MODIFY MAINTENANCE
1 __ Define dataset 2 __ Import dataset from System 1032 3 __ Modify dataset 4 __ Define default forms, frames and menu items 5 __ Define form 6 __ Import form from System 1032 7 __ Modify form 8 __ Define frame 9 __ Modify frame		
Select choice and press ENTER: ■		

Screen 1: The key development menu. This is choice 4 on the main AF menu, Screen 3.

P A R K S		
Team Name RED SOX	Grass T	Left 315
Team Code 2	Dome F	Center 390
	Home Field Value 335.00	Right 302
S T A T S		
PLAYER_ID 2951		
PLAYER		
First Name Wade	Last Name BOGGS	
TEAM_ID 2		
TEAM		
Team City Boston	Team Name Red Sox	
Evan Rating		46.12
Games 147	At Bats 551	Runs 108
Total Hits 200	Doubles 40	Triples 6
Batting Average .361	RBI's 89	Home Runs 24
Sacrifice Hits 1	Sacrifice Flies 8	Stolen Bases 1
Out Stealing 3	Walks 105	Intentional Walks 16
Hit By Pitch 2	Strikeouts 48	Grounded Into DP's 13
STATS		
Previous Update	Next Add	Select View
Recompute Evan Rating	Delete	Copy
	Return	Drop
^v Viewing STATS__FORM ... Type <ENTER> to return to menu		

Screen 2: The View option allows a user in the Parks database to access the Stats database and see all factors simultaneously.

breeze. It can be described as a hierarchical screen-based environment that automatically generates code for application components that the developer builds using a logical series of menus and windows. These components are:

1. Dataset — Contains attributes and a single name with no procedures.
2. Form — A set of fields for data display and input, usually associated with a dataset.
3. Frame — An application component associating a form with a menu of options that can be selected by the user while viewing the form. There may be several frames defined for the same form.
4. Menu — A list of options to select.

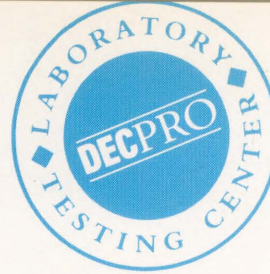
In a few days, I caught on to the pattern for adding and modifying components:

1. Define datasets, create data fields and lay them onto a form.
2. Set field validations and help prompts.
3. Write procedures and formulas if necessary.
4. Embellish the application by establishing links between disparate data screens or adding option buttons; e.g., AF lets you add Mail.
5. Design menus and report procedures.
6. Hit Build. This command (which, I found is most often used to rebuild) is AF's most prodigious function.

The documentation follows this same development progression. The three-ring booklet describes every menu option encountered when editing datasets, forms, frames, menus and custom-written procedures, in that order.

Building An Application

To test AF thoroughly, I tried to develop an application that would use every AF facet and push some of CompuServe Data's claims to the limit. It easily could



implement data from outside databases, and generated applications could be tweaked easily using editors and other facilities in 1032 and in 1032/AF.

The application, called Baseball, used a database of complete 1987 American League batting statistics (331 records) that was downloaded from Stats Inc. in St. Louis, Missouri, an authorized major league record keeper. It also used a database of variables for the 14 American League ball parks that I entered into AF manually. I wanted the completed application to be used to update records during the season and to generate descending lists of current leaders in any statistical category.

Player datasets from Stats were defined interactively with menu options (see Screen 1). Without guidance, AF set up screens for each record that boxed First Name with Last Name and Team City with Team Name, and set up nice, clean tables for the numerical statistics. I then added an attribute called Team Code (Baltimore 1, Boston 2, etc.) to link the ball park data with the data from Stats. By typing the desired Team Code in a blank Parks form, you get the statistics of that ball park. Choosing the View option lets you pull Stats data for each player who plays in that ballpark, in alphabetical order (see Screen 2).

The forms options (see Screen 1) prompted me to design the Parks table. I added and validated fields for grass surfaces (T/F); domed stadia (T/F); distances to the left, center and right field fences (integers); and a computed average of these distances called Home Field Value. AF also invited me to write help messages to explain each field.

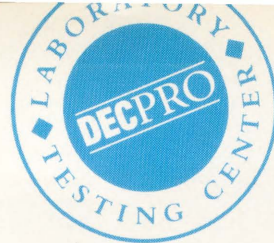
The Parks statistics were used to adjust an involved formula named the Evan Rating, which manipulated almost every stat from each player's record to determine his overall offensive value. Players playing in home parks with close outfield fences or climate-

BASEBALL	DEFINE OR MODIFY APPLICATION	SELECT__APPL 1032/AF
	1 __ Define application header 2 __ Modify current application header 3 __ Select existing application 4 __ Define or modify application components 5 __ Modify application menus 6 __ Build application or components 7 __ Delete application or components 8 __ Make dictionary reports 9 __ Use 1032/AF utilities	
Select choice and press ENTER:		
MENU OPTION	System 1032	Help
	Top Menu	Exit to VMS
Select menu option or <CTRL-Z> to return to main menu; "?" for help		

Screen 3: From this menu, CTRL-Z pushes the developer to interactive 1032, online help, the top AF menu or the \$ prompt.

BASEBALL	baseball formulas
1 __ Home Ballpark Statistics	Frame
2 __ Ballplayer Statistics	Frame
R E P O R T S	
3 __ Report on Top 10 Rated Players	Trim
4 __ User Defined Reports	Proc Proc
ADD/EDIT ITEM	
Item Type	PROCEDURE
Item Label	User Defined Reports
Item Code	
Defined By:	METADEMO APR-21-1988
Modified By:	METADEMO APR-21-1988
MODIFY MENUS	Add Item
Resequence	Select Menu
Edit Item	Edit Help
Delete Item	Exit
Move Item	
Enter updated information for menu items	

Screen 4: This is the top menu for the sample application, shown in development mode, with the modification options.



controlled domed ceilings had their home run totals lowered, while those who played on hard artificial surfaces had their base hit totals slightly reduced, etc. (In addition to these weights, the

Evan Rating invokes Boswell's Total Average and James' Runs Created formulas.)

This procedure was written in inter-

active 1032, which automatically invoked EDT. Hitting CTRL-Z lets you follow four paths out of AF (see Screen 3). When the calculation was completed, the whole procedure was pulled back into AF. For this, I had to customize a screen option in the Stats frame that I labeled Recompute Evan Rating. I then sequenced this option with the other user options automatically generated by AF (see Screen 2).

With the two databases and mathematical formulas in place, I added a prominent Evan Rating field on the Stats form. Each player's rating automatically appeared when his screen appeared. (The Red Sox's Wade Boggs and the Brewer's Paul Molitor rated highest.)

User-Defined Reports

To make this application more useful, I needed to allow the user to generate customized statistical reports. In AF, report procedures are part of the Menu Editor (see Screen 4). From the top development menu, I selected "Modify application menu" rather than "Define or modify application components," which I'd been using (see Screen 3). From here, AF let me choose from these

options: Procedure, Frame, Menu or Trim.

The menu had assigned default names to the two databases, which were edited. Using the Trim facility, I designed a Reports heading for the two reporting options I wanted.

Add Item and Edit Item (see Screen 4) let me design the reports. The level of customization I wanted in the reports pulled me to EDT to write the procedure. Editing in EDT functioned differently in AF than it did in the earlier interactive 1032.

I selected "Build application or components." Fortunately, when AF can't build, it stops and tells you what obstacle prevented it from building. Every time it stopped, the problem turned out to be errors in the procedures I had written. In interactive 1032, EDT immediately had notified me when I made coding errors.

Throughout the whole process, AF's logically organized screens and easy way of using windows prevented me from getting lost. For example, when editing Stats frames, the Define/Modify Frame information layer remained at the top of the screen. I then selected a frame option (e.g., Select) and a frame editing procedure (e.g., Edit Option). Information on the Select option appeared in the middle of the screen, and a new Option Edit Menu appeared at the bottom.

Also, the way the application screens are layered, AF was flexible about letting me design some components from the top down and others from the bottom up, depending on the quirks of my procedures.

The Future Of AF

With V7 of 1032, due July 1, a host of new features will be added. Among

these will be V1.1 of AF, which initially was introduced in March. The new version will have no significant functional upgrades over V1.0, which was reviewed for this article. But, V1.5, expected at the end of the calendar year, will have three major additional features: improved text attributes, a better screen painter and improved field level validations. An import/export facility that pushes and pulls data from one dictionary to another also will be in 1.5, and a few underlying data definitional and maintenance things will be updated to support the additions to 1032 V7.

Cipher F880-1 Microstreamer

David W. Bynon

In this age of gigabyte tape cartridges, worm disks and volume shadowing, the half-inch reel-to-reel tape drive quickly is becoming a dinosaur. So why would I be doing a lab on such a beast? Because we still have the issue of compatibility.

If compatibility is the only reason to have a reel-to-reel tape drive, it seems obvious to me that a small, light-duty drive would fill the bill. I bring to you the Cipher F880 Microstreamer.

I purchased the F880-1 Microstreamer for no other reason than compatibility. In fact, the only time the machine gets turned on is when I need to install software or transfer data.

The Cipher F880 is a compact, front-load, microprocessor controller, multispeed magnetic tape subsystem designed to be used as a streamer. In some applications, it also may replace a start/stop drive. It was constructed to be

1032/Application Facility

CompuServe Data Technologies
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mounted inside a 19-inch rack but works equally well as a tabletop unit. If required, Cipher builds an inexpensive tabletop enclosure that's hinged in the middle for easy access to the drive.

The F880 is available in two model versions: F880 Microstreamer and F880 Microstreamer 2. The fundamental difference between the two is their data rates. The Microstreamer 2 will read and write 1600/3200 bpi tapes, while the Microstreamer only will process 1600 bpi tapes. The Microstreamer may be upgraded to the Microstreamer 2. Both drives stream at rates up to 100 inches per second at 1600 bpi. Tape reading and writing is performed in PE format (1600 bpi), which meets ANSI standard X3.39-1973 requirements for data interchange.

The F880 is built on a simple design, which is good because there are

fewer things that can go wrong. The drive's interface (which conforms to the standard Pertec format), logic and software are housed on a single printed circuit board. Further simplifying the drive are the two direct drive DC motors that drive the tape reels.

The Microstreamer self-loads tapes (7-, 8½- and 10½-inch) through the use of an optical tachometer. The tape is blown, in a series of small steps, to the take-up reel; optical sensors are used to release more tape as it moves along its path. When loaded, tape tension is maintained by a single tensioning arm.

Operation of the drive is a simple matter of tossing a tape on the spindle, closing the door and pressing the load button. I've tried both 7- and 10½-inch reels in the drive. Occasionally, the drive will have a load failure, but it never has refused to load a tape, even when the tip

F880-1 Microstreamer

Cipher Data Products
10225 Willow Creek Rd.
San Diego, CA 92131
(619) 578-9108
Price: \$4,000

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was not prepared.

The only problem I've experienced with the drive is a broken door. Someone in the office tried to open the door (with a heavy hand) before the tape was unloaded. The problem could have been prevented by installing a better interlock latch or a warning light.

The F880 is easy to service. Cleaning the heads, for instance, is a matter of pulling the drive out on its slides and lifting the top cover. The heads then may be swabbed with cleaning fluid. The drive is hinged in the middle for maintenance access to the drive electronics or motors.

The most attractive feature of this drive is its price. I shopped by phone for two days and was amused by the quoted prices. They ranged from \$2,000 - \$4,000. A local distributor gave me a package deal for \$2,450: F880 Microstreamer, tabletop cabinet, cables and a 90-day on-site warranty.

Controllers for the F880 Microstreamer are available from OEMs, such as DILOG, MTI and Emulex. Simply ask for tape controllers that support the Pertec format and use the TSDRIVER supplied with VMS. Controller prices range from \$650 - \$1,200.

Finally, the clincher. This is the same drive that DEC uses in its TSV05 tape drive system; the only difference is the color of the front panel. DEC's basic TSV05 package is equipped with the Cipher F880 Microstreamer, cables and a DILOG controller; the price, a mere \$11,760.

DEC must be paying a lot for its controllers.

File Edit Baud Settings Phone Emulation Commands

Date: (Col: 5 Row: 6) F (G) [2,6] - 2

Header Plot Form Range Window Grid Order Title Subt Labels Heading Axis Name Quit

	1	2	3	4	5	6	7
	Homers	Miers	Children	Cats	Dogs		
Nikes	23	15	16.2	16.2	21	13	
Reebok's	17.2	17	9.35	9.35	15.2	15	
Pro-Keds	12.5	23	9	9	10.5	21	
Dr. Brooks	24	25	13	13	22	23	
Converse	19	33	21	21	15	31	
Pro-Keds	33	35	23	23	31	33	

Mac to VAX

Terminal Emulation/ Communications Software for the Macintosh™

Example 20/20™ session using Tektronix 4105 emulation.

™ Access Technologies

VersaTerm™

Version 3.20 Price: \$ 99.00

DEC VT100/102, DG D200, Tek 4014 emulation. Kermit, XModem and YModem protocols.

VersaTerm-PRO™

Version 2.20 Price: \$ 295.00

Vector-oriented, Tektronix 4105 color graphics emulation... in addition to all the features of standard VersaTerm 3.2.

KaleidaGraph™

Version 1.00 Price: \$ 179.00

A Data Analysis and Graphics Application for Business, Engineering and Science.

TekPrint™

Version 2.00 Price: \$ 79.00

Utility that supports Hewlett Packard 7470 and 7475 Pen Plotters.

• All Programs are Macintosh II and SE Compatible. • All Programs Utilize Color on the Mac II.

• VersaTerm, VersaTerm-PRO and TekPrint Execute in the Background with the MultiFinder!

• VersaTerm-PRO and KaleidaGraph Make Use of Big Screen Monitors.


Designed for a 512K Mac, Mac-XL, 512E Mac, Mac Plus, Macintosh SE and Macintosh II. All Support the ImageWriter(I & II) and LaserWriter printer.

The following are trademarks: Macintosh, AppleTalk, MultiFinder, ImageWriter, LaserWriter - Apple Computer Inc.; Tektronix - Tektronix Inc.; DEC, VAX, VT100 - Digital Equipment Corp.; DG, D200 - Data General Corp.; AlisaTalk - Alisa Systems; VersaTerm, VersaTerm-PRO, TekPrint, KaleidaGraph - Abelbeck Software

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Developed by:



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2000

ONLINE DISK OPTIMIZATION FOR VMS PROFESSIONALS

Diskit 2000 is engineered for discriminating VMS professionals, the pros who demand perfection.

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Sure, Diskit 2000 delivers convenient, transparent online operation. Sometimes, that's just not enough. So, Diskit 2000 also includes a specially designed offline program to restructure system files and create perfect disks.

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The option is yours. Of course Diskit 2000 provides automatic optimization. It'll consolidate free space for faster file creation, automatically place directories to minimize head movement, and multi-stream data for faster operation. More important, Diskit 2000 provides an interactive graphic display to monitor disk optimization and all the options you need to maximize disk performance.

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Full Featured Dual Mode:

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- Offline Restructuring for Perfect Disks including System Files

Maximum Compression

- Restructures All Files — even Multi-Header
- Consolidates Free Space
- Multiple Disk Operation

Absolute Data Integrity

- Detects Bad Disk Structures and Shuts down Automatically
- Full Automatic Recovery from System Interruptions
- Data Maintained on Disk at All Times
- Checks All File Accesses — Even NOLOCK
- Safe on Clusters
- Label Check to Intercept Operator Error

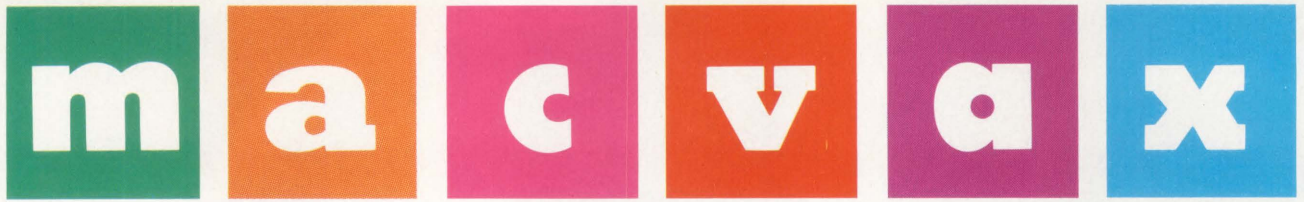
Maximum Flexibility

- Automatic or User Defined Directory Placement
- Optional User Defined File Placement For Faster Access
- Automatic or User Defined Free Space Placement
- Adapts to Your Site Environment

Easy Operation

- Doesn't Lock Out Users
- Suspends and Restarts to Work Within System Load
- Built in Scheduler
- Instant Reports

CIRCLE 269 ON READER CARD



White Pine's Reggie

Double-reverse terminal emulation.

BY EVAN BIRKHEAD

THERE'S NO SUCH THING as a typical Reggie user. Anyone who needs to link Macintosh graphics with VAX applications should be able to find room in the shop for this inexpensive (\$149) conversion package from White Pine Software Inc. of Amherst, New Hampshire. In just a year and a half, Reggie has uncovered a diverse user base that spans applications in CAD/CAM, electronic publishing, graphics presentation and videotext. In short, it has a potential role in either classic Mac or VAX houses.

Reggie completes the third leg of

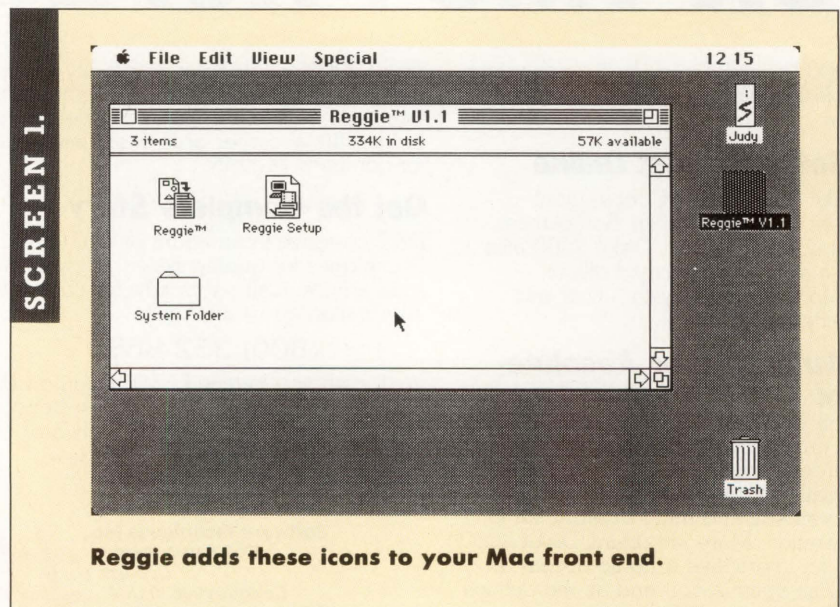
a file management/terminal emulation triangle that has been assembled by White Pine. The first side of the triangle is the Mac220 and Mac240 series VT emulators. (The Mac240

supports ReGIS and Tektronix 4010/4014 terminals.) The second is VMacS, a file transfer program that converts MacWrite, etc., into VMS formats and catalogs files on the VAX.

Reggie Version 1.1

White Pine Software Inc.
94 Rte. 101A
P.O. Box 1108
Amherst, NH 03031
(603) 886-9050
Price: \$149

CIRCLE 570 ON READER CARD



ReGIS is object oriented, and SIXEL is bit-mapped.

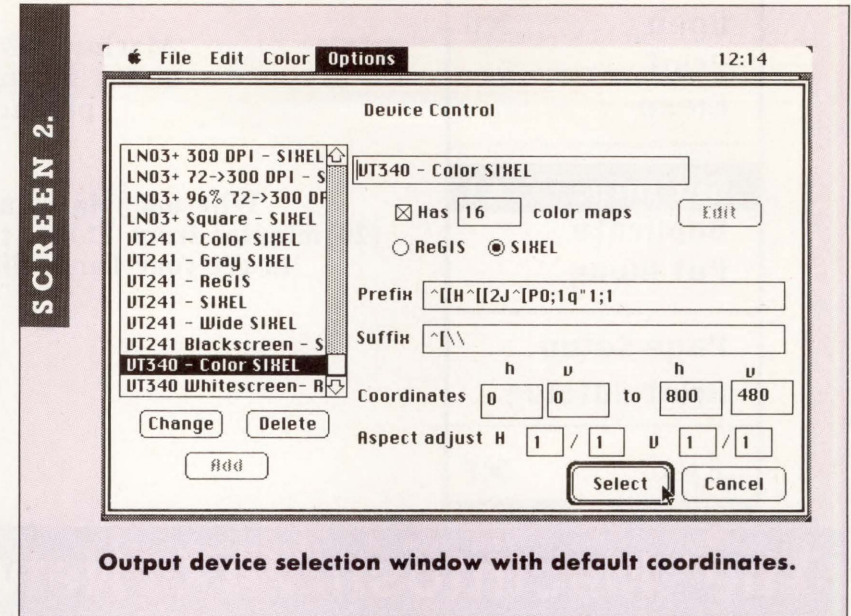
VMacS runs with either Mac240 or MacTerminal, but each White Pine system basically is designed to be a standalone tool that complements the others.

ReGIS OR SIXEL

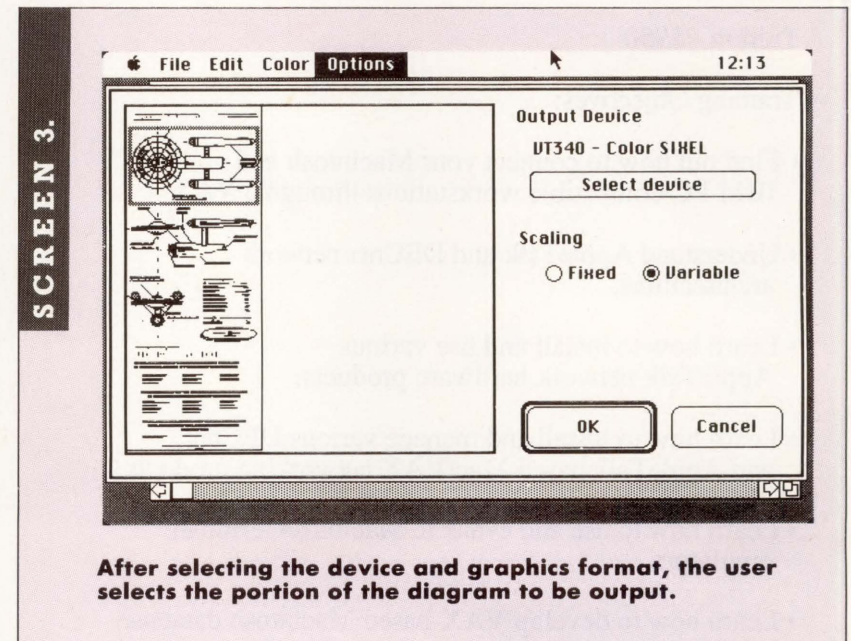
Reggie converts Macintosh graphics instructions into either ReGIS (the root of its name) or SIXEL instructions. Graphics that you designed on the Mac then are shipped into VAX/VMS applications and displayed on your VT-compatible terminal or printed out on your DEC printer. Although this doesn't sound extravagant on the surface, remember that Reggie is dealing with two different worlds: ReGIS is object oriented, and SIXEL is bit-mapped. Underneath, Reggie is performing powerful code conversions.

With a minimum number of selection windows and prompts, Reggie can open pictures from MacDraw, MacPaint or PICT files, which can be object oriented. It can open any arbitrary file that it sees as a resource file, or take drawings directly from the Mac clipboard. Then, it converts the color and resolution into output that can be understood by DEC equipment.

Colors are added one at a time; i.e., individual colors are selected for each object in a MacDraw document and converted into the closest cor-



Output device selection window with default coordinates.



After selecting the device and graphics format, the user selects the portion of the diagram to be output.

responding color at the other end. Some beautifully colored, high-resolution Mac II pictures came across on the terminal as the best color and highest resolution that each DEC machine (printer or terminal) could muster. It was fun watching them try to match up.

Reggie can deal with large draw-

ings. When selecting the output device (see Screen 3), a mouse-controlled frame lets you define a portion of the drawing you want sent. The program takes advantage of several nice Mac OS gizmos like this. For instance, when sending drawings, charts track the progress of conversion development and buffer space.

File Edit View Special

Confused?

New Folder
Open ⌘O
Print
Close

Get Info ⌘I

Duplicate
Put Away

Page Setup...
Print Catalog...

Eject ⌘E

No wonder.

Macintosh®-VAX/VMS™ Networking
means a dizzying array of connectivity
products, network architectures,
and hardware options.

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September 7-9, 1988 •

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Tuition - \$950

Training Objectives:

- Find out how to connect your Macintosh and IBM PC-compatible workstations through a VAX
- Understand AppleTalk and DECnet network architectures.
- Learn how to install and use various AppleTalk network hardware products.
- Learn how to install and manage various DECnet and AppleTalk based Mac/VAX networking products.
- Learn how to use and evaluate Macintosh terminal emulators.
- Learn how to develop VAX-based Macintosh database applications.

Topics Covered:

- Network Architectures •
DECnet, AppleTalk
- Network Hardware •
Ethernet
LocalTalk
Bridges
Gateways
- Network Management •
- Terminal Emulators •
VT100, VT220, VT240
Tektronix
- VAX/VMS File Servers •
AlisaTalk, PacerShare
- Networked Databases •
- Network Management •



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CIRCLE 179 ON READER CARD

Macintosh II to Ethernet, Now.

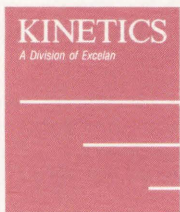
Speed. Access. Power.
The EtherPort II
from Kinetics.

As always, the best-connected Macintoshes
begin with Kinetics.

The EtherPort II:

- Connects your Macintosh II directly to Ethernet.
- Provides full EtherTalk compatibility.
- Includes Macintosh O/S and A/UX drivers.
- Supports TCP/IP, DECnet, OSI and EtherTalk connections to VAX, UNIX, PC or Macintosh environments.

You can also connect your Macintosh SE to Ethernet with the Kinetics EtherPort SE.



For more information, call 800-433-4608 outside
California, 415-947-0998 in California.

Kinetics, Inc. 2540 Camino Diablo Walnut Creek California 94596

CIRCLE 266 ON READER CARD



Tie All Your Loose Ends Together.

VAX to MAC and IBM PC

Multi-system environments are a way of life. Your Macintoshes and IBM PCs have become powerful tools to use with your VAX system. Now you need Pacer to tie everything together into a seamless package.

PacerLink connects your Macintoshes and IBM PCs to your VAX over serial line, remote modem, AppleTalk or Ethernet configurations. It integrates full functionality into one product: terminal emulation, file transfer, virtual disks, and print services. And you get even more when you extend PacerLink with the add-on file server and graphic terminal emulator.

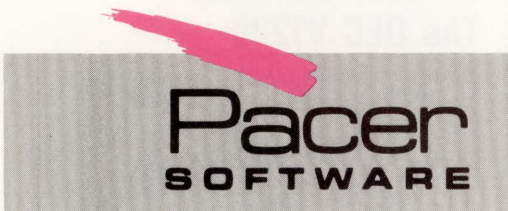
PacerShare VAX/VMS file server provides Macintosh and IBM PC file sharing via Ethernet or AppleTalk bridged to Ethernet. It transparently integrates the micro and VMS file systems.

PacerGraph gives your micros VT240 and VT241 graphic terminal emulation, including ReGIS and Tektronix 4010/4014 support.

PacerPrint provides VAX PostScript print spooling.

Kinetics hardware combined with Pacer's software gives you high speed Macintosh to host interconnect over Ethernet.

Our connectivity solutions are in place at over 1500 sites. And we want yours to be the next. Give us a call and let us show you how we can integrate your minis and micros into one well-connected package.



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SOFTWARE

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TEL: 617-898-3300

CIRCLE 244 ON READER CARD

Trimarchi Slashes RD54 Prices

Trimarchi Inc. has slashed the price of the RD54 equivalent from \$3,495 to \$1,995. Each disk drive has a two-year warranty, 24-hour advanced replacement, 24-hour delivery from stock, testing and formatting, cables, mounting hardware for MicroVAX 2000, engineering assistance and guaranteed DEC field service.

Find out more by contacting Thomas Trimarchi, Ph.D., Trimarchi Inc., P.O. Box 560, State College, PA 16804; (814) 234-5659; FAX: (814) 237-8031.

Circle 400 on reader card

Multisession Support Added To Reflection

Walker Richer & Quinn has enhanced the LAT support included with its Reflection Series of terminal emulation and communication software. Release 3.0 of Reflection 4 PLUS and Reflection 2 PLUS includes Reflection's new multisession capability, similar to that available in DEC terminal servers.

The new LAT support includes commands such as SHOW SESSIONS and SHOW SERVICES to provide information about the host services available. The improved LAT support is included in Reflection 2 and 2 PLUS, Reflection 4 and 4 PLUS, and in Reflection 1 PLUS and 7 PLUS. Support for other networks, such as 3Com and Ungermann-Bass, is included in the PLUS versions of Reflection.

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

Circle 401 on reader card

P3 Upgrade Has Easier Data Entry

Primavera Systems Inc. has announced V3.1 of its flagship product Primavera Project Planner (P3). The upgrade has easier data entry and interchange capabilities. New features

include import capabilities and expanded batch processing. Continuous printed bar charts also are available.

P3 is a comprehensive project management system with the features and flexibility required to manage large and small projects. It interfaces with Primavision for presentation graphics that can be customized to any level of detail. P3 runs on the IBM PC and PS/2 Series and compatibles. It requires a hard drive and 512K.

More information is available by contacting Diane Dempster, Primavera Systems Inc., Two Bala Plaza, Bala Cynwyd, PA 19004; (215) 667-8600.

Circle 402 on reader card

Polygen Software Runs On VAXstation 8000

Polygen's QUANTA and CENTRUM products now are supported on the VAXstation 8000 high-performance 3-D graphics workstations. QUANTA is a 3-D graphics system and operating environment for the visualization of chemical structures and control of numerically intensive simulation software. It incorporates the X Window System, Version 11 windowing and PHIGS+ graphics software standards.

The CENTRUM system automates the process of producing scientific and research documentation in office and laboratory environments.

For further information, contact Ethel Kaiden, Digital Equipment Corporation, Maynard, MA 01754-2571; (617) 467-2347.

Circle 403 on reader card

Version 3.0 Of EDItran Announced

EDI Solutions has announced EDItran version 3.0 (Electronic Data Interchange). Two new features are the ability to operate on the

VAX under VMS and the capability to enter, view and modify partner file records using CICS screens.

EDItran version 3.0 features include support of CICS online partner file maintenance, operates under VAX/VMS system, separation of transactions into multiple output files, enhanced audit reports and support of conditional element validation.

For additional information, contact EDI Solutions Inc., Northwestern Financial Ctr., Ste. 702, 7900 Xerxes Ave. S., Minneapolis, MN 55431; (612) 831-9059.

Circle 404 on reader card

AOK Adds Product Features

AOK Software Products Inc. has announced enhancements to the abc spreadsheet graphics. Spreadsheet users now can develop pie chart images with one of the pie slices offset.

AOK.abc easily is integrated into ALL-IN-1. It then becomes one of the menu items in the ALL-IN-1 environment. Instructions for structuring the abc spreadsheet within ALL-IN-1 require about 10 minutes to execute. Then, users have a familiar spreadsheet tool at their disposal.

Also, a built-in, online tutorial is available to first-time spreadsheet users. A built-in spreadsheet macro now walks the user through the use of spreadsheet fundamentals.

AOK.abc is a Lotus 1-2-3 clone for VAX/VMS users.

Learn more by contacting AOK Software Products Inc., 1305 Wiley Rd., Ste. 102, Schaumburg, IL 60173; (312) 884-7123.

Circle 405 on reader card

GP-220Z Emulates The DEC VT220

Northwest Digital Systems has announced the GP-220Z terminal. It has 290 KB of display list zoom memory that allows the terminal to display zoomed images using smooth lines. Other features include the ability to output alphanumeric and vector commands to hardcopy devices, such as DEC LN03 Plus, resulting in full-size, high-quality hardcopy output.

The GP-220Z offers all the features of the GP-220 terminal including 75 pages of "Off-Screen Text Memory." Eight built-in fonts include the DEC Technical font used in WP programs, such as MASS-11. The terminal also allows convenient text display formats of 80 x 132 columns x 24, 33, 50, or 68 lines.

The GP-220Z is priced at \$1,795.

Find out more by contacting Northwest Digital Systems, Seattle, WA; (206) 524-0014.

Circle 406 on reader card

Raima Releases db__REVISE

Raima Corporation has announced db__REVISE, a database restructuring product for use with the db__VISTA III database development system. Raima's system is written in standard C for system portability and is linkable with most C compiler libraries including DEC C.

A developer can use db__REVISE to

transform an existing database into one that incorporates new record relationships (formed by splitting, combining or creating record types), data field additions or deletions, data typing conversions (character to numeric, integer to floating point and all other combinations), record redistribution across files, creation and deletion of set relationships (parent to child pointers), creation and deletion of keys, and data conversions through developer-supplied routines.

For additional information, contact Mark Hervol, Raima Corp., 3055 112th Ave. N.E., Bellevue, WA 98004; (206) 828-4636; FAX: (206) 828-3131.

Circle 407 on reader card

VAXsimPLUS Maximizes System Availability

DEC has introduced VAXsimPLUS, an AI-based software technology that helps predict potential system failures and prevent system downtime.

The new technology, provided as a standard feature of VAX/VMS system warranty and service contracts, acts as an on-site monitor of DEC systems and storage devices. It continuously tracks system activity and alerts the appropriate personnel to potential problems before a failure or data loss occurs. For RA series hard disks, VAXsimPLUS automatically can copy and protect data on a suspect disk.

VAXsimPLUS runs on all VAX/VMS systems. It's free for all VAX/VMS systems covered by a DEC system warranty or standard service agreement.

Learn more by contacting Nick Houpis, DEC, Maynard, MA 01754-2571; (617) 870-3285.

Circle 408 on reader card

Wollongong Improves TCP/IP Performance

Users of VAX computers now can have the latest in TCP/IP technology and increased performance, with Wollongong's enhanced software data communications product WIN/TCP for VMS. This is the latest member of the WINS (Wollongong Integrated Networking Solutions) family of network operating systems, which support TCP/IP and ISO/OSI protocols on systems ranging from PCs to supercomputers. This version is targeted to VAX/VMS users.

WIN/TCP's advanced performance is provided by the incorporation of leading-edge research technology known as "congestion control." This monitors the performance of the data transmission media, and adjusts the flow of information in order to maximize the network's throughput.

Find out more by contacting Norman Lombino, The Wollongong Group Inc., 1129 San Antonio Rd., Palo Alto, CA 94303; (415) 962-7200.

Circle 409 on reader card

Encore Offers VAX Compatibility Suite

Encore Computer Corporation now offers a VAX Compatibility Suite of software that gives VAX users access to the throughput of Encore's Multimax parallel processing systems, while maintaining a compatible user environment.

The VAX Compatibility Suite includes two modules that interface to UMAX, the UNIX-based operating system of the Multimax. The first module is Encore VCL, a VMS emulator implementing a majority of commands in the DEC command language. Encore EDT+ emulates and implements all the features of the VAX EDT WP system. For VAX FORTRAN users, Encore also offers FORTRAN 77 with VMS extensions.



Raima Corporation's db__VISTA III database development system software.

DILOG Subsystems



The PROBLEM SOLVERS

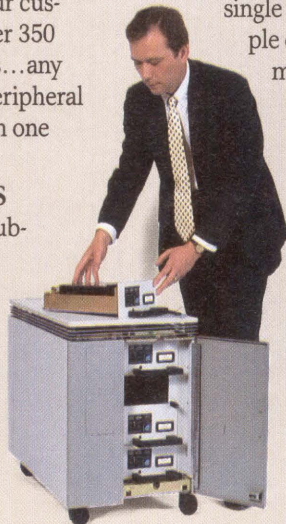
There's good news. And better news.

You know you can rely on DILOG to solve your controller/coupler problems...over 95,000 in the field. Good news.

Now, DILOG offers subsystems too. Better news. You and your customers can pick from over 350 subsystem combinations...any DILOG controller and peripheral you can think of. All from one source.

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You need a 5 $\frac{1}{4}$ " disk subsystem or $\frac{1}{4}$ " QIC tape back up with a reliable interface. DILOG Problem Solvers have it... complete in a BA123 or BA23 compatible housing with cables, ready to operate.



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You need hard disk capacities... single drive from 70 MB to multiple drives with 5 GigaBytes or more. And high speed tape back up. DILOG Problem Solvers have it... popular drives... interfaces... compatible housings... cables... everything.

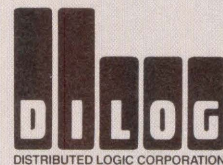
INSTALLATION

DILOG Problem Solvers can help you install your subsystem, interface your computer system or run diagnostics tests... everything. Staff personnel world-wide make it easy.

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Even after installation the DILOG Problem Solvers can handle service... subsystems or the complete system. Again, you can rely on DILOG's Problem Solvers. Sole source supply. Sole source service. Faster than 3rd party service too.

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Anaheim, CA 92806
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FAX: (714) 978-2420

The Encore Compatibility Suite costs \$10,500.

Find out more by contacting Mary Kae Marinac, Encore Computer Corp., 257 Cedar Hill St., Marlboro, MA 01752; (617) 460-0500.

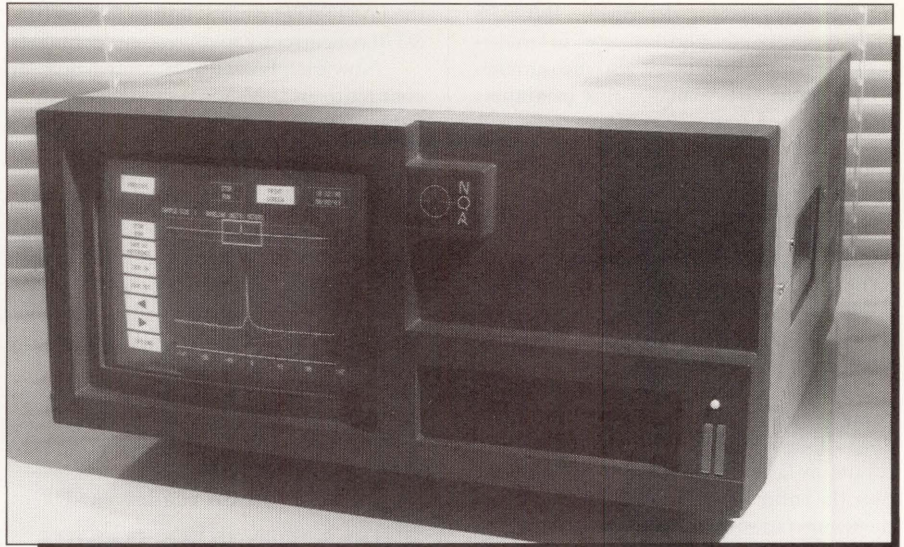
Circle 411 on reader card

LRT Launches Network Quality Analysis

The British networks company, Logic Replacement Technology (LRT), has an Ethernet network management system that prevents network downtime by measuring the quality of the network through previously unmeasured parameters and alerting the manager to potential problems before they become serious.

The Network Quality Analyser (NQA) combines digital signal measurement with highly usable data presentation techniques to identify network degradation that's often hidden from the user by the compensating effect of network protocols.

All signal measurement and test functions are conducted without interfering with network traffic so that the network remains live at all times.



The Network Quality Analyser from Logic Replacement Technology.

More information can be obtained by contacting Robert Barrett, Logic Replacement Technology Ltd., Arkwright Rd., Reading, Berks RG2 0LU; +44 734 311055.

Circle 410 on reader card

INGRES RDBMS Has Multiserver Data Manager


Relational Technology Inc. now is shipping Release 6 of the INGRES relational database



Comptrol at Your Fingertips

Imagine the touch of a key providing a manager with control of his business. We at **Compu-Share** call such control "comptrol" and offer it to you in our "**Business Comptrol Series**" of VAX accounting software. Now you can design your own financial statements showing virtually any comparison you might want; project your cash requirements for the next 90 days; analyze which vendor has the best delivery and terms record; or compare each of your division's profits over the last three quarters. The **Business Comptrol Series** does all this and much more. After all, the Series has been built on the principle that a computer system should afford you

control of your company—rather than the computer controlling you. Our software is fully **interactive**, checking for mistakes, providing information, and updating files instantaneously. Our **customer service** department is just as responsive, giving you the help you need, when you need it. Thorough training services equip your personnel to easily handle the system. Isn't it time you took "Comptrol"? Join the hundreds of other companies who have upgraded to the **Compu-Share Business Comptrol Series**, which includes GL, AP, PO, PR, AR, OE, IC, and FA. Call today to speak with one of our consultants. **Comptrol** is right at your fingertips!


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5214 68th Street Lubbock, Texas 79424

CIRCLE 241 ON READER CARD

management system (RDBMS). INGRES provides scalable performance in multiprocessor environments. It also incorporates a multiserver data manager that maximizes the power of leading edge, cost-effective hardware; e.g., the Sequent multiprocessor UNIX system, the VAXcluster and the Polar Star systems.

INGRES Release 6 supports more users, larger databases and fully automated recovery techniques. It provides the high performance required for OLTP and for the complex query processing required by decision-support tools.

Release 6 introduces INGRES TPA, combining Tools, Power and Access to produce a Total Performance Architecture, which results in faster, more productive software over the entire lifecycle of database development, operation and maintenance.

For more information, contact Relational Technology, 1080 Marina Village Pkwy., Alameda, CA 94501-9891; (415) 769-1400.

Circle 413 on reader card

FASTPATH Enhances Its Capabilities

Intel Corporation has enhanced capabilities for its FASTPATH product line that enable

the FASTPATH control unit to link an IBM S/370 concurrently to diverse environments.

Now each FASTPATH control unit can connect to an IBM S/370 simultaneously to a TCP/IP network, as well as to either a VAX, a MAP/OSI network, a custom Ethernet network or to ASCII devices.

A FASTPATH control unit with Flex-LINK connectivity software now can manage simultaneous connections from an IBM S/370 processor to up to four VAXs or to a VAX and TCP/IP network. The connection to the VAX is through the high-speed DR11W/DRB32W interface.

More information is available by contacting Phyllis Stern, Intel Corp., 3065 Bowers Ave., P.O. Box 58065, Santa Clara, CA 95052-8065; (602) 869-3778.

Circle 415 on reader card

Silicon Graphics Debuts The 4D Workgroup

Silicon Graphics Inc. recently introduced a series of products that allow IRIS Superworkstation users to share information, compute cycles, graphic objects and applications wherever those resources reside on the network.

The new products, which comprise the

4D Workgroup, address the three major concerns of a networked environment: network access, distributed graphics objects and resource sharing to distribute compute and storage loads.

4DDN gives users access to applications running on DECnet. It provides a Phase IV, DECnet-compatible node on the network, so users can transfer files, obtain directory listings, exchange data and access other DECnet nodes. 4DDN also provides DECnet management functions.

4DDN also provides VAX/VMS users with access to the UNIX operating system, because they can log in to any IRIS 4D Superworkstation running 4DDN.

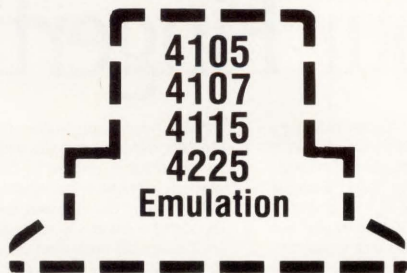
To learn more, contact Silicon Graphics Computer Sys., 2011 Stierlin Rd., Mountain View, CA 94043; (415) 960-1980.

Circle 414 on reader card

Aviv Delivers Backup System For MicroVAX

Aviv Corporation's TFS 935D-8200 is a high-density tape storage system for MicroVAX and MicroPDP-11 Q-bus computers. It's based on Exabyte 8mm tape cartridge technology. Up to 2.3 GB of data can be stored at the data rate of 246 KB/sec. on

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Chief of Information Sciences, NASA/Ames

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Jay Lala
Draper Labs

CISC vs. RISC

Bill Geideman
Sr. Manager, McDonnell Douglas

Future Bus Structures

Sven Behrendt
CEO, Force Computers

1553 Standard Data Bus for Spacecraft

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Kirtland AFB Program Manager

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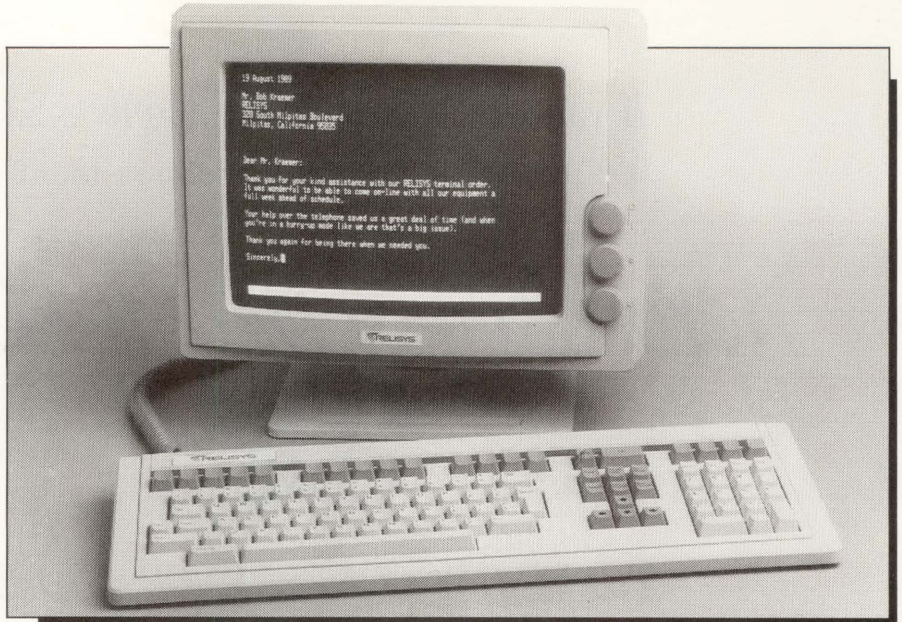
The system occupies the same form factor as Aviv's 5 1/4-inch disk drives. The combination of rotating heads and moving tape yields a head-to-tape speed equivalent to a 150ips, 1/2-inch, 9-track open reel tape drive and a data transfer rate of 246 KB/sec. Read-After-Write verification and automatic data block rewriting by the drive ensure high reliability while maintaining high data throughput and eliminating time-consuming host intervention and tape repositioning.

The TFC 935D is compatible with DEC software driver TSV05 or TS-11 and with RSX-11, RSTS (V.8.0), TSX-11 Plus, RT-11, ULTRIX, MUMPS, UNIX and VMS operating systems. Up to four drives are supported by the TFC 935D Controller. For further information, contact Aviv Corp., 26 Cummings Park, Woburn, MA 01801; (617) 933-1165; FAX: (617) 938-5691.

Circle 416 on reader card

RA320 Emulates DEC's VT320

Relisys has introduced the Model RA320, which emulates the VT320. It interfaces with



Relisys' Model RA320.

all DEC computers for general-purpose OA data entry use.

Screen character attributes include reverse video, underline, bold, blink, blank,

and double-height, double-width characters, plus split screen, screen saver and menu setup screen.

The unit features a low-profile DEC-

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compatible keyboard and includes 15 programmable function keys, as well as five user-selectable control keys and four LED indicators. All the character attributes, character sets and downline loadable features of the VT320 are included. This includes ASCII, DEC special and supplemental graphics, ISO Latin and National Replacement (NRC). The unit also is compatible with VT52, VT100 and VT220 with ANSI 3.64-compatible control functions.

Find out more information by contacting Relisys, 320 S. Milpitas Blvd., Milpitas, CA 95035; (408) 945-1062; FAX: (408) 945-0587.

Circle 412 on reader card

Performance Upgrade For VAX 11/780 Users

Nemonix Inc. has released the next generation of system expansion products. The upgrade is designed for VAX 11/780 users and increases overall system throughput up to 45 percent.

The upgrade is hardware/software compatible and includes Nemonix micro diagnostics, memory diagnostics, benchmark

software and the customer protection package.

The upgrade is priced at \$29,900, which includes the CPU upgrade and 16 MB of Nemonix memory.

For additional information, contact Ken Burdulis, Nemonix Inc., 106 South St., Hopkinton, MA 01748; (617) 435-9087.

Circle 417 on reader card

VMS Tuning Guide Released

Touch Technologies Inc. has released a tuning guide for VAX system managers and operators. The *VMS Tuning Guide* was written in response to many requests for insight and information on VAX/VMS tuning. It provides information about VMS SYSGEN parameters and attempts to standardize tuning methodologies. TTI assumes that the reader is already familiar with the VMS SYSGEN and VMS AUTHORIZE utility.

The *VMS Tuning Guide* explains that "... the purpose of tuning is to get maximum benefit from existing hardware. Tuning is not a way of life. It is the last step before acquiring new hardware."

Interested VAX users can obtain a copy of *VMS Tuning Guide* free by contacting Touch Technologies Inc., 9990 Mesa Rim Rd., Ste. 220, San Diego, CA 92121; (800) 525-2527; in California (800) 325-2527; outside U.S. (619) 455-7404.

Circle 419 on reader card

Box Office Tracks VAX/VMS Software Access

Owen + Davis Systems Inc. has introduced a utility called Box Office, which lets VAX/VMS software developers license their products by user. This product tracks the number of people using a software application program and prevents user access beyond a predetermined limit set by the software developer. It also allows VMS software developers to compete with PCs on a cost-per-user basis, while ensuring that software licensed for a single CPU can't be copied across an entire VAXcluster and used by multiple CPUs.

Box Office continues to operate correctly even if the program being protected crashes or is interrupted.

The Box Office user-tracking system

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*PC-DOS is a registered trademark of IBM; MS-DOS and Zenix are registered trademarks of Microsoft Corp.; SCO is a trademark of The Santa Cruz Operation, Inc.

CIRCLE 187 ON READER CARD

has a one-time price of \$695 and operates on all VAX systems.

Learn more by contacting Matthew Owen, Owen + Davis Sys., 3100 Airway Ave., Ste. 116, Costa Mesa, CA 92626; (714) 540-8878.

Circle 418 on reader card

8-, 16-, 32-MB Memory Now From Clearpoint

A new MicroVAX and VAXstation 3XXX-compatible memory series consisting of 8-, 16- and 32-MB boards has been announced by Clearpoint Research Corporation. Using a custom gate array design, Clearpoint's MV3000 delivers 32 or 16 MB of memory using state-of-the-art one megabit DRAMs.

The MV3000/8 MB uses 256 Kbit ZIP DRAMs. It also can be used by MicroVAX II customers who upgrade their MicroVAX II CPU boards to the MicroVAX 3000.

The MV3000 comes with an unconditional lifetime warranty and a 24-hour before-repair/replacement policy.

For more information about this series, contact Greely Summers, Clearpoint Research Corp., 99 South St., Hopkinton, MA 01748-2204; (617) 435-6184.

Circle 420 on reader card

Cisco Systems Announces Hybrid Bridge/Router

Cisco Systems Inc. has announced its first bridging product, the HyBridge, a hybrid bridge/router for internetworking. HyBridge combines the functionality of Cisco's Level-3 router with that of a MAC-layer bridge (media access control at Level-2 of the OSI protocol stack).

This product is a full-performance network-level router that simultaneously provides the ability to fall back to bridging functions in specified cases. The HyBridge provides DECnet users with true interoperability — the HyBridge router allows DECnet to interoperate with TCP/IP and other protocols, while the bridge can handle the DEC's proprietary LAT packets. To the user, this all occurs transparently.

HyBridge is priced from \$6,200.

Learn more information by contacting William R. Graves, Cisco Systems Inc., 1360 Willow Rd., Menlo Park, CA 94025; (415) 326-1941.

Circle 421 on reader card

Eikonix Introduces New Desktop Slide Scanner

Eikonix Corporation has announced the EIKONIX 1435 Slide Scanner. This small-format digitizer is tailored for high-throughput scanning of 35mm mounted and unmounted slides, negatives, single frames

and film strips, 35mm sections of 70mm film and aperture cards.

The high-performance scanner completes a color scan in less than three minutes and has 2800-dpi resolution with a dynamic range of up to 12 bits per pixel per color. It is suited for applications such as advertising, presentation graphics, desktop publishing, photojournalism, printing and publishing.

The new Eikonix family of digital imaging cameras supports a variety of computer buses and systems including IEEE-488, UNIBUS and Macintosh II PCs.

If interested in obtaining more information, contact Eikonix Corp., 23 Crosby Dr., Bedford, MA 01730; (617) 275-5070.

Circle 422 on reader card

Double Announcement From MegaTape

Two new backup drives and subsystems have been introduced by MegaTape Corporation: the MT-1500 and the GT-88. Both are available in subsystems for use with DEC.

The GT-88 provides a formatted capacity of 1.2 GB and a sustained data transfer rate of 764 KB per second. It has a four-channel head that simultaneously writes four tracks of data to attain the transfer rate. Each channel is provided with 128 KB of cache buffer and the head is stepped nine times to generate 36 tracks on the 1/2-inch wide tape.

The 8mm GT-88 cartridge drive provides a capacity of 2.0 GB and writes data in the Exabyte format. The sustained data transfer rate is 246 KB per second.

The MT-1500 high-performance drive costs \$19,500 and the medium-performance version is \$16,500. The GT-88 is provided at \$7,950.

For more information, contact Clyde R. Cornwell, MegaTape Corp., 1041 Hamilton Rd., P.O. Box 317, Duarte, CA 91010-0317; (818) 357-9921.

Circle 425 on reader card

Chem-X/AMBER Interface Gets Green Light

Chemical Design's Chem-X molecular modeling system now offers a transparent interface to AMBER, the molecular dynamics simulation program. Version 3 of AMBER is also available.

A major advantage of Chem-X/AMBER is that data for structures built in Chem-X are converted automatically to the correct format before transfer to AMBER. This overcomes the problem of data input often encountered when AMBER is employed as a standalone program.

For more information, contact Hollon Bridges, Chemical Design Inc., 200 Route 17, Ste. 120, Mahwah, NJ 07430; (201) 529-3323.

Circle 423 on reader card

EIS Combines 20/20 With Ross Systems' Tools

Ross Systems has a new Executive Information System (EIS) for financial executives. Called MAPS/EIS, the system is a combination of software tools, allowing users to access, manipulate, report and graph data from Ross Systems' MAPS family of accounting software and from PC-based spreadsheets.

Ross Systems is offering EIS, the 20/20 spreadsheet from Access Technology, as part of MAPS/EIS. The spreadsheet integrates graphics, database management and project



The GT-88, from MegaTape Corporation, is a high-capacity drive using an 8mm cartridge.

modeling with powerful spreadsheet functionality.

MAPS/EIS also consists of CROSSVIEW, a cross-product inquiry and reporting tool that allows simultaneous access to Ross Systems' financial accounting applications; MAPS/MICROLINK, a link between Ross Systems' MAPS software, VAX and PC spreadsheets; MAPS/GL Management Report Writer, for extracting data from MAPS/GL at summary or detail levels; and the 20/20 Database Connection tool for accessing data from other databases directly from 20/20.

More information is available by contacting Sue Sweeney, Ross Systems, 1860 Embarcadero Rd., Palo Alto, CA 94303; (415) 856-1100.

Circle 424 on reader card

Attachment Support For VMS Mail

OA Technologies Inc. has announced OATmail for VMS. Version 1.0 will allow VMS users to send attachments to VMSmail messages. OATmail for VMS works as a standalone menu-driven interface for VT users or as a programmatic interface for OATmail PC users. The special programs of OATmail permit the inclusion of attachments of all format types (text and binary) for transfer through the VMS mail router and across the DECnet. If format conversion is required, attachments are routed automatically through format conversion utilities for conversion of incompatible WP, spreadsheet and database files.

OATmail for VMS is priced from \$2,500 for a MicroVAX II to \$7,500 for the VAX 8800.

To find out more information, contact Michael Jones, OA Technologies Inc., 1001 Craig Rd., St. Louis, MO 63146; (314) 432-3622.

Circle 426 on reader card

"Parts Bin" Saves Time And Money

LESTECH International has announced "Parts Bin". Written in COBOL, the routines are designed to be used in a commercial DP development environment using VAXs.

"Parts Bin" includes routines for text manipulation, security, conversion of dollar amounts to verbal descriptions, date manipulations, specialized formatting and a comprehensive menu system. Also provided with "Parts Bin" is a user's manual, the RUNOFF text file for the user's manual, test programs and examples and the source code for each routine.

A one-time, single CPU/Network license is available for \$99.

To learn more, contact LESTECH Intl., P.O. Box 5968, Auburn, CA 95603; (916) 823-2208.

Circle 427 on reader card

SL-GMS Offered For Less Than \$10,000

SL-GMS from Sherrill-Lubinski, can produce anything from basic screens with simple graphics management to fully articulated

visualizations of dynamic (animated) processes.

Five integral components make up the complete SL-GMS development system: SL-DRAW, a mouse-driven interactive graphics editor; the basic Graphical Modeling System Function Library (SL-GMF); the Graphical Modeling Language (SL-GML), a useful graphics interpreter; the Graphical Modeling Dynamics Library (SL-GMD); and (SL-OOE) a comprehensive Object-Oriented

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Environment that manages and controls the underlying architecture.

SL-GMS comes in two forms. The Development configuration starts at \$9,500 for screen composition, management and editing, and goes to \$12,500 with the addition of editing/management of coherent binding. The application or run-time configuration starts at \$2,400 to \$3,600 for the coherent binding version.

To learn more, contact Sherrill-Lubinski, Ste. 110, 240 Tamal Vista Blvd., Corte Madera, CA 94925; (415) 927-1724.

Circle 430 on reader card

RAXCO Unveils VAX-To-FAX

RAXCO Communications has introduced RAXMAIL, an easy-to-use, efficient and complete system for managing FAX, Telex and Teletex (European communication mode) messages in VAX/VMS environments. It lets companies centralize FAX control, while giving every VAX terminal user the ability to send a FAX from a VAX terminal.

RAXMAIL offers storage queues where users store multiple FAX messages. It waits until FAX lines are available, then sends stored messages at the first opportunity and alerts the user about message status.

More information is available by contacting RAXCO Communications, 2440 Research Blvd., Rockville, MD 20850; (301) 258-2620; FAX: (301) 330-5756.

Circle 431 on reader card

MessageNet V3.0 Integrates Networks

S&H Computer Systems Inc. announced V3.0 of MessageNet, data communications management software for VAX/VMS systems. MessageNet 3.0 integrates data communications across both public and private networks, including DECnet. It automates access to Western Union's EasyLink, ITT TIMETRAN Network and MCI Mail. The S&H package also features proprietary data compression and error-checking protocols.

The MessageNet Base software starts at \$1,500. A 90-day demonstration version is available for \$150 on TK-50, plus \$50 for each Gateway.

For further information, contact Richard Dohrmann, S&H Computer Systems Inc., 1027 17th St. S., Nashville, TN 37212; (615) 327-3670; Telex: 786577.

Circle 434 on reader card

ADSIM Enhancement Runs On VAX

Applied Dynamics International (ADI) has announced ADSIM/VX, an enhancement

that allows its users to run ADSIM, its proprietary simulation software, on any VAX. ADSIM/VX allows continuous system modeling language to run in a standalone environment for program development, testing and debugging.

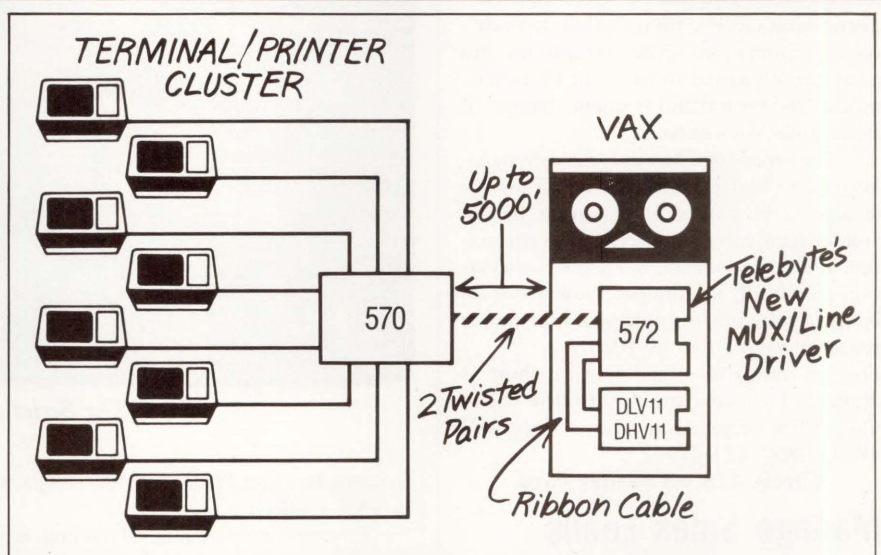
Until now, ADSIM has been used in a real-time environment where a VAX control computer, after compiling the ADSIM source program, is used to load the object module into ADI's AD 100 digital parallel processor. The AD 100 then runs the actual simulation.

ADSIM/VX saves time and money by allowing multiple users to develop simultaneously and debug simulation programs off-line on a VAX processor.

ADSIM/VX is compatible with the entire VAX line running VMS, V4.5 or higher, including the MicroVAX series.

Find out more by contacting Larry Bobrowski, Applied Dynamics Intl., 3800 Stone School Rd., Ann Arbor, MI 48108; (313) 973-1300.

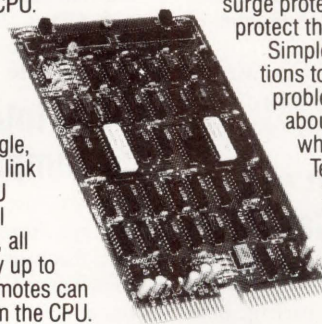
Circle 433 on reader card



VAX/MICROVAX REMOTE TERMINAL CLUSTER WIRING IS A SNAP WITH TELEBYTE'S NEW QUICK MUX 572.

Everything about the new Quick Mux 572 multiplexing controller for the DEC multi-user environment is simple. Eliminated are the RS-232 connector panels on the backpanel of the CPU. Instead, there's one small bracket.

Instead of 8 separate hook-ups, cables, line drivers, etc., there's one 4-pin connector for a single, 2 twisted pair composite link cable over which the CPU communicates with 8 full duplex remote terminals, all operating simultaneously up to 19,200 baud. And the remotes can be located 5000 feet from the CPU.



To make things even simpler, we've packaged the Quick Mux 572 on a dual DEC PC board to install "in a snap" inside the CPU. We've even built lightning and surge protection into each unit to protect the composite link.

Simple, elegant, low cost solutions to data communications problems—that's what we're all about. Call or write today to see what we've thought up for you.

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FAX: (516) 385-8184.

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Controlled Power Introduces New UPS

Controlled Power Company's latest product, the Series 1000 Model D UPS meets the needs of small- to medium-scale VAX sites. It provides reliable, conditioned power and power distribution throughout the office, which decreases cost and time of installation.

The back panel of the Series 1000 Model D has output distribution panels that accommodate flush-mounted NEMA receptacles, distribution cables with receptacle and field-wired terminations. New receptacles and cable can be added in the field to accommodate the typical and frequent changes of a computer environment.

The Series 1000 Model D has zero transfer time to battery so there's never any interruption of power, ± 3 percent output voltage regulation, transverse noise attenuation of 120 db, common mode noise attenuation of 140 db to eliminate power disturbances. Available in single phase for power requirements of 1 to 20 KVA.

Further information and free brochure is available by contacting Controlled Power Co., 1955 Stephenson Hwy., Troy, MI 48083; (800) 521-4792.

Circle 428 on reader card

Manage Sales Leads With Marketrieve PLUS

Marketrieve PLUS is a sales lead tracking and market analysis software from IDSC Rental Company Inc. It provides telemarketing scripting, customer service and support and runs on VAX and HP 3000 systems.

Marketrieve provides quick access to data, search by company, contacts, phone number, parent company and follow-ups are tickled automatically. There are 50 user-definable fields. You can obtain market analysis reports, forecasts, sales management reports, advertising analysis and form and custom letters.

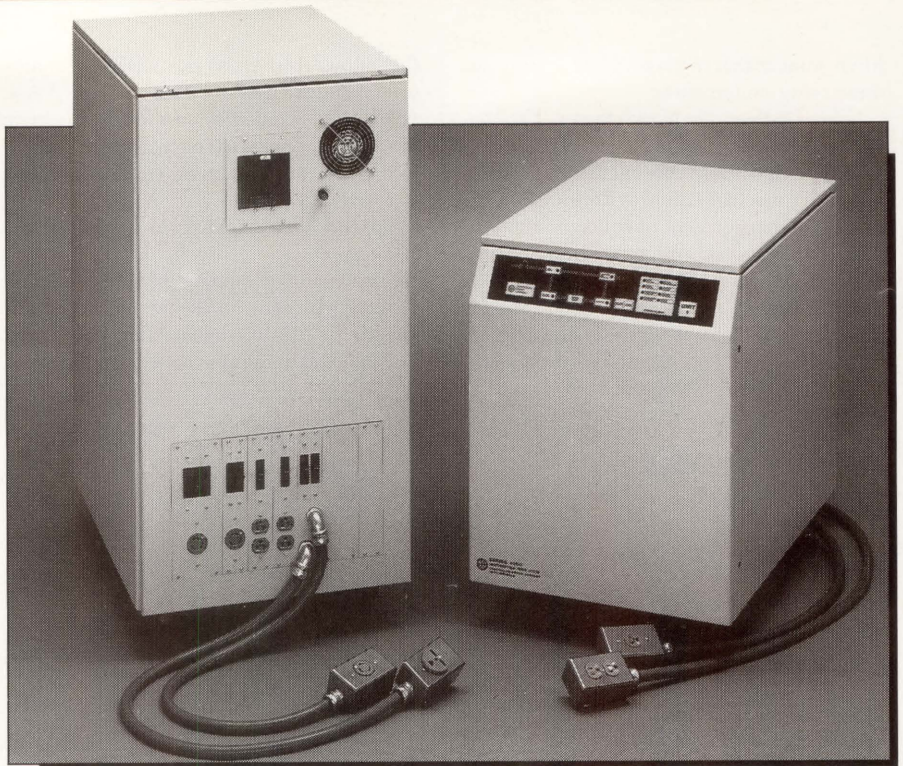
Customer service and support modules are available. Pricing is based on number of users and modules purchased.

More information is available by contacting IDSC Rental Company Inc., 350 Harvey Rd., Manchester, NH 03103; (603) 645-6677; FAX: (603) 645-6681.

Circle 436 on reader card

MCBA Releases Capacity Requirements Planning

MCBA Inc. released the final package in its Manufacturing System for VAX computers. Capacity Requirements Planning (CRP) is the 18th module in the MCBA system and completes the company's closed-loop Manu-



The Series 1000 Model D uninterruptible power system.

facturing Resource Planning (MRP II) system in VAX COBOL.

Capacity Requirements Planning is a shop floor management tool, allowing comparison of each work center's projected load to its available capacity. By having advance knowledge of potential bottlenecks, the manufacturer can make adjustments to the production plan.

Some CRP features include a "Simulated Load" file, which allows the user to alter orders to see the effects of alternate schedules without affecting the actual orders; and "Graphic Load Profile" graphically shows the load that exists on a particular work center for a given period of time, allowing the planner to quickly determine if capacity is adequate to handle the projected load.

For more information, contact MCBA Inc., 425 West Broadway, Glendale, CA 91204-1269; (818) 242-9600; Telex: 194188.

Circle 432 on reader card

GWA Introduces SYSPAC To Simplify Maintenance

SYSPAC is a menu-driven application package from GWA Information Systems Inc., that provides a cost-effective alternative to in-house VAX/VMS technical and operational personnel by simplifying VAX/VMS maintenance functions. It allows authorized users to add or update user accounts and parameters, and conduct orderly VAX system shutdowns and restarts.

SYSPAC also accommodates the setup of systemwide logicals, the sending of the systemwide login messages and the sending of terminal-specific messages.

SYSPAC builds a database of all files that have been stored on the backup volumes so users may inquire which backup tape volumes contain a specific file and can have the desired file restored. SYSPAC instructs the user to load the appropriate tape volume and executes all necessary commands to restore the file or files.

To learn more, contact George A. Merrill, Jr., GWA Information Systems Inc., 1432 Main St., Waltham, MA 02154; (617) 890-1838.

Circle 435 on reader card

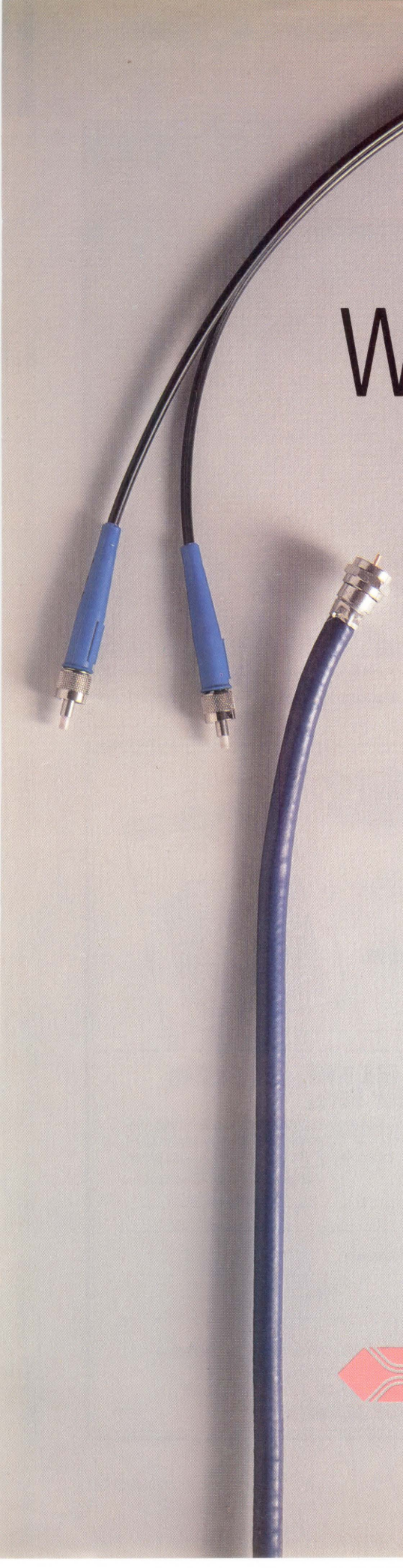
VAXstation 8000 Performance Enhanced

Star Technologies Inc. has announced 50 and 100 MFLOPS vector accelerators for the new VAXstation 8000 workstation.

The Star ST-50 array processor, which operates at 50 MFLOPS, can be used as a single-user, real-time resource or as a shared computational resource serving up to three VAXstation 8000 workstations per array processor. The 100 MFLOPS ST-100 can service up to seven VAXstation 8000 workstations.

Get more information by contacting Gary Hertz, Star Technologies Inc., 515 Shaw Rd., Sterling, VA 22170; (703) 689-4400.

Circle 447 on reader card



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Systems Union Inc.'s SunAccount is designed to handle the multicurrency accounting and financial reporting needs of international organizations. SunAccount is a combined ledger accounting and reporting package that automatically translates and consolidates multicurrency accounts into a single-base currency.

SunAccount can import and export data from most WP database and spreadsheet packages. All financial statements and analysis reports can be read into spreadsheets for further manipulation. Exchange rate tables also can be downloaded from external systems.

SunAccount is available on most hardware systems including VAX. Licensing prices range from \$3,500 to \$100,000 depending on CPU size, operating system and number of users.

For more information, contact Stewart McKie, Systems Union Inc., 244 East 48th St., New York, NY 10017; (212) 753-7777; FAX: (212) 753-7825.

Circle 429 on reader card

```

MAINTAIN CHART OF ACCOUNTS

Account Code      <64003 >   Address Code      <MARINE/1 >
Account Name      <Marine Security Systems >
Lookup Code       <MARINE >
A/c Type (D/C/T/P/B) <D>         Direct Debit      < >
Bal.Fwd/Op.Item(B/D) <0>
Account Status    < >         Priority           <2>
Area              <US2 >       Pay Method (C/B/ ) < >
Account Type      <R >         Credit Limit      < 5000>
Sales Region      <1AS >
Analysis Category 4 < >         Payment Days     < 30>< >
Analysis Category 5 < >
Conversion Code   < >         Discount 1:      Days < 5> % < 3.000>
Suppress Revaluation < >       Discount 2:      Days < > % < >
Comment           < >
Permission        < >
Last Transaction   28/02/81       Transactions Present Y

-----
Selection <_ >   C=Create, A=Amend, D=Delete, E=Examine, M=Menu,
                  U=View, R=Report, T=Transfer, N=Menu
    
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This screen shot from Systems Union Inc.'s SunAccount, multicurrency accounting software, depicts the creation of a new account in the ledger.

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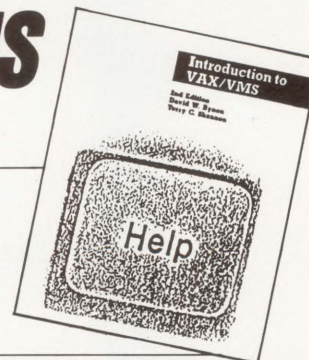
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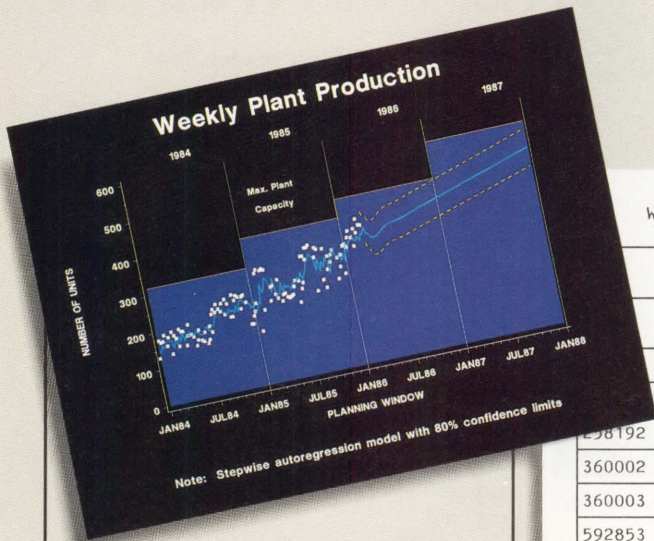
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	20110	1000	MON, MAR 30, 87
	8585	0	TUE, FEB 10, 87
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* Computer Intelligence, January 1986.

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		Lowest	Highest		
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40	6	1	6	3.5	33
50	6	3	8	5.5	66
60	6	4	9	6.5	83
70	7	4	10	7.0	85



Optifile optical disk subsystem from KOM Inc.

LorTec's 3 kVA UPS Ideal For Office

Providing clean, uninterrupted ac power for minicomputers like the IBM S/36, VAX and HP 1000, the new 3 kVA online UPS Model 302CAB, available from LorTec Power Systems Inc., incorporates reliable ferroresonant inverter in a compact, quiet, single-phase unit suitable for office use.

The LorTec 3 kVA ContinuAC UPS is equipped with a 100 percent solid-state output transfer switch. A touch-controlled meter function select panel lets you automatically scan, or manually monitor, nine conditions: dc voltage, battery current, bypass frequency, output voltage, output amps, output power, bypass voltage and inverter voltage. Where the UPS is installed in an unattended location, the remote performance-monitoring system can be installed in the computer room, at a security desk or instrumentation center.

For more information, contact Dale Lamirand, LorTec Power Systems Inc., 145 Keep Ct., Elyria, OH 44035; (800) 222-2600 ext. 265.

Circle 437 on reader card

Microbiology Software Module Enhanced

System Analysis Corporation has announced Micro-CAL, an enhanced microbiology software module designed for the micro-

biology laboratory. Micro-CAL provides comprehensive features and audit trails, including patient and specimen status, test ordering, culture workups and histories, daily and cumulative patient reports and epidemiology studies. The system is fully integrated with the Clini-CAL Laboratory Information System, which runs on DEC computers.

Some features include online or printed workcards, specimen plating requirements, user-defined specimen label format and quantities, online error checking and comprehensive Epidemiology reports.

Learn more by contacting Gail Rutherford, System Analysis Corp., One Hollis St., Wellesley, MA 02181; (617) 237-9500.

Circle 438 on reader card

NLI Announces DataTalker For Rdb

Natural Language Incorporated announced the availability of the NLI DataTalker and the NLI Connector for the VAX Rdb relational database management system. The NLI DataTalker is a natural language interface that lets you access relational databases using conversational English. The NLI Connector customizes the DataTalker for the particular database application.

The DataTalker can handle ad hoc, complex and unstructured queries because it understands the concepts, context and rules

of sentences. It supports SQL-based relational databases including ORACLE, Ingres, SYBASE and VAX Rdb.

The NLI DataTalker and NLI Connector are priced from \$4,500 to \$80,000 depending on CPU.

More information is available by contacting Allen Joesepp, National Language Inc., 1786 Fifth St., Berkeley, CA 94710; (415) 841-3500.

Circle 439 on reader card

KOM Supports RSX With OPTIFILE II

The OPTIFILE II software device driver from KOM Inc., now supports Toshiba 5 1/4-inch and Fujitsu 5 1/4-inch optical disk drives. PDP/RXS-11M and 11M-PLUS users can migrate current applications to optical technology. This provides an ideal combination: large storage capacity of 800 MB, but with the compactness of 5 1/4-inch storage.

OPTIFILE II, an essential component of an optical storage subsystem, allows optical drives to emulate standard magnetic devices without system or application changes required.

OPTIFILE II RSX currently supports SONY, OPTIMEM, OSI and ATG 12-inch drives. A VMS version of OPTIFILE is available, which means media interchangeability between the two operating systems is possible. Data written to a platter from an RSX host computer can be read by using VMS and vice versa.

For more information contact Linda M. Bradley, KOM Inc., 145 Spruce St., Ottawa, ON K1R 6P1; (613) 238-7766.

Circle 440 on reader card

MEC Bridge Provides DECmate-To-PC Transfer

Microsystems Engineering Corporation's new product MASS-11 Bridge, allows direct transfer and conversion of WPS documents residing on DECmates to PCs or vice versa.

Bridge also lets any two PCs running MASS-11 to transfer DOS or MASS-11 files, supplying direct, simultaneous communication.

To transfer a file from MASS-11 WP to the DECmate, MASS-11 Bridge first converts the file to the DX file format and then transfers it to WPS on a DECmate. From a DECmate to a PC, the document is first transferred and then converted.

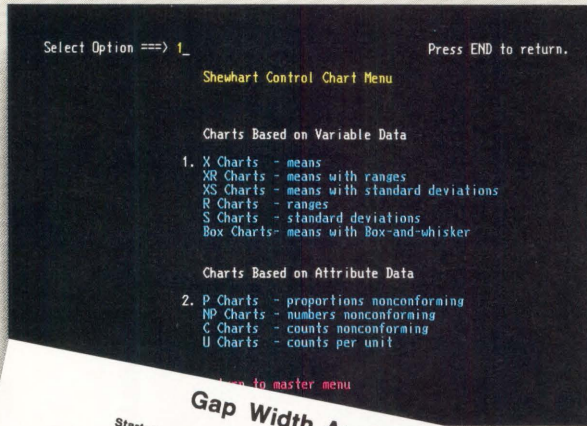
MASS-11 Bridge is available for IBM PCs or compatibles for \$195 per PC.

Find out more by contacting Microsystems Engineering Corp., 2400 W. Hassell Rd., Ste. 400, Hoffman Estates, IL 60195; (312) 882-0111.

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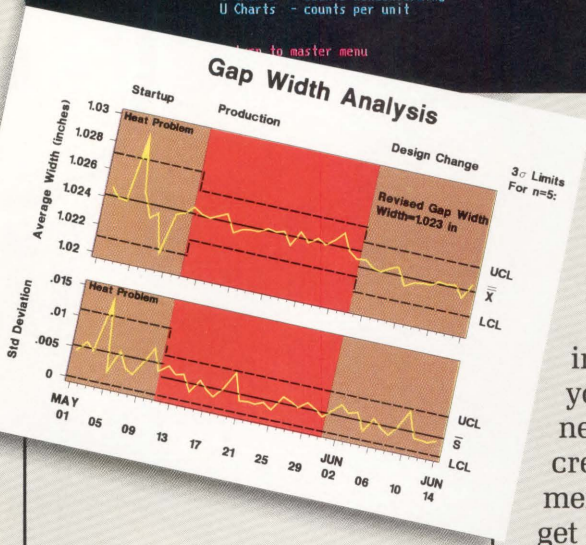
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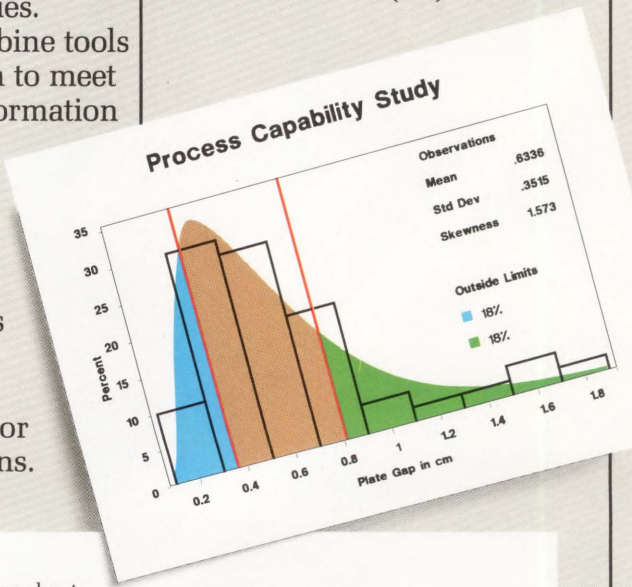


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The SAS System runs on IBM 370/30xx/43xx and compatible machines, Digital Equipment Corporation's VAX[™] and MicroVAX II[™], Data General Corporation's ECLIPSE[®] MV series, Prime Computer, Inc.'s Prime 50 series, and the IBM PC XT and PC AT. Not all products are available for all operating systems. SAS is the registered trademark of SAS Institute Inc., Cary, NC, USA. Copyright © 1987 by SAS Institute Inc. Printed in the USA.

Software Solutions Adds IQL To 4GL Product Line

Software Solutions Company has announced an interactive query language utility (IQL) to its existing 4GL product line, which consists of a data entry utility, processing and report writer, financial report writer, menu/security system and query language. The entire range of products is integrated through a common data dictionary.

IQL lets the user select criteria, subtotal and total fields, perform calculation steps and output to screen, printer or disk file. Commands can be entered in prompting mode through a script file or through the pull-down menu environment.

IQL runs on VAX/VMS 4.0 or later. Prices range from \$2,000 to \$15,000. Learn more by contacting Charles Howard, Software Solutions Co., 2210 San Joaquin St., Fresno, CA 93721; (209) 486-4750.

Circle 444 on reader card

UNBOUND Introduces Helical-Scan Systems

UNBOUND Inc. has announced the availability of helical-scan tape technology in its full line of PDP-11, MicroVAX II and MicroVAX III QUBE desktop computers.

UNBOUND's helical-scan system options are based on Exabyte Corporation's EXB-8200 high-capacity magnetic tape drive that uses standard 8mm video cartridge tapes as media. Each cartridge stores up to 2.3 GB and costs less than \$10. A typical UNBOUND QUBE MicroVAX II system, fully integrated with a helical-scan tape, 760 MB disk, controllers, 5-MB memory and nine ports costs less than \$29,000 in small OEM quantities.

All UNBOUND helical-scan system and subsystem products use the standard DEC TMSCP driver for full compatibility. To find out more, contact Robert J. Rudy, UNBOUND Inc., 15235 Springdale St., Huntington Beach, CA 92649; (800) 862-6863, in CA (714) 895-6205.

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IQ Option Available For The VAX

CP International Inc. has announced that IQ, a natural language front-end and reference ranking option for its STATUS text retrieval system, is now available for the VAX.

STATUS/IQ replaces formatted commands with everyday English questions. STATUS/IQ is a text storage and retrieval system that prioritizes references and uses a natural language front-end.

STATUS/IQ is marketed and supported by CP International, the U.S.-based software

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For more information, contact Norman Eagle, CP International Inc., 1 Water St., White Plains, NY 10601; (914) 686-9030.

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New DMMs Designed To Go Anywhere

The Instrumentation Products Division of Beckman Industrial Corporation has introduced multimeters. The models HD151, HD152 and HD153 are a new generation of heavy-duty digital multimeters (DMMs) and are hand sized.

The meters use a CMOS dual-metal gate A to D converter, which incorporates a fast voltage-to-frequency converter for range selection. By amplifying this signal and connecting it to a speaker, a tone proportional to the magnitude of the reading is produced. The HD153 detects the presence of most standard logic signals and alerts the user with a beep.

These models feature DC voltage ranges of 200mv, 2, 20, 200 and 1500 with resolution of 100uV. AC voltage ranges for the HD series are 200ms, 2, 20, 200 and 1000 with a resolution of 100uV.

The HD151 lists for \$149, the HD152 for \$169 and HD153 is priced at \$199. For further information, contact Rey Harju, Beckman Industrial Corp., 3883 Ruffin Rd., San Diego, CA 92123; (714) 671-4830.

Circle 463 on reader card

Softerm PC Preconfigured For DEC

Softerm PC from Softronics is a communications and terminal emulation program, available in versions preconfigured for VAX/VMS. These versions include a user-selectable keyboard remapping, which lets you use the same key commands used by the PC version of WordPerfect with the mainframe version; seamless remote virtual-disk, a concept pioneered by Softronics, provides seamless integration of file transfers between PC applications such as WPs, spreadsheets and database management programs, and the host system.

An optional tape is available with source and executable versions of the KERMIT and Softrans file transfer protocols. Each package comes with eight diskettes, binder and slipcase, technical reference manual and quick reference cards. Softerm PC revision 2.10 retails for \$195 and the optional tape is available for \$40.

For orders or information, contact Softronics Inc., 7899 Lexington Dr., Ste. 210, Colorado Springs, CO 80920; (800) 225-8590.

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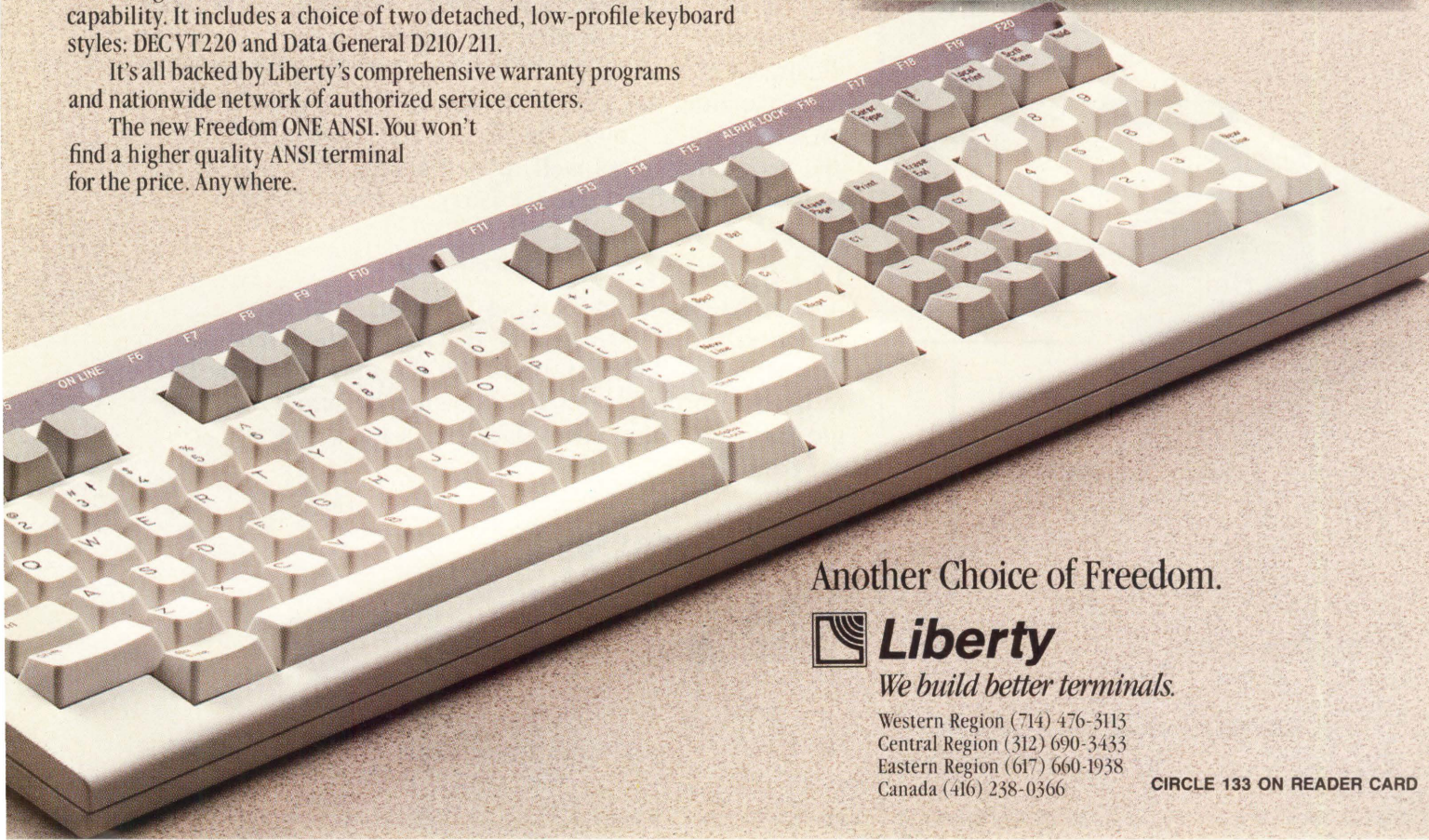
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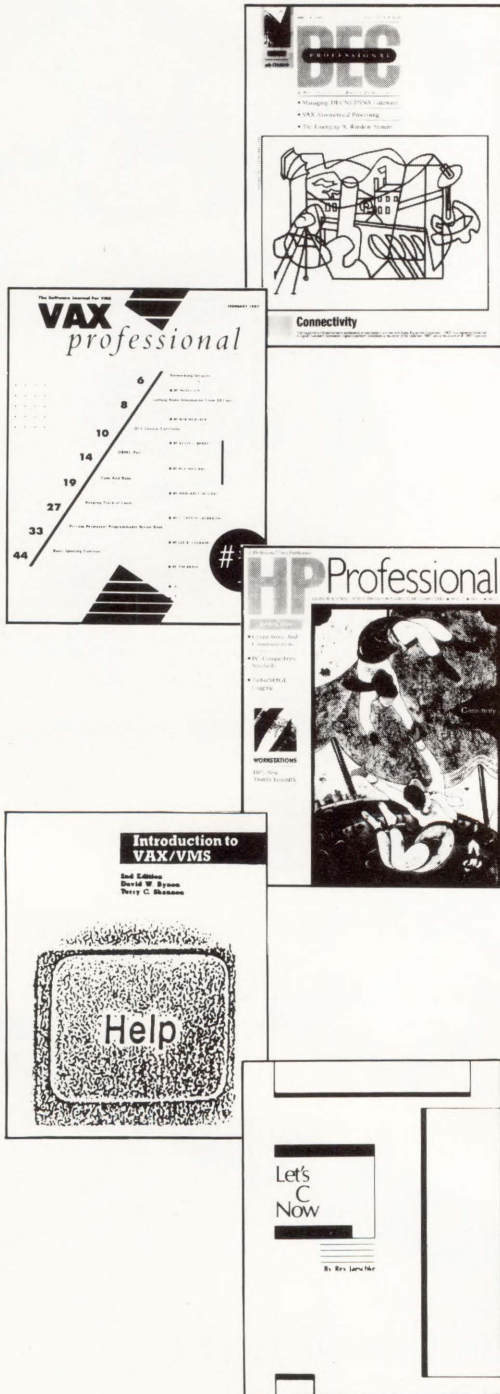
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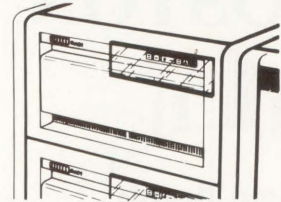
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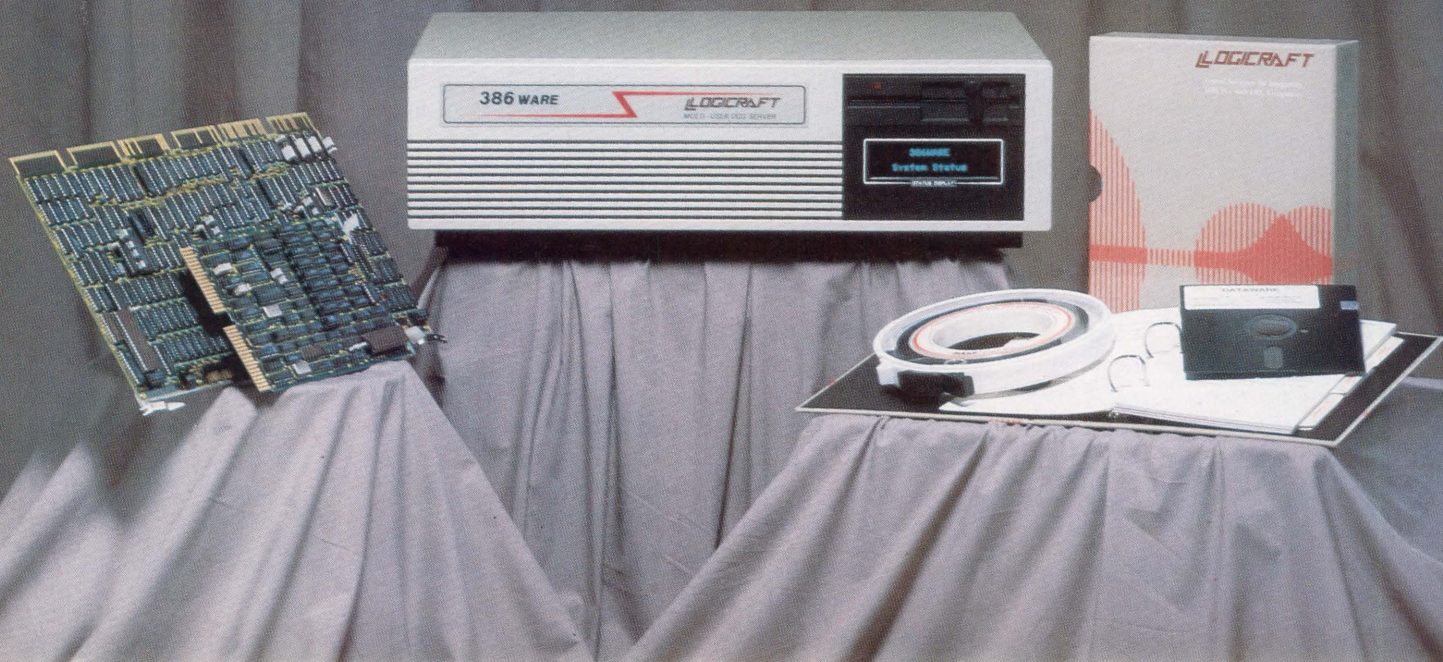
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A Tale Of Two Idea Men

Programmers are notorious for never finishing a project. The culprit is creeping featurism. The bigger the project, the more likely you are to see creeping featurism. Whole sections of once acceptable code soon are perceived as garbage by the programmer. Time slips away as needed changes are made. Mania begins to set in.

This happens suddenly when it dawns on the programmer that the project is near completion and the baby is near birth. It won't take long to implement any changes, says the programmer to the project leader. He convinces the bosses that these additions are necessary. At this point, the world's greatest salesman should study the sales techniques employed by the most introverted programmer. A red cape and tights appear on the once meek programmer who suddenly feels duty bound to promote his needed features. His arguments go from, "The program will be no good without them" to, "This is what they really want." That's the first round of arguments. Soon, it turns into, "I've found out that this is what the competition is doing for its next release of a similar product. They'll kill us in the marketplace if we don't have it too."

It degenerates into, "I'll quit and kill the project if we don't have these features." During this period, the programmer has been promoting his new ideas, so the project leader lets him add a few features. When the programmer begins to code again, a smart project manager will threaten to release the product, bugs and all, swearing to publicly name and blame the programmer for any problems. The guy shapes up fast and gets a reasonable product out

the door, nine months late. That's on time in software parlance.

I admire the great programmers of the world. The better they are, the more unlikely they are to finish any project they've started. This is their nature and part of the programming process. I feel sorry for publishing houses that think programmers actually can do what they say. Sillier are the people who genuinely believe that a program will operate the way it's supposed to.

I tell you this about programmers, because they're the model for the biggest procrastinators in the industry; i.e., the corporate Fellow. These are guys who seldom write a line of code; they're still trying to finish their ideas.

In the world of small computers, there are a couple of characters worth mentioning. The first guy is Ted Nelson, who coined the term hypertext and has been one of the computer industry's grand pooh-bahs for decades. Nelson was the dinner speaker in 1977 at the West Coast Computer Faire, and he derided IBM, much to the delight of the audience, who perceived IBM as an ugly monster; the enemy of the personal computer movement.

Nelson has been refining his ideas for so-called project Xanadu, some hypertext be-all and end-all program.

I remember him when he worked on some sort of grand scheme at Processor Technology, a microfirm that rode high for a time. However, when the company failed, the idea lived on. So, he went on his own. A decade passed. Suddenly, Nelson is scooped up by Autodesk and named a Fellow there. He found his niche.

Another luminary is Alan Kay, an Apple Fellow. The classic computer-industry Fellows are the IBM Fellows. These are the big thinkers whom Kay and, to a lesser extent, Nelson emulated. The results probably will be similar. As

far as anyone can tell, an IBM Fellow's sole job is to cogitate and roam the hallowed halls, stimulating the drones into thinking they're privileged to be working at IBM; hey, it's such a creative and interesting place. Kay does this at Apple, and I suppose Ted Nelson will do the same at Autodesk.

Kay coined the term Dynabook and described the product in a *Playboy* article in 1971, or whenever. Kay goes beyond the programmer's inability to finish his code: As far as I know, Kay is the master of not being able to finish his ideas. He's been honing his notions with creeping featurism as though the raw ideas were somehow a product. The advantage Kay and Nelson have over lesser known fellows at IBM and elsewhere is they maintain a high profile and can promote their ideas so other people can try to implement the ideas. Both idea men have the rare opportunity to take credit for the successful implementation of their ideas and the ability to criticize the failures without having to take responsibility. Hypertext products are cropping up all over, and a slew of Silicon Valley companies are working on Dynabook-like products. Kay and Nelson look good.

I like these two guys, but I think it's a shame that Nelson and Kay haven't been forced to do any real work. The twosome have been playing the same theme song for years and haven't done much more than hone their notions. This is typical of a Fellow at IBM or any high-tech firm. The Fellow will be the last guy to complain, because he's well paid and the job of cogitating isn't all that bad. The public suffers, though.

Let's put the brains in gear and get the country off its duff. Let's start by putting all these quasi-retired fellows back to work. ■



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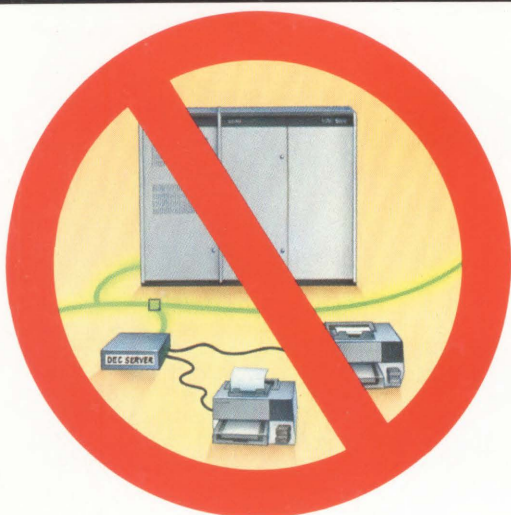


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