STORAGE

MT MA-24 Tape Drive

- Workstations Flex Their Processing Muscle
- Flush Times For Digital's LAT™ Protocol
- Programming With AppleTalk For VMS™

FEBRUARY ■ 1990

DEC Professional

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Software Engineering

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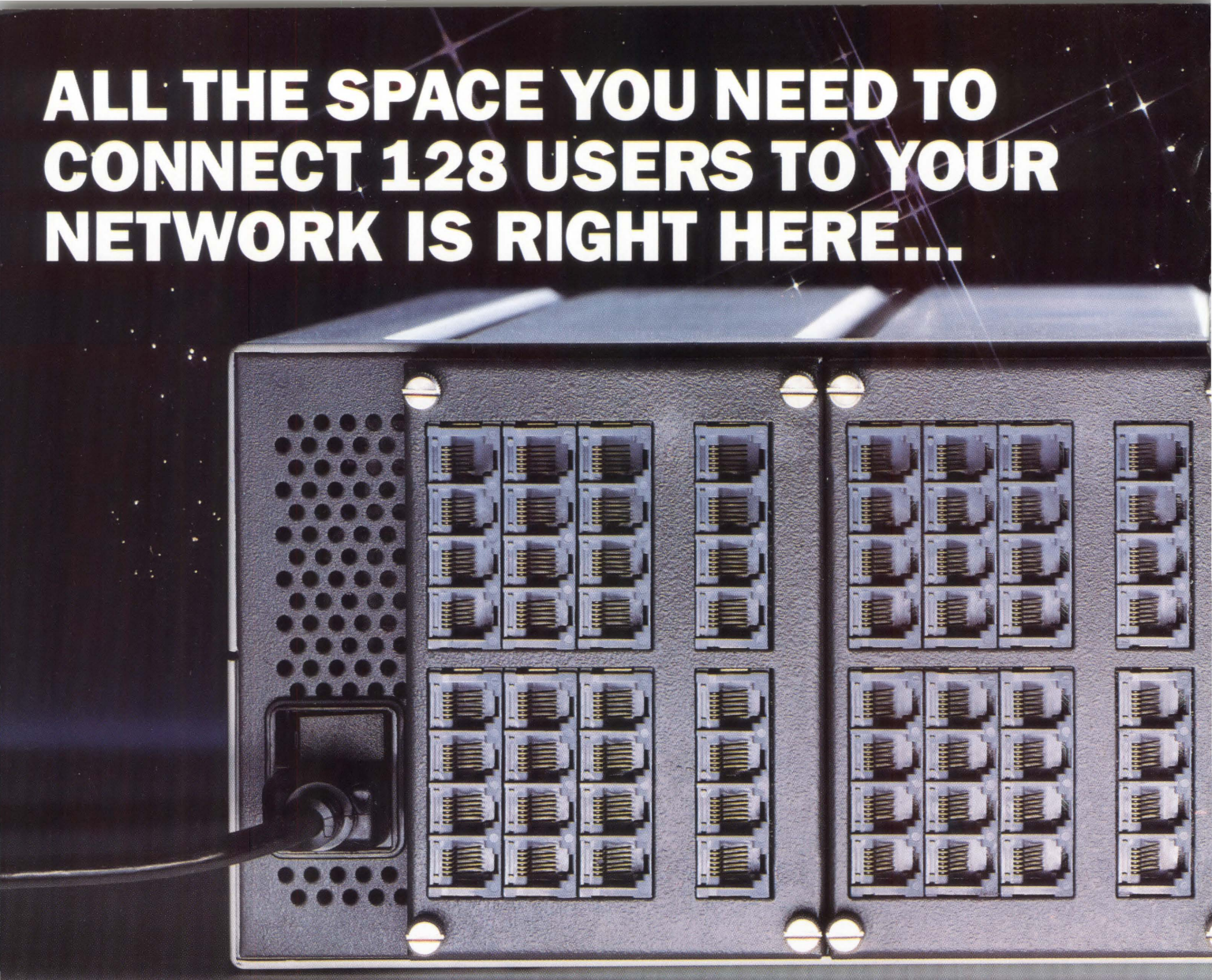

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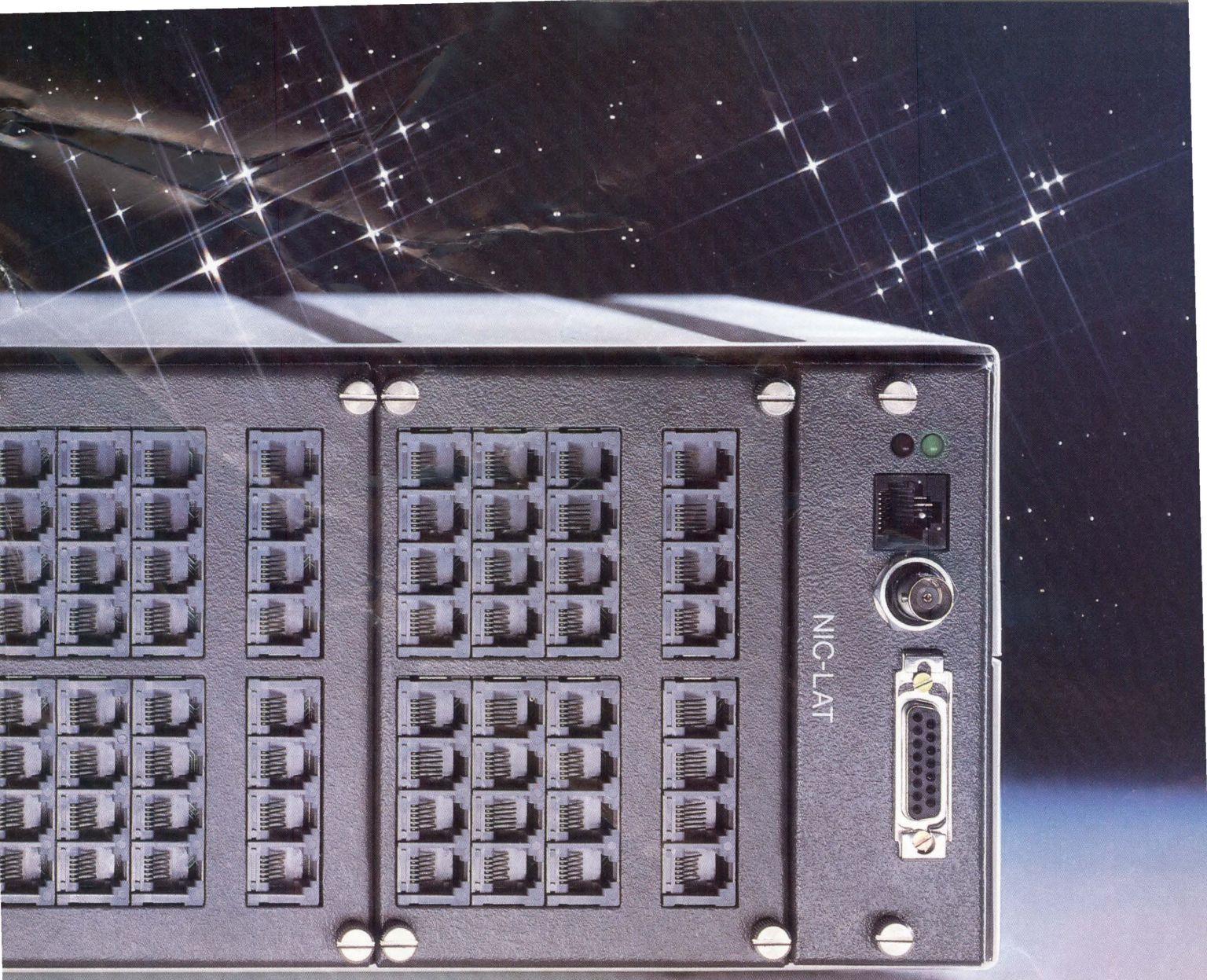

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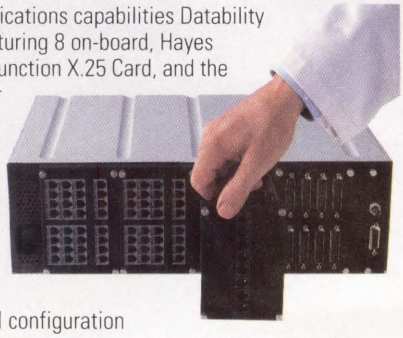

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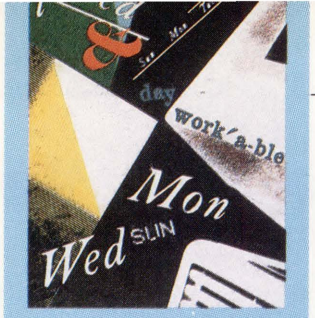

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by Donald G. Hirsh
LAT, Digital's elegant LAN-based terminal protocol, is the basis for its DECserver™ family and is becoming a de facto standard. Third parties have been churning out DECserver clones for the last year or so, but now that Digital is licensing the technology, prepare for a flood of LAT-talking products. Competition within this niche is about to get fast and furious.

70 **INTERNATIONAL: FROM THE EUROPEAN FRONT**
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If the recent *DEC User* show is any indication, the Digital industry in Europe is flourishing. This growing opportunity underscores the need for companies to establish a firm foothold in Europe in advance of the 1992 trade deregulation.

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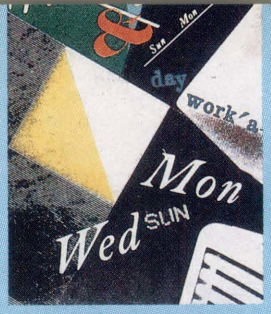

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DEC PROFESSIONAL DP LABS TESTING CENTER

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Eight-millimeter helical-scan tape drives are one of the best things to happen to system managers since AUTOGEN. Micro Technology has created an excellent backup system, the MA-24, by combining the raw storage capacity of 8mm drives with the availability and performance of an HSC.

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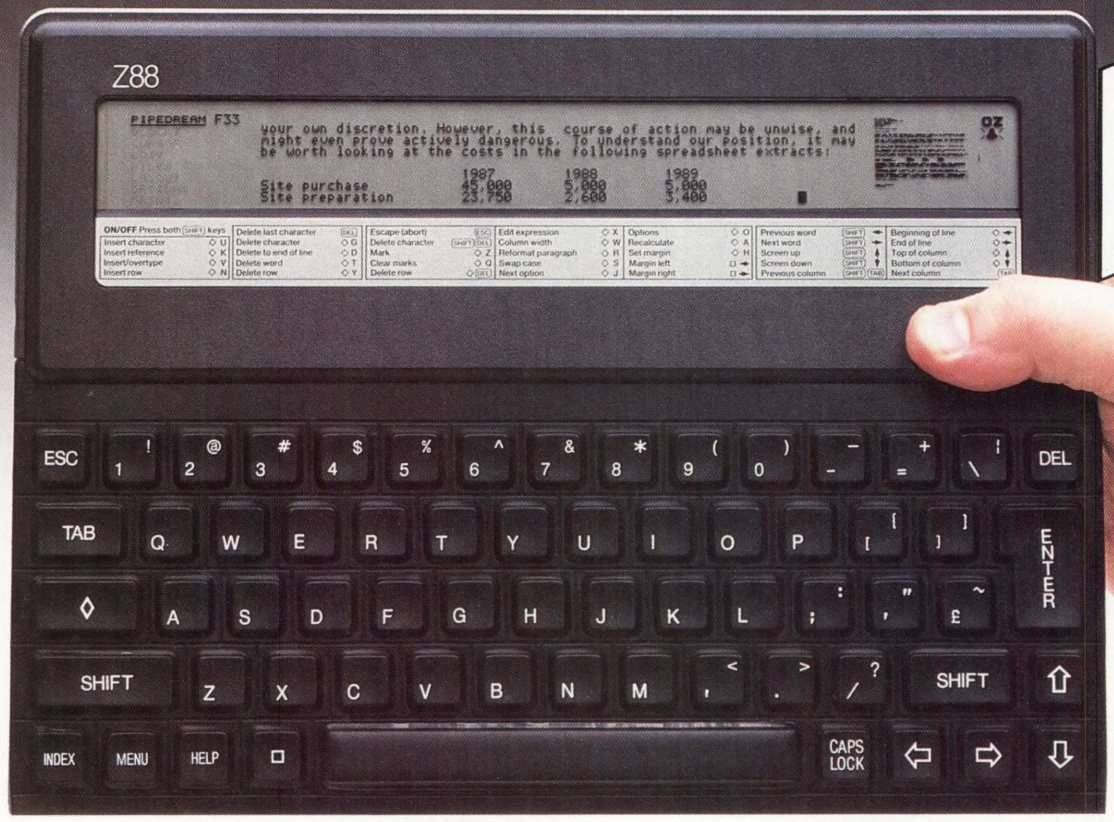

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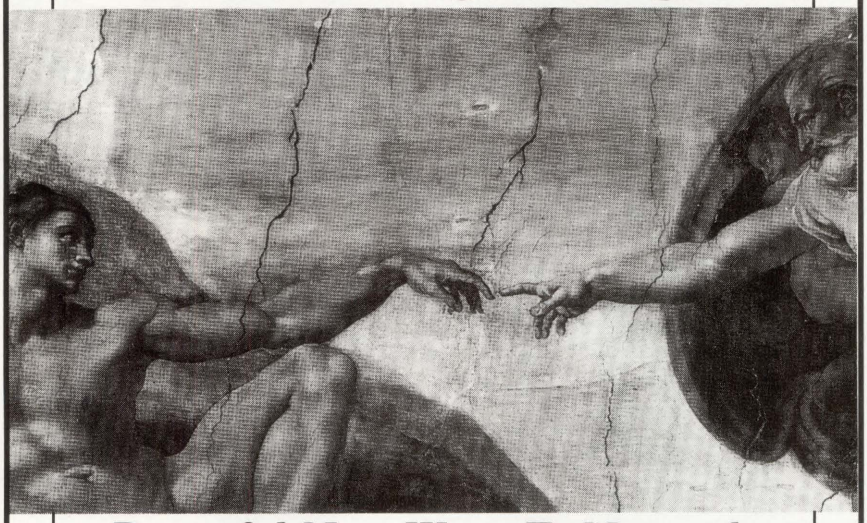

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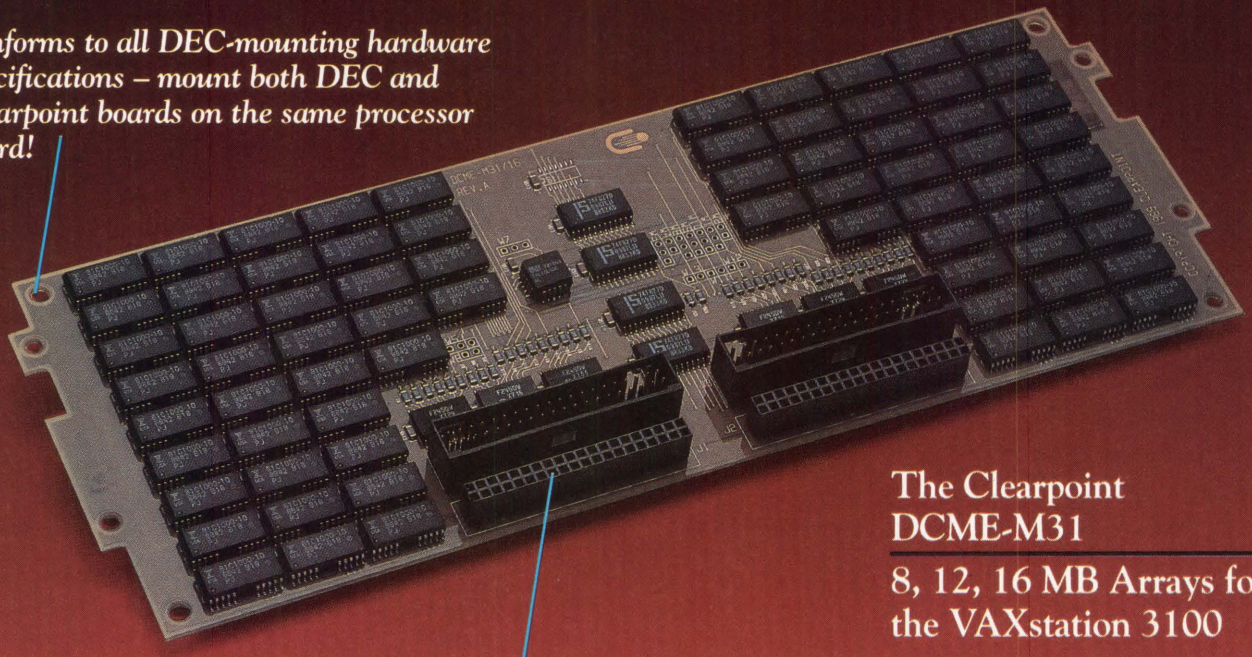

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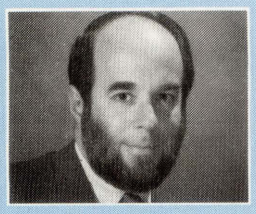

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Being Discovered ... Again

When PCs were introduced to the DEC world, they weren't the big hit they were in other computing cultures. I've always believed that this was because people in the DEC world were accustomed to sitting in front of terminals and having the terminals do what they wanted when they wanted. For example, they could stop them whenever they wanted by typing CTRL-C.

When I first saw a PC, I knew all I needed to know when I typed CTRL-C and ran a program simply by typing the program's name. To the world of noninteractive computing, PCs were and still are a wonder. Our secret had been discovered.

Of course, PCs were single-user devices and didn't have the power of the PDP-11. Each time they were improved, a new VAX outstripped them by miles. When DEC introduced the VAXmate, this ill-fated PC compatible sported an Ethernet connection and the software to be used in conjunction with a VAX. Using the Ethernet, the VAX could become a file server for the PC and as such could link PCs in a star network with the VAX in the center. Clever third-party software vendors even enabled the PC to be a server for VAX applications, all using that Ethernet connection. DEC's Ethernet PC connection was cloned and made available for PCs by third-party suppliers.

This was the world's introduction to networking, clients and servers — DEC-style. We also had clusters, DEC's real networking design. The idea of transparently adding processors or disk storage to a coherent network and letting users access any processor or disk file to which they had privileges was as foreign to batch processing-types as personal, I mean DEC-style, computing. When DEC introduced the Ethernetted PC, it introduced networking for everyone.

Although Apple believed in networking, it chose to make it's own AppleTalk at one-tenth the speed of Ethernet. Ethernet became possible on Macs with an add-on board or via an AppleTalk-to-Ethernet gateway, but only the former provided Ethernet speed.

For the last few years, it has been possible, even desirable, to have your DEC networks include PCs and Macs as well as multiple DEC processors and workstations. In the proper configuration, each has broad access to all the power available on the Ethernet.

Found Out Again

Today, PCs are sporting 80486 chips running at unbelievable speeds with multimegabyte memories. Macs are using 68030 chips with a lot more power than the original 128-KB version of the 68000. And there are more workstations and networks out there than you can count.

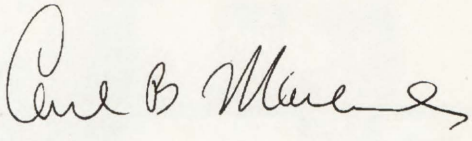
But these are all worthless running by themselves. Only by working with other workstations and using specialized servers connected by a robust network can these powerful parts be pulled together into a useful computing system. "The network is the computer!" someone shouts. We knew that years ago, just as we knew about personal, that is, interactive, computing.

A promotion by a prominent workstation vendor compares a network of its workstations and servers to a VAX 6000 or 9000. I thought it unusual to compare a network of workstations and servers to a single computer until I realized that they're really the same, just housed differently. A lobster has a skeleton on the outside, while a fish has one on the inside, yet both function well in the ocean. Isn't a VAX 6000 a computer with its skeleton on the inside and a network of 10 workstations and five servers a computer with its skeleton on the outside? If you examine the internals of a VAX 6000 processor, you find parts that handle compute functions and parts that handle I/O functions. Aren't these akin to workstations and servers?

It doesn't matter whether a computer's skeleton is on the inside or outside. What's important is that it can do useful work and support users. VAXs are a combination of these computer models — they can be just one VAX or a cluster of VAXs, they can have PCs attached or appear in any combination.

DEC's competition isn't the 80486 workstation, the newest Sun or the latest 55-mip machine. Rather, it's a combination of these, connected by a robust network that has personal workstations, multiuser workstations and servers. DEC's competition is offering what DEC offered us years ago. If you think this model of computing lacks something, wait a year or two for workstations to run at 100 mips and the network to be fiber with a bandwidth that exceeds that of most busses today.

Is the light of DEC dimming? No, it's just natural ebb and flow while the world catches up with good ideas. What we need from DEC are new ideas, new hardware (the VAX 9000 was a good start) and new customer-comes-first thinking. There aren't as many problems as there are opportunities in computing. It's time for DEC to get going.



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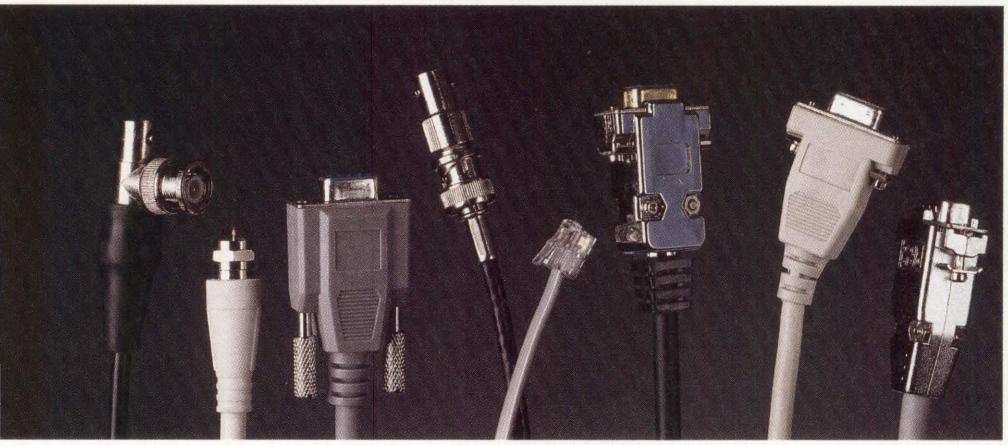

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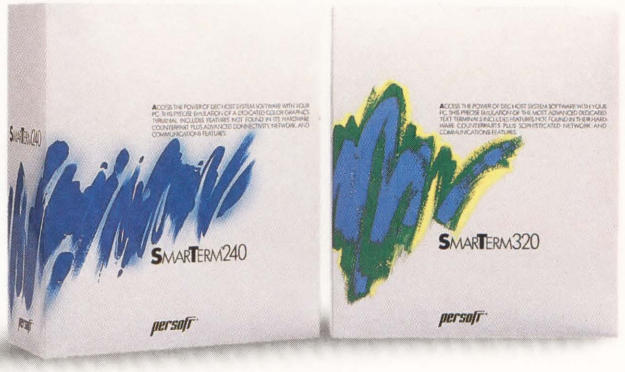

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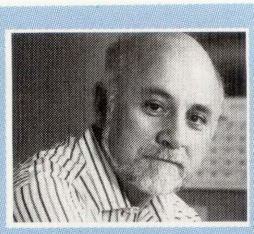

EDITORIAL

Dave Mallery

Singing The Big-VAX Blues

In last month's editorial, "Big Bargains On Big Machines," I pointed out the massive loss of liquidity in the installed base of VAX 8000s. Here's an update: A VAX 8550 I've been following fell an additional 25 percent in just four weeks! Machines selling for $110,000 in early December 1989 are selling for less than $80,000 four weeks later. Where they'll stop is anyone's guess. When prices fall rapidly, with no plateaus, it is a clear indication that there are no buyers. My prediction is that there will be a plateau at about $50,000 for a while, followed by an inexorable plunge to zero.

I'm amazed by the rate of decline. An equivalent VAX 6000 Model 410, cluster-ready with a paid-up license, costs about $280,000! The VAX 6000 Model 410 and the VAX 8550 both run VMS at the same speed and with the same peripherals. Perhaps no one is buying the big VAXs at all.

In the last few months, I've encountered vendor after vendor who is porting to ULTRIX. These are serious, big-time software houses, not garage shops. Apparently, a number of porting products, such as PICK To C and BASIC To C, really work. A DECsystem 58xx can deliver the horsepower where it counts. And wait till you get a load of the R6000 chip set!

The last two big applications I've looked at for internal use run on ULTRIX. We expect to use up a DECsystem 3100, which we got for the Lab just a few months ago, in the near future.

Are we looking at the Götterdämmerung of VMS? I doubt it. We're still writing hundreds of lines of code each day and are the lucky owners of hundreds of thousands of lines. VMS runs Professional Press, and it doesn't ever do the weird things ULTRIX and its cousins do. The last UNIX demo I saw crashed five times getting through a job. An ULTRIX SYSGEN sends me back to the '70s with deja vu!

I will snap up one of those VAX 8550s as soon as they hit the plateau. Even at $7,000 or $8,000 per mip, it'll be a good buy. We'll need a big-mip VMS server in our cluster if we intend to use Xterms in the near future.

Unless the cost of a VMS mip rapidly follows the market down to about two or three grand, we're watching the beginning of the last act of the VMS opera. The proverbial fat lady is singing her warm-up scales in the green room, and price will be the only thing that keeps her off the stage.

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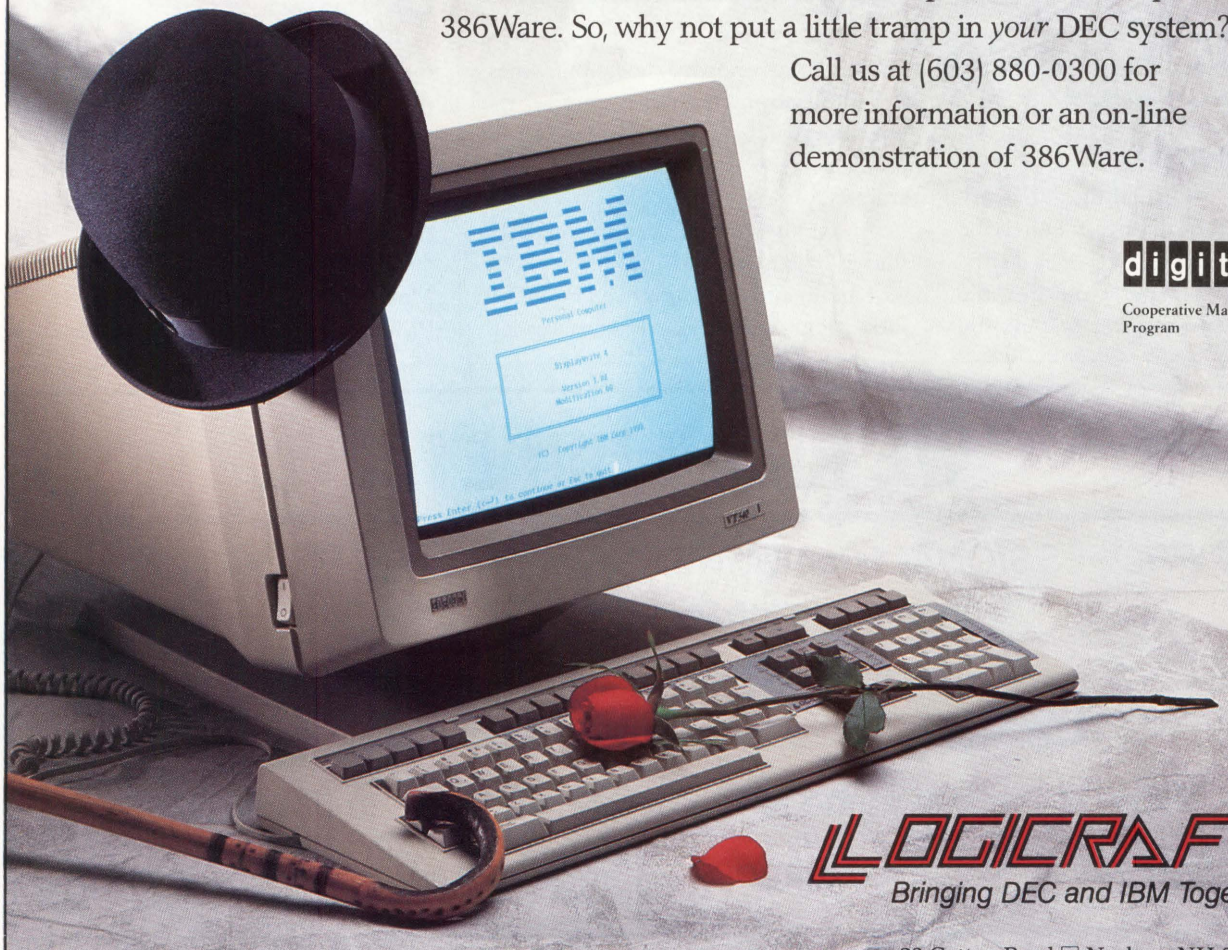

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CIRCLE 141 ON READER CARD

LETTERS

A CAPITAL DIFFERENCE

After reading "UNIX And VMS Editors Contrasted" by Philip E. Bourne, Ph.D., and Janie Weiss (December 1989), I must submit an aside.

For those who came to VMS quite a while ago, the vi editor on UNIX may seem more like old home week than frightening. It's essentially similar to the TECO editor on DEC operating systems. They even shares commands. What I found more difficult to get used to is that UNIX editors are case-sensitive, so that while j moves the cursor in vi, J does something very different. I had a note taped to the terminal that read: "Is the caps lock off ?"

Barbara Altman
Digital Equipment Corporation
Marlboro, Massachusetts

DISASTER SWITCH

Ron Levine's "Dispelling Disaster" (December 1989) discusses Hurricane Hugo and the recent Bay Area earthquake. Even in the Santa Cruz area, the disruption of data services was mostly limited to overloaded telephone lines. From a data processing perspective, the Hinsdale switching office fire was a larger problem, yet it wasn't mentioned in the article.

About three years ago, in Hinsdale, Illinois, a Chicago suburb, a telephone switching office was destroyed by fire. It took about three weeks to restore service. For several national mail order companies that used the service, business was completely halted. For these companies, communications was far more important than computers.

The Hinsdale fire taught many mainframe shops that disaster planning doesn't stop when the data leaves the office.

Jerome Vollborn
Santa Clara, California

Please address letters to the editor to *DEC PROFESSIONAL*, P.O. Box 218, Horsham, PA 19044-0218. Letters should include the writer's full name, address and daytime telephone number. Letters may be edited for purposes of clarity or space. You also can fax letters to us at (215) 957-1050.

PROFESSIONAL PRAISE

Thank you for publishing an in-depth and interesting magazine. I receive many magazines each month, some weekly, but *DEC PROFESSIONAL* is the only one I take home with me to read at length.

I enjoy the "Product Watches" and the online bulletin board, ARIS/BB, but the thing that sets your magazine apart from the rest of the bunch is that you take the time to explain technical issues at length and with very good illustrations. No fluff allowed here.

Keep up the good work.

Mark Robson
Pawtucket, Rhode Island ■

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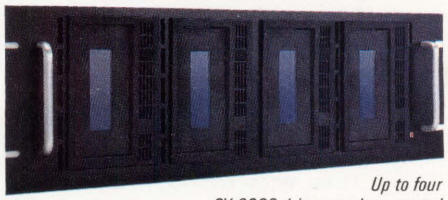

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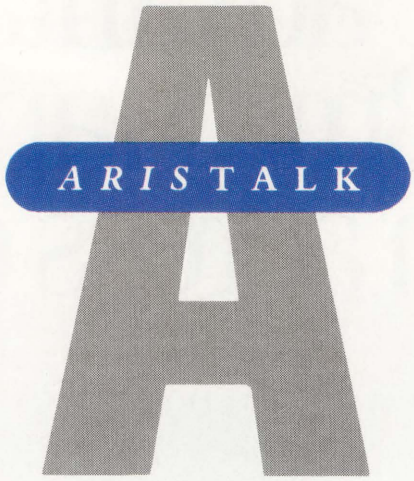

CLUSTERING A MICROVAX

QUERY:

Jim McGerigle *(SIG 11/MESS 448)*: We're purchasing a MicroVAX 3800 for R&D and would like to cluster it into our VMS V5.1 VAXcluster, an 8530, an HSC-70 and our related disk farm. Digital says this isn't possible, but *Systems and Options* says it is.

Can I connect directly to the cluster or just attach to DECnet?

REPLIES:

Richard B. Gilbert *(SIG 11/MESS 449)*: You should be able to cluster your 8530 and a 3800. What you want is called a mixed interconnect cluster. The 3800 can't connect to the CI that connects the 8530 and the HSC. Instead, it will connect via Ethernet to the 8530.

Matt Quigley *(SIG 11/MESS 450)*: Have you looked at clustering, over the Ethernet? DEC calls it a Local Area VAXcluster (LAVc). As of VMS V5.1 (or V5.0?), DEC supports mixed clusters, i.e., CI cluster and an LAVc. Check your System Management set. The *Network Manual* gives you more information. Also, DECdirect lists a free brochure that details all of DEC's network solutions.

VMS V5.0 AND CLOGGED PORTS

QUERY:

Tim Kennedy *(SIG 21/MESS 119)*: Has anybody experienced problems with clogged ports under V5.1 and later? I'm specifically speaking about MicroVAX IIs and 3100s with DH Q11s and the 3100 equivalent controller. Each has the harmonica-style eight-line external interface.

We have three sites (of about 30) running V5.1 or V5.2. One is a MicroVAX II and the others are 3100s. Other MicroVAX II sites running V4.5 to V4.7 don't experience this problem.

Ports clog and you can't do anything but reboot the system to unclog them. If you enter Setup and set No XON, set Display Controls and Clear Comm, you'll see that the system is spitting out D3s (XOFFs) each time you press Return or type a character.

Digital personnel can't find a reference to this problem, but it's rumored that leaving terminals turned on can alleviate, if not correct, the problem.

REPLIES:

Phil Gravel *(SIG 21/MESS 120)*: There's a known problem with the Modified Page Writer under V5.0 and V5.1 that causes the pagefile rapidly to become fragmented internally. Eventually, the file becomes so fragmented that the system hangs and must be rebooted. On large VAX systems, the console receives a warning message. On many MicroVAXs, the console is used as a terminal so that no message is ever seen. The good news is the problem has been fixed under V5.2.

Tim Kennedy *(SIG 21/MESS 123)*: Unfortunately, the problem you describe isn't our problem. The clogging occurs to a single terminal line at a time and causes no other ill effects. All other terminals are fine, and the system runs normally: no system errors, no terminal line errors, no OPCOM log messages.

It hits random terminal lines and usually happens only once or twice a week. Apparently, VMS thinks that a particular line needs to be XOFF'd and won't stop. A reboot clears all XOFF'd lines.

Ralph Brandt *(SIG 21/MESS 124)*: This may not be relative to the problem, but you mentioned leaving terminals turned on all the time.

We've experienced a similar problem with servers 200 and 550. DEC was unable to help, but our third-party service vendor found an EC that fixed the problem.

As I recall, any DL 200 and DL 550 boards made before July 1989 had a bad chip. This chip is used in the 200, 300 and 550. Maybe it's used in other boards for the VAX.

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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. Set your terminal emulation to VT100 and dial:

- (215) 957-1000 - Pennsylvania
- (818) 577-9100 - Southern California
- (415) 873-2135 - Northern California
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Baud rates: 300, 1,200 or 2,400.

When the modems CONNECT, hit Return two or three times.

The ARIS/BB symbol appears at the beginning of each article when the program is downloadable. *VAX PROFESSIONAL* programs are available to subscribers of *VAX PROFESSIONAL* only. For subscription information, contact Karol Hughes at (215) 957-1500, 9 a.m. - 5 p.m. EST. Use these recommendations at your own risk. Professional Press is not liable for any damages to your system that might be caused by the hardware, software, programs or procedures discussed here.

XMODEM and KERMIT are available.

SIG Identification

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

11 ..... Clustering/Networking
12 ..... Site Management
21 ..... Controllers/Memory
42 ..... Communications/File Transfer

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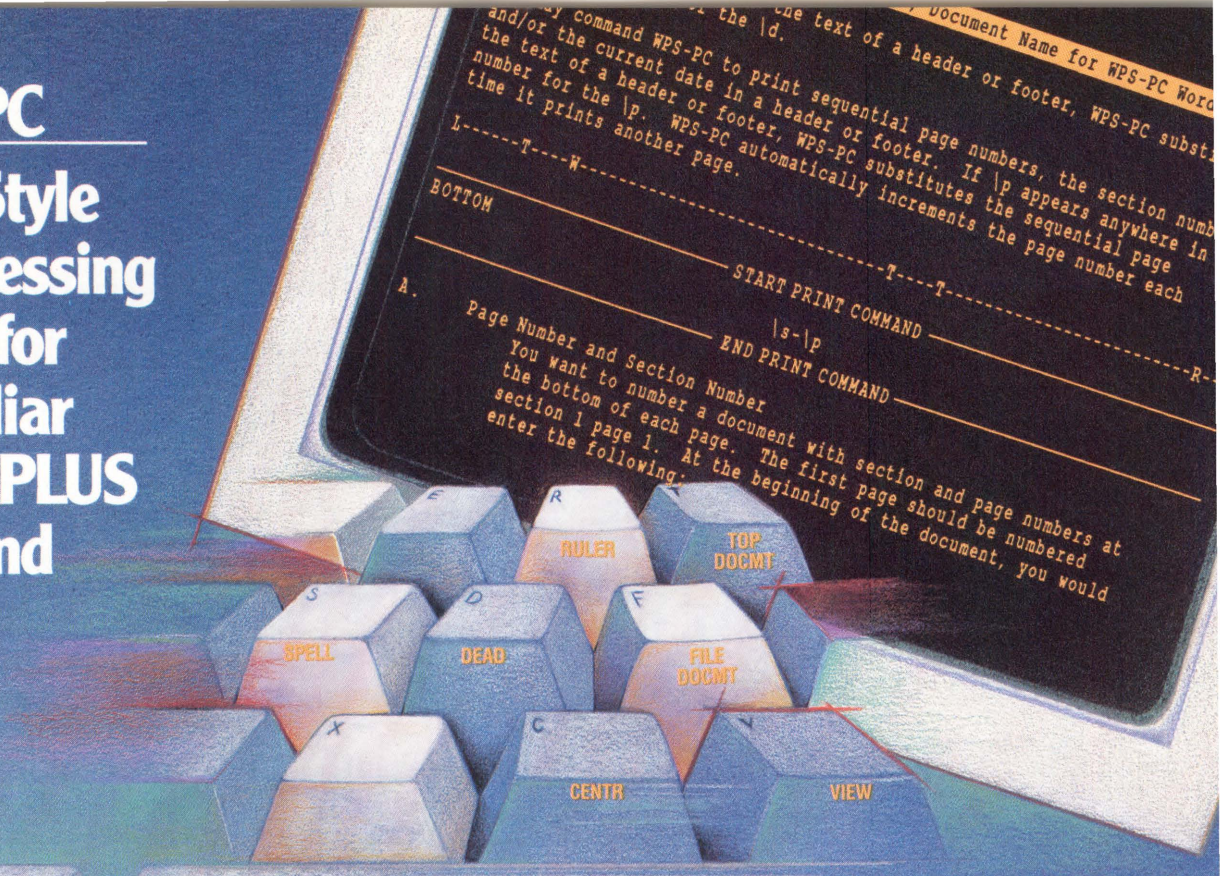

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For your desktop PC or laptop WPS-PC redefines PC keyboards to place the Gold Key and the Gold functions in the familiar Gold Key keyboard locations. Keyfront labels help identify Gold Key features. There are specific layouts for the PC/XT keyboard, the 101-key AT keyboard, the VAXmate/LK-250 keyboard, the Tandy 1000 and laptops from Zenith, Toshiba, Compaq and others. WPS-PC runs on hard drive systems or on small systems with as little as two floppy drives and 384KB of memory.

Exchange documents with other word processors WPS-PC directly reads and writes DECmate diskettes on the AT or 386 with a 1.2MB 5¼" internal drive. Using the AX and DX communication modes or the Document Transfer screen, fully formatted documents can be exchanged with WPS-PLUS/VMS and ALL-IN-1. To exchange documents with other popular word processors (such as WordPerfect, Wordstar and Microsoft Word) WPS-PC reads and writes a document to a "DX file" which can then be converted by utilities such as Software Bridge (from Systems Compatibility Corp.)

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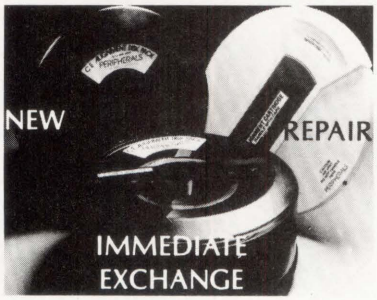

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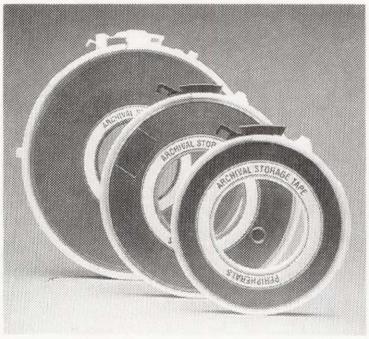

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CIRCLE 151 ON READER CARD

[Report From Dr. R.]

Defrag Decisions

Editor's note: Dr. R. contributes timely information about upcoming Digital products and strategies. Look for his insights on ARIS/BB and in ARISTALK.

■ Regrettably, DEC's plans for disk defragmentation remain nebulous. In one scenario (circa August 1989), DEC allegedly planned to incorporate a defrag utility in VMS V5.4. As V5.4 is due out in spring/summer 1990, it seemed DEC would have to go outside to purchase or cooperatively market an existing third-party defrag product. More recently, DEC has indicated that it will provide hooks into VMS and the file system, enabling third-party vendors to write to a VMS "API." To make matters more interesting (and confusing), at least one reliable DEC source has indicated that VMS will, at a time to be decided, incorporate a native defrag capability.

AUTODIAL MODEM SOFTWARE

QUERY:

Jack Berger *(SIG 42/MESS 657)*: Does any one have experience setting up autodial modems so that they work with SYS$SHARE:DTE_XYZ? I've loaded DTE_AUTO but have problems getting it all to work. When I SET HOST/DTE TTXX/DIAL=(NUMBER:12345, MODEM= AUTO), the modem gets the first message to set response to integer, but the system later responds with a message that it failed to connect to the port and exited with a dataset hangup error. The modem is a Multitech 224EH. Does anyone know what modem switch settings to use? My terminal port is set to modem.

REPLY:

Phil Anthony *(SIG 42/MESS 660)*: Make sure the modem is set to indicate the true condition of carrier detect (CD) and to respond to data terminal ready (DTR) from your VAX. Hayes decided to hold CD always true and ignore DTR as the default for its 2,400-baud modems, and everybody else in the business followed Hayes' lead.

This effectively messes up any halfway intelligent communications program, as well as modem control on minis. Also, check your cabling. You should have at least pins 2 (TD), 3 (RD), 6 (DSR), 7 (SG), 8 (CD) and 20 (DTR) wired straight through, and probably pins 4 (RTS) and 5 (CTS), as well. The dataset hangup error suggests that one or both of these may be part of the problem.

SYSUAF.DAT LAYOUT

QUERY:

Shaw *(SIG 12/MESS 314)*: I need to write code to read the SYSUAF.DAT file to do routine checking, i.e., a list of users and their privileges, quotas, and so on. Where can I find the field names and their offsets in this file?

REPLIES:

Randall C. Newcomb *(SIG 12/MESS 318)*: Use SYS$GETUAI for reading UAF information. Its write counterpart is SYS$SETUAI, and you don't have to rewrite it each time a new VMS release comes out that rearranges the UAF file.

If you're a glutton for punishment, the file layout is in a module in a .MLB library in SYS$LIBRARY. However, you're better off using system services rather than doing your own OPENs and READs to the UAF.

In VMS V4.0, SYS$GETUAI always returned an RMS$ record not locked status if you had both SYSPRV and GRPPRV on. Digital may have fixed this.

NIK *(SIG 12/MESS 320)*: I think you're looking for:

```
$lib/ext=$uafdef/out=tt:/
 macsys$share:lib
```

Lee K. Gleason *(SIG 12/MESS 323)*: I agree that in most cases SYS$GETUAI is a better choice than reading the UAF. The exception is when you need to wildcard through the UAF. SYS$GETUAI seems to want a specific user as input. ■

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Gold-Mail includes pull down menus with accelerator keys for frequently used functions. There's a powerful text editor for easy creating and editing of messages. Plus, Gold-Mail has registered mail, so now you don't have to wonder if your message has been read. Best of all, Gold-Mail lets you interact freely with VMS Mail users; it allows you to access messages from networks and systems which interface with VMS Mail without conversion headaches.

Features	VMS Mail	Gold-Mail
100% VMS Mail compatible	•	•
Pull down menus		•
Registered mail		•
Re-edit message		•
Re-edit header		•
Gold accelerator keys		•
Message undelete		•
Visual drawer/folder system		•
Automatic line wrapping		•
Bold, underline, line draw		•
Multiple columns and rulers		•
Spell correction		•
Batch mode send		•

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800-843-1317

Gold-Mail

Data Processing Design, Inc.
1400 N. Brasher St., Anaheim, CA 92807
Phone: 714-970-1515 • Fax: 714-779-7468

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CIRCLE 114 ON READER CARD

Power Graphics Processing

Tektronix Inc.'s XD88/10 Graphics Superworkstation Operates At 17 Mips

If you buy compute performance by the mips, Tektronix Inc.'s new graphics superworkstation, the XD88/10, may be for you. In April 1989, the company announced the XD88 family, a line of workstations based on the Motorola 68020 graphics engine and 88000 RISC chip for compute performance. The XD88/10 operates at 17 mips and runs such standards as UNIX System V with Berkeley Extensions; Tek's Color-Cache implementation of MIT's X Window System, Version 11.3; Ethernet with TCP/IP; binary compatibility standard (BCS); and PC emulation.

The 1,280 x 1,024 bit-mapped workstation is designed for use in earth resources and geographic information systems (GIS), mechanical computer-aided engineering (MCAE), manufacturing automation/ process control and data analysis.

FOR MORE INFORMATION

Tektronix Inc.
P.O. Box 500
Beaverton, OR 97077
(503) 627-7111
Circle 482 on reader card

The computer runs software ported to X11 on Tek's other XD88s or on Tek's 4319 68000-based workstation with little or no modification. If you've written software to Tek's OnRamp graphics library, it will run on this entry-level RISC computer. Released after more powerful family members XD88/20 and 30, the XD88/10 fits into environments already employing the higher-level Tek workstations.

Configurations are flexible. You can expand RAM to 32 MB and disk storage to 3 GB. A VME slot is available for specialized capabilities. You can expand the 256-color system to 24 bitplanes with an 8-bit overlay.

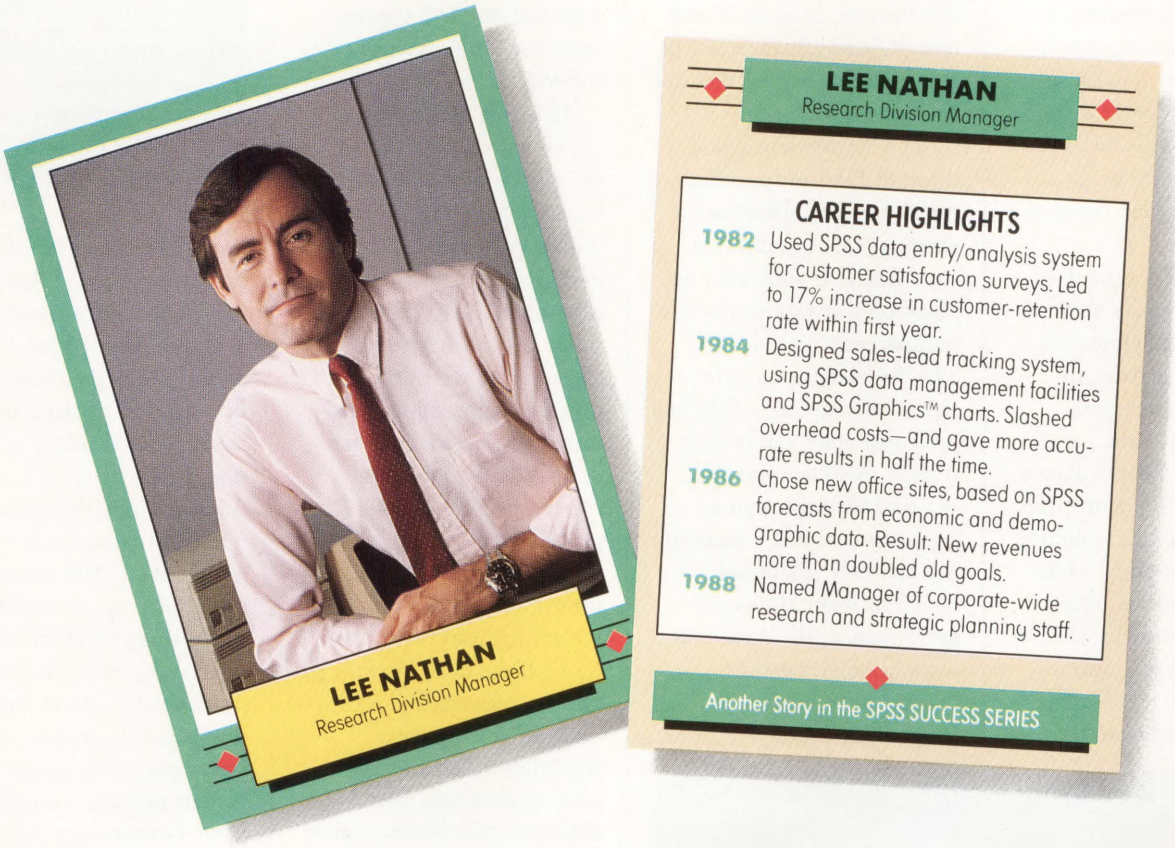
The XD88/10 employs technology designed to boost the performance of color systems. Called Color-Cache, this Tek gate-array CMOS-integrated circuit optimizes color bitmapped performance by providing an interface between the workstation's 32-bit system bus and the 256-bit pixel data bus that goes to the frame buffer. Color-Cache stores the colors you're currently using, letting the processor draw with those colors by sending only one bit of data per color rather than the eight bits that traditional technology demands.

Tektronix Inc.'s XD88/10 graphics superworkstation is based on the Motorola 68020 graphics engine and 88000 RISC chip.

Four Color-Cache systems work in parallel, providing data paths for 32 of 256 colors. According to Tektronix, this is as fast as most monochrome systems. This color technology is designed to speed line and shape drawing, pattern filling, painting background screens and working with text.

The XD88/10 costs $15,450, including color monitor, 156-MB hard disk and 8 MB of RAM.

Put us on DEC and we'll make you Manager of the Year.



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That's where SPSS-X™ comes in. Its data analysis talents can take your VAX to new levels of productivity. And take your company along with it.

The complete SPSS-X base package and options let you go from data entry to high impact graphics, with statistical procedures designed for the end user. It's highly interactive, with commands in plain English. So your people get hard-hitting answers for sound business decisions. Which makes you a better manager.

SPSS-X interfaces with other popular VMS™ software tools, from All-In-1™ and 20/20™ to DATATRIEVE,™ Rdb,™ ORACLE™ and Ingres.™ It lets you access files anywhere on your DECNET. And it works smoothly with your PC environment as well.

You get the speed, accuracy and versatility that's won repeated awards from industry publications. Plus the training, documentation and support that's made SPSS a leader in statistical software for over 20 years.

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CIRCLE 160 ON READER CARD

Speeding Your Oracle RDBMS

Charles River Data Systems' Relational Accelerator Provides Back-End Processing And Maintains High RDBMS Production Standards

Network managers using VAX-based Oracle applications can triple their OLTP and decision support system performance with the Relational Accelerator from Charles River Data Systems Inc.

Specifically designed for the Oracle RDBMS V6.0, the Relational Accelerator is a database engine that can execute TPI benchmark transactions at 25 tps. According to Charles River President Rick Shapiro, the accelerator provides practical back-end processing while maintaining high RDBMS production standards. DEC-based Oracle applications with one to 20 users will particularly benefit from the Accelerator, Shapiro added, using Charles River's 16-MB real memory entry-level user configuration.

The Accelerator links through Ethernet and high-speed network software to existing VAX systems that run Oracle. It allows the application software to operate transparently on the VAX. The Accelerator contains 16 MB of RAM, a 33-Mhz 386 processor and 1 GB of disk storage. Another gigabyte can be added through an expansion cabinet containing five 200-MB disk drives.

To facilitate back-end performance, the Accelerator relies on real-time system software aimed at eliminating excess overhead, a parallel disk I/O system, and improved network software.

Using an adaptation of a client/server architecture, the Accelerator allows the back end or server to link with a VAX. Because back-end Oracle processing is disk- and CPU-intensive, a tuned operating system allows transferal of the process to specialized hardware. The host is then free of back-end concerns to concentrate on front-end processing tasks.

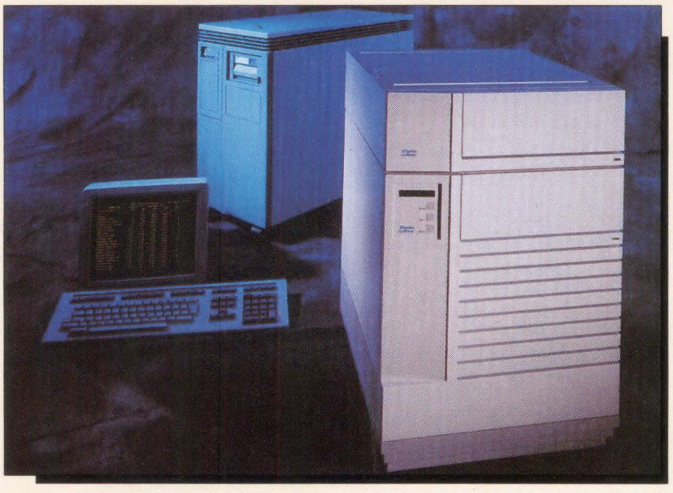
Unique to the Accelerator's operating system is the Relational Executive. Because of the large amount of Oracle software, the Executive allows for greater flexibility in scheduling while providing a 300-microsecond context switch time. The Executive is UNIX-compatible, allowing easy porting of RDBMSs to the Accelerator. Unlike UNIX, however, it includes real-time features designed to run Oracle software to maximum advantage.

The Accelerator incorporates multiple disk drives and controllers, multithreaded software drivers, and better management of disk buffers to obtain speedier disk access. This form of I/O parallelism lets the Accelerator's disk drive achieve access times of 28 ms. Using an interleaving technique that spreads the database along isolated spindles, four disk drives are shared. Assuming a long disk access queue, drive access is randomized. This technique, called striping, can result in access times of less than 7 ms.

The Accelerator also addresses the network connection's need to handle SQL commands with speed. It gathers multiple commands from various users, identifies the commands by header and combines them into a single, transmission-oriented network packet.

When the system is installed in a network, it runs as a separate process and has no effect on network traffic. Standard protocols are still usable in other operations.

The Relational Accelerator is priced at $35,900 for the 1-GB model. The 1-GB expansion cabinet costs $14,900.

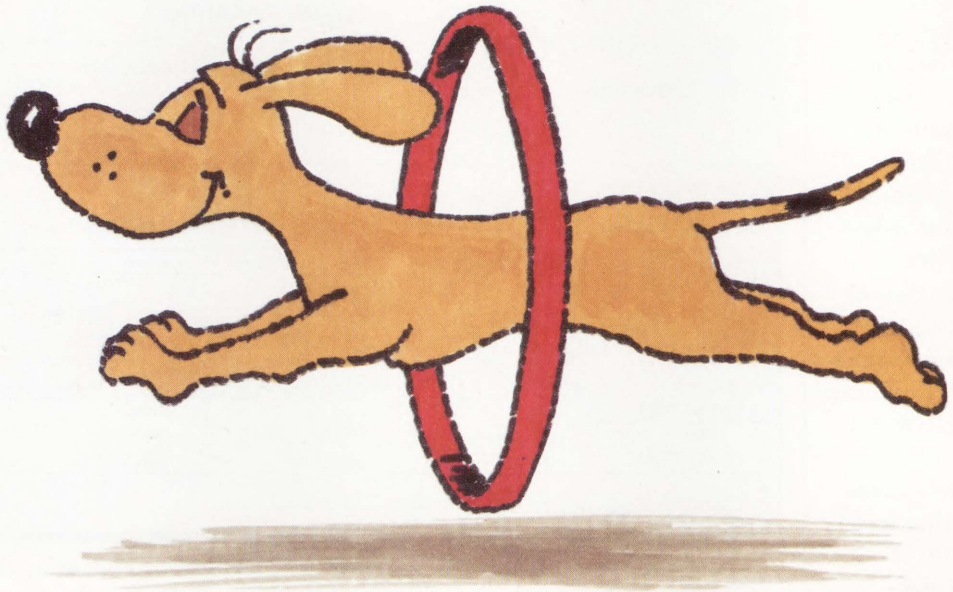


Charles River Data Systems' Relational Accelerator can execute TPI benchmark transactions at 25 tps.

FOR MORE INFORMATION

Charles River Data Systems Inc.
983 Concord St.
Framingham, MA 01701
(508) 626-1000
Circle 523 on reader card

If your data storage vendor can't do this for you, call us.

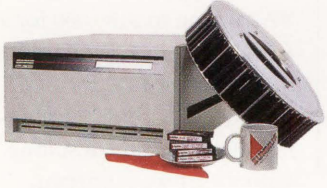


At Summus Computer Systems, we do it every day. For clients like Lockheed, NASA, Chevron, GE, and others. Clients who demand exceptional service with their high-capacity data storage products. Why do they choose Summus? Because we offer more.

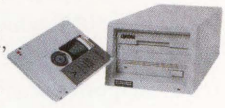
MORE STORAGE SOLUTIONS

UNATTENDED BACKUP – The ***GigaTape***™ our 8mm helical-scan tape drive, gives you 2,000 megabytes of capacity. A single compact 8mm data cartridge can replace fifteen 150-megabyte tapes for less than two cents per megabyte.

REAL UNATTENDED BACKUP AND ARCHIVING – No matter how large your system or network, our ***JukeBox-Library***™ provides the most cost-effective solution available today. Using the same 8mm helical-scan technology as our ***GigaTape*** and our own advanced autoloading carousel, you can have on-line access to 125 to 1,000 gigabytes of data in a compact 19" rack-mount.



ERASABLE OPTICAL – The ***LightDisk***™ magneto-optical drive delivers 600 megabytes in a rugged, removable cartridge. It also features ISO standard data formatting for easy media interchangeability between similar magneto-optical drives.



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CIRCLE 161 ON READER CARD

Record-Intensive RDBMS

CompuServe Data Technologies Serves Up A New Version Of Its System 1032 4GL/RDBMS

CompuServe Data Technologies (CDT), part of the software products division of CompuServe Inc., is now shipping the System 1032 4GL/RDBMS V8.0. It has been optimized for fast retrieval and analysis in query-based applications that require the manipulation of large database records. CDT categorizes these applications under an umbrella it calls the high-performance RDBMS marketplace.

Rather than build classic transaction processing applications, the majority of CDT's users build high-performance applications for data analysis, high-volume reporting, forecasting, administration, and research and development. The company has uncovered a large user base for these applications in industries that historically are big VAX users, including aerospace, defense, government, academia and science.

System 1032 V8.0 was created with the needs of designers who build complex applications in mind, according to the company. The goal of the design team was to provide the capability to execute large applications rapidly. The vastly revised database engine, which consists of more than 16 data types, has the capacity to sustain more than two billion records. Enhancements include:

1. VMS Identifier support that includes a new level of security control and improves integration with the parent operating system.
2. Shareable procedures that store commonly run applications in memory.
3. A VMS-like 4GL program debugger that searches for application problems twice as fast as the previous version.
4. A COLLECT command that collectively appends several data sets.
5. A JOIN procedure that can group multiple attributes from data sets.

G.D. Searle Research and Development of Skokie, Illinois, reports that it has been using System 1032 V8.0 for clinical trial applications. The multiattribute JOIN is used by Searle software engineers to change conditions dynamically for rapid analysis of diverse situations.

System 1032, which is written for VAX/VMS systems, supports parallel expansion, networked distributed processing, and VAXclusters. The 4GL element features a programming scheme based on selection sets. It's menu-driven and features an intuitive command structure.

The database structure is an inverted B-tree that supports groups, arrays and indexes. The language interfaces with all VAX languages, including BASIC, C, FORTRAN, COBOL and Ada.

System 1032 features several optional layered software tools, including a PC interface; a user facility, which is a user interface that lets nonprogrammers make queries and reports; and an Application Facility (1032/AF), which is an interactive, menu-driven development environment.

In the near future, the company intends to provide 1032 with support for the SQL data standard, client/server database architectures, object-oriented DBMSs and DEC's RMS, Rdb and DECwindows.

Licenses for System 1032 V8.0 range from $3,000 for a VAXstation to $180,000 for a VAX 8840. CDT, which also offers System 1022 for DECsystems, provides training, support and consulting with its software systems.

FOR MORE INFORMATION

CompuServe Data Technologies
1000 Massachusetts Ave.
Cambridge, MA 02138
(617) 661-9440
Circle 493 on reader card

DATASET DEFINITION

Dataset NEW CUSTOMER ORDERS Location device:[directory.AFDEMO]

Input File Name S1032 AF DEMO:CUSTOMERS.DMI

Seq	Attribute Name	DataType	Key	Len	Dec	Left	Right
1.0			F			1	

1 2 3 4 5 6 7 7
1234567890123456789012345678901234567890123456789012345678901234567890123456789

LAST_NAME	FIRST_NAME	STREET_ADDRESS	CITY	STZIP
Jones	Mark	5 Center Street	Dedham	NC28801
Levinson	Roger	68 William Place	Brighton	NJ08008
Merz	Louis	12 Beacon Street	Roxbury	CT06481
Gott	Charles	57 William Street	Brighton	NY14610
Savio	Alfred	10 Putnam Avenue	Roxbury	FL33314

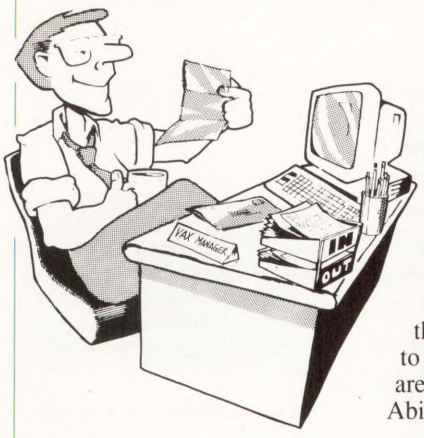
EDIT DATASET Add Change Delete Details
Next Previous Select Renumber Shift Left
Shift Right Create DS Test Load Full Load Exit

Enter attribute data; <ENTER> when done; <CTRL/Z> for DS Editor Menu

System 1032 datasets are built using the Application Facility.

AbilityVMS™

"...a concept that is long overdue for busy VAX managers."



Since the release of AbilityVMS, the leading edge in system software for "Disk, File, and Process Management", we've received many letters of acclaim. We thought you would like to read some of what users are saying about AbilityVMS.

Scott Sexton of Hughes Aircraft says:

"We recovered enough valuable disk resources in the first week to cost justify AbilityVMS. We were impressed. Naturally, we bought."

"If I had the extra staff and budget to build and support the ultimate VAX management software, I'd build a product just like AbilityVMS. But why would I when all the benefits are available today for less than two weeks of my development costs?"

Scott has a good point. Why spend tens of thousands of dollars building software in-house that won't be usable for several man-years when you can have a complete solution with full support, higher performance, lower resource consumption, continual enhancement, and availability today, at a fraction of the cost?

Another user, John Campbell of Biles & Associates says:

"I used to be 'interrupt-driven' like my disk drives, supporting my users and responding to resource support issues, but that's all changed with Ability! In most cases I know there is a problem and can correct it before anyone on the system is even aware of the situation. Ability's unique reporting and action approach to managing a VAX/VMS environment sure makes VAX management significantly safer and easier."

"Managing our disk farm with Ability gives us control so we can break important user and resource challenges into manageable parts. No longer will we work with multiple vendors or companies offering 'compatible' system software products."

With AbilityVMS, John has the power to address important VAX management issues quickly and easily, before they become problems. This keeps Johns systems operating at peak performance.

Dan Esbensen, President of Touch Technologies and developer of Dynamic Load Balancer, Dynamic Tape Accelerator, Intouch and now I/O Plus, is an AbilityVMS user that knows a great deal about system software products, utilities, tools and procedures for VAX/VMS. Dan says:

"It [Ability] is a concept that is long overdue for busy VAX managers. The ability, through different interfaces, to meet the needs of both new and experienced VAX managers is unique. I think this product is exactly what the market is looking for. We use it and I think it's great!"

We worked hard to make AbilityVMS an invaluable helpmate to experienced VAX managers like Dan, as well as system managers new to VAX/VMS.

With AbilityVMS, "Disk, File, and Process Management" is easier than ever for hundreds of busy VAX managers worldwide. We know you too are busy and looking for the most cost effective and efficient ways to manage your VAX systems. AbilityVMS is the solution you've been looking for. So don't wait any longer, learn more about AbilityVMS and take action to free yourself from time consuming disk, file, and process management activities today by putting AbilityVMS to work for you.

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Find out why Digital Equipment, Hughes, JPL, Martin Marietta, Northrop, the U.S. government and hundreds of others have purchased AbilityVMS.

CIRCLE 106 ON READER CARD

Terminal Server Solution

Lantronix's ETS-8 Terminal Server Solves Ethernet Networking Problems

Lantronix has a compact way to solve networking problems. Its ETS-8 terminal server supports both LAT and TCP/IP, providing a low-cost Ethernet networking solution.

The ETS-8, which provides DECserver 200/DL and TELNET TCP/IP emulation, is an eight-channel, IEEE 802.3/Ethernet terminal server. It offers network connectivity for systems supporting TCP/IP and LAT over standard Ethernet terminal protocols. Prerequisites for operation are a LAT host (e.g., VMS, RSX or ULTRIX) and a UNIX host for TCP/IP (e.g., SUN/OS, HP-UX or AIX).

"The ETS-8 allows us to approach both the DEC and the UNIX marketplace by supporting both protocols," says Brad Freeburg, president of Lantronix. He notes that the ETS-8 is a commodity-directed product for departmental or distributed environments.

Measuring 8 x 2.6 x 5.2 inches, the ETS-8 comes standard with an AUI, DB15 transceiver interface. It has eight RS-423 (MMJ or RJ12) ports, an LED activity panel, an onboard microprocessor and memory and power supply.

Logical connections to the ETS-8 include any mix of LAT and TCP/IP sessions with a maximum of 64 sessions (eight per port) on any eight serial terminals. "A common workgroup of up to eight users will find the ETS-8 designed with them in mind," says Freeburg. He explains that advantages realized through using the ETS-8 are ease of use and the ability to relocate workgroups and servers readily anywhere on the Ethernet network.

The ETS-8 supports ASCII terminals with RS232-C- or RS423-compatible interfaces. Supported text and graphics terminals include the VT100/200/300-series and compatible ASCII terminals. The product also supports PCs and Macs, with terminal emulation connected over serial lines and printers. It has eight configurable lines, with formats of seven or eight data bit characters, one or two stop bits, and parity of odd, even, mark, space or none.

Data rates range from 75 to 38.4K baud with split speed and autobaud capability. Modem control includes two lines: DTR/DSR and support for Hayes-compatible and DF03-compatible modems.

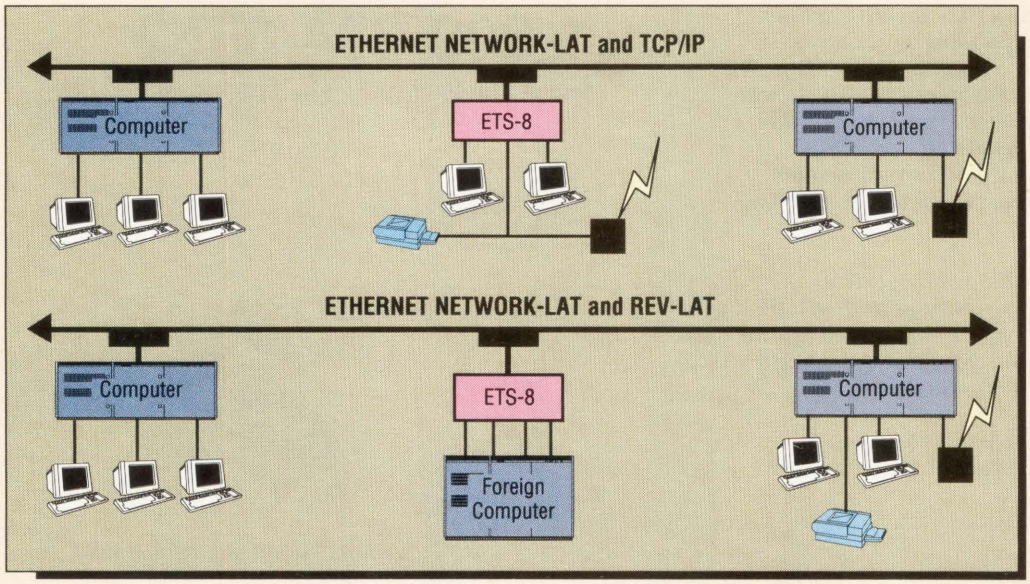
Additional features include advanced gate array technology that allows the unit to forego a fan for cooling, ensuring quiet operation; selectable flow control; and DSR-enabled auto log off when the terminal is turned off.

In addition to the ETS-8, Lantronix announced the optional MAU-2. The MAU-2 is a 10base2 ThinWire transceiver that connects ThickWire cabling and RG58 ThinWire Coax cabling. It plugs directly into the AUI 15-pin D-connector on back of the ETS-8. A T-connector and one terminator come with the unit.

The basic ETS-8 unit costs $1,695. The MAU-2 optional attachment costs $175. Both products come with a two-year warranty.

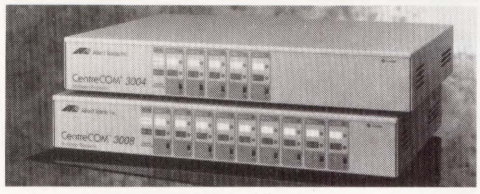
FOR MORE INFORMATION

Lantronix
26072 Merit Cir., Ste. 113
Laguna Hills, CA 92653
(714) 367-0050
Circle 496 on reader card



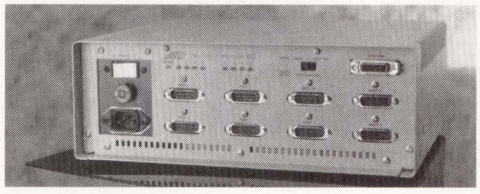
Lantronix's ETS-8 accommodates LAT and TCP/IP environments.

DEC Professionals! Use the BEST ETHERNET BUILDING BLOCKS



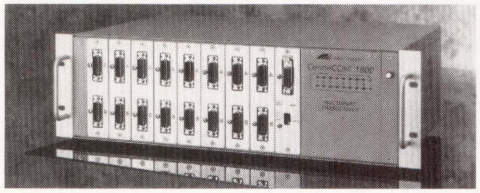
- **MULTIPORT REPEATERS**
  CentreCOM 3000 Series
  - 3022 with 2 Thick and 2 Thin ports allows Thick-to-Thick, Thick-to-Thin, or Thin-to-Thin segment connection
  - 3004 and 3008 have 4 and 8 Thin ports, and 1 Thick port
  - Optional 19" rackmount kit
  - Automatic and manual partitioning, switch selectable
  - Switch selectable termination for each port eases mid-segment (T-Connector) repeater configurations

  from $1150* to $2495*



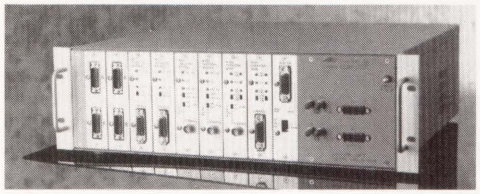
- **8 PORT MAU – MULTIPORT TRANSCEIVERS**
  CentreCOM 800 SERIES
  - Small, desktop size unit
  - 8 Transceiver ports and 1 trunk cable interface
  - Direct DELNI* replacement

  List $945*



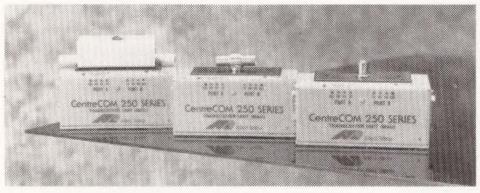
- **16 PORT MAU – MODULAR MULTIPORT TRANSCEIVERS**
  CentreCOM 1600 SERIES
  - 2 to 16 transceiver ports per chassis
  - Cascades to connect up to 256 stations to one backbone tap
  - Switch select local or remote mode, forms local networks
  - Diagnostic LEDs report status of each port
  - Direct DELNI* replacement, but with twice as many ports

  16 Ports for $1795*



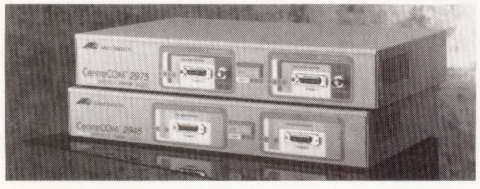
- **MULTIMEDIA CONCENTRATORS**
  CentreCOM 5000 SERIES
  - Modular, user configurable, supports Transceivers, Repeaters, even MAC Layer Bridges in a rack mount or desktop chassis
  - Thin Net, Thick Net and Fiber Optic Ethernet media supported

  Call for Details



- **SINGLE and DUAL PORT TRANSCEIVERS**
  CentreCOM 100 and 200 SERIES – Single Port
  CentreCOM 150 and 250 SERIES – Dual Port
  - Ethernet/IEEE 802.3 compatible. Completely independent circuit board for each port, share only the tap
  - Heartbeat On/Off switch, diagnostic LEDs for each port
  - U.L. Plenum rated, FCC compliant
  - Compact, highly reliable with a **2 year** warranty

  from $199* to $425*



- **LOCAL MAC LAYER BRIDGES**
  CentreCOM 2000 SERIES
  - Protocol transparent
  - Thick and Thin Ethernet support
  - Network Management firmware/software option
  - Supports Spanning Tree protocol

  from $1950*

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CIRCLE 103 ON READER CARD

Ring In The MicroVAX

Simpact Associates Inc.'s TCI 2000 Series Links MicroVAXs to Token Ring Networks

A few months ago, IBM announced that it had sold one million Token Ring node adapters. The networking solution has taken off, and DEC customers in multivendor shops want in.

In November, Simpact Associates Inc. introduced a DEC-to-IBM Token Ring Interface. The TCI 2000 Series of Token Ring interfaces connects a MicroVAX directly into a Token Ring network.

Simpact believes that its TCI 2000 Series will fit many needs. "We suspect that there are people who have Token Ring in their corporate office but MicroVAXs running applications on the shop floor. They want to get information from one place to the other, but right now they are isolated," says company spokesman Steve Adams. "Other people are looking at the link for different reasons. Some system administrators who run MicroVAX applications prefer the 16-megabit technology of the Token Ring."

The TCI 2000 Series lets a MicroVAX connected to a Token Ring look like any other Token Ring node. Because the MicroVAX is connected directly to the network and is perceived as a native node, performance doesn't suffer.

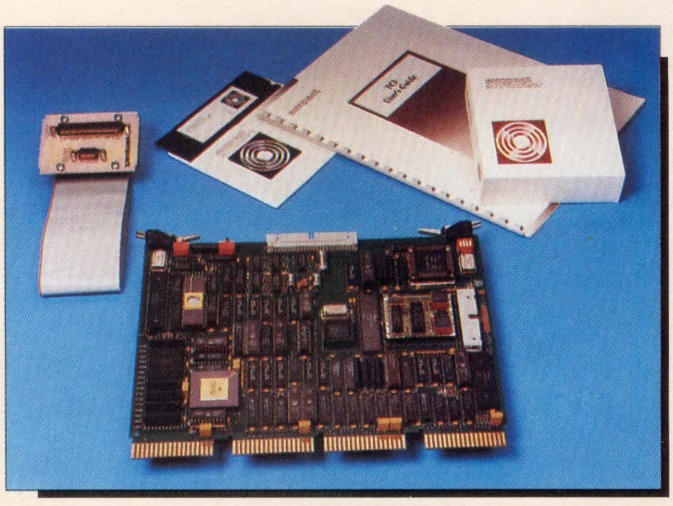
Four interfaces support various protocols. Each comes with hardware and software.

The hardware is an intelligent communications front-end processor (COMFEP) based on the Motorola 68020 and packaged as a single, quad-height Q-bus board that plugs directly into the backplane of the MicroVAX. The COMFEP uses a chipset from Texas Instruments, the TMS380C16, to provide links to both 4-megabit-per-second and 16-megabit-per-second Token Rings.

Software protocols include an 802.2 interface, a TCP/IP link and IBM-compatible NETBIOS and LU6.2 interfaces.

Called the TCI 2100 LLC Software, the IEEE 802.2 interface is a low-level link for station-to-station transactions. At Level 2 on the OSI stack, the TCI 2100 is a logical link interface that comes with software development tools with which you can develop custom or high-speed protocols. It features software development tools and templates. Its onboard operating environment provides a multitasking operating system, host-resident device drivers and a host interface.

The TCI 2200 TCP/IP Software is for end users. Via TCP/IP, you can connect your MicroVAX to PCs, midrange systems and mainframes. The TCI 2200 includes the FTP, SMTP and TELNET application suite, which allows the MicroVAX to emulate terminal connections, transfer files and exchange mail with any other TCP/IP-connected device on the Token Ring. With the TCI 2200's Sockets applications program interface (API), you can develop custom programs that communicate with other devices connected to the Token Ring via TCP/IP.



Simpact Associates Inc.'s TCI 2000 Series lets a MicroVAX connected to a Token Ring look like a Token Ring node.

FOR MORE INFORMATION

Simpact Associates Inc.
9210 Sky Park Ct.
San Diego, CA 92123
(619) 565-1865
Circle 441 on reader card

The TCI 2300 and TCI 2400 provide program-to-program communications. The 2300, an IBM-compatible NETBIOS interface, is a high-level link (OSI Level 5) generally used for MicroVAX-to-PC connectivity. "The majority of PCs on a Token Ring use NETBIOS to connect," explains Adams. He cautions that sophisticated users such as system integrators and applications developers are generally more comfortable with this level of interface, as well as with the TCI 2400.

The TCI 2400 provides SAA peer-to-peer connectivity over the SNA APPC (LU 6.2) protocol. Also a high-level link (OSI Level 5), it's designed for systems integrators, applications developers and sophisticated end users who want to connect MicroVAXs to any system on a Token Ring, from a PC to a mainframe.

Prices range from $7,900 to $17,150, depending on hardware and software configurations.

INTRODUCING THE TERMINAL SERVER YOU THOUGHT DEC WAS GOING TO ANNOUNCE.

16-Port DECserver Due This Summer; Uses LAT, TCP/IP

MAYNARD, Mass. — DEC is slated to announce this summer a 16-port terminal server that supports both LAT and TCP/IP, according to sources.

The introduction of the DECserver 300 on

The MAXserver 1000 Series.

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CIRCLE 175 ON READER CARD

Mac To VAX At A Distance

Computer Methods Corporation's AsyncServer Lets You Dial Into A VAX/VMS System From A Mac

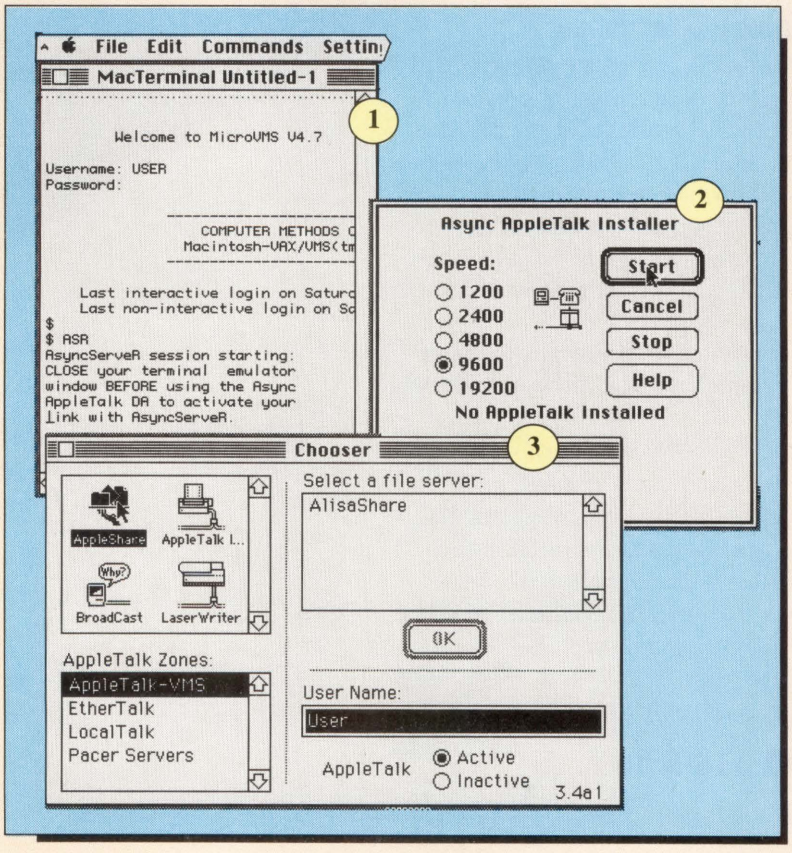
The ability to network your portable computer to your office is one of the greatest benefits of portable computing. Computer Methods Corporation's AsyncServer is VAX-based software that lets you dial into a VAX/VMS system from your Mac.

"For more than two years, we've heard requests from Mac users for a way to access their AppleTalk network by dialing into their corporate VAX systems," says Computer Methods spokesperson Anthony Caraffa.

Users say that AsyncServer provides them with transparent, on-the-road AppleTalk networking, he maintains.

Based on Apple Computer's AppleTalk for VMS V2.0, AsyncServer lets you use a client Mac to communicate with any AppleTalk-based facility in your organization through the VAX host. On a local dedicated asynchronous network, you can access AppleTalk networks through VAX terminal port hardware. The product delivers AppleTalk services to Mac and Portable Mac users over dial-up lines using ordinary modems. Communication is transparent.

After you're in the corporate network, you can run Mac/VAX connectivity packages such as Alisa Systems' AlisaTalk, Pacer Software's PacerShare and Odesta's Helix VMX over asynchronous terminal lines. The product is compatible with VAX multiplexers and LAT-equipped DECserver terminal servers.



To use AsyncServer interactively, (1) use any Mac terminal emulator to log into the host VAX and start an AsyncServer process, (2) start AsyncServer on your Mac using the desk accessory and (3) select and use AppleTalk servers in your network.

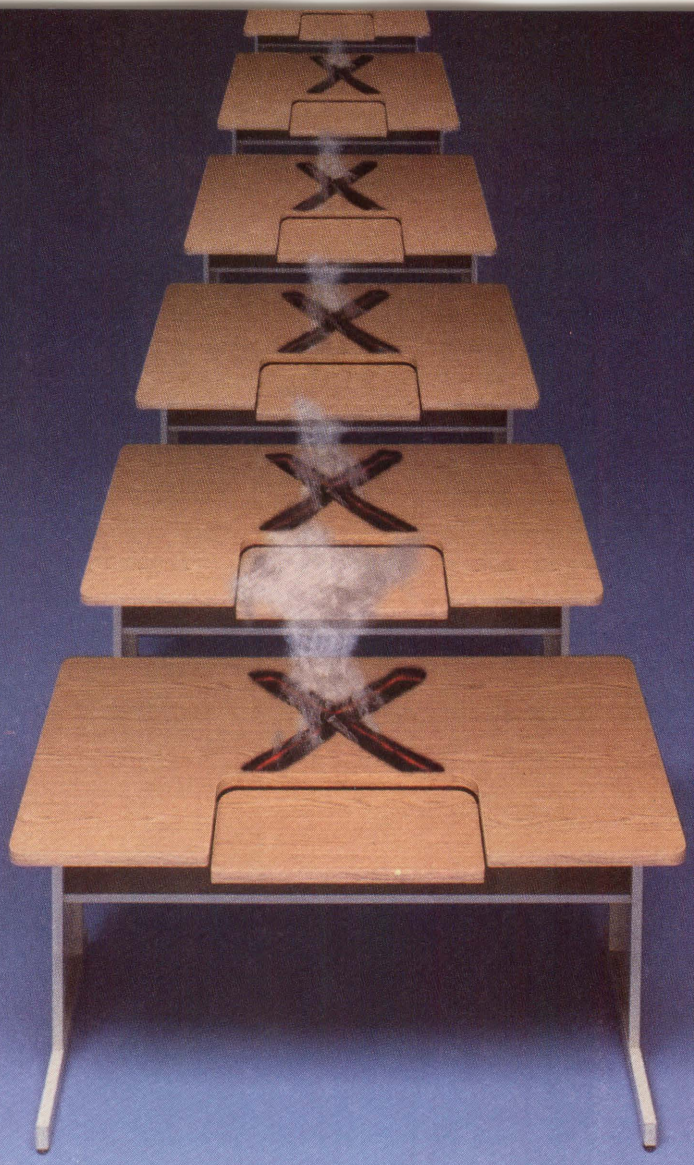
FOR MORE INFORMATION

Computer Methods Corp.
525 Rt. 73 S., Ste. 300
Marlton, NJ 08053
(609) 596-4360
Circle 483 on reader card

AsyncServer, a software-only solution, isn't intended to replace higher-performing Mac/VAX connectivity hardware such as the Kinetics FastPath. AsyncServer currently is installed at about 20 sites, including Apple, Colgate Palmolive, DEC, Du Pont, Mobil Oil, Tulane University and federal government locations.

AsyncServer supports Mac clients using a modified version of Dartmouth College's Asynchronous AppleTalk software. Future releases will support Asynchronous AppleTalk Mac client software from other vendors as well as AppleTalk for VMS V3.0. These releases are scheduled to offer advanced security features, including access control lists on AppleTalk networks, which you can tailor to restrict network access to specific users or groups.

The product is licensed for use on a single VAX CPU. Licenses range from $595 for a low-end VAX/VMS server such as a MicroVAX II to $1,895 for use on high-end systems.



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It's a graphics superworkstation that runs X11 at 17 MIPS. It comes with 8 megabytes of RAM, a 156-megabyte hard disk, and a high-resolution monitor that can display 256 colors at once.

Which means you can access multiple applications simultaneously—and use them under one fast, graphical interface.

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The XN10 gives you full-color X Windows, 1024-by-768 resolution, and requires virtually no administration. Like the XD88/10, it provides a common graphical interface for applications running in multiple compute environments. Dual coprocessors keep redraw speeds high and network loading low.

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Client/Server Connections

3Com Corporation's 3+Open CSS Client/Server System Allows Efficient Network Management

Network management across vendor lines is an integral part of information management. Toward this goal, 3Com Corporation recently released the 3+Open Client/Server System (CSS). This computing platform combines the flexibility, broad application support and ease of use of a networked PC environment with the reliability, security and centralized management of larger, host-based systems.

The open architecture of 3+Open CSS supports DOS, DECnet, Mac, OS/2 and UNIX applications. This architecture frees workstation space for local processing, because the server handles a majority of network processing. The product runs on DECnet, OSI, TCP/IP and SNA. DEC's Enterprise Management Architecture (EMA) connects with 3+Open CSS using DECnet/OSI. 3Com's X.25 Public Data Network gateway, IBM-compatible SNA gateway and TCP/IP service for DOS workstations let you connect DEC, Hewlett-Packard, IBM and OSI environments with 3+Open CSS.

Benefits of 3+Open CSS include host- and PC-based applications, a cooperative user interface, cost-effective, high-volume data storage and extended network management and security. The product offers distributed processing, open connectivity and modularity.

3Com Corporation's 3+Open CSS combines the flexibility of a networked PC environment with the reliability and centralized management of a host-based system.

3+Open CSS consists of 3+Open LAN Manager system software with Demand Protocol Architecture (DPA), a network server based on the Intel 80386 microprocessor, 3Com's network workstations and such network services as e-mail and internetwork connectivity.

DPA enhances DOS memory using Resident Protocol Manager (RPM) and NetBIOS Protocol (NBP). RPM lets protocols be loaded and unloaded to access system applications without rebooting the workstation. NBP enhances client/server communication by using minimum system memory while providing maximum performance. DPA provides between 520 and 577 KB of available DOS application memory, depending on system configuration.

The 3+Open CSS 3Server/500 features 8 MB of RAM, a 320-MB internal hard disk and a 250-MB tape backup unit for centralized storage and security for large portions of data. You can expand your storage to 6 GB by daisy-chaining up to five high-capacity Disk Expansion Units (DEU) through the SCSI port on the server. You also can add an optional 2.3-GB tape backup unit for storage and data protection.

As part of its client/server system, 3Com also announced two additions to its 3Station family of Intel 80286-based network workstations. 3Station/2ED and 3Station/2X, like the 3Station/2E introduced in 1988, feature a built-in Ethernet interface and support VGA monitors, up to 5 MB of onboard memory and an optional numerics processor. These features cost about 25 percent less than a similarly configured PC adapted for network use.

Two standard 3+Open CSS configurations are available. They feature a 3Server/500 including 3+Open LAN Manager with DPA and one or more 3Stations. A package with one 3Station/2E costs $21,495. A package with 10 3Station/2Es, 3+Open Mail, 3+Open Internet and 3+Open LAN Vision installed on the server costs $41,925.

FOR MORE INFORMATION

3Com Corp.
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(408) 562-6400
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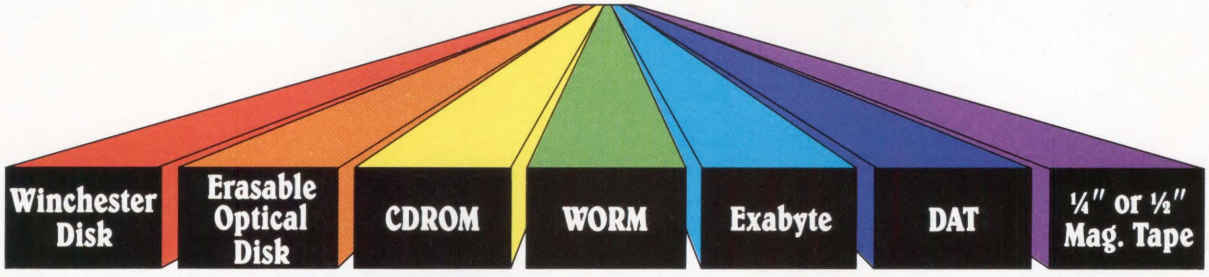

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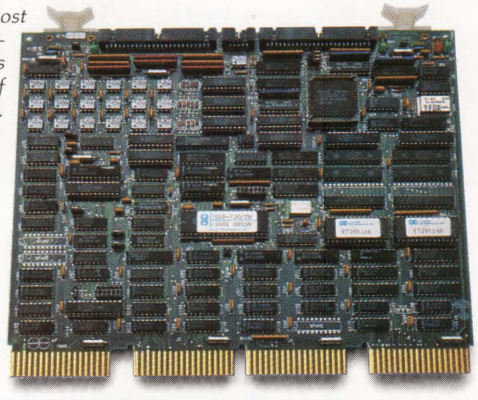

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DRIVE INFORMATION			OPERATIONS STATUS			
DEVICE NAME	VENDOR ID	REV NO.	CURRENT OPERATION	SENSE KEY	REMAINING TAPE (MB)	%REWRITE %ECC
MUA0	EXABYTE		WRITE FILE MRK	OK	1580.857	0.0254
MUA1	EXABYTE	423D	READ	OK	2090.897	0.168

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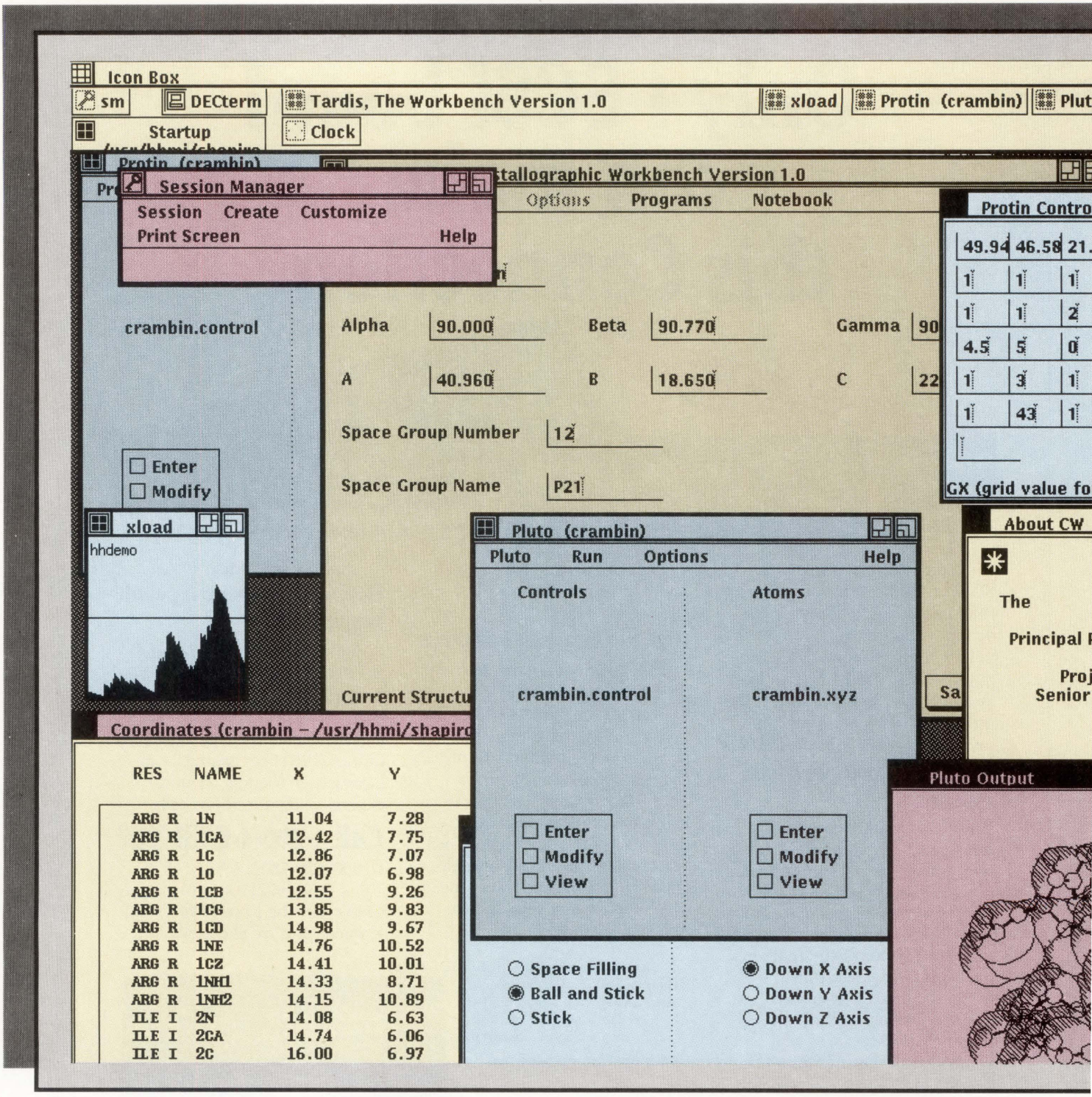

Developing With DECwindows

By Lawrence S. Shapiro and Philip E. Bourne, Ph.D.

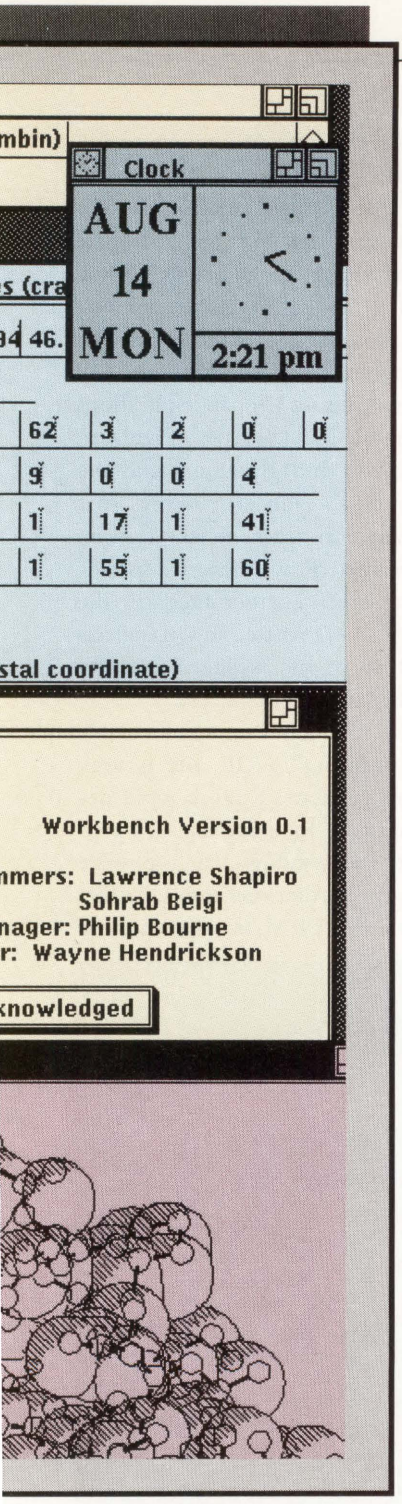

Figure 1: A typical DECwindows application.

A closeup look at the effort involved in adding a DECwindows interface to your code.

MUCH HAS BEEN written about the DECwindows interface delivered as part of VMS V5.1 and ULTRIX V3.0. However, the majority of this material is written with the user in mind. Certainly such desktop accessories as the calculator calendar and file viewer are usful, but what else are you left with, aside from the Digital terminal emulation found in VAX Workstation Software (VWS), the forerunner of DECwindows? The answer: a comprehensive and elegant object-oriented programming (OOP) environment.

For users of Digital and third-party software products, DECwindows means the gradual emergence of improved user interfaces, each having the same look and feel. But what about programmers who wish to add a DECwindows interface to their own code? Does it take more work than writing the original application or, as should be the case, does it improve the productivity of the user with minimal effort on the part of the programmer?

We set out to answer these questions with codes we use every day in molecular biology research. The applications represent a situation common in scientific research: a large set of poorly documented FORTRAN codes connected by common data, not necessarily in the same format, and arcane job control.

Figure 1 gives you an idea of what was achieved in 10 person-weeks. It was fun and unique in our association with Digital to feel that we were on the front line and pushing forward into no man's land, encountering bugs and documentation errors with a frequency not found in more-established Digital software. Bugs and documentation errors

> WITHOUT X THERE WOULD be no DECwindows, but DECwindows makes the X tools usable by mere mortals.

are a minor inconvenience to those who have tried to achieve the functionality shown in Figure 1 with the X Window System. Programming in X isn't simple. Without X there would be no DECwindows, but DECwindows makes the X tools usable by mere mortals.

The DECwindows Difference

What makes DECwindows different from X? First is a sophisticated widget set consisting of high-level user interface abstractions such as push buttons, labels, sliders and text entry fields. Those who are familiar with the Athena Widgets or other widget sets developed using Xtoolkit will be impressed by what DECwindows has to offer.

Second is the User Interface Language (UIL), which distinguishes the Digital X User Interface (XUI) toolkit from previous incarnations of Xtoolkit widgets. UIL provides a simple and effective means to describe and control user interfaces under DECwindows.

UIL isn't a typical programming language. It doesn't compile into executable code. Rather, UIL files compile into binary User Interface Definition (UID) files that are accessed by your application at run time through the Digital Resource Manager (DRM). UIL is the key component in making the DECwindows Application Program Interface (API) an OOP environment. Using UIL, an applications programmer defines the types of widgets, their geometry and placement and the names of the C callback routines that execute when an action is taken on an object. Because UIL was designed specifically for implementing user interfaces, the structure of a UID written in UIL reflects the structure of the widget hierarchy that the user sees on the screen.

Because UIL doesn't create executable code, "compiling" a UIL file is very quick. This facilitates a more rapid development of the look and feel of a program under DECwindows than is possible without UIL. Further, because UID files are read by the DRM at run time, the

Figure 2.

```
/*
 * kill_me.c  a simple DECwindows demonstration program
 */
#include <stdio.h>                                  /* For printf and so on.*/
#include <X11/DECwDwtApplProg.h>                    /* DECwindows Toolkit */

static Widget toplevel_widget, main_window_widget;

DRMHierarchy uid_files;                             /* DRM database hierarchy ID */
static DRMType *dummy_class;                        /* and class variable. */
static char *filename_vec[] =                       /* DRM hierarchy file list. */
    {"kill_me.uid",                                 /* These are the UID files */
    };

static int filename_num =
                (sizeof filename_vec / sizeof filename_vec [0]);

void quit_proc();                                   /* forward declaration of
                                                     * our callback */

static DRMRegisterArg reglist[] = {                 /* The names and addresses of */
    {"quit_proc",(caddr_t) quit_proc}               /* things that DRM has to bind. */
};

static int reglist_num = (sizeof reglist / sizeof reglist [0]);

/*
 * Here we are at main()
 */
main(argc, argv)
unsigned int argc;
char *argv[];
{
    DwtInitializeDRM();                             /* Initialize DRM */
                                                    /* Initialize Xtk */
    toplevel_widget = XtInitialize("Kill Me Version 1.0",
                                   "example",NULL,0,
                                   &argc,argv);
    /*
     * Open the UID files (the output of the UIL compiler) in the hierarchy
     */
    if ( DwtOpenHierarchy(filename_num,filename_vec,NULL,&uid_files)
            != DRMSuccess )
                fprintf(stderr,"can't open hierarchy");

    /*
     * register the callback routines
     */
    DwtRegisterDRMNames(reglist, reglist_num);

    /*
     * now fetch the main widget
     */
    if ( DwtFetchWidget(uid_files, "KILL_ME_MAIN_WINDOW",
        toplevel_widget,
            &main_window_widget, &dummy_class) != DRMSuccess )
                fprintf(stderr,"can't fetch main window");

    XtManageChild(main_window_widget);              /* everything pops up on the */
    XtRealizeWidget(toplevel_widget);               /* screen now. */

    XtMainLoop();                                   /* process X-events now. */
}

/*
 * The user pushed the quit button, so the application exits.
 */
    void quit_proc(w, tag, reason)
    Widget w;                                       /* these are the standard callback */
    int *tag;                                       /* routine arguments */
    unsigned long *reason;
{
    exit(0);
}
```

Sample C code calling UIL objects.

Now Available: GEMBASE Financials!

WHY GEMBASE IS MAKING HEADLINE NEWS

SOFTWARE NEWS

DEC Chooses GEMBASE 4GL To Head List Of ProCIM Software

NEW ZEALAND - In response to demand from the process industries, Digital Equipment Corporation has developed a specialized software program, ProCIM, which features the state-of-the-art relational 4GL software designed specifically for Rdb, GEMBASE.

Digital's ProCIM program is upon a solid foundation of prac- The ProCIM pro- Wide" manufacturing solution. GEMBASE 4GL is offered head of the product software the relational 4GL database to handle accounting, di and process manufacturin ment.

Companies such as and Co-operative Dairy largest dairy company and Tasm

GEMBASE Is The First 4GL Designed For Rdb, Maximizes Performance and Capabilities

SAN DIEGO - GEMBASE Version 2.2, a state-of-the-art 4GL development software system designed specifically for Rdb, was recently released.

"GEMBASE is uniquely positioned in the DEC marketplace since it is the only 4GL available today erately designed by Rdb experts 4GL development

"GEMBASE's commitment to VAX architecture is unsurpassed as is evident with GEMBASE's commitment to DSRI, SQL, CDD+, and DECWINDOWS," he said.

GEMBASE Version 2.2 features adhoc query utility, report, forms application generators, graphics and CASE interface.

"GEMBASE provides a comple pt envi out th

GEMBASE is the ultimate in 4GL development for Rdb.

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Figure 3.

```
module kill_me
        version = 'v1.0'
        names = case_sensitive

include file 'DECwDwtApplProg.uil';

!procedure declarations go here

procedure
        quit_proc (integer);

! We declare objects here

object
        KILL_ME_MAIN_WINDOW : main_window {
            arguments {
                width = 200;
                height = 100;
            };
            controls {
                dialog_box geometry_manager;
            };
        };

object
        geometry_manager : dialog_box {
            controls {
                push_button kill_me_button;
            };
        };
object
        kill_me_button : push_button {
            arguments {
                x = 25;
                y = 25;
                label_label = 'Kill Me';
            };
            callbacks {
                activate = procedure quit_proc(0);
            };
        };
end module;
```

Sample UIL code.

program needn't be relinked to be updated. The DECwindows libraries (which include the Xlib and Xtk libraries) are huge, so this saves considerable time.

Although UIL is a good development tool, it has drawbacks. As the application opens the UID files at run time, UID files must be shipped with the executable and loaded in to a directory where the application can find them. Further, UIL is verbose (although this is in large measure responsible for its simplicity), and UIL files therefore become large very quickly.

For a complex interface, fetching widgets from UID files won't satisfy all of a programmer's needs. Thus, XUI comes with a complete C language library of calls through which the DECwindows widgets can be defined and controlled. These calls are useful, but by using the C language libraries, the correspondence between program structure and program function given by UIL may be lost. And although fetching a widget from a UID file is homogenous — the arguments to the DwtFetchWidget( ) function are independent of the type of widget — this isn't true using the C language library. A label widget would be created with DwtLabel( ), and a text widget would be created with DwtSText( ). Each call has a different set of arguments. That is, although the application could be coded entirely in C, UIL offers a convenient shortcut.

Program Layout

Like other windowing systems, DECwindows applications that use UIL follow a standard format:

1. Initialize the DRM by calling DwtInitializeDRM( ).
2. Initialize the Xtoolkit by calling XtInitialize( ), thereby obtaining a top-level widget with which the window manager communicates and from which all other widgets are descendents.
3. Open the UID files by calling DwtOpenHeirarchy( ).
4. Register the names of the C language callback functions specified in the UIL files by calling DwtRegisterDRMNames ( ). This is necessary because UID files aren't accessed when the application program is linked. Thus, the names of the executable callback functions must be bound to their addresses at run time.
5. Fetch the application's main window widget with a call to DwtFetch Widget ( ). When a widget is fetched from the UID file, the address of the widget data structure is an argument to the DwtFetchWidget( ) call. The data structure then is loaded with the appropriate values for that object as defined in the UIL file.
6. Manage the main window widget with a call to XtManageChild( ). Managing a child widget adds that widget and its children to the widget tree structure.
7. Realize the top-level widget by calling XtRealizeWidget( ). This maps the descendents of the top-level widget (i.e., all the managed children of your application) to the screen.
8. The final statement in the main( ) of your application ordinarily will be XtMainLoop( ). This function is simply an infinite loop of the form:

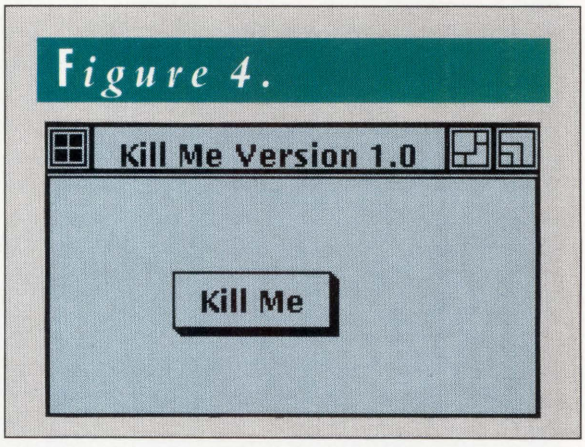
```
while (True)
{
 XtNextEvent();      /* get the next event */
 XtDispatchEvent(); /* now go to the proper
                       *callback routine   */
}
```

It's possible and sometimes necessary to write your own event-handling loop that, for example, filters a specific kind of event for special processing. However, it's generally easier and more readable to stick with XtMainLoop( ) and process all events in callback routines.

All the processing in a DECwindows application takes place inside callback routines, so main( ) never need change, regardless of the size and complexity of the remainder of the program.

The eight steps above are illustrated by the program "kill me" (the "Hello World" of DECwindows). This program creates a push button that, when activated, simply exits the program. The C source code for "kill me" in Figure 2 opens the UID file created by compiling the UIL file in Figure 3. This file, kill_me.uil, illustrates the elegance and simplicity of UIL in producing the push button in Figure 4. The UNIX commands

Figure 4.



The push button created with the kill_me program.

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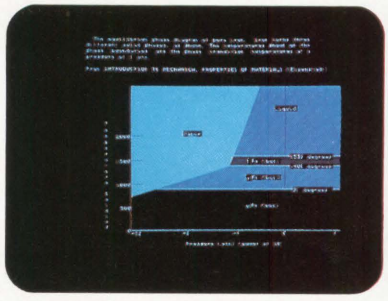
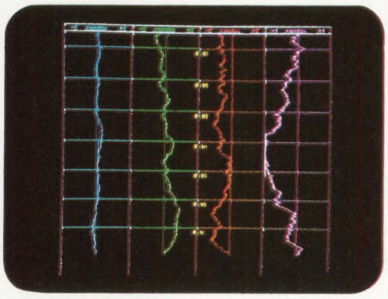
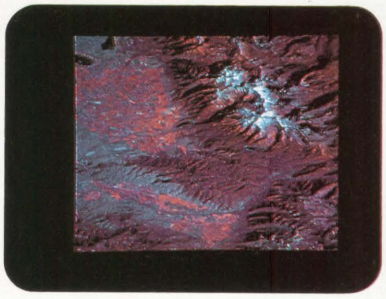
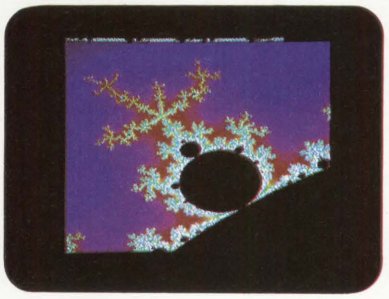
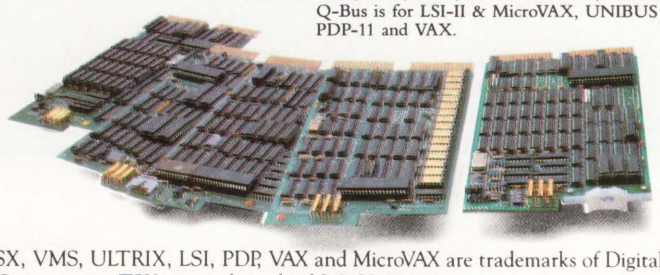





	MODEL	BUS & SIZE	FEATURES AND OPTIONS	PIXEL GRAPHICS PRIMARY	PIXEL GRAPHICS OVERLAY (S)	ALPHA-NUMERICS
COLOR/GRAY SCALE	VCL	Q QUAD	68030,68882 32-BIT RAM, ACRTC, DMA 2 DUART, PAN ZOOM, SCSI	1024 x 1024 x 8	1024 x 1024 x 4 HARDWARE CURSOR	
	VCM	Q DUAL	ACRTC, PAN ZOOM, DUART	1024 x 1024 x 8	1024 x 1024 x 4 HARDWARE CURSOR	
	VCW	Q DUAL	ACRTC, PAN, 2 CHANNELS	640 x 480 x 8	HARDWARE CURSORS	50 x 80 x 6
	VCT (avail. 1/90)	Q QUAD	34020, PAN ZOOM, SCSI, 2 DUART	1024 x 1024 x 24	1024 x 1024 x 8 HARDWARE CURSOR	
	VCX	Q & U QUAD	EXTERNAL SYNC INPUT	512 x 512 x 24		50 x 80 x 6
MONOCHROME	VRH	Q DUAL		1024 x 1024		64 x 128
	VRS	Q DUAL		512 x 512		50 x 80
	VRA	Q DUAL				24 x 80

NOTES: VCK, VRC, VCH, etc. also available, contact factory. Q-Bus is for LSI-II & MicroVAX, UNIBUS is for PDP-11 and VAX.



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Remote Procedure Calls: Building Distributed Systems

The X Window System provides one way to distribute applications across a network. Because of its client/server architecture, X allows the user interface part of an application to run on one node in a network and the rest of the application to run on another node. Although X is an excellent way to distribute the user interface, if you want to distribute other parts of an application you may want to use remote procedure calls (RPC).

Every programmer is familiar with the concept of a procedure. A procedure, also known as a subroutine or function, is simply a small piece of a program. In well-designed programs, a procedure implements a single function, although that function may be as simple as looking up a customer's name or as complicated as calculating stresses on a section of an airplane wing. Programs are built by putting together a series of procedures, each independent of the others and each performing a small part of the entire program's task.

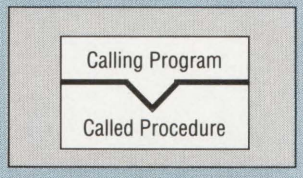

Figure A: Local procedures.

On a single network node, a procedure looks like Figure A. The calling program invokes the called procedure, optionally passing it data to operate on. The called procedure performs work and generally returns data to the calling program.

In the case of an RPC (see Figure B), the calling program and the called procedure operate on different nodes in a network. The calling program (the client) runs on one node, and the called procedure (the server) runs on another.

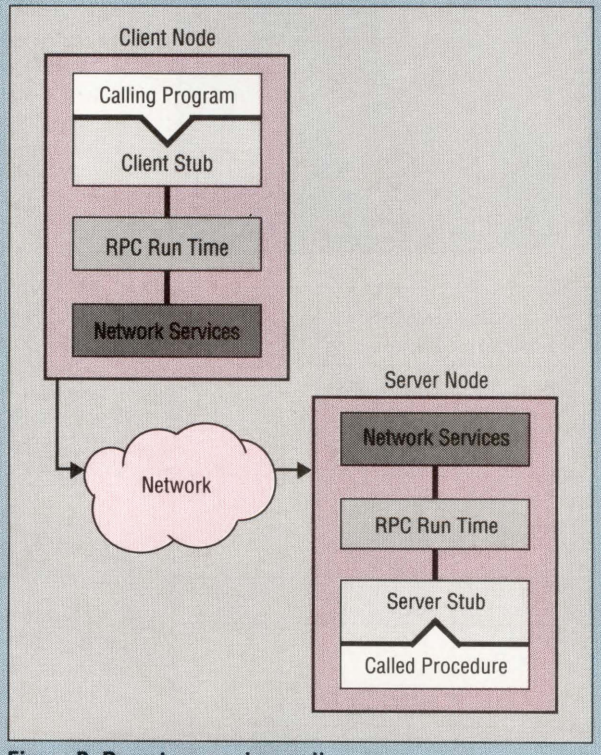

Figure B: Remote procedure call.

In the case of a correctly implemented program and called procedure, there's essentially no programming difference between the RPC and the local procedure call. That is, it's transparent to the software developer. But to make all this work transparently requires a great deal of work on the part of the RPC.

At development time, a program using RPCs is designed and built essentially the same as most other programs. However, because the called procedure will run on another node, the application designers must be careful to ensure that the called procedure and calling program don't share node-specific resources (such as address space, open file pointers and locks).

As you can see in Figure B, a small subroutine called a stub is linked into the procedures on both ends. The stub for both the client and the server sides is created at the compile time of the subroutine. The client-side stub is linked with all clients that want to use the server and communicates with the run-time portion of the RPC.

The server-side stub is essentially a main program that receives requests from the network and invokes the called procedure on behalf of the client. However, many tricky issues are associated with the implementation of the server:

1. Authentication — Is the client authorized to use this data?
2. Location — Where is a server that can satisfy my request?
3. Naming — Is this the right server?
4. Data Conversion — Is the data representation the same on both the client and the server (for example, big-endian and little-endian integers)?
5. Performance — Do we need to send all subroutine arguments in both directions? How long do we leave open a client/server connection? Will the client be multithreaded? Is there an asynchronous interface?
6. Internationalization — Will character sets and text strings be represented in the language of the client?

Why use RPCs? Broadly, because the resource you want isn't always on your local node. That resource might be almost anything, including a faster processor, special vector hardware, special devices or access to data.

To be most useful, RPCs must work in a heterogeneous environment of machine types, networks and operating systems, so standards are critical. There are two competing standards for RPCs being developed: Sun Microsystems' Open Network Computing (ONC) and Hewlett-Packard, Apollo Division's Network Computing Services (NCS). Digital has licensed NCS from HP, Apollo Division and is working on the RPC services coming from MIT's Project Athena. Digital also says that it will work with HP, Apollo Division to add WAN support, internationalization and multiple computer language support (presumably something like the VAX Calling Standard) to NCS.

—Philip A. Naecker, Technology Editor

necessary to generate kill_me are:

```
% cc -o kill_me kill_me.c -ldwt -lX11
% dxuil -o kill_me.uid\
    kill_me.uil -I/usr/include/X11
% kill_me
```

As stated previously, UIL allows the programmer to define objects that can be fetched by the DRM at run time. An object definition includes four important sections:

1. The type of object. For example, the kill_me_button in Figure 3 is of type push_button.

2. The optional argument list. The content of this list varies depending on the type of object defined. For example, for the kill_me_button, we define the x and y positions and a label. Push_button arguments that we haven't specified, such as width, height and background color, default to reasonable values.

3. The controls list. It lists the object's children and shows how the structure of a UIL program mirrors its function: The KILL_ME_MAIN_WINDOW controls the geometry_manager, which controls the kill_me_button. (It could be written with nested object declarations, but this way is simpler for those new to UIL.) When an object is fetched with DwtFetchWidget(), its children are fetched, as well. Thus, when we fetch KILL_ME_MAIN_WINDOW, we also fetch the geometry_manager and kill_me_button objects.

4. The callback list. This takes the form:

```
callbacks {
    reason = procedure procedure_name();
};
```

where reason is a description of an event (for example, 'activate' for activation of a push_button) and procedure_name( ) is the name of a C callback routine. When the event specified by the reason occurs, the specified procedure is called. Thus, your code is called back by your object upon a particular event.

For those already familiar with OOP, DECwindows will pose few problems. For the majority, some features will take getting used to. For example, the DECwindows callback system allocates the responsibility for flow control to the objects themselves: A button calls your

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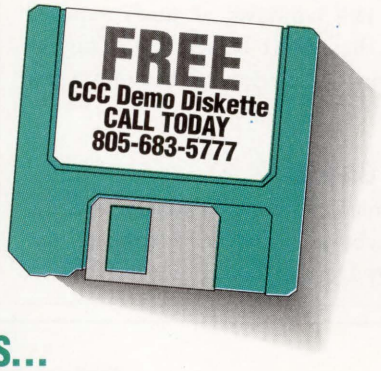

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routine when it's activated, or a toggle notifies you when its value has changed.

On the positive side, OOP gives you a great deal for relatively little effort when compared to more structured programming languages. For example, a text widget that can be called with a single DwtFetchWidget( ) call on a UIL simple_text object provides a powerful editing environment. The simple_text object gives the user the capability to enter or delete text; cut letters, words, lines or paragraphs and paste them in other DECwindows applications; resize (or scroll) to accommodate the entire text; and so on. To achieve this functionality in an if-then-else programming environment requires a great deal of code. Under DECwindows, all that's required is that the object be fetched. This requires one C function call and only a few lines of UIL.

Hints On UIL

UIL is relatively simple to learn. xuidemo and decburger, the two examples supplied by Digital (located in the ULTRIX directory's /user/examples/xuidemo and /user/examples/decburger), are helpful. decburger illustrates the fundamental points of programming under DECwindows. xuidemo is useful as an example of the capabilities of the DECwindows widget set and is a little more complicated. The full programmer's documentation set is recommended. Volume 1 contains a good introduction to DECwindows and X concepts and writing applications under XUI.

Although DECwindows is a well-designed coding environment, it functions largely as a buffer that spares the applications programmer from dealing directly with Xlib calls. The DECwindows programmer often is reminded of this when a task must be accomplished by writing directly to Xlib.

For example, DECwindows alone has no facilities for producing vector graphics. It requires that you purchase GKS. Alternatively, DECwindows allows you to create a window widget — an X window that can be drawn into using Xlib calls. Processing events for interactive graphics applications such as mouse-motion events then must be handled by writing your own Xlib-level event loop inside a DECwindows callback routine. If you plan to use DECwindows for this sort of application, your task won't necessarily be simplified.

Programming in C with frequent calls to UIL in the manner described here made it possible to create a large window-based interface to existing programs as represented in Figure 1. A feature of this environment is that little or no change must be made to programs to implement the interface. The input of all data needed to run the programs, the association of data files with each program and the running of the programs are achieved using the mouse and a few keystrokes.

The DECwindows API, which includes UIL, has been adopted by the Open Software Foundation (OSF) as the basis of its windowing environment, Motif. A program written using DECwindows compiles and runs under OSF/Motif with minor modification, namely changes to function calls. The arguments and functionality of corresponding Motif and DECwindows calls are the same. By programming in DECwindows now and assuming that Motif becomes the standard, we may yet approach the user's dream: user-friendly, hardware-independent software. —*Lawrence S. Shapiro and Philip E. Bourne, Ph.D., are with the Howard Hughes Medical Institute at Columbia University. Bourne is ULTRIX editor for* DEC PROFESSIONAL.

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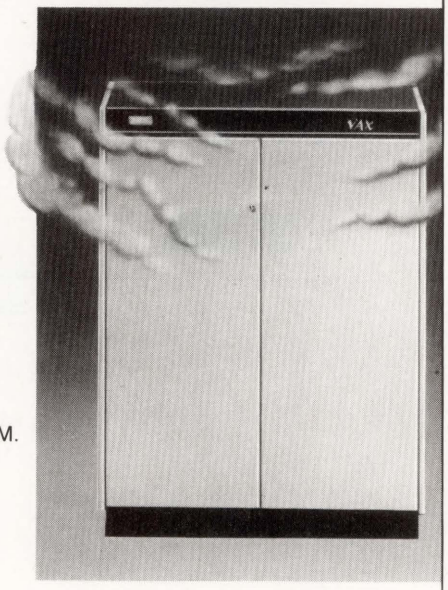

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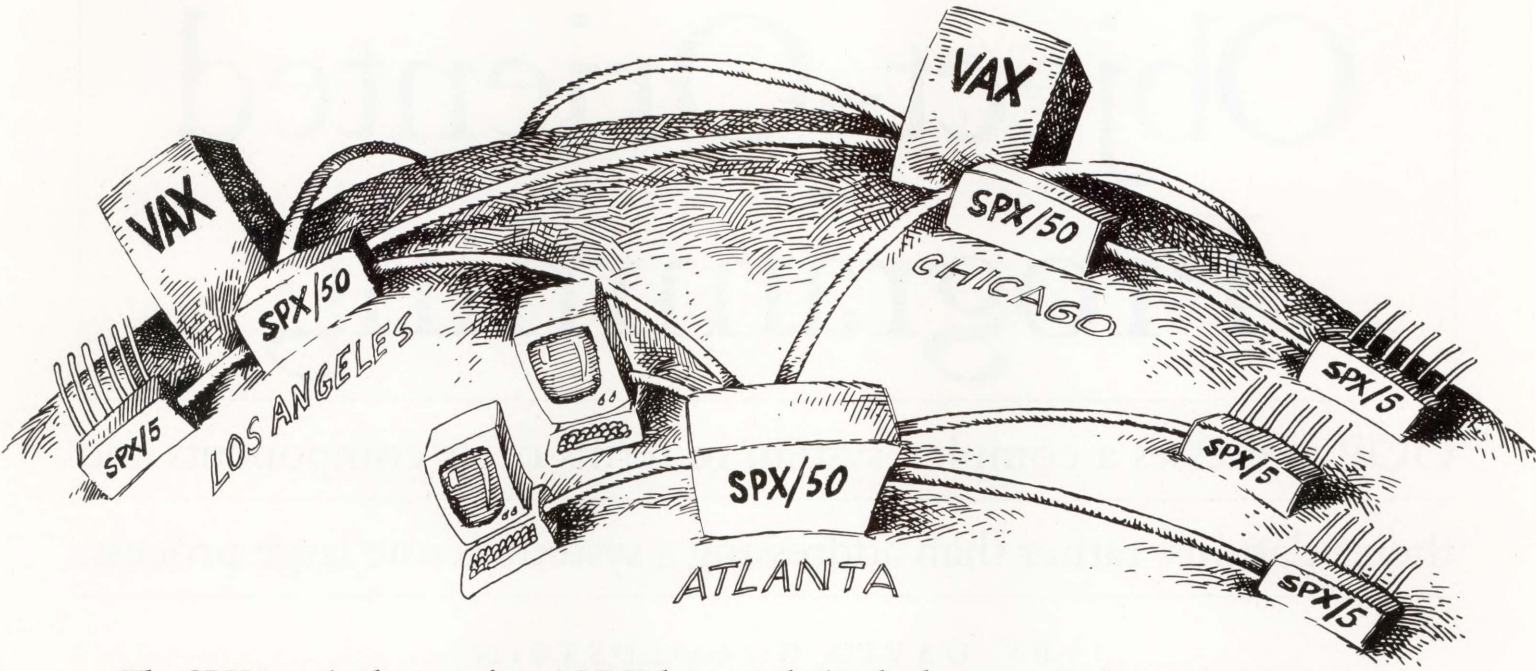

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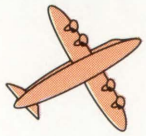


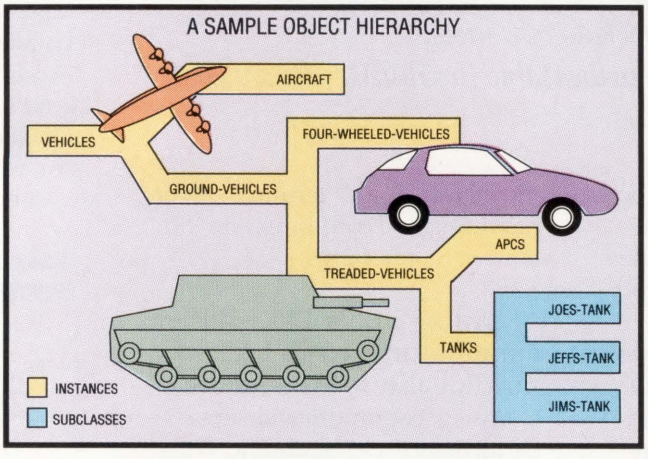
Object-Oriented Programming

OOP expresses a complex system in terms of its components and their relations, rather than addressing a system as one large process.

BY DAVID G. GOLDSTEIN

OBJECT-ORIENTED programming (OOP) is a methodology for addressing difficult programming problems. It provides a new way to address problems and the appropriate tools to develop their solutions.

OOP considers systems as independent objects that interact and have operations performed on their components. The strength of the approach is the way in which a complex system can be expressed in terms of its components and their relations, rather than addressing a system as one large process. OOP is an attractive alternative for applications in areas such as AI, databases and simulation.



Tools that support OOP range from OOP languages such as C++ to entire programming environments such as Next Computer's Next machine. A tool is considered object-oriented if it incorporates characteristics used to implement OOP:

1. Hierarchical representation — allows each object to be decomposed into subobjects.
2. Classes — allow templates to be built describing a data item, with the tool enforcing the template's constraints.
3. Instances — allow users to create data elements belonging to classes of objects. For example, TANK can be a class that describes vehicles with treads, PANZER a subclass of TANK and JEFFS_TANK an instance of a TANK.
4. Slot — denotes the address (in memory) in which a data element can be stored. An example of a slot in TANK is GAS_MILEAGE.
5. Filler — denotes the value that occupies a slot. An example of the filler in slot GAS_MILEAGE is 0.5 (miles to the gallon).
6. Inheritance — implicitly gives a subobject the characteristics of its parent (higher-level) objects unless explicitly prohibited. If PANZER has no

GAS_MILEAGE slot but TANK does, then JEFFS_TANK would inherit its value from the GAS_MILEAGE slot in TANK.

7. Methods — are functions that execute to create, destroy or modify an instance or the filler of an instance of an object.

8. Message passing — allows objects to send data (communicate) among themselves. Message passing is used to send data to be inserted in a slot, have objects execute their methods or create or destroy other instances of objects. Examples of message passing are described below.

Figure 1 depicts an example of a simple object-oriented representation and the code that implements the description. The diagram on page 46 presents a hierarchical representation of simulated objects showing how the classes form an inheritance tree.

This article doesn't stress strong typing, because typing is a result of a language's construction and not a feature of OOP.

When And Why

OOP is useful in applications in which elements naturally form classes of objects. Two examples include representing a simulation as the simulated environment and items simulated; and database systems as items in the database and tasks to be performed using the items.

Virtually any problem can be thought of as objects with behaviors. Even mathematical theorem-proving can be considered as theorems constantly looking for assumptions and formulas.

A strong indication of a problem's suitability for an object-oriented approach is its lack of predictability. If all aspects of a problem are well-understood and require obvious control logic, then a more conventional approach is probably in order. Conversely, if you're unsure which action should be performed next, then expressing the problem in terms of its constituents, their states and desired behaviors might be in order.

One advantage OOP offers is modularization. Because problems are decomposed into discrete objects, you only need to consider the behavior of a specific object at one time.

Major problems occur when using more traditional programming practices because of the global side effects present. However, because OOP localizes the scope of an action to the objects receiving the message, there's less worry about how an isolated action can affect the system.

OOP lets programmers think more abstractly. Because a mechanism for computing gas mileage can be specified for vehicles, you can specify it once and forget about details. Researchers concentrate more on TANK behavior, strategy and deployment.

A strong argument for OOP is that it combines declarative and procedural knowledge. Translated from AI jargon, OOP is as much concerned about what's being represented as how it's being processed. Traditionally, systems have been described in terms of how they act, often as a large mesh of procedures. OOP

Figure 1.

```
(TANK
  (VEHICLE)
  NIL
  ((AMMUNITION NIL NIL NIL NIL ((CARDINALITY.MIN (1))
(CARDINALITY.MAX (4))))
(WEIGHT (50000) NIL NIL NIL (CARDINALITY.MIN (1))
(CARDINALITY.MAX (1))))
)
  0)

(VEHICLE
  NIL
  ((FUEL_CAPACITY NIL NIL NIL NIL
  ((CARDINALITY.MIN (1)) (CARDINALITY.MAX (1))))
(FUEL_RATE)
(X_POSITION NIL NIL NIL NIL ((CARDINALITY.MIN (1))
(CARDINALITY.MAX (1))))
(Y_POSITION NIL NIL NIL NIL
  ((CARDINALITY.MIN (1)) (CARDINALITY.MAX (1))))
)
   0)
```

Figure 2.

```
class tank {
truct vehicle v;                    // part of our sample class

          /* Function prototypes */

          public : tank();                    // constructor (builds an object)
                   ~tank();                   //destructor (removes object)
                   move(float,float);         //moves tanks with given offsets
                   }
}

void tank::tank()                             // construct a tank
{
          v.propulsion = TRACKED;
          v.weight = 70000;
          v.length = 27.4;
          .
          .
          .
}

void tank::~tank()                            // remove a tank from the simula-
                                    tion
{
          delete t;                           // delete the storage associated
                                    with the tank
}

void tank::move(float dx, float dy)
{
          v.x_pos += dx;                                  /* update x,y position with move
                                                    ment */
          v.y_pos += dy;
}
```

encourages specifying what the data is, how it should appear and how it can be acted on.

Another argument in favor of OOP is the intuitive representation it provides; tanks, mines, soldiers, terrain, strategies, and so on seem a more natural way to represent a battlefield than 1,000 functions executing in one big "for" loop.

Tools For OOP

A few of the many OOP tools are presented here. Examples of an object-oriented traditional procedural language (C++), functional language (LISP Flavors) and an expert system shell are included.

1. C++ — Although there are many OOP languages on the market, C++ (and its sister objective C) is the most familiar. C++ isn't a language but rather a series of extensions to C implemented by a preprocessor to the C compiler.

C++ offers several enhancements to C:

■ Object-oriented data types provide encapsulated objects. When C++ objects are declared, functions to create and destroy objects are generated automatically. Programmers can designate private functions, available only to instances of the class.

■ Strong typing performs rigorous type-checking on functions, arguments used in function calls and values returned by functions to check for agreement. C++ allows many of the function declarations to be made in a header file, making software management easier.

■ Overloading provides the capacity to create functions that take arguments of different types. An example of a commonly overloaded function is +, where the different functions called depend on the types of the arguments passed, such as real, integer and long. With overloading, arbitrarily robust functions can be constructed: + might include string concatenation or result in BATTALION + ARMY, returning the force strength of the combined armies.

C++ offers low-cost, easily accommodated OOP, because only extensions are made to the existing language. C++ has several attractive aspects:

■ Already developed algorithms are still useful.

■ Existing data representations and structures can be accommodated.

■ C programmers can use all their skills.

■ C development environments and tools can be supported.

Figure 2 is an object-oriented C program.

2. Flavors — Flavors provides OOP extensions to LISP. Developed at MIT (after a trip to an ice cream parlor), Flavors made functional programming easier.

For non-LISP experts, functional languages operate almost exclusively by performing functions on objects. A good LISP program is shown in Figure 3. This type of programming permits programs that can be considered as one large, compound function with arguments (see bottom of Figure 3).

Actions that aren't simply functions acting on arguments are called side effects. Flavors provides object data structures and side effects to send messages from one object to another. Figure 4 is an example of Flavors.

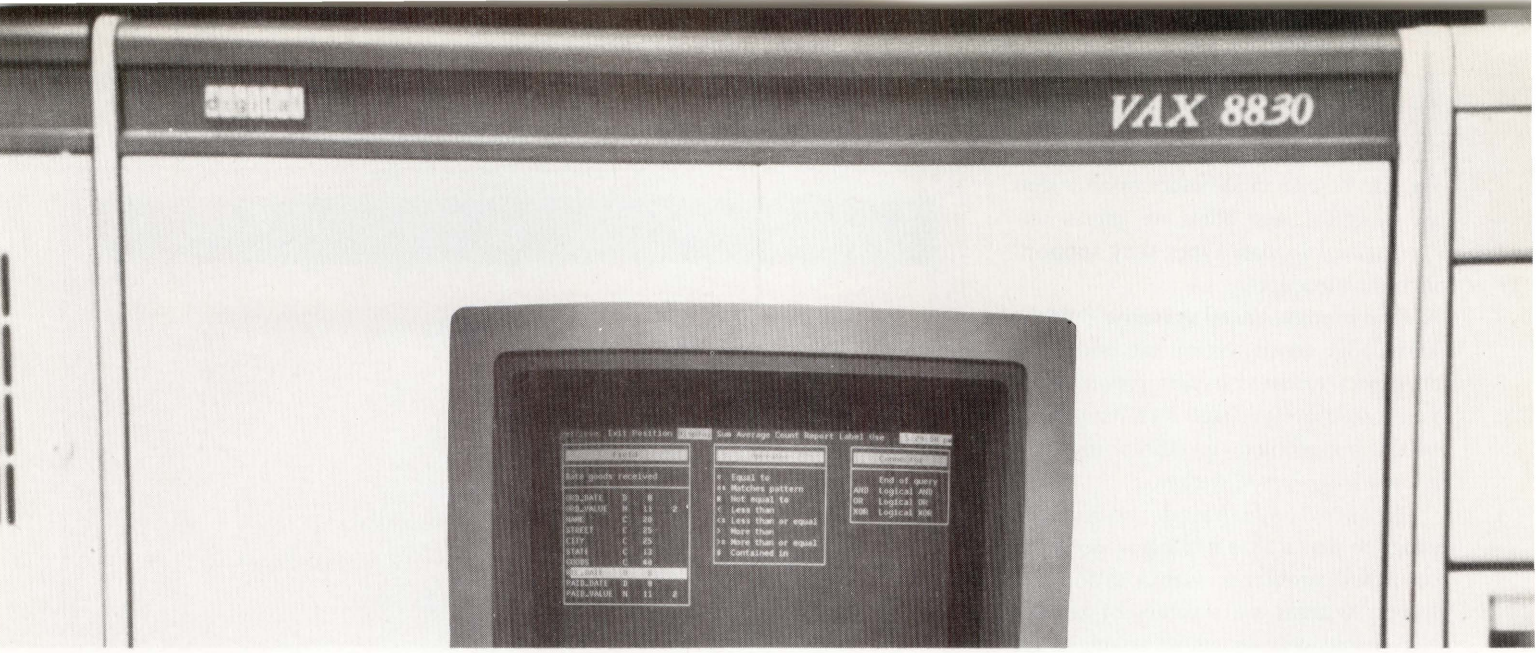
Flavors incorporates standard object-oriented features such as objects, methods and inheritance. It provides even more flexibility than many OOP environments. Locally executed methods (mix-

Figure 3.

```
(function name_1 (arguments)
                 (function_previously_defined [arguments or functions of
        arguments])
)

(function name_2 (arguments)
                 (function_previously_defined [arguments or functions of
        arguments])
)
.
.
.
(function name_last (arguments)
                 (function_previously_defined [arguments or functions of
        arguments])
)

_____________________________________________________________

(function (function ( function ...(function [arguments]))...)))
```

Figure 4.

```
(defflavor weapon
            ;define a tank(
            calibre                                          ;slots
            firing-rate
            ammunition-type
            ammunition-weight)
            (:required-methods fire-weapon)          ; methods at flavors disposal
            (:initable-instance-variables)           ; allow inheritance
            (:readable-instance-variables)           ; can be read from keyboard
            (:writeable-instance-variables))         ; fillers set via lisp setf

(defflavor tank(                                                ;define a tank
            turret-size                                         ;slots
            armor-thickness
            platoon-leader)
            (ground-vehicle weapon)                             ;flavors inherited
            (:required-methods move_tank destroy_tank refuel_tank)
            (:initable-instance-variables)           ; allow inheritance
            (:readable-instance-variables)           ; can be read from keyboard
            (:writeable-instance-variables))         ; fillers set via lisp setf
(defmethod (make-instance) (&rest ignore)            ; create instance with fillers
   (setf (turret-size self) 900)                     ; set turret size to 900cm
   (setf (armor-thickness self) 10)                  ; set armor to 10cm
   (setf (firing-rate self) 15)                      ; fires once every two minutes
   (setf (ammunition-type self) 'high-impact-shell))
(defmethod (move_tank) (& rest ignore)               ; a method to move tanks
   (update-position self)
   (cond ((not (destroyed self)) (draw-tank-icon-self))  ; if not destroyed,
                                                     redraw tank
            (T (remove-from-simulation self))))      ; else remove from
                                                     the simulation
```



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CIRCLE 231 ON READER CARD

ins) can be executed before or after slots are modified, and fillers are almost unconstrained in data types they support, including graphics.

3. Knowledge-based systems —Many knowledge-based systems are built with an object-oriented expert system shell, i.e., a software package including many of the nonproblem-specific portions of a knowledge-based system.

A knowledge-based system is a program that makes intelligent decisions on posed problems within a domain. Expert systems are a subset of knowledge-based systems whose solutions are considered equivalent to that of an expert in the domain.

Expert system shells often incorporate many object-oriented features, including structured classes, methods and constraint enforcement on instances. The shells provide additional features for inferencing, including a built-in user interface, rule-handling capabilities, backward (goal-directed) and forward (data-directed) chaining inference mechanisms, a database manager and hooks to higher-level languages.

Figure 5 presents a modified segment of a simulation written using an object-oriented expert system shell.

Building An Application

Let's build an application using an OOP tool. We'll build a bank's sophisticated loan-assessment program to run on a workstation.

The first task is determining what objects will be represented and what their behavior will be. Many windows seem intuitive objects to create, including ones to view existing loans, credit history, assets, projected payment capability, and so on.

Viewing several windows simultaneously seems advantageous.

Here we see some application of OOP: The windows should be almost completely autonomous, i.e., the existing loan window shouldn't interfere with the asset window. By treating each window and its individual application programs as independent objects, such interference is avoided.

Figure 5.

```
; ____________________________________________
; Distanced squared between two objects x,y positions
; Input: point #1' x,y, point #2's x,y
; Output: Square of distance between #1 and #2
; ____________________________________________
(defun distance.squared! (x1 y1 x2 y2)
  (+
    (square! (- x1 x2))
    (square! (- y1 y2))
    )
  )
; ____________________________________________
; Check to see if a tank hit a mine and the mine should detonate
; based upon strategy selected.
; This method is called as each tank moves to see if it has encountered a mine.
; Input: xpos  (x position) , dx (distance tank to mine x)
;              , ypos dy of tank, list of mines still to check
; Output: True if mine kills tank, Nil otherwise
; ____________________________________________
; operates by cdr'ing down the list of mines, applying detonation strategies

(defun killed.by.mine! (xpos dx ypos dy)
  (let
  ; access an individual mine's detonation strategy
    ((strategy (get._the_slot_value 'mine.1 'detonation.strat)))
            ; get a list of mines to work with
     ;  access every  instance of the mine class and place
    ;  the square of their distances to the tank in a list
"dist.name.mine.list"
    (cond
      ((equal strategy 'closest)                          ; apply a detonation
                                                        strategy
"closest"
       ; by applying a method with the list of mines to the tank we are currently
       ; moving
         (killed.by.mine.assist! (sort dist.name.mine.list) self))
       (T nil)
       )
     )
  )
; ____________________________________________
; Assists in checking to see if a tank hit a mine and the mine should detonate
; Output: True if mine kills tank, Nil otherwise
; ____________________________________________
; operates by cdr'ing down the list of mines, applying detonation strategies

(defun killed.by.mine.assist! (dist.name.mine.list tank)
   ;  the above is a list of (distance unit.name) of mines and a tank
   ; below we get the fillers of some slots for mines and access the list
  (let
    ((mine (car dist.name.mine.list))
     (kill-prob (get._the_slot_value 'mine.1 'probability))
     (mine.name (cadr mine))
     (distance (car mine))
     )
    (if (null mine)
   ()              ; done entire list of mines
   (           ; otherwise perform some mine detonation checks
   )
    ; call a method to display a destroyed tank and modify the simulation if the tank
    ; has been blown up
     (killed.by.mine.assist! (cdr dist.name.mine.list) tank)
     )
  )
```

When one program needs another's data, messages are passed and data exchanged via methods. This way, the asset- and loan-assessment programs can perform interest-rate computations without worrying about how the other compounds interest, names variables, scopes functions, and so on.

A first level of OOP is obtained by declaring each class with the methods it uses. A second level of OOP should be used, though, on the window display functions. Many computer systems include object-oriented display functions for such purposes, including functions to move, resize, close, redisplay and scroll windows transparently.

By using an OOP format, the application programmer needn't worry about the window's implementation but only that he sends it text or graphics. The object's methods take care of the win-

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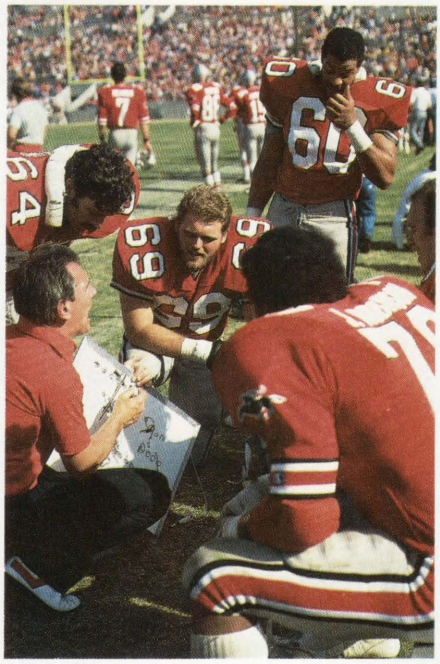

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New Frontiers For CASE

Research sponsored by Software Engineering for Corporate America (SECA), a CASE company, reveals that approximately 80 percent of programming costs go not toward planning, coding or testing but toward maintenance, an often-overlooked phase of the software life cycle. SECA also learned that 50 percent of all software now being developed will be obsolete or unusable by the time it's completed.

These staggering percentages represent the reasons why companies that invest heavily in software engineering — and many have been hesitant to change their ways — are turning to CASE technology to automate their software development life cycles.

A new technology, CASE has advanced to the point that no one should be reluctant to use it. The leading products in the Digital industry, for example, are more secure than earlier systems, integrate the phases of the software life cycle with shared access to relational databases and have provisions for optimizing distributed and client/server network architectures.

Current CASE systems can design software applications for such advanced uses as embedded systems, real-time sites and visual simulations. They also offer more complete portability, especially among UNIX workstations. Best of all, their icon/object-based user interfaces make them easy to implement. For some sites, the payoff in system productivity comes quickly.

CASE Innovations

Implementations of CASE and CASE technologies have matured quickly during the last year. For example, a variation on the CASE theme called software re-engineering is capable of application code maintenance and rebuilding techniques.

This neonatal technology is being implemented in the Digital industry by Hypersoft and InterPort Software. The goals of such products are to provide ways to extend current applications and provide for the portability of code running on new platforms to the extent that it appears to have been designed on the host platform.

Another CASE innovation is traceability, a project management-type function that tracks and allows the review of every step of the design process. Many CASE users consider this a bigger benefit of CASE than its cost savings.

CASE systems also increasingly implement object-oriented database technology as part of their core architectures. This not only makes CASE faster and easier to use, but the inclusion of the concept also makes it more amenable to adopting objects as the fundamental database technology in the future.

CASE Objects

CASE industry analysts agree that object-oriented technology will become the standard data environment for CASE systems. The trend is underscored by Mike Connell, general manager at Servio Logic Development, which produces the GemStone object-oriented database. He says that designers of CASE and CAD systems make up the bulk of object-oriented database users. Thor Johnson, CASE product manager at Cadre Technologies, says that sizeable portions of his program are written with C++.

Larry Stevens, CASE strategist at Oracle, says that Oracle's four-year-old CASE product, which integrates with the Oracle RDBMS and IBM's DB2, uses an object database for building interrelationships within its design/diagram tools. Stevens notes that most of Oracle's CASE customers use facilities such as these to design extensions to their existing applications.

The potential for these products seemed limited a few years ago. "It's much easier to implement graphical window systems, for example, as a collection of objects," says Sesha Pratap, president of Saber Software. "Also, you can potentially use it to develop spreadsheets, where each cell is stored as an object."

These new technologies still need time to mature, and the development of standards is a major impediment to their acceptance. The Object Management Group (OMG), Westboro, Massachusetts, is pushing for standards on four levels:

1. A common user interface.
2. A common definition of objects, i.e., standard types of functions and naming conventions.
3. Standardization on the use of and integration with C++.
4. The interoperability of objects. Servio Logic's Connell considers this the Holy Grail of object programming.

Database Integration

While CASE has progressed rapidly in some environments (mostly technical), it lags in others. Analysts predict that a final shakeout of CASE vendors may begin before the trend kicks into high gear.

CASE specialists in the Digital industry such as Cadre Technologies, Index Technology and Interactive Development Environments stand well-positioned to weather a shakeout. Cincom Systems, Cognos, Computer Systems Advisers, Cortex, Information Builders and Software AG, which focus on various aspects of CASE, should do equally well.

The spreading of the CASE gospel depends on how well CASE manufacturers can integrate their products with existing 4GLs and RDBMSs — design software that engineers are comfortable using and have too much invested in to abandon. Many CASE companies are establishing relationships and bridges with 4GL and RDBMS vendors to ensure data compatibilities.

This integration ultimately will involve objects. Significantly, Servio Logic's GemStone interfaces with the Sybase transaction processing-oriented RDBMS. SmartStar and others are designing their packages to integrate with CDD/Plus, Digital's distributed data repository.

New CASE From Digital

Digital is relying on the talents of many of these companies to solidify the VAX as the leading CASE platform. However, Digital offers a package of software engineering tools called VAXset to which the company has devoted much research and development in the last year. Digital recently introduced a new Program Design Facility (PDF), a major enhancement to the VAXset editor.

Digital's overall CASE project has been stepped up in recent

Continued on page 54.

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New Frontiers For CASE

Continued from page 52.

months in response to IBM's plans to develop and ship a CASE Repository, which inevitably will become the standard way CASE data is stored throughout the industry. IBM's accompanying product set is called AD/Cycle (Applications Development). Besides its technological implications, the IBM effort gives the misunderstood CASE industry a needed endorsement.

Digital's CASE strategy, which has been cogent for more than four years, is considered to be slightly ahead of IBM's. According to Alfonso Di Ianni, Digital's CASE program manager, the current goals for the company's CASE products include:

1. Support for CASE tools in the NAS networking environment, including software standards such as POSIX, CDA and SQL.
2. The development of a common user interface for all CASE systems based on DECwindows/Motif.
3. A common repository that permits the integration of CASE tools.

Hugo Simpson, corporate vice president of the Information and Productivity Systems Group at Unisys, says that CASE and 4GLs only are beginning to make a contribution, and their potential still lies far in the future.

"What CASE hasn't yet achieved is a fresh conceptual breakthrough in the way applications are designed, coded and maintained," says Simpson. "The real CASE frontier is the ability to bring the power of the application closer to the user, reflecting true business requirements."

"What software engineers *really* want is to be able to speak into a microphone and have code come out the other end," laments Cadre's Johnson.

Indeed, the biggest battle for CASE vendors may be to overcome unreasonable expectations and common misconceptions. "The greatest barriers to implementing software engineering," says Steven Barsh, president of SECA, "are cultural rather than technological."

—Evan Birkhead, Senior Editor

dow's behavior.

As the application is developed, the key guideline becomes apparent: Objects should behave as they should be seen by the world; they should act like actors in a play. Following such a guideline eases application development.

OOP IS AN ATTRACTIVE alternative to more traditional approaches, especially when the problem either decomposes into objects and their respective behaviors naturally or has no obvious flow of control, i.e., you don't know what to do next.

Software designers recognize the significant cost-savings that can be achieved via the more subtle features of OOP, including strong typing, cardinality- and bounds-checking, and inheritance. These features speed the development of a large software effort tremendously because, although an initial overhead is incurred to detail the constraints, trivial mistakes that can be difficult to find and correct are avoided.

—David G. Goldstein is a Ph.D. student studying parallel expert systems and computer vision. He also works as a consultant.

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WORKSTATION MUSCLE

Workstations may become the system of choice for many applications. BY DAVID W. BYNON

ABOUT 30 YEARS AGO, a computer company was founded on simple yet profound principles: distribute computer resources to smaller units, make them interactive and easy to use and let them share what they have. The company, of course, was Digital, and its founder, Ken Olsen, had the brilliant idea to distribute the computer as close to its user as possible.

In a distributed system, the LAN binds many systems into one. The distributed system is a contribution of valuable resources by many machines. Until recently, the full potential of distributed systems couldn't be realized.

Mainframes and minicomputers have the power to support large applications and databases, but the user interface to these systems is often unfriendly and inefficient. Worse, large systems frequently operate under a mainframe MIS mentality in which user computing takes a back seat to business applications.

At the other end of the spectrum, PCs fulfill the need to have a friendly, useful computing resource on the user's desk. But they can't contribute to the distributed system. PCs merely extend the capability of mainframes and minicomputers. They don't replace them.

The Workstation Difference

The workstation is different. With the muscle of a minicomputer, a dynamic user interface and the ability to tap the power of other systems, workstations quickly are becoming the system of choice. For many applications, workstations are replacing minicomputers. The workstation can bring the full power of a distributed system to the user and share its potential with others.

Fueling the workstation fire is MIT's X Window System. Until X, workstations couldn't completely take advantage of all network resources. Specifically, workstation users couldn't use applications loaded on other workstations, mainframes or minicomputers in the network. Like PC users, the workstation user accessed these resources through terminal emulation.

X completed the distributed system concept by allowing a workstation to be both a server and a client in a network. With X, a workstation can share its software and processing potential with others, while it displays applications running on other systems for the workstation user.

Like PC graphical user interfaces (GUI), X GUIs are intuitive and support a do-it-yourself mentality. Although there are relatively few user computing tools that take full advantage of X, many database and 4GL software developers promise to support the new workstation standard. Within a few years, most popular applications will be compatible with X.

Another reason for the rush to use workstations is the low cost of workstation hardware and software. In 1989, the average workstation cost $15,000, and

workstation software is starting to compete with high-end PC software packages. Workstation prices are dropping quickly because of the fierce battle among workstation manufacturers. The cause of the battle is understandable: The computer company that wins the desktop in the 1990s probably will be the most successful in subsequent decades.

Businesses using distributed workstations in place of minicomputers do so for two reasons: power and cost. Ten DECstation 3100s (at about $200,000) equal the raw processing power of a VAX 9000 (at about $2,500,000). While this may be an apples and oranges comparison, it dramatizes the price/performance ratio of today's workstations.

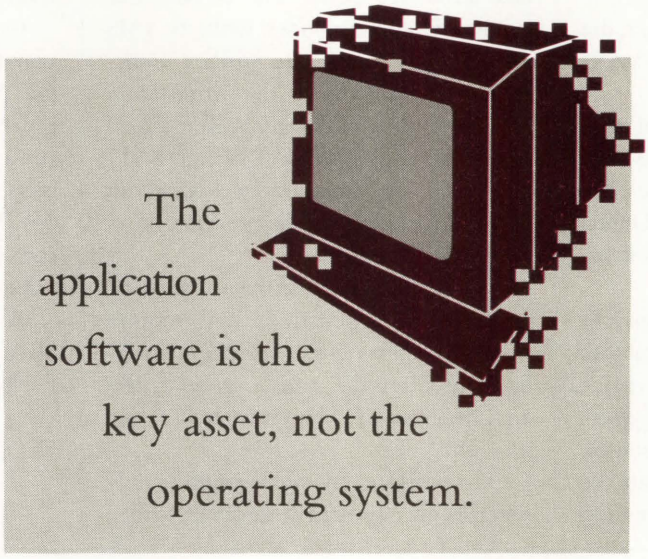
Although workstations continue to be most prominent in scientific and engineering functions, other applications are emerging rapidly. Information-intensive tasks such as statistical analysis and financial trading are growing quickly. Commonly known as computer hogs, these power-hungry applications are well-suited to what workstations offer.

Occasionally, I've witnessed a small group of statisticians, analysts or programmers bring a small VAX 8000 or 6000 to its knees. In these cases, the workload is so CPU-intensive that everyone is slowed. Had this same application been applied to a network of workstations, the work would have been processed much faster for less money.

Operating System Opposition

One concern raised by many would-be workstation users is the VMS versus UNIX controversy. Even though the price/performance of RISC heavily outweighs CISC, DEC shops continue to buy CISC machines. In the last quarter of 1989, Digital was selling more VAXstation 3100s than it could ship. Although the choice of an operating system should be a consideration, it shouldn't be your primary one. The application software is the key asset, not the operating system.

Digital, Hewlett-Packard, Sun Microsystems and several other workstation vendors have made it easy to integrate their workstations with existing machines. With Sun's Network File System (NFS), workstations share storage devices with server systems as seamlessly as client systems in a VAXcluster. Digital's implementation of NFS, called the VMS/ULTRIX Connection, lets one or more standalone or clustered VAXs serve UNIX workstations. The VMS/ULTRIX Connection software supports internet networking protocols, including Transmission Control Protocol (TCP), Internet Protocol (IP), File Transfer Protocol (FTP), User Datagram Protocol (UDP), Internet Control Message Protocol (ICMP) and Address Resolution Protocol (ARP).



To the workstation user, the operating system is less of a concern than the GUI. With the exception of programmers, most workstation users rarely venture past the user interface. With the introduction of Motif, the X GUI from the Open Software Foundation (OSF), few workstation-compatibility issues remain. The workstation user can run and display local programs or programs running on client systems (VMS or UNIX).

Data Sharing And Networking

X has made information access as easy in the network as it is on a single system. X's ability to let its user open a window into another system is a tremendous asset. Remote resources appear to be local. Unfortunately, this ability could induce a negative side effect in the form of network delay.

Independent tests have shown that a pair of DECstation 3100s can saturate an Ethernet. Although the tests were extreme (client applications making graphic primitive requests to remote servers at full speed), they prove that X can be a problem if used incorrectly.

This potential threat to network performance could have serious consequences for X terminal manufacturers. When workstation applications are run on the user's workstation, which is most often the case, network traffic isn't affected. X terminals are designed to tap the power of compute resources on the network. Their load on the network is continuous. Large X installations probably will require the use of LAN bridges to manage and localize network traffic.

If you're deciding whether to use a workstation in place of a minicomputer, consider how storage requirements and printing will be realized. Some workstations, especially those without a backplane adapter, are limited.

The most economical way to provide storage services to a network of workstations is to use a server. Although the server can be another workstation, this defeats the purpose. A server should be dedicated to the task of resource serving.

In the Digital environment, MicroVAXs most often are used as workstation servers. Digital's MicroVAX family of servers spans a range of price and potential. At the low end, a VAXserver 3100 running ULTRIX, two SCSI controllers and a 104-MB disk drive costs $6,680. At the high end, a dual-host VAXserver 3800 running VMS, TK70 tape and two 400-MB disks costs $104,900. MicroVAX servers typically are priced 20 to 25 percent less than the equivalent multiuser system.

The VAXserver 3100 appears to be the better value. This is the case if your storage

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requirements are relatively low. Each VAXserver 3100 can support two SCSI controllers. Each SCSI controller can manage one to four drives. Using third-party disks, the maximum storage capability of the VAXserver 3100 is 4.8 GB.

Although this is a fair amount of storage, the I/O bandwidth of the VAXserver 3100 imposes a severe performance penalty to RISC workstations. Most Digital buyers prefer Q-bus servers for their capacity and greater I/O capability.

One of the best storage solutions is to use a combination of servers and local disk storage. Servers should be used to maintain common system software, application software and data. Local workstation storage should be used to maintain the user's primary application. This method keeps disk I/O as local to the workstation as possible without duplicating files. Using the workstations for casual disk serving won't noticeably affect the workstation user's performance.

If common output devices are desired, network terminal and printer servers can be used. Many sites use terminal servers to take advantage of the one- to two-user licenses Digital provides with its VMS workstations. While the primary workstation user logs in at the workstation display, another user can log in using an ASCII terminal. With DECnet/LAT-compatible X terminals, two users can take full advantage of the workstation.

GENERALLY SPEAKING, the workstation is suited to applications that require power, graphics and a modeless interface. Workstations and X provide this environment, but the cost per user can be high.

The workstation can be justified only when its use is proved more effective than other systems. In some cases, this can be as simple as a hardware/software cost analysis. In a recent analysis of my own, I found that a clinical software package license for a MicroVAX 3400 costs $141,000. The same software license for a VAXstation 3100 costs $5,000. The cost savings in software would be enough to purchase several VAXstation or DECstation 3100s.

Other applications, such as statistical analysis or programming, are justified by the processing requirements. I find it easier to justify a dozen DECstation 3100s and a disk server for a group of programmers, analysts or statisticians than a VAX 6000 Model 410. The VAX 6000 Model 410 costs at least twice as much, and it doesn't provide the same level of performance.

Although the workstation won't replace the minicomputer completely, it's finally taking its rightful place.

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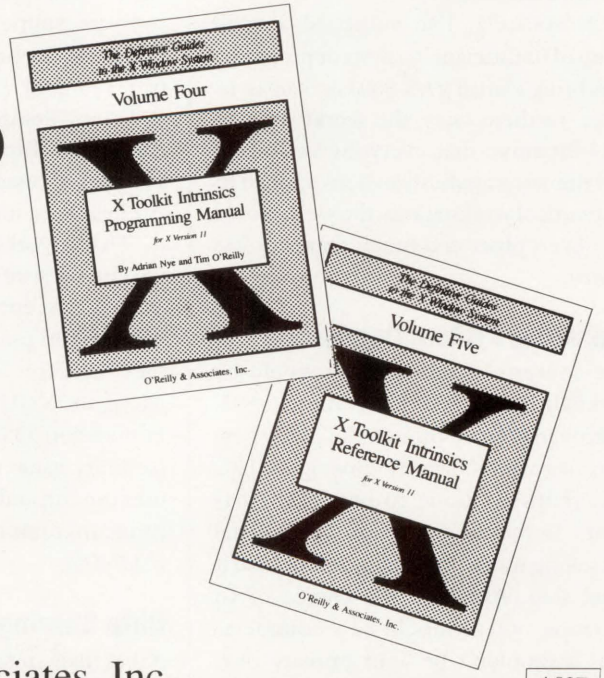

These are the books you've been waiting for: the *X Toolkit Intrinsics Programming Manual* and *X Toolkit Intrinsics Reference Manual*. The X Toolkit is powerful but complex, and users complain that "you have to know everything to do anything."

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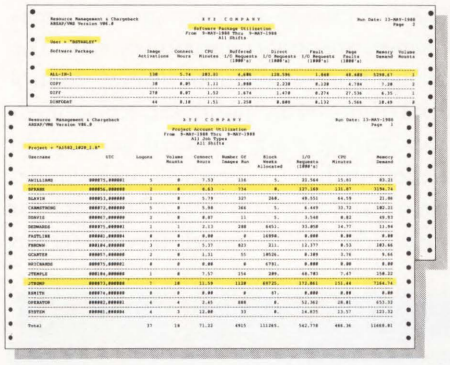

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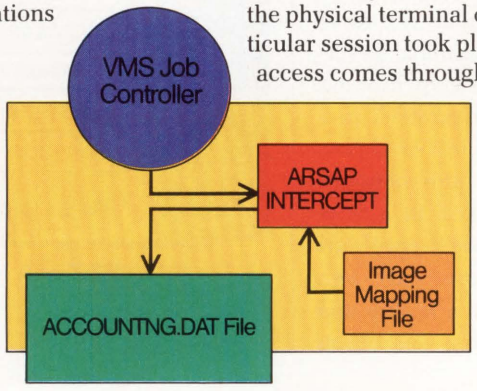

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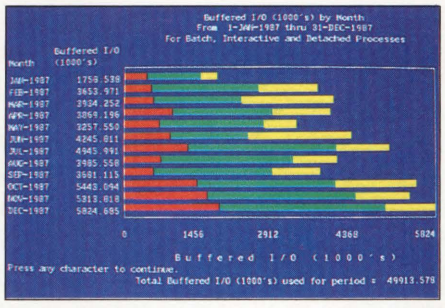

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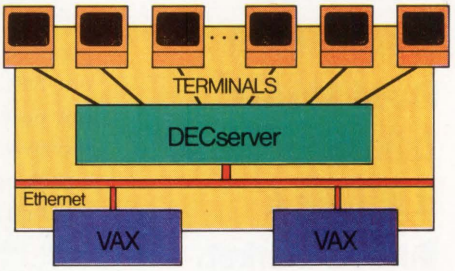

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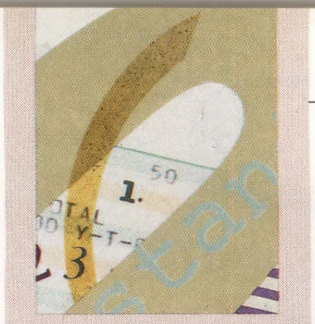

PROTOCOLS

FLUSH TIMES FOR LAT

By Donald G. Hirsh

Now That Digital Is Licensing LAT Technology, Prepare For A Flood Of LAT-Talking Products. It Will Be A Buyer's Market.

Several years ago, Digital built an elegant LAN-based terminal protocol called Local Area Transport (LAT) that's the basis for its DECserver family of products. LAT is well on its way to becoming a de facto standard.

Now that Digital has obtained one of several LAT patents and is licensing the technology, prepare for a flood of LAT-talking products. Third parties have been churning out DECserver clones for the past year or so, but now it's official, and even the most conservative players will hit the trade shows with a pack of new features.

Digital has decided to promote LAT as a de facto standard for terminal traffic, and with good reason. Because it's uniquely optimized for its task, LAT is a blessing to system managers. For asynchronous traffic on local networks, LAT is the best available technology and won't easily be supplanted by OSI's VT or IP's TELNET.

Terminal Server Basics

Terminal server technology has become so pervasive within the past five years that a number of VAX professionals may not recall what life was like without it. Terminal servers simplify life when you connect asynchronous devices (such as terminals and printers) to a host. When a server is packaged in a small box, say with eight ports, it constrains network wiring problems. If you looked in a busy Digital shop in 1983, you saw a spaghetti of wires running from terminals and printers distributed throughout a facility and terminating in the machine room. Expansion and change were difficult at best, and troubleshooting failures were painful.

Into this arena walked a small device that constrains the spaghetti to reasonably short runs — from a desktop to a wiring closet. In conjunction with a premises distribution wiring system, such as DECconnect or systems from Mod-Tap System and Nevada Western, facilities maintenance on a large network of terminals and printers has been greatly simplified. Changes are now comparatively easy. The cost savings from installation, change control and maintenance easily justify the replacement of direct wiring with terminal servers. In conjunction with the other bells and whistles that are a part of every server, the case for local networks and terminal servers (versus

FIGURE 1.

The OSI Model	LAT
Application	
Presentation	Service Class
Session	Slot
Transport	Virtual Circuit
Network	
Data Link	Data Link
Physical	Physical Link

LAT as it corresponds to the OSI Networking Model.

Concurrent LAT-TCP/IP? It's no biggie.

In a very small way, Lantronix has just revolutionized the terminal server.

Fact is the Lantronix ETS-8 packs 8-channels, Ethernet compatibility and dual protocols in an incredibly small package.

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No big price tag either. The ETS-8 is by far the lowest cost dual-protocol terminal server on the market today.

And it's the only real solution when you're adding just a few terminals or printers.

The savings are even greater when you figure your total cost per installed terminal. Because the ETS-8 is designed to be installed close to your workgroup's terminals, you eliminate the needless expense of cabling each terminal to a centralized location.

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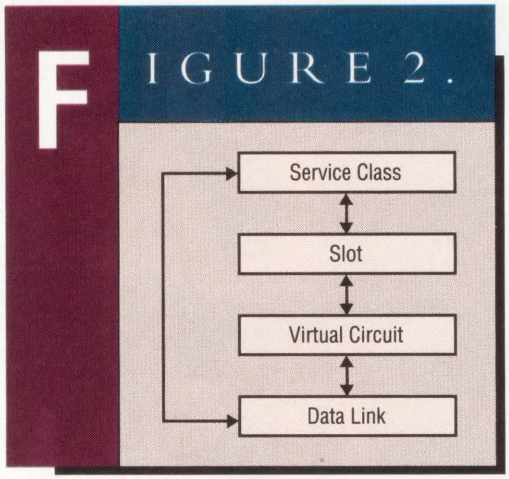
direct-wired asynchronous devices) is complete.

What are the bells and whistles? They include multiple sessions to multiple hosts from a single terminal/port (with out-of-band signalling to toggle between the sessions); support for printers attached to the server; and password protection of individual server-ports, offering a modest security addition. Recent features include multiprotocol support, support for parallel ports, and 3270-ANSI interoperability. The future promises more of the same.



LAT interlayer communication.

The Origins of LAT

Digital began exploring terminal server technology in 1981 to solve an explicit problem: dynamic access to the VAXs of the then-experimental VAXcluster. The primary concern was a load-balancing front end for CI-based clusters. Several schemes were proposed and abandoned before a flexible and economic front end was developed in the form of an Ethernet interconnect and a PDP-11-based terminal concentrator.

The first prototypes were developed using DECnet transport and the CTERM protocol (just as DECwindows initially is being shipped using this combination of transport and virtual terminal protocols). Performance problems ensued when the PDP-11s executed multiple copies of these complex protocols.

The following problems surfaced as DECnet was grafted into an application for which it (and all other standard transport/virtual terminal protocols) was unfit:

1. How could a VAXcluster appear to be a single processing system rather than a collection of individual hosts on an Ethernet?
2. How could the load of asynchronous traffic be balanced across the members of the cluster?
3. How could server management be simplified and automated?
4. How could protocol processing time be minimized for hosts and servers?

The solution to these questions is embodied in the LAT protocol. As opposed to its networkwise brethren (such as TCP/TELNET, TP4/VT and DECnet/CTERM), LAT exploits four environmental attributes to optimize performance.

1. The protocol assumes that all participants in a LAT network are peers on a LAN. There's no network layer to route packets over an arbitrary network topology. Connectivity exists for data link peers.
2. The protocol multiplexes multiple simultaneous sessions onto a single virtual circuit between a given host and server.
3. Digital internal research showed that experienced typists are unaffected by character echo of less than 100 ms. The useful exploitation of this fact by making LAT timer-based is one of the protocol's most elegant features. The protocol buffers characters for as long as it can — typically 80 ms — and then ships a packet to the host. In conjunction with multiplexing, this minimizes LAN traffic.
4. Because the protocol buffers multiple characters from multiple users before sending a packet from server to host, interrupt processing on the host is significantly more efficient than the same set of terminals connected to standard asynchronous controllers.

LAT Operations

There are four major operational attributes in LAT. We'll examine each briefly

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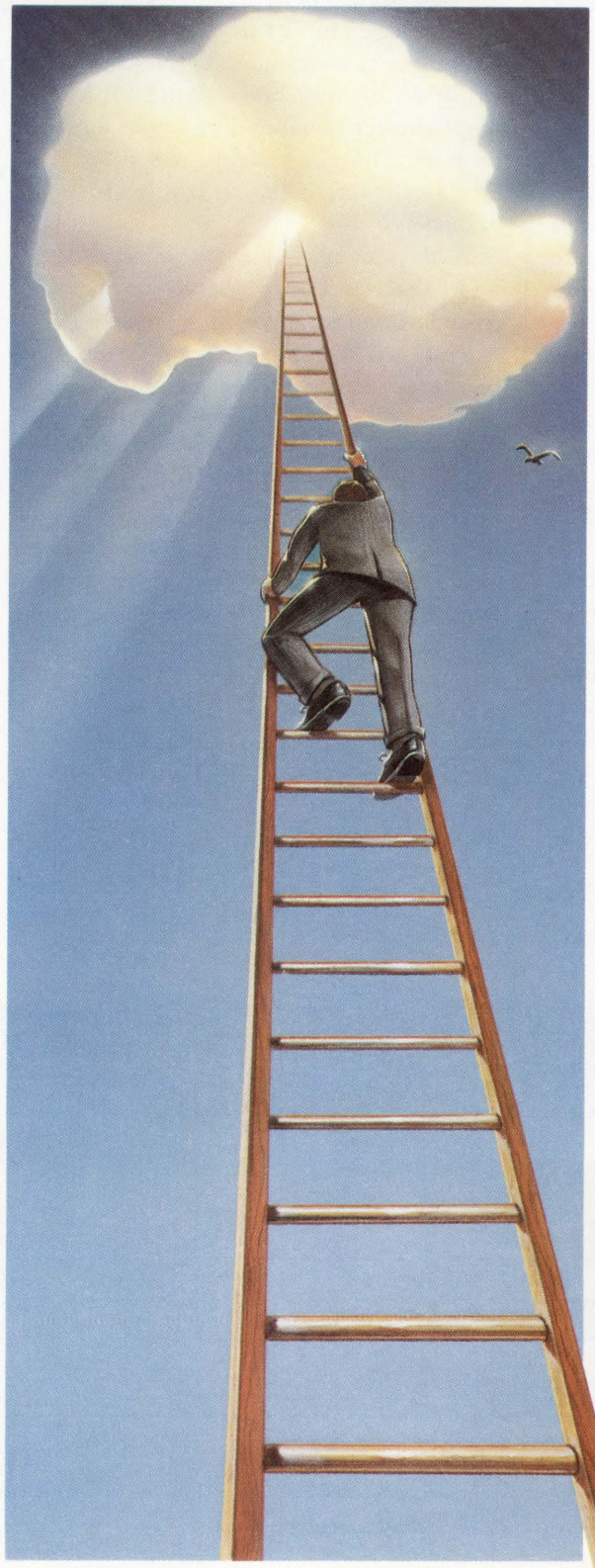

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LAT AND TCP/IP SUPPORT

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as we work up the OSI Networking Model (see Figure 1). Also see Figure 2 on LAT interlayer communication.

First, processes or processors that embody the LAT protocol must be (or appear to be) LAN peers (Level 1). Currently, LAT supports an Ethernet frame at the physical layer. LAT supports IEEE 802.2 (the standard 48-bit addressing scheme) as the standard method of getting a datagram from one entity to another (Level 2). LAT hosts and servers can be named, and these names are associated with individual Ethernet addresses (see Figure 2).

LAT is notable for its absence of a network layer (Level 3). If I can't get your Ethernet address, I can't get to you. At the transport layer (Level 4), LAT supplies a virtual circuit capability roughly analogous to TCP or XNS' Sequenced Packet Protocol (SPP).

Again, LAT differs from these in exploiting the high reliability of Ethernet. TCP and SPP provide a data-integrity checksum, which LAT doesn't, and the negotiation of an idle or balanced state in which a virtual circuit is maintained but no packets are sent for long periods of time. A comparison of popular virtual terminal protocols and their underlying networks is shown in Figure 3.

The second attribute appears in LAT's session layer and is called slot management. Its function is to multiplex streams of data onto a single virtual circuit. In almost all other protocols, an individual virtual circuit must be created for each terminal session or process. When a single TELNET server creates five sessions to a single host, five distinct virtual circuits are created. With LAT, a single virtual circuit provides service for them all. This is a principal reason for LAT's efficient network bandwidth utilization.

At the session and presentation layers is LAT's Service Class, which provides the remaining two attributes.

First, here the protocol is partitioned into server and host components. This implementation minimizes host system load (and correspondingly increases server load) and simplifies the creation and management of connections (only servers can initiate connections).

Second is Directory Services, a dynamic, decentralized load-balancing naming service. Hosts, or things that offer services to servers, advertise the availability of named services by issuing periodic multicast messages. Among the attributes in a service-availability message is a service rating, a value based on a measure of host business. In this way, hosts can provide multiple identically named services. When a server initiates a virtual circuit to a particular named

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FIGURE 3.

The OSI Model	LAT	XNS	TCP/IP	DECnet (Phase IV)	OSI
Application		Various Proprietary	TELNET	CTERM	VT
Presentation	Service Class				Presentation
Session	Slot			Session Control	Session
Transport	Virtual Circuit	SPP	TCP	End Communications	TP4
Network	No Network	IDP	IP	Routing	CLNP, X.25
Data Link	802.2	Various	Various	Data Link	Various
Physical	Ethernet	Various	Various	Physical Link	Various

LAT's architectural efficiencies include the lack of a network layer and the multiplexing of streams of asynchronous data on a single virtual circuit.

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In addition, we have a package, Reggie, that converts those beautiful Macintosh graphics into DEC formats (ReGIS and SIXEL) for use by VAX applications or output devices. And VMacS provides two-way file transfer and conversion to allow users to store and manage Macintosh files on the VAX's hard disks and tape drives.

So if your VAX is still using dumb terminals, maybe it's time they got smart. Or if your Macintosh and VAX don't communicate, maybe it's time *you* did.

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service, it chooses the one with the best service rating.

The Market Scene

Digital filed European and American patents in 1984 and 1985, within a year of the DECserver 100 product launch. From the outset, manuals in the DECserver family have had fairly explicit operational descriptions. Other recent Digital-engineered protocols, such as those underlying LAVc or PCSA, have virtually no descriptive literature, save an occasional DECUS presentation. The availability of descriptive literature encouraged would-be server manufacturers to analyze the protocol while rumors of patents-pending kept third-party activity to a minimum.

A lot of competitive water has flowed under the bridge and rendered a once-proprietary technology a virtual standard, even before Digital's licensing announcement. Digital's licensing program guarantees that even the most conservative terminal server and workstation manufacturers will offer LAT.

From 1984 to the present, Digital has moved from selling LAT as a layered VMS product (LAT-11) with a companion PDP-11-based server (DECSA) to bundling LAT with its major operating systems and an accompanying family of terminal servers (the DECserver 200, 300, 500 and 550).

During that same time, before the licensing policy, almost a dozen third-party competitors have developed either LAT on PCs running terminal emulators or LAT-compatible terminal servers. In DOS-land, the charge was led by Meridian Technology, Polygon and Walker Richer & Quinn, all emulating the LAT functionality offered by the LAT support of DECnet-DOS. In the server lineup, Able Computer Communications, Datability Software Systems, Emulex, Infotron Systems, Racal-InterLan, Sytek (now Hughes LAN Systems) and Xyplex shipped LAT-compatible servers before LAT was patented. The third party was already moving rapidly by the time one of the LAT patents was issued in April 1989. Now, Digital's primary objective is to promote LAT as a de facto standard.

The Future Of LAT Networks

Terminal server technology is straightforward. Hardware components are typically a standard 16-bit microprocessor (80186 or 68010), a few hundred kilobytes of memory, a standard Ethernet interface, UARTs and a bus.

On the software side, a simple real-time executive (optional), one or more protocol implementations, a command interpreter and software interface to the LAN, and asynchronous ports make up the remaining components. This is off-the-shelf technology, and terminal servers are rapidly becoming a commodity business.

The process of developing a multiprotocol server or different protocols to operate on an existing server is largely a process of integrating a new communications protocol into an existing product environment. If the manufacturer does a good job building a modular environment, it's simple to develop a multiprotocol server. If it doesn't, it pays with longer time-to-market. One thing is certain: We'll see an unprecedented number of products in the near future. Here are a few well-informed bets:

1. X over LAT — There has been a fair amount of speculation about whether Digital will support DECwindows sessions

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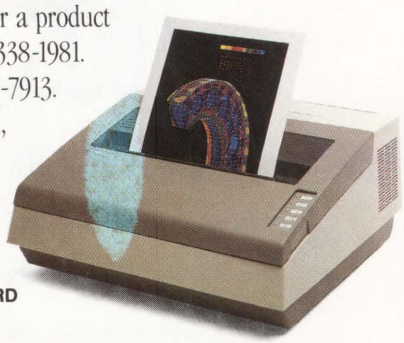

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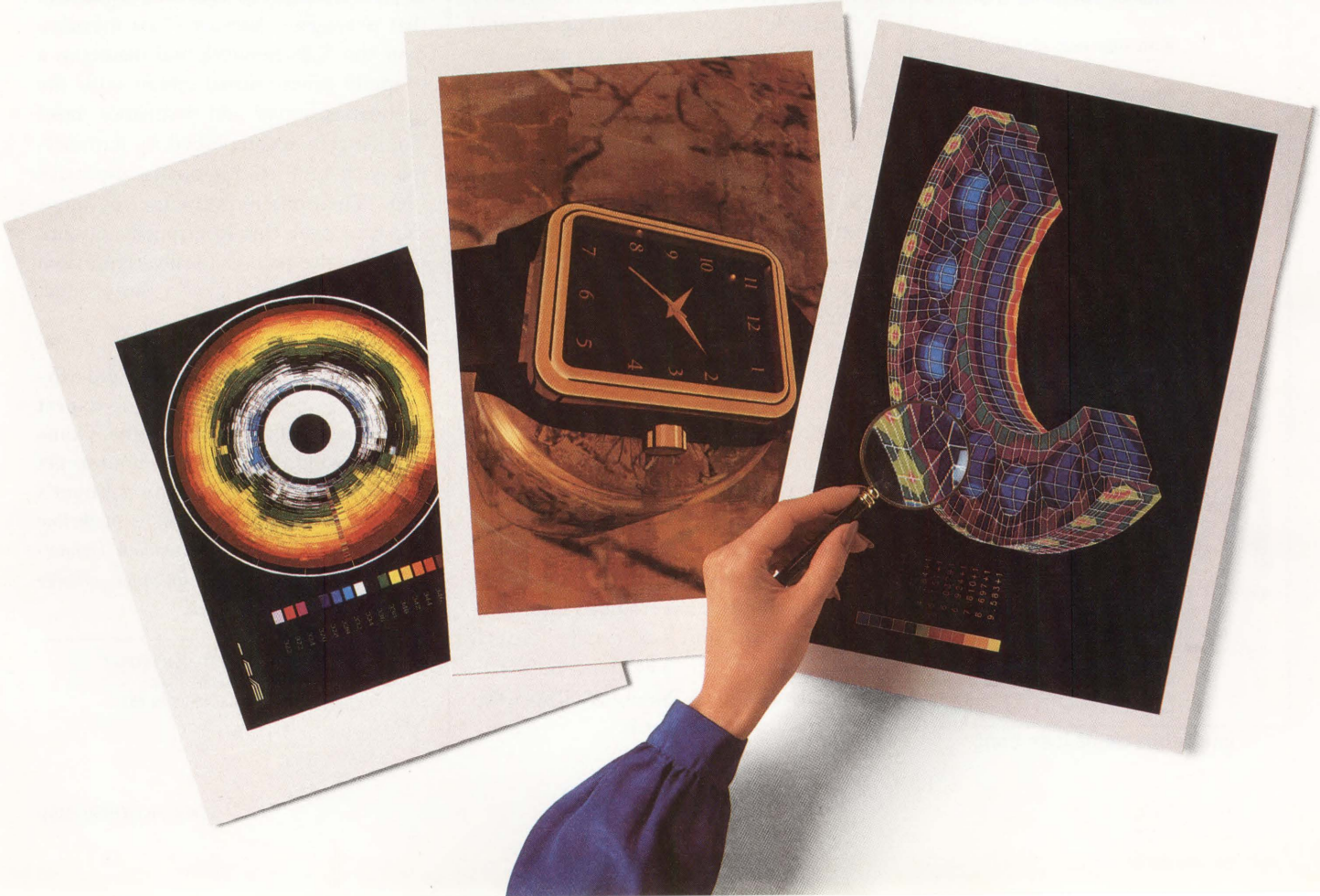

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over LAT. No significant limitations within the protocol prevent this. This extension of LAT functionality will have to gain support from within Digital before there will be a significant market impact. X terminal manufacturers will follow Digital's lead. Expect Digital to ship X terminals before it adds this support to VMS or ULTRIX.

2. New-generation terminal servers — Watch for a surge of product differentiation. Because multiprotocol support is now a given (primarily LAT/TCP), the three most obvious product differentiation schemes are support for various network management protocols, product packaging, and families of servers, from eight-port shirt-pocket units to systems the size of small data switches.

3. Managing bundles of terminal servers — A simple-minded but useful product called Terminal Server Manager (TSM) lets you store DECserver configurations on a VAX and download them to servers. Expect competitive software offerings (management tools) and vendors complying with one another's management programs.

4. LAT on PCs — Until recently, LAT compatibility for PCs running terminal emulation software was an extra-cost option. By mid-1990, this capability will be considerably devalued. This once-strategic advantage is rapidly moving toward being standard.

5. LAT on workstations — Digital has offered only the host portion of the protocol on any of its systems. By mid-1990, third parties will offer complete implementations for UNIX, Finder, OS/2 and DOS.

6. 3270 on LAT — SNA gateways and channel-attached communications controllers will now be retrofitted with LAT to function as bidirectional gateways. Expect product announcements early this year.

7. Gateways — With LAT readily available, it will be a modest product development exercise to build LAT-to-N gateways in which N can be Novell NetWare, 3Com 3+Open, TELNET, Ungermann-Bass Net-One, IBM's PC-LAN products, and so on.

Further Reading

The following texts offer a detailed exposition on the development of LAT technology within Digital:

Local Area Transport (LAT) Network Concepts. Maynard, Massachusetts: Digital Equipment Corp., 1987. Order Number AA-HY66A-TK.

Mann, B.E., Strutt, C., Kempf, M.F. "Terminal Servers on Ethernet Local Area Networks." *Digital Technical Journal* No. 3, (September 1986).

Meridian Portable LAT Engine Design. St. Louis: Meridian Technology Corp., 1989.

8. Long-haul LAT — The strength that gives LAT its efficient performance is also a weakness. LAT only works on a LAN. There's no reasonable way to use LAT over, say, an X.25 network. But a number of extensions could support a simulated LAT connection over some sort of internet.

The trick would be to develop a pair of LAT-talking X.25 PADs and a protocol that propagates Service Class messages over the X.25 network and maintains a properly timed virtual circuit with the originating server and destination host. The latter is accomplished by terminating each LAT circuit on its respective LAN. Then one fools the user by moving data over this low-speed network between the pair of locally terminated LAT circuits. Don't expect this product before 1991.

LAT TECHNOLOGY IS elegant and efficient from many standpoints, so expect to see it around for years to come. Competition within this niche is about to get fast and furious. It will be a buyer's market. *—Donald G. Hirsh is marketing director, OEM Products, at Meridian Technology Corporation, a communication software company based in St. Louis.*

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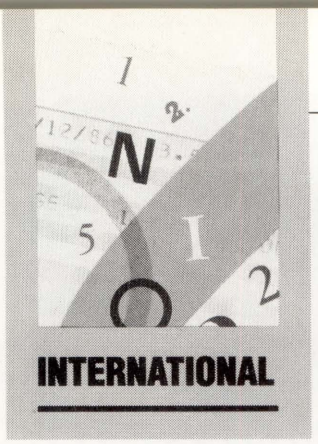

FROM THE EUROPEAN FRONT

By Peter Mullins,
European Correspondent

If The Recent *DEC User* Show Is Any Indication, The Digital Industry In Europe Is Flourishing.

More than 160 companies gathered at the Wembley Convention Centre in London from November 28 to December 1, 1989, for the annual *DEC User* Show. The organizers claim that the exhibition, which was crowded and lively, is Europe's premier showcase for Digital and Digital-compatible vendors. They stressed the need for companies to establish a firm foothold in Europe in advance of the 1992 trade deregulation.

You can gain an idea of Digital's international strength from the fact that $5.9 billion of Digital's $12.7 billion worldwide revenues comes from the European marketplace, with nearly a quarter of that deriving from the United Kingdom. The U.K. is reputed to be the world's largest information technology marketplace as a proportion of gross national product.

According to M&T Marketing, a Redwood City, California-based company responsible for selling the show in the U.S., the European market for Digital products is growing faster than the U.S. market. This was confirmed by several leading U.S. companies at the show.

International Incentive

Ron Howard, president of Datability Software Systems, reports that the international marketplace represents a huge opportunity for growth in the communications industry, evidenced by the high profitability of Digital's international activities.

"Our strategy is to expand the company's international sales and intensify worldwide support for our VCP-1000 communications server platform and Remote Access Facility [RAF]," he notes. "We have boosted our turnover from $5 to $25 million in the last few years, and 75 percent of all new expense dollars are being devoted to Europe."

"Europe is very much a mixed-vendor environment, and we see a big growth in TCP/IP," confirms John Cumpsty, Datability's manager of European Operations. "One key announcement at the show is the launch in Europe of new TCP/IP and dual-protocol TCP/IP and LAT-compatible network interface cards for the VCP-1000 communications platform."

Emulex's European subsidiary, Emulex Ltd., launched a family of Standard Disk Arrays and demonstrated its LAT-compatible terminal server, the P4000-V. More than 7,500 units have been installed to date. Emulex also displayed its range of MicroVAX II and 3000 disk, tape and communications controllers and subsystems.

Simpact Associates announced European distribution agreements for its range of connectivity boards. The company provides single boards for BI-bus, VAX, MicroVAX and PDP-11 machines for multivendor, real-time access to WANs and point-to-point connections.

Sally Walker Simonic, Simpact's director of

For The Latest Concept In Storage Subsystems, We Took A Page From The Past.

Performance Arrays from System Industries offer the DEC market a monumental development: tiered storage.

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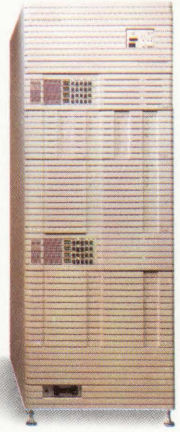
The middle tier contains more data but still sees high demand for interactive and application files.



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international sales, explains that the company is expanding quickly in Europe. It soon will appoint distributors in Germany, France and Italy to back up its longstanding arrangement with Eurologic Systems, which handles the U.K. market.

Kevin Kalkhoven, president and CEO of Demax Software, reports that his company showed its Securepak software for the first time in Europe. Demax has had a base in the U.K. for some years.

Kalkhoven comments that Europe is a changing and growing marketplace. "We see a big future in Europe. The market is growing more rapidly than the U.S. The upcoming trade deregulation has important economic and political implications. There will be change, and computers will manage that change."

Executive Software was present in the form of its new U.K. subsidiary, Executive Software UK. A company spokesperson says that the subsidiary was created to satisfy a growing demand in Europe for its VAX defragmenter.

Networking Dynamics showed its PEEK, SPY and Multisessions packages. PEEK lets a watcher make a software connection between his terminal and a target terminal. SPY is similar, except that the target isn't warned that he's being watched, and he can't enter commands to control the SPY program. Multisessions allows the user to switch back and forth among up to 10 VAX/VMS processes running from the same terminal.

Dan Kingsbury, chief executive of Networking Dynamics, says that his company has been marketing software in Europe since 1981, originally through distributors but directly in recent years. However, with the trend toward VAXs rather than PDPs (and hence added value and larger installations), there has been a swing back to distributors.

"This enables us to devote more research and development and better quality to the product," Kingsbury notes. "In addition to our British business, we're beginning to see interesting pockets of business in Germany, France and Italy."

Clearpoint Research exhibited two products new to Europe: the DSB-series high-performance disk controller for the VAX 6xxx and 8xxx; and the DCME-M30, a 32-MB memory upgrade compatible with the BA23 enclosure.

Karin Bono, European marketing manager, says that Clearpoint established a base in Haarlem, the Netherlands, five years ago and has since opened branches in the U.K. and Germany. It's due to start operations in France this year.

Another U.K. subsidiary of a U.S.-based company prominent at the show was EMC Computer Systems (UK). In addition to VAX-compatible memory products, the parent company offers Maxport disk storage systems with capacities from 622 MB to 11.5 GB.

Oracle UK offered the first of a new generation of application development tools. SQL Forms V3.0 and SQL Menu V5.0 incorporate a look-and-feel technology that enables applications built using these tools to run unmodified across different standard user interfaces. These include character mode, block mode and bitmapped user interfaces such as IBM's Presentation Manager, DECwindows, the Mac, and OSF/Motif.

Ingres also was present at the show. Its U.K. subsidiary, Ingres Ltd., was set up in 1985. It demonstrated its recently announced Ingres gateway to Rdb/VMS. And, for the first time, it demonstrated

Companies Mentioned In This Article

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Ingres/Simplify, a windows-based user interface, running on a Sun 360 high-performance graphics terminal.

On The Worldwide Scene

Among new products from non-U.S. companies at the show, Migration Technology launched CGEN-TB, a software tool that automatically translates BASIC and MAI BASIC into C. A similar tool, CGEN-BP, translates DEC BASIC PLUS and DEC BASIC PLUS II into C. Paul Beesley, Migration's sales and marketing manager, says the need for better translators follows a strong trend toward open systems.

> ...the exhibition is Europe's premier showcase for Digital...

Bradly Associates announced Ginograf and Ginosurf, new versions of the Gino-F graphics package designed to run on DECwindows under VMS or ULTRIX. The company says the new versions bring to VAXstation users the features and benefits of a graphics package using the X Window System.

European Network Engineering showed its Pathway product range from the Wollongong Group for the first time in Europe. Pathway integrates departmental PC LANs and Apple Computer's AppleTalk networks with systems on a corporate TCP/IP backbone network. Hawke Systems demonstrated for the first time the ULTRIX version of Autodesk's AutoCAD running on the RISC-based DECstation 3100.

THE *DEC USER* SHOW is changing venue for 1990. The show will take place at London's Olympia, a more central location.

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BOOSTING BACKUP

Micro Technology's MA-24 Combines The Raw Storage Capacity Of 8mm Drives With The Availability And Performance Of An HSC.

Eight-millimeter helical-scan tape drives are one of the best things to happen to system managers since AUTOGEN. Micro Technology (MT) has created an excellent backup system, the MA-24, by combining the raw storage capacity of 8mm drives with the availability and performance of a Hierarchical Storage Controller (HSC).

Eight-millimeter helical-scan tape drives currently are made only by Exabyte, but you can buy the drives integrated with controllers from a large number of peripherals manufacturers. Because Exabyte makes all the transports, there's little difference among OEM products in terms of raw drive characteristics such as rewind speed, drive reliability and maximum read/write rate.

However, there can be significant differences among manufacturers in many other important ways. These include controller characteristics, such as performance and reliability, instrumentation, and how the tape subsystem (controller plus drive or transport) connects to the computer.

MT's drive distinguishes itself in the way the subsystem connects to the computer. The MA-24 connects via the HSC. The HSC, in turn, connects to the Computer Interconnect (CI), which makes the MA-24 available to every machine in the VAXcluster. The MA-24 appears like a DEC TA79 (a big, expensive, power-eating 6,250-bpi 125-ips tape drive) to the HSC and VMS software.

The MA-24 we tested had two drives. To the HSC, it looked like a TA79-AF (formatter plus transport) with an extra slave transport TA79-AF. A single control-

PHILIP A. NAECKER

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breakthrough (brāk′thro͞o′)

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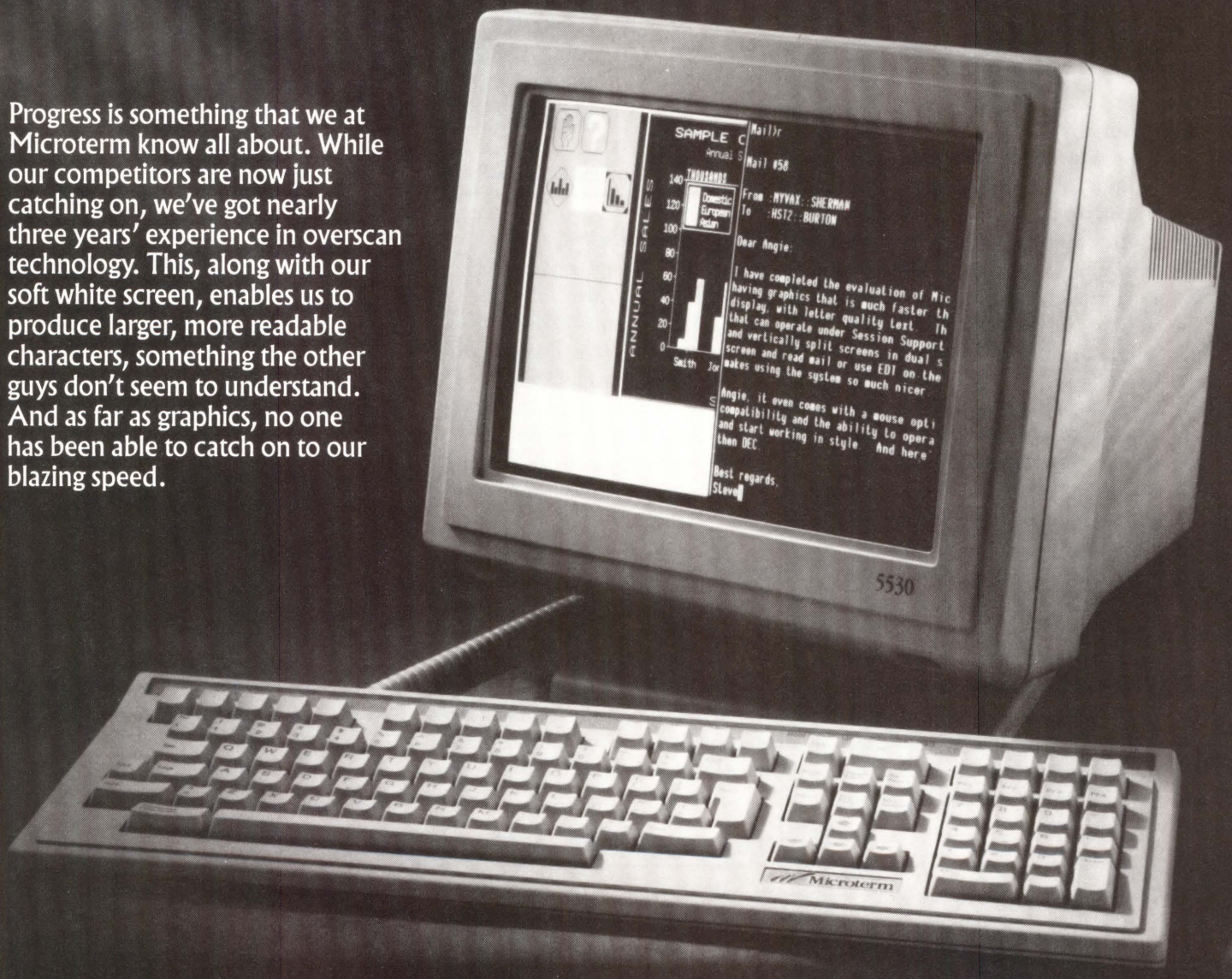

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ler card in the MA-24 box performs the protocol conversion between the STI interface on the HSC and the SCSI bus that's used by the helical-scan tape drives. MT supplied the STI cable as part of the subsystem. The MA-24 uses just one of the four slots on the HSC5X tape interface card in the HSC. If you need more drives, you can add more slaves to the controller and STI port or use more STI ports and add another controller with one to four drives.

Unless your nightly backups total more than 8 GB, you'll probably prefer to get two controllers, each with two drives. This configuration has the advantage of avoiding a single point of failure in the controller at minimal additional cost. It also can be upgraded easily by adding one or two additional drives to each controller.

We observed some apparent interferences between certain operations on the two drives. That is, some operations seemed to take much longer on one drive if the other drive was busy. These interferences may mean that in some circumstances drives on separate controllers may have better performance than drives on the same controller and HSC port.

However, we weren't always able to repeat the interferences, and we weren't able to tell whether the problem was on the controller, SCSI bus or HSC5X card, in the HSC logic or even the VMS device drivers. If you're hoping to use these drives for many overlapped operations, you may want to perform simple timing comparisons between standalone and overlapped operations to make sure that a quirk of your procedures isn't causing you to lose throughput or capacity.

Figure.

Operation Completed	Time (min:sec, approx.)
BACKUP command issued	0:00
Load and mount completes	1:30
Writing finishes on saveset header, header is verified by BACKUP	3:10
First file written	3:50
600K blocks (300 MB) written	30:00
DISMOUNT/NOUNLOAD completes and tape is remounted	31:50

Typical BACKUP sequence on the Micro Technology MA-24.

The MA-24 features a small LED on the controller panel that tells you the state of each drive. An LCD display panel tells you if each drive is reading, writing, spacing forward or backward by file or record, or writing a tape mark or data security erase pattern. Alternatively, you can have the display indicate the drive error rate or tape remaining in megabytes.

Ready For Backup

Installation of the MA-24 was trivial. The drive housing can be mounted in a standard 19-inch rack or set on top of a cabinet. The STI cable is screwed onto the back of the HSC without powering anything down, and the other end connects to the MA-24. (Your field service engineer must have previously installed the HSC5X tape interface card.) The MA-24 power cable plugs into a standard 120V or 240V circuit (they need different power cords). After powering up, the HSC automatically recognizes the drive and knows how many slave drives are attached.

The MA-24 can be connected to two HSCs simultaneously, and you can enable either the A port, the B port, or both. Nominally, you'd enable both A and B and let the HSCs negotiate for access to the drive, which works nicely. Connection to two HSCs eliminates the HSC as a single point of failure.

To shake down the drives, I first did a series of large BACKUP commands. I used a large block size (32,768 bytes) and the maximum number of buff-

Chronology Of A Backup

When you first sit down and use a Micro Technology (MT) MA-24 connected to an HSC, you're likely to expect a speedy response to a heavy foot on the accelerator. I did, and I nearly put my foot through the floor trying to get the device to go. I kept checking to see if I had put the drive online and if I had hit RETURN for the BACKUP command.

The drive was working fine. In fact, now that I understand it, I wouldn't have it work any other way. I'm used to the load and mount characteristics of a nine-track tape drive or even a TK50. But the design principles of an 8mm tape subsystem are completely different from those of a nine-track.

Instead of using powerful motors to load, mount and position the tape quickly, much smaller and much less expensive transport mechanisms are used. But the 8mm drive makes up for the slower tape transport, because its vastly greater media capacity allows for fewer than one-tenth the number of mount/rewind/dismount operations.

The Figure shows a typical BACKUP sequence on the MA-24 tested on an HSC. It takes 1 1/2 minutes to mount the tape. Because of the way BACKUP writes the saveset prologue and the HSC processes backspace operations, it takes a similar amount of time to write initial saveset information. Nearly four minutes elapse before the first block of a file is written to the tape. In contrast, most nine-track drives complete the same operations in 15 to 30 seconds.

But from that point, the tape is written at a continuous rate of 14 MB per minute, completing our 300-MB test (on files with a typical distribution of extent sizes) in about 30 minutes. The rewind time of the drive is quite respectable, with a rewind and remount (no unload done) in well under two minutes. And we've used well under 20 percent of a single cassette, whereas a 6,250-bpi nine-track drive would be on its third 2,400-foot reel.

It doesn't matter so much that the drive is slow to mount and initialize the backup prologue. What matters is that the total operation goes along at a 14-MB-per-minute pace and that the whole thing can run unattended for more than 2 GB of storage in under two hours of operation. If you sequence drives (two to four drives) in the BACKUP command, you can get up to four times the storage and running time, all unattended.

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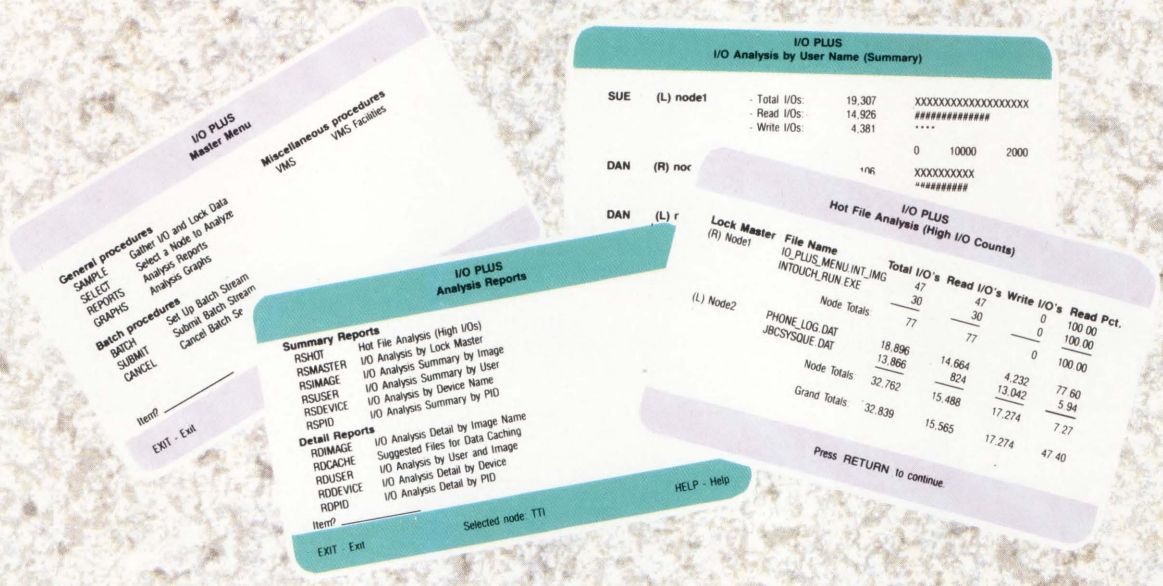

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ers under VMS V5.1. (V5.0 and later of VMS BACKUP chooses the correct number for you automatically.) I played with using both /CRC and /NOCRC on the backups. If you use one of these drives for off-hours backup, I recommend /CRC. You probably have the spare CPU cycles, and it may one day save you from losing data.

I also tried the drives with the HSC backup utility. This utility can produce a physical backup without any CPU overhead on your VAX. Together with the MA-24, this is an ideal way to make backups of, say, shadow set members removed gracefully from the shadow set or of any quiet disk. We used the HSC backup with 16K blocks and were able to keep the tape drive streaming without a problem. However, using VMS BACKUP for the same operation (/PHYSICAL/BLOCK=16384), it took about one-third longer, and we used about one-third more tape.

Because the physical backup has no information about the file system, you can't restore just a single file from the backup produced. You must restore the entire disk. But for disaster protection, the performance and reliability of HSC backup may be of interest.

We also used the MA-24 with a number of DCL tape operations, including SET MAGTAPE and DIRECTORY. Directory operations proceed very rapidly on the MA-24, because the Exabyte drive has a fast file search capability that's used during these operations. Operations such as SET FILE/SKIP work quickly, too. So if you have multiple backup savesets on a tape and know which you want to process, BACKUP can locate it within a few minutes.

Interestingly, MT indicates that the HSC gets in the way for some operations. For example, the HSC has a feature that converts a "space to next file" command into a series of "space record" commands. Because the Exabyte drive processes space record commands at the relatively slow read rate, this feature gets in the way. The MA-24 will run slower for this operation than MT's 8mm drives connected to a Q-bus or UNIBUS controller.

I WOULD HAVE PREFERRED a little more documentation. The installation and hardware information was adequate, but MT probably should spend time telling system managers more about how to use the drive. There's little information in the documentation about which operations will work well or not-so-well on the MA-24. For example, the documentation could describe the buffering operations in the controller and the drive (512 KB and 256 KB respectively) and the effect of running out of data on the write operation.

By combining 8mm storage capacity with the advantages of an HSC, the MA-24 should provide system managers with needed backup relief. ■

8mm Tape Tale

Like many VAXcluster installations, we spent a significant amount of time feeding tapes to BACKUP running on a nine-track tape drive. A 3,200-foot computer tape recorded at 6,250-bpi stores about 250 MB, at best. Our VAXcluster required many tapes and tape changes to do an image or physical BACKUP.

An image BACKUP of our disk farm previously took about 16 tapes recording at 6,250 bpi. Although our cluster is used by plant staff 24 hours per day seven days per week, the data center is only staffed during normal working hours. Consequently, backups have to be done online during that time.

Our cluster consists of a VAX 6000 Model 330 and two VAX 11/750s. The nine-track tape drive was connected to the UNIBUS of one 11/750, a VMS-only machine that's only licensed for VMS and DECnet. This machine is used strictly for system maintenance and running backups. However, this configuration didn't allow us to use the faster VAX 6000 Model 330 for backups, nor did it provide any access to the tape drive in case the 11/750 went down.

As the only process running on the 11/750, a complete image backup normally took about two days. Image backups are done at midmonth and at the end of the month. Incremental backups are done daily between images. With the image backup requiring more than 16 tapes and two days and the incremental taking as many as six tapes, the tape drive had to be monitored constantly so that new tapes could be loaded.

Special backups of an application database also are done on a weekly basis. This backup quite often required computer operations staff to work overtime to change the tapes.

Staff time spent changing tapes, time needed to complete backups, and the fact that the tape drive is available on only one cluster member led to the decision to evaluate high-density backup devices. HSC-based 8mm drives appeared to be a solution for providing the unattended backup needed for our VAXcluster. We choose a Micro Technology (MT) MA-24 with two tape drives. Each tape drive can store up to 2.3 GB of data on an 8mm cassette.

Because the unit is HSC-based, it can do an image backup from a VAX using VMS or a physical backup directly from an HSC without using a VAX. We also can use our idle VAX 6000 Model 330 at night to run the backup, which improves tape utilization. We can run unattended image backup of all of our disks at night as a batch job using the two-drive configuration. This type of operation would have been impossible with a standard nine-track computer tape unit. —*Robert B. Irvin is manager of information and control systems for the City of Los Angeles Bureau of Sanitation.*

MA-24

PLATFORMS: HSC cluster software under VMS or ULTRIX

PRICE: $30,000 approx.

MICRO TECHNOLOGY

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OWNERSHIP: Private

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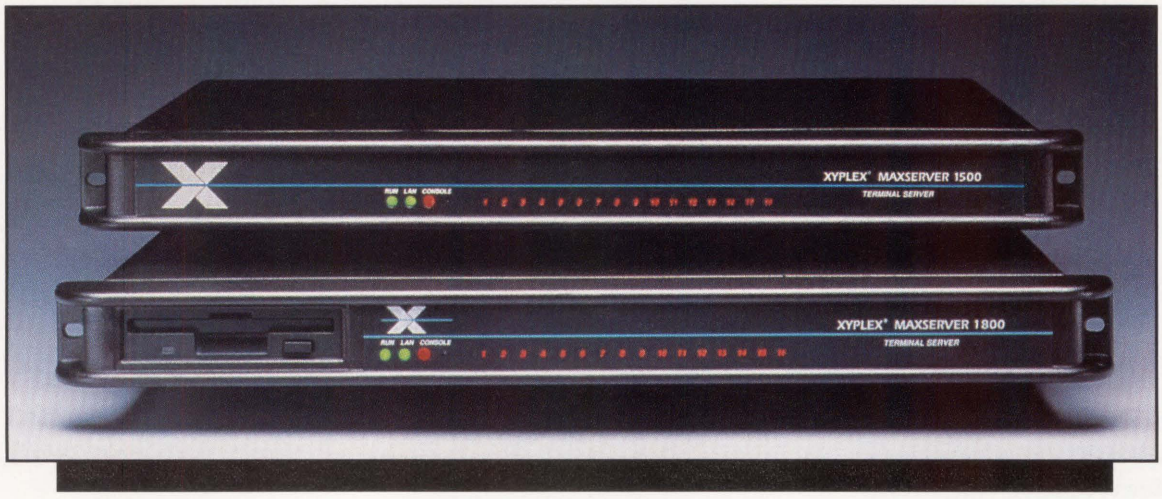
CIRCLE 551 ON READER CARD

Xyplex's MAXserver 1500 And 1800 Provide LAT And TCP/IP Flexibility.



Managing Your Protocol Mix

Getting around in today's multivendor networks isn't easy. You may be part of a network in which some nodes understand TCP/IP, while your DEC nodes speak LAT.

Owning terminal servers that speak both is an advantage for mixed-protocol shops. Xyplex provides this multiprotocol capability with its MAXserver 1500 and MAXserver 1800 terminal servers. We had one of each on our network.

Terminal Server Traits

The MAXservers are LAT-compatible with DECserver 200s. Internet support includes support for Address Recognition Protocol (ARP), Internet Control Message Protocol (ICMP), TELNET, User Datagram Protocol (UDP), and Berkeley Internet Name Domain (BIND) protocol in addition to TCP and IP.

The 1500 and 1800 are identical units, with one exception. The 1800 has a 3 1/2-inch disk drive that you can use to load Xyplex's TCP/IP software rather than having the 1800 boot from a parameter server on the network. The 1500 lacks the drive but can load the software and boot from an 1800, elimi-

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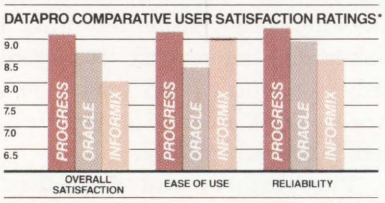

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CIRCLE 236 ON READER CARD

nating the need to have the software installed on a computer host.

Each unit is rack-mountable and compact at 1.75 inches high x 19 inches wide x 11.7 inches deep. Each features 16 ports capable of baud rates from 75 bps to 38.4 Kbps. Every port has full modem control. RJ-45 connectors are required to cable devices to the units. Xyplex recommends using eight-line RJ-45 connectors. Using six-line connectors could damage the server's ports and prevent you from using RJ-45 connectors in the future.

ThickWire and ThinWire Ethernet connectors are supplied. The correct connector is selected automatically when network activity is sensed by the server.

Individual front-panel LEDs are used to indicate that the server is running, network activity is detected and a console session is in progress. Lights for each port indicate whether or not a connection is established. A small hole provides access, to a server reset switch.

Operation

A self-test is performed upon power-up. The port lights are used to indicate error codes. The reset switch can be used to rerun the self-test and reinitialize the server.

Figure.

```
Welcome to the Xyplex Configuration Menu.

XYPLEX MAXserver 1500 Sixteen Port Terminal Server

Configuration/Maintenance Menu

    1. Display configuration
    2. Modify load and dump settings
    3. Initialize server and port parameters
    4. Modify network selection
    5. Perform extended mode testing
    6. Revert to stored configuration
    7. Exit saving configuration changes
    8. Exit without saving configuration changes

Enter menu selection [8]:
```

The MAXserver 1500's configuration menu can be used to change basic server settings in addition to the normal SET/DEFINE commands available after logging into the server.

The reset switch also is used to place you in configuration mode. In configuration mode, you can determine the server's image loading method, initial port and server parameters and network connector selection method (see Figure).

Image loading takes between one and two minutes. Xyplex LAT-TCP/IP software can reside on a VAX host. It also can be loaded directly from a floppy disk if you have a MAXserver 1800.

After booting, MAXservers behave like DECservers. Xyplex commands used to configure the server and its ports should be familiar to you if you've ever used DECservers. Differences are noted in a two-page appendix.

Commands also are provided for TCP/IP support. TELNET port commands include those to set up special keys such as the attention and interrupt characters, commands to define preferred services and commands to control port behavior such as buffering.

The last five commands are stored in a history buffer and can be recalled. For security purposes, commands containing usernames and passwords aren't retained.

Setting up the MAXserver for LAT operations requires the same procedures as those used for DECservers. DSVCONFIG can be used to add the server to your host node's database. You also can use a series of NCP SET/DEFINE commands.

Setting up the server for TCP/IP operations involves setting the server's internet address and subnet mask. Domain name server support is included. You can specify the server's domain name, domain suffix and the addresses of the primary and secondary domain name servers on your network.

DOCUMENTATION IS EXTENSIVE. Detailed explanation of server commands and setup requirements as well as a quick reference guide are included.

The MAXserver 1500 and 1800 provide the best of both protocol worlds. Their space-saving design lets you install them anywhere your Ethernet runs. The disk-loading feature of the 1800 is particularly noteworthy. No longer do you need a VAX host to downline-load terminal server software.

The features and flexibility of Xyplex's new terminal servers make them an attractive choice for those in a mixed TCP/IP-LAT environment. ■

MAXserver 1500 and 1800

PRICE: MAXserver 1500 costs $3,795, MAXserver 1800 costs $4,395. Xyplex LAT-TCP/IP is included. A LAT-only MAXserver 1100 is available for $3,395

PLATFORMS: DEC LAT and TCP/IP environments

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Sophisticated Spreadsheet

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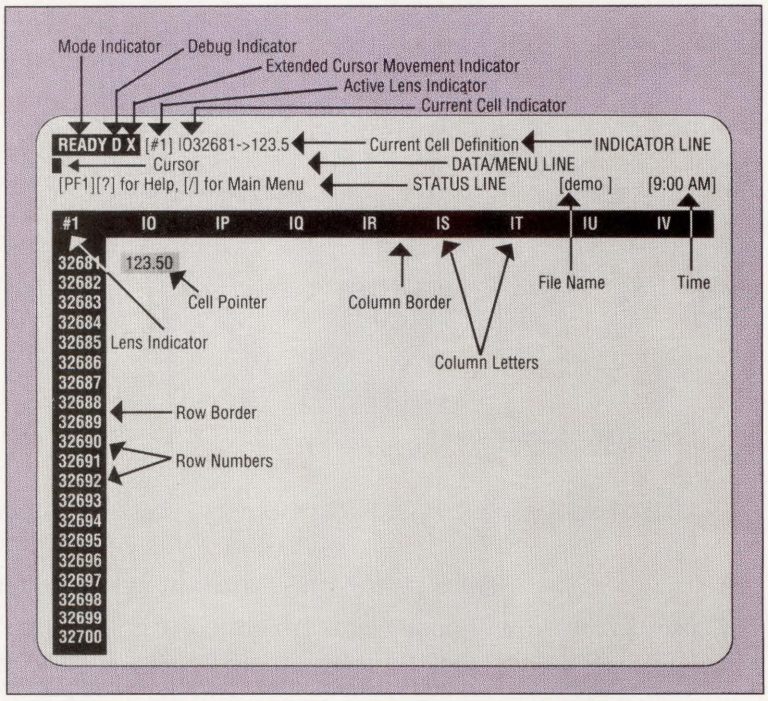

Figure 1: Mass-11 Spreadsheet's worksheet showing the Control Panel.

If you're a DEC user accustomed to Mass-11 word processing, you may want to consider Mass-11 Spreadsheet from Microsystems Engineering Corporation (MEC). Mass-11 Spreadsheet can be run from Mass Office or standalone.

We tested Mass-11 Spreadsheet V9.0 on LABDOG::, the Lab's MicroVAX II. Installation is done by restoring the necessary files using VMS BACKUP. You must assign one system logical, WP$DIR:, to point to the directory where the Spreadsheet image will be. We don't have Mass Office on LABDOG::, so we installed it standalone.

Mass-11 Spreadsheet runs either by taking the Spreadsheet option from the Mass Office main menu or, if standalone, typing a symbol that your system manager has set up. We typed M11SS, which brought up the Mass-11 Spreadsheet opening screen. Typing RETURN opens a worksheet grid with 20 rows and nine columns, A through I. If you've used Mass-11 Spreadsheet earlier in the day, you'll go directly to the worksheet, bypassing the opening screen.

Extensive information is displayed in three lines above the grid: the Indicator Line, Data/Menu Line and Status Line, collectively called the Control Panel (see Figure 1). Upon starting Spreadsheet, you're in READY mode, which means that the program is ready for input to the current worksheet. Typing / will put you in Menu mode, and the Data/Menu and

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CIRCLE 123 ON READER CARD

Status lines are replaced by the choices in the top-level menu.

Lotus 1-2-3 users will find the interface familiar. Lotus data, graphs and macros can be imported. "Live links" to Mass-11 WP are provided, allowing merging of Spreadsheet data into WP documents. Mass-11 Spreadsheet can also import data from Access Technology's 20/20 and Ashton-Tate's dBase III.

The product features a tree-structured command set (see Figure 2). You can access commands by progressing from a main menu or a series of submenus by moving the cursor to the desired item. Alternatively, you can select commands directly by typing the menu mode character (/) followed by the first letters of the commands or submenus down the tree. For example, /WS takes you to the main menu, selects the Worksheet submenu and turns on the Status line.

Context-sensitive help is available for any item in any menu. Help also is available when entering or editing data. Help is accessed by typing PF1-? and exited with PF4. For VT200- and VT300-series terminals, the key alternatively labeled F15 or Help also invokes Help.

The worksheet on your screen is a window, or lens, into a portion of the available worksheet area. Mass-11 Spreadsheet's worksheet area is 256 columns (labeled A through IV) by 32,700 rows, which totals 8,371,200 cells. The Primary Lens (#1) is always open. You can open up to eight lenses on the screen at once. This lets you display data and graphs simultaneously on the screen. You also can Zoom in on a specified lens to examine it full-screen while the other lens is still "underneath" it.

Formula For Success

Formulas are entered by inserting the + character before the cell references in the formula. For example, entering +A1+B1 in a cell causes the result of that operation to be placed in that cell. Note that the addresses are relative. With the /C (Copy) command, Mass-11 Spreadsheet copies the formula to a different cell but adjusts the column and/or row references to correct for the new location. This makes it easy to copy an address across a row or column and still produce the desired results. You can specify that the addresses are absolute. Mass-11 Spreadsheet won't recalculate a new reference if you /M (Move) or /C (Copy) the formula. In the above example, you'd enter +$A$1+$B$1.

If you want to fill a cell with a character, for example, an underscore (_) to create a line, enter \ in READY mode. This puts Mass-11 Spreadsheet into DRAW mode and fills the cell with whatever character you enter. What's attractive about this is that if you have a line drawn in a cell and subsequently change the cell size, the line will expand or contract to the new size.

The worksheet can be set to recalculate manually or automatically as changes are made. You also can specify the recalc mode to be either Natural, Row-wise or Column-wise. Natural recalculate is based on the most significant formula cell — the cell on which most other formulas in the worksheet are based. For example, to set the worksheet to Manual Natural mode, the command is /WGRMN (Worksheet Global Recalc Manual Natural).

To perform the recalculation, type PF3. If you choose / WGRAN, a recalculation will be performed automatically as data is entered or modified.

Functions

Mass-11 Spreadsheet has more than 120 built-in functions. Included are mathematical, statistical, financial, trigonometric, logarithmic, date and time functions. Database, logical, lookup and string functions also are provided. Functions are in the format @FUNCTION_NAME (Arg1, Arg2,...).

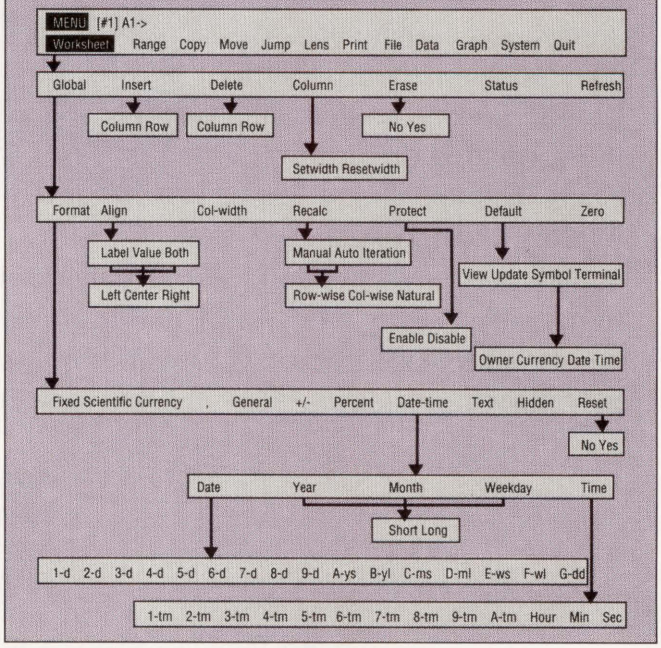
The product supports numerous formatting commands to alter the appearance of the worksheet. Column width can be set from one to 64; the system default is nine. The width can be set on the fly with /WCS (Worksheet Column Setwidth) or Globally with /WGC, which sets the default column width for the entire worksheet.

The data can be displayed in different numerical formats, including Fixed, Scientific, Currency, General, Comma, +/-, Percent Date-time, Text and Hidden. The /R (Range) menu changes the format for a range of cells as specified by the user. For example, /RFG sets specified cells to General format. To change the default for the entire worksheet, the command is /WGFG (Worksheet Global Format General). Figure 2 presents a picture of how this ties together.

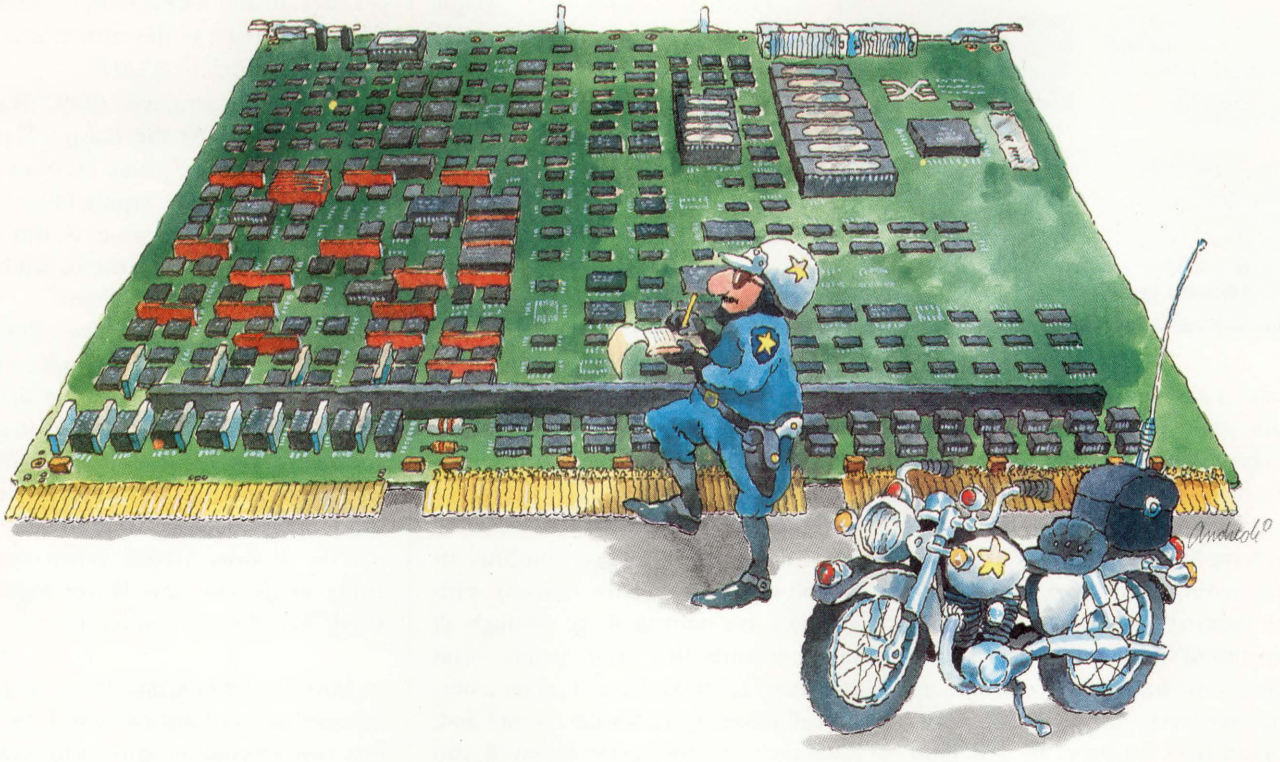
Print It

To set up Mass-11 Spreadsheet to print from the menu, run the M11SYS.EXE program included in the package. Working with the M11PRINTR.DAT file and

Figure 2.



Menu map for worksheet commands.



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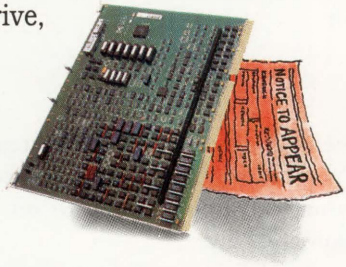

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using the .PRD (printer description) file for your printers, you can tell Mass-11 Spreadsheet what your print hardware is.

This operation can be complex and is best left to a system manger or, if you already have Mass-11, the person responsible for setting it up. If you're already up and running on Mass-11, you won't need to run M11SYS again unless you're changing your hardware configuration. On the user level, you can set up Mass-11 Spreadsheet to print to a default printer transparently by Printer-ID with desired print parameters. This is done by entering the /P (Print) menu tree. /PDS (Print Define Setup) lets you set up your default printer parameters and options. In addition, Adobe PostScript support is provided.

Mass-11 Spreadsheet has sophisticated, easy-to-use graphic capabilities. To view a Spreadsheet graph on your terminal, it must be able to interpret ReGIS graphic commands and must be a VT200- or VT300-series or compatible terminal. You also must issue the DCL command:

```
$SET TERM/DEVICE=VT200/REGIS
```

or:

```
$SET TERM/DEVICE=VT300/REGIS
```

before you run Mass-11 Spreadsheet. You can have this command line put in your LOGIN.COM file to set this up automatically.

To define a graph, you first must select the graph type. /GTP (Graph Type Pie) selects a pie chart. The other possibilities are Bar, Stack, Xy and Hi-Lo-Close (for stock tracking).

Next, you enter /GD (Graph Define). In this submenu, you'll create choices for the CXR (Coordinate X-axis Range), C1R (Coordinate 1st Y-axis Range) and TM (Title Main).

A /GV will let you see the graph; V acts as a toggle from the graph back to the worksheet. Changing the graph type is as easy as going back to the /GT menu and selecting whatever type you wish.

When you're satisfied with the results, you can write the graph to a file with /GDW (Graph Define Write).

Lenses And Graphics

Mass-11 Spreadsheet can combine its windowing capabilities (lenses) with graphics. It's difficult to go through all the commands here. But, simply, you can issue /LC (Lens Create), enter a useful cell range at the Range prompt and, assuming you have a graph file saved, you can /GDL (Graph Define Load) the file and then /GV (View) the graph in the window you've created.

If you then /FU (File Update), the worksheet will be saved with the second lens open and the graph displayed.

Other commands you'll use frequently are /FR, which retrieves a worksheet file, and /FS, which saves it to a name of your choice. To get out of Mass-11 Spreadsheet, type /QY (Quit Yes).

You can create macros in Mass-11 Spreadsheet. Usually, you enter macro commands in cells in an unused portion of your worksheet. You can enter any valid Mass-11 Spreadsheet command preceded by an apostrophe ('). If you want to enter a multiline macro, a tilde (~) indicates a Return. The PF4 or Spreadsheet escape key is entered as {ESC}. Macros are named by preceding the name with \. For example:

```
Macro \T
'/GDLgraphname~{ESC}{ESC}{ESC}
'/GV{ESC}{ESC}
```

In this example, you create a macro called T. You load a graphic file called graphname, escape (PF4) three times to get back to the READY mode, and /V (View) the graph in the current lens and again escape back to READY.

To name a macro, type /RNC (Range Name Create). At the Range Name? prompt, enter macro_name \T. Now you can run the macro by typing PF1-M followed by the macro name, in this case T. Mass-11 Spreadsheet macros can be as simple or complex as you need.

The document set includes a *Reference Manual*, *Pocket Reference Guide*, and a *Getting Started* book. *Getting Started* teaches the basics of spreadsheets in general and Mass-11 Spreadsheet in particular. Everything you wanted to learn about Spreadsheet but were afraid to ask is in the *Reference Manual*. When you become proficient, the *Pocket Reference Guide* should be all you need.

MASS-11 SPREADSHEET is a well-thought-out tool that's easy to learn and extensive enough to grow with you. It should be especially attractive to current users of Mass-11. And it might bring others into the Mass-11 family. ■

Mass-11 Spreadsheet Version 9.0

PLATFORMS: Any VAX system running VMS/MicroVMS V4.7 or later. ReGIS graphics are required to display graphs

PRICES: From $5,175 for a MicroVAX to $20,700 for a VAX 8xxx

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OWNERSHIP: Private

BRANCHES: In the U.S., Europe and Australia

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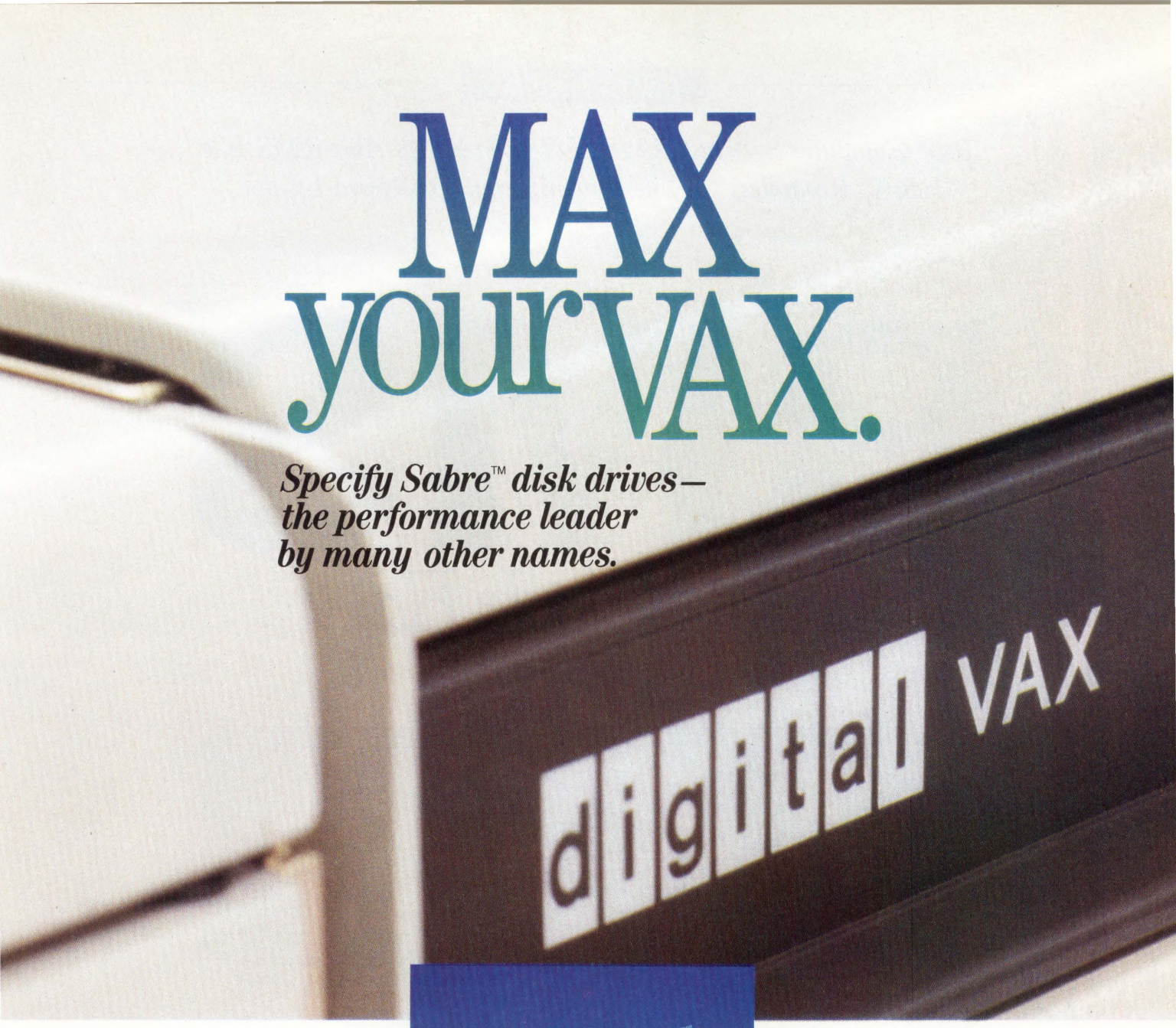

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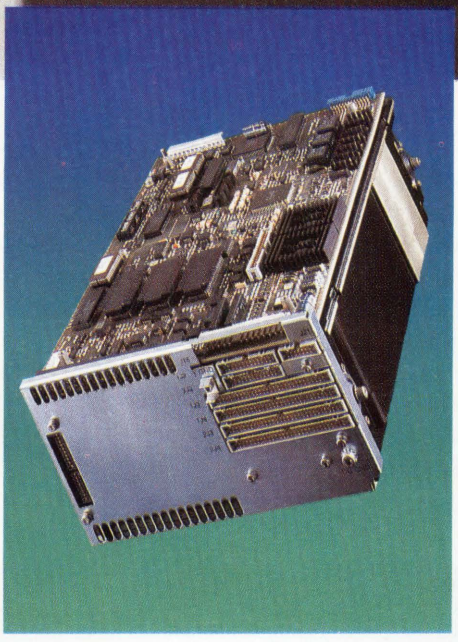

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Beck Computer Systems' RMSEDT Can Access Any RMS File Easily, Regardless Of File Organization Or Record Layout.

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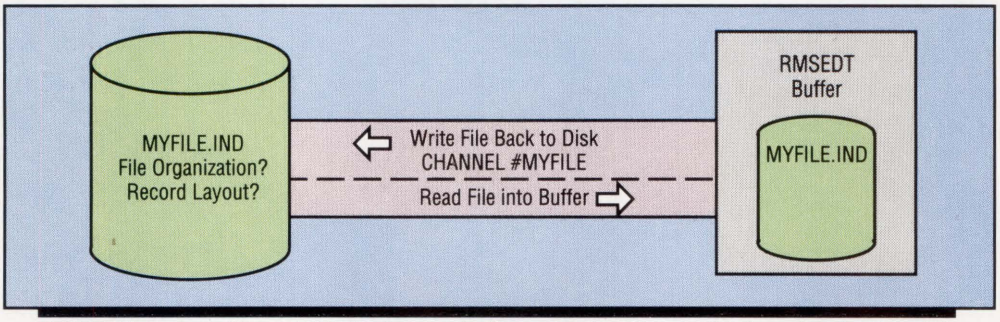
Access Made Easy



RMSEDT lets you edit any RMS file in your buffer and writes the modified version back to disk.

How often have you needed to access an RMS file quickly to correct or modify a record without knowing the structure or characteristics of the file? RMSEDT from Beck Computer Systems can help.

RMSEDT is an interactive tool that can access any RMS file easily, regardless of file organization or record layout. It's an extensive utility that lets you do everything DEC's RMS utilities do, including OPENING and CREATING RMS files and creating .FDL files. There are more than 55 qualifiers to the OPEN and CREATE commands in RMSEDT. The program's source code is composed of 6,000 blocks of VAX MACRO code. We tested it on LABDOG::, the Lab's MicroVAX II.

Installation is by VMSINSTAL and is straightforward. We installed it under our DUB1:[PRODUCTS] directory and added the following line to SYSTARTUP.COM:

```
ASSIGN/SYSTEM
  DUB1:[PRODUCTS.RMSEDT.V21C]
  RMSEDT_INI RMSEDT_INI
```

You also should set up RMSEDT as a foreign command by inserting the fol-

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The Potential for Data Caching on the VAX

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CIRCLE 246 ON READER CARD

lowing in SYLOGIN.COM:

```
RMS*EDT :==
  $DUB1:[PRODUCTS.RMSEDT.V21C]
  RMSEDT.EXE
```

The package we received, V2.1C, includes example files with which you can practice while mastering this comprehensive program. To get the most from RMSEDT, you should understand RMS concepts and the related utilities ANALYZE/RMS_File, CONVERT and CONVERT/RECLAIM. It helps if you have a general conception of the three basic file organizations: Indexed, Sequential and Relative. A good place to start is the VMS documentation, specifically the *Guide to VAX/VMS File Applications*.

Don't be afraid you'll harm anything, because RMSEDT defaults to a /ACCESS=READ when you OPEN a file. RMSEDT syntax is like that of DCL, which helps you get started quickly.

RMSEDT runs on any VAX with VMS or MicroVMS V4.4 or later. If you have V5.0 or later, type TUTORIAL and you'll be led through a DEC-like computer-based instruction session. Because we have V5.2 on LABDOG::, I tried it and found it complete and well-organized. If you'd rather type the commands yourself, try the first and second Tours in the *User's Guide*.

How Do You Want It?

RMSEDT performs useful work immediately. It adapts to your needs and performs complex functions. It isn't for repetitive tasks that need to be performed often each day. Use a conventional programming language for those.

According to Executive Vice President Gary Beck, RMSEDT originally was designed as an in-house tool. Beck says that there are many ways to do the same thing in the program. This is by design, so you can find the method most consistent with the way you work. We can't touch on everything here but will conduct a "tour" of important features.

To start RMSEDT, type RMS at the $ prompt. You'll get the Rmsedt> prompt. To do anything with a file, you first must open it. I used one of the files supplied with the program, BOOKS.IND, an indexed file. The installation kit places all the sample files in a subdirectory called [.EXAMPLES]. By typing the RMSEDT SET DEFAULT command, which has the same syntax as the DCL command, you can control your environment. Thus, you don't have to make sure you're in the correct directory before entering the program.

Figure 1.

```
BOOK_T_TITLE          A QUIET OF STONE
BOOK_T_AUTHOR         STEPHEN LEIGH
BOOK_T_SUBJECT        SCIENCE FICTION
BOOK_T_PUBLISHER      BA
BOOK_D_PRICE          2.75
BOOK_V_COPYRIGHT      12-MAY-1988 00:00:00.00
```

Variables as displayed in RMSEDT's DISPLAY window.

You won't change your default. RMSEDT's SET DEFAULT is internal to RMSEDT and provides a shortcut to typing a long filespec. If you type SET DEF [-] in RMSEDT, it will take you one directory level higher than you were before you invoked RMSEDT. You also can set defaults for the OPEN and CREATE commands as well as for indirect command files (SET DEF CMDFILE) and the MAP command (MAPFILE). The *RMSEDT Command Guide* gives a full explanation and examples of these.

Let's continue OPENing BOOKS.IND. After invoking the command:

```
Rmsedt>OPEN BOOKS.IND
```

you get the information message:

```
%RMSEDT-I-OPNFILMSG, opened
DUB1:[PRODUCTS.RMSEDT.V21C.EXAMPLES]
BOOKS.IND;, channel #BOOKS
```

which tells you, in the familiar VMS syntax, that it has opened an I/O channel for the BOOKS.IND file whose name defaults to the file name.

If you only want to examine the records in that file, issue a NEXT command, which GETs the next record in the file. You also can GET a file by its primary key, that is:

```
Rmsedt> GET "PRIMARY_KEY_NAME"
```

which by default gets the record whose primary key is PRIMARY_KEY_NAME on the primary channel. The first channel you open becomes the primary channel by default.

If you issue the command:

```
Rmsedt> GET #PRIMARY_CHANNEL_NAME KEY
1 EQ "SECONDARY_KEY_NAME"
```

you're retrieving a record by its secondary key and resetting subsequent GET operations to use that key level implicitly.

You also can save a record's Record File Address (RFA) and later GET it by its RFA as shown below:

```
Rmsedt>DECLARE RFA TMPRFA
Rmsedt>TMPRFA=F$GETRFA(#CHANNEL_NAME)
Rmsedt>NEXT
(more RMSEDT commands)
Rmsedt>GET RFA TMPRFA
```

For relative files, you can GET RECORD record_number or go to the end of a file by typing EOF.

To scan through a file, use the LOCATE command, which searches through the file and prints the record with the first occurrence of that string. We tried this with BOOKS.IND, and it displayed the following:

```
Rmsedt>LOCATE "ZELAZNY"
BLOOD OF AMBER     ROGER ZELAZNY
  FANTASY     AV<A!!!!!!...f7G...
```

(Of course, the output is displayed horizontally across the screen.) LOCATE/NEXT locates the next record in a file

and retrieves it into your buffer. RESTORE takes you to the beginning of a file after any operation.

A Time To Change

If you must change elements of a record or add or delete records, you'll have to declare variables. For example, to declare a variable in your buffer BOOK_T_TITLE, with a length of 32 bytes, issue this command:

```
Rmsedt>DECLARE #BOOKS STRING
BOOK_T_TITLE/LENGTH=32
```

If this is your first variable declaration for the current session, it will associate the first 32 bytes of the file with BOOK_T_TITLE, so you can perform operations on the record by specifying that variable name. Subsequent variable declarations will begin at the point you left off. In this case, the next declaration will begin at byte 33.

Alternatively, you can specify the /OFFSET qualifier, which specifies an absolute location from the beginning of the record buffer. You can put all your variable declarations in a command file, give it the extension .COM and execute it from RMSEDT with the standard DCL @ sign.

Command files in RMSEDT can be created by using EDT from the Rmsedt> prompt. You can use labels in RMSEDT command files. RMSEDT supports the if-then-else-end-if construct as well as internal GOSUB, GOTO and ON ERROR commands. REPEAT loops can be created.

RMSEDT supports most standard VMS data types, including VMS DATEs as well as RSTS DATEs and TIMEs for file conversion from RSTS/E or RSX.

An alternative to declaring variables explicitly is to use the MAP command. This searches a specified file for a language-specific record MAP. For example, the following statement looks for a BASIC MAP in the file BOOKS.BAS on the default primary channel:

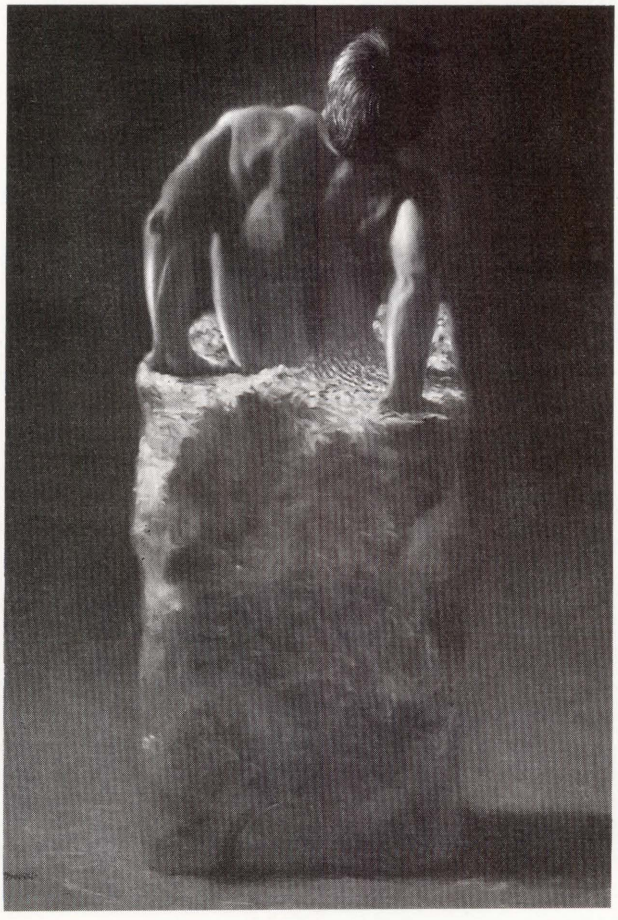
```
Rmsedt>MAP BOOKS.BAS
/BASIC/MAPNAME=BOOKS
```

If the MAPNAME in BOOKS.BAS is BOOKS, the /MAPNAME qualifier is unnecessary, because the default is the file name of the opened file on the specified or default channel. If the command is successful, you'll get a completion message as follows:

```
%RMSEDT-I-NUMVARDEF, 5 variables
defined
```

RMSEDT also supports FORTRAN STRUCTURE and DIBOL RECORD templates. With V2.1C of RMSEDT, you also get support for the Common Data Dictionary (CDD), although RMSEDT doesn't recognize CDD pathnames. Not all languages support all VMS data types. If you want to DECLARE a VMS date for example, you'll need to do an explicit DECLARE.

The most convenient way to see your variables and their contents is to issue the



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CIRCLE 228 ON READER CARD

DISPLAY command. This opens a window displaying the variable names and contents in the current record (see Figure 1). The default window size leaves a scrolled region of five lines at the bottom of your screen to keep track of the last few commands you've issued. The INQUIRE/DISPLAY command puts you inside the window where you can change data in the window. CTRL-Z takes you back to the command line.

At this point, you're only changing the data in your buffer. To write a modified record to disk, you'll need to UPDATE. A new record is added with the PUT command. However, you must have opened the file with the /ACCESS=WRITE qualifier, or RMSEDT won't let you overwrite the file. To remove the window, issue a SET NOWINDOW command.

When you DELETE a record, RMSEDT saves the record in a special buffer. If you've made a mistake, you can recover by issuing a RETRIEVE /DELETE command. Now PUT the record back in the file.

RMSEDT provides a host of functions that work like DCL LEXICAL functions. A list of these is shown in Figure 2.

Macros can be created as a shorthand for a series of frequently used commands. To define a macro, type MACRO at the Rmsedt> prompt. At the Macro> prompt, type a series of legal statements, which will become the body of the macro. You end the session by typing END MACRO, which returns you to the Rmsedt> prompt. Each time you type the macro name, RMSEDT will replace (expand) it with its body.

By using macros rather than command files, you don't incur the overhead of opening the command file. Unlike subroutines, you can use a macro in interactive mode. A macro's definition is global whether it's initially defined interactively or from within a command procedure.

Macros can be defined with up to eight arguments, P1 through P8. These are passed to the macro sequentially, separated by spaces (as opposed to the comma delimiter for passing DCL command parameters). You also can create macro "libraries" by defining a series of macros within a command file. On execution, the macros defined are placed in memory during your current working memory. An actual library file isn't created.

DOCUMENTATION COMES IN a loose-leaf binder. It includes a *User's Guide*, *Command Guide*, *Topic's Guide* and *Installation*. It should answer most of your questions about RMSEDT. The package includes 90 days of free support, and yearly support can be purchased.

Other RMSEDT features include the ability to set up sophisticated error-checking and edit a script to prompt for user input.

If you need to make frequent modifications, corrections and additions to RMS files, you'd be wise to consider RMSEDT. ■

RMSEDT V2.1C

PLATFORMS: VAX/VMS or MicroVMS V4.4 or later

PRICE: Primary license fees range from $950 on a MicroVAX I through $7,950 on a VAX 8978

BECK COMPUTER SYSTEMS

HEADQUARTERS:
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Long Beach, CA 90805
(213) 428-2894

PRODUCT LINE: RMSEDT, accounting packages, custom applications

FOUNDED: 1983

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Figure 2.

F$ABS	absolute value	F$MOD	calculate remainder
F$ASCII	ASCII value of string	F$NUM	convert number to string
F$BUFFER	get entire current record	F$NUMTIM	return element of VMS date/time value
F$BUFSIZ	get maximum record size	F$OFFSET	offset of variable within record
F$CHR	generate character	F$POS	position of substring
F$DATE TIME	current date and time	F$RECNUM	get current record number
F$EDIT	edit string	F$RECSIZ	return current record size
F$FILESPEC	return file spec for file	F$SEARCH	search for file
F$FIX	truncate value to integer	F$SEG	get substring
F$GETRFA	get RFA of record	F$SPACE	make string of spaces
F$INT	get integer value	F$SQR	square root
F$LEFT	get left portion of string	F$STRING	make string of one character
F$LEN	get length of string	F$TODAY	return current VMS date
F$LOWCASE	convert string to lowercase	F$TRANSLATE	translate selected characters in a string
F$MAX	return maximum value	F$TRM	trim trailing blanks
F$MESSAGE	error message text	F$UPCASE	convert string to uppercase
F$MID	get substring	F$VAL	get numeric value of string
F$MIN	return minimum value	F$WEEKDAY	return day of week of VMS date

Supported RMSEDT functions.

Catch Up to Your VAX

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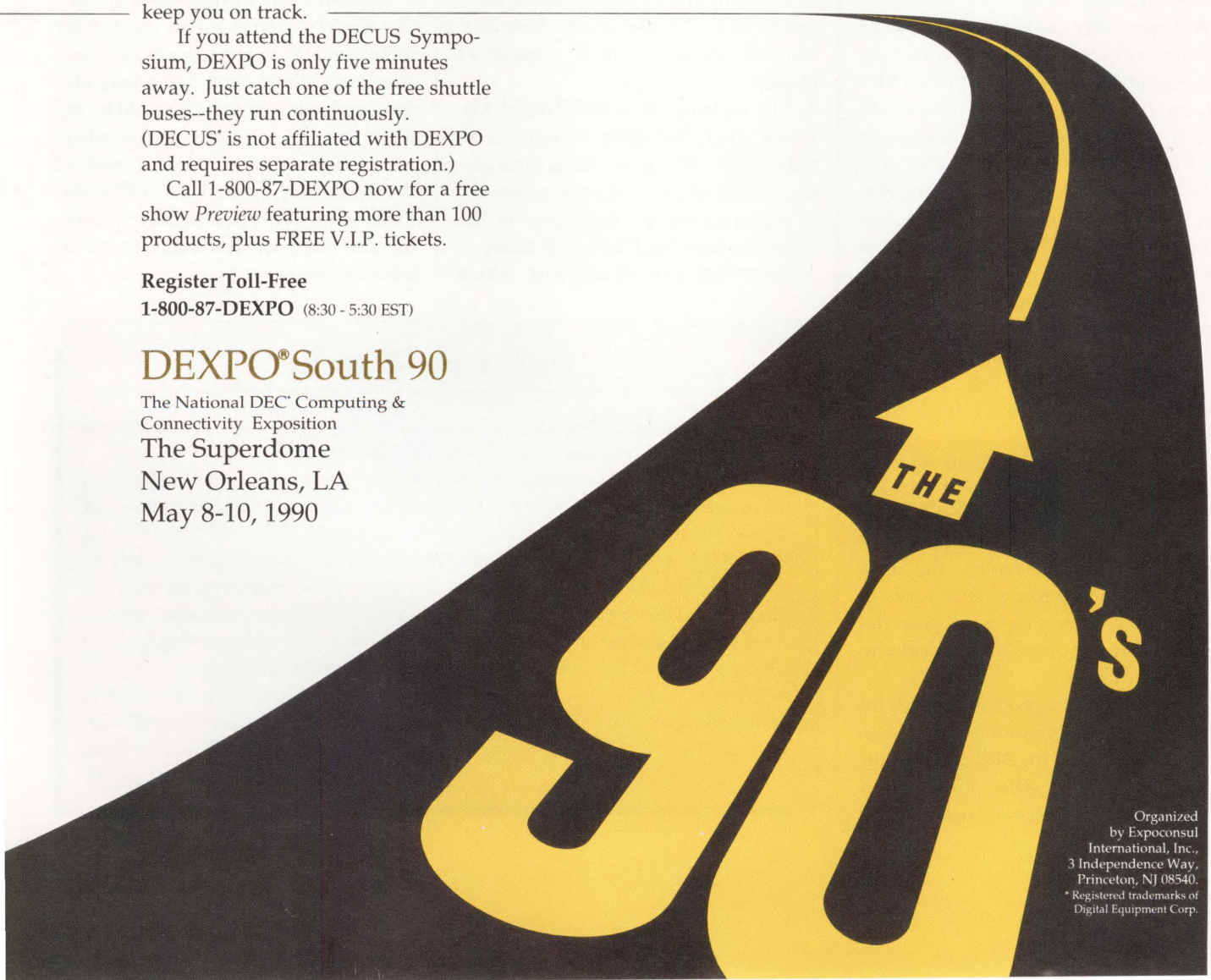

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DIGITAL WATCH

Evan Birkhead

Processor Protection

Ever since DEC premiered the VAX series 13 years ago with the VAX 11/780, the company has stuck with the VAX game plan. Over the years, DEC continued to produce bigger and better VAXs, and each featured the same internal architecture, supported the same operating systems (VMS and ULTRIX), networking software and connections, and, perhaps most important, ran the same software programs.

When VAXclustering debuted in 1983, the DEC customer's VAX investment was solidified further. Clustering meant that VAXs essentially could share distributed storage and build processing power by incrementally networking VAXs. This ensured that older VAXs could retain much of their value by performing as part of a team of VAXs. The venerable VAX 11/780, for instance, still has a remarkably large installed base, in part because of its prevalent utility as a VAXcluster boot node.

Likewise, subsequent technologies from DEC, including Local Area VAXclustering and Symmetric Multiprocessing (SMP), have helped customers squeeze functionality from their existing VAXs.

This strategy hasn't been without hitches, however. The overall smoothness of connectivity and portability has been disrupted by the introduction of RISC processors and servers. But these machines are only part of DEC's pattern of constantly releasing more powerful VAXs before customers have a chance to adapt to old ones.

DEC has taken a good deal of heat for this. Like any organization involved in product development, DEC faces a complex problem: At what point does a company put a freeze on research and development and begin shipping the product?

Upgrade Mania

DEC's response to this problem generally has been better than that of its competition at IBM and HP, but the very nature of its single-architecture, high-to-low-end processing scheme has forced a few miscues. For example, the VAX 8800 caused an uproar when customers learned that it would nearly quadruple the power of the 8700 for virtually the same price. More recent examples of this upgrade mania are:

1. The MicroVAX series, which blossomed from the 2000 to the 3500/3600 and then the 3800/3900 in a matter of months.
2. The midrange VAX 6000 Model 300, which single-handedly eliminated all reasons for owning its recent predecessor, the Model 200, or for that matter any of the processor configurations in the relatively short-lived VAX 8000 family.
3. The VAX 6000 Model 410, which pulled a similar trump card on existing Model 300s with more storage and 85 percent more processing power. The beauty of the Model 410, however, is that it can be expanded via SMP to a six-processor system. Around the time of the Model 410 announcement last summer, DEC quietly disclosed that it was ending production of most 8000-series systems.

Inarguably, the 8000 series, which received star billing just a few years ago, now has been relegated to dinosaur status. Can the VAX really protect our investment, as DEC claims, if it's constantly being outmoded?

Customers are being assured by DEC that the 6000 series is here to stay for some time. If it stays intact for three years, that would constitute a long lifetime, and many customers would be ecstatic. But DEC's history suggests otherwise. In fact, DEC revealed that much of the technology in the VAX 9000 mainframe soon will appear in more powerful and inexpensive versions of its midrange systems.

Industry Watch

■ **Compaq Gears Up** — Compaq Computer has unveiled a PC it claims is significantly faster than the HP 9000 Series 835 and the VAX 6000 Model 310.

According to Compaq spokesperson Nora Rice, in a recent 60-user industry-standard test of similar systems, the Compaq SystemPro, linked with two 386/33 System Processor Boards, two Intel 80386 microprocessors, 16 MB of memory and an 840-MB drive, was six times faster than the VAX 6000 Model 310, six times faster than the HP 9000, and nine times faster than the IBM AS/400 B30 minicomputer. These results were posted by the independent Chicago-based benchmarking firm Neal Nelson and Associates. Nelson's Business Benchmark monitoring process consists of 18 tests involving reading from and writing to the fixed disk drive and performing floating point calculations.

■ **Telecom Ties I**— Last December, DEC announced an agreement with Mitel to incorporate Mitel's SX- 2000 Integrated Communications System with DEC's CIT V2.0 software. The SX 2000 ICS microprocessor-controlled PBX offers digital switching

Continued on page 99.

Despite DEC's constant upgrades, the company delivers a better investment-protection sales pitch than its competitors at all levels of computing, from mainframes to workstations, by virtue of its ability to run VMS and ULTRIX on its entire range of processors. No market could be better-suited for the survival of older processors than DEC's. A huge and diverse cross section of DEC's customer base thrives on the implementation of existing and secondhand VAXs.

Ample opportunities are open for used-equipment dealers in DEC's smaller installations, mostly in companies that can't afford to keep pace with DEC's rapid development. The bulk of this "after-*after*-market" includes smaller businesses and scientific and engineering shops. And it isn't unusual for a new company to purchase a used VAX as its initial processor. Besides the smaller capital base, there are fewer competitive pressures outside the *Fortune* 500 companies and the government.

Larger organizations would seem to be unlikely buyers of used equipment, because system managers in these environments often are pressured into maintaining state-of-the-art installations, resulting in continuous upgrades. But while the *Fortune* 500 companies and the government purchase large quantities of new VAXs (only eventually to replace them and sell them back to resellers and OEMs), as a whole they're the biggest customers of used systems.

In fact, system managers looking for a financial edge may unearth a gold mine in the used-VAX market. The most astute DEC watchers have learned that every time a VAX is introduced, so is an upgrade program that allows existing VAXs from the previous series to be reconfigured. And the system the new VAX replaces often can be purchased at clearance rates from DEC or its OEMs.

DEC's current bargain basement pricing schedule for the VAX 8000 series is a perfect example. Prices are plummeting: 8600/8650-series CPUs that sold for $500,000 last spring are now below $100,000 and will continue to drop. Dur-

Industry Watch

Continued from page 98.

technology that handles from 400 to 2,500 lines. CIT applications using the SX-2000 PBX will enhance existing data communication applications by combining incoming/outgoing phone links, making and breaking network connections, and creating call transfer and call/station status information capabilities.

In conjunction with the announcement, DEC noted an agreement with Siemens Information Systems. The relationship will produce an application-level connection between the VAX and Siemens' Hicom PBX applications connectivity link. DEC expects the link to develop applications in customer service and product support environments, telemarketing, office telephone and facilities management, and database integration.

■ **Telecom Ties II** — DEC's initial CIT application entry, the VAX CIT Message Desk, aims at standard office telephone system improvements by providing keyboard dialing, electronic mailbox, messaging services and corporate directory functions. The keyboard dialing service allows users to make and return phone calls by entering Message Desk commands. The Message Desk also provides message transferal between parties, as well as a phonebook service that offers a personal online phone directory.

In a related development, DEC announced the release of its DECvoice Response System under CIT V2.0. DECvoice software provides interactive access to information via voice input and output capabilities.

■ **Diskeeper Keeps Up With Ingres** — Executive Software cleared the decks for its Diskeeper/Plus program to run with Ingres' RDBMS software. Ingres reports that recent tests indicate that Diskeeper/Plus improves performance on VAX/VMS systems running Ingres. Diskeeper/Plus is compatible with VMS V5.2 and runs on any supported VAX/VMS system.

■ **IBM And HP, Apollo, Form FDDI Think Tank** — An impressive group of leading systems developers will join forces to solidify FDDI development standards. Sponsored by Synernetics, a group of industry heavy hitters, including IBM and HP, Apollo Division, have formed the Station Management Development Forum. The forum will seek uniform implementation of the Station Management portion of FDDI.

■ **The Super Supercomputer** — Thinking Machines has been awarded a $12 million contract to develop a megacomputer capable of 1,000 times more power than any supercomputer.The company has convinced the U.S. Defense Advanced Research Projects Agency (DARPA) that it has the know-how to produce a supercomputer boasting top speeds of one trillion operations per second. No target completion date has been announced.

■ **Smart Move** — Ross Systems and SmartStar have announced a partnership for cooperative marketing and product development between SmartStar's 4GL application development environment and Ross' financial, accounting, distribution and human resource software. The partnership will allow easier data transferal from one database system to another. Ross CEO Dennis Vohs says that SmartStar "allows our customers to use multiple DBMSs simultaneously and, more important, allows our customers to migrate from RMS, Oracle and other database systems to DEC's Rdb."

■ **DEC Makes Tracks** — DEC has taken to the road to educate users on networking and multivendor concepts. "Network Solutions: The Desktop and Beyond" is a coast-to-coast venture targeting 28 U.S. cities early this year. Launching a series of user- and applications-oriented seminars, DEC showcases the latest in graphics and windowing technology. The company shows off a LAN that includes two MicroVAX 3500s, a VT340, a VAXstation 3540, a VAXstation 3100 running VMS and a DECstation 3100 running ULTRIX, a Mac IIcx, an IBM 3192F, a DECstation 320, an IBM PS/2 Model 50, a VRE001 flat panel display, and two Printserver LPS20s.—*Brian O'Connell, East Coast Editor*

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ing 1989, the prices of the midrange 8000s declined by as much as $75,000, while the MicroVAX II dropped by about $4,000. Somewhere, there's a full warehouse.

Digital Dealers

One of the best places to start when comparing used equipment prices is your DEC sales representative. He should be able to quote low prices on older systems or lead you to OEMs or VARs in your area that have good reputations at DEC.

As a rule, disregard the prices listed for outdated VAXs in the DECdirect catalog. Any computer or peripheral available from DEC is often available for less from its OEMs. Many OEMs and VARs can service and support smaller VAXs, from VAXstations and MicroVAXs to 8200/8300s. Many of these companies are listed with the Digital Dealers Association (DDA).

The DDA was organized in 1982 to develop an orderly competition among companies in the secondary market. The group has a published code of industry practices and ethics. Member dealers must pay an annual fee for the right to use the DDA logo and attend DDA conventions. The association has branched out to include Europe, Australia and Canada.

The DDA works with DEC in a love/hate relationship. Slowly, DEC seems to be acknowledging that the DDA may be good for its business.

Among other things, the DDA has helped to keep DEC's installation, licensing and other field service practices fair. It has created a system of checks and balances in the DEC industry infrastructure.

C.D. Smith, president of the DDA, is confident for the near term. "DEC will continue to depress values in the used market in an accelerating fashion," he says. "This is a side to the industry that is totally ignored at this time. Nowhere does the media or DEC acknowledge the impact of these products on the customer book value, the financial lessor's residual value or the dealer's inventory value."

These are important considerations for both the new systems buyer and the secondary buyer. In a world of accelerated upgrades, protecting your investment isn't easy. ■

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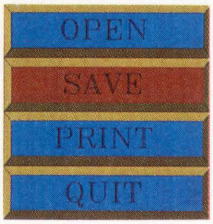

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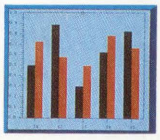

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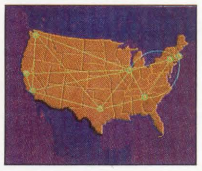

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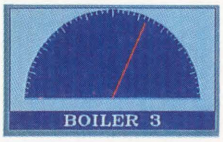

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UNIX

John D. Deans

The Flavors Of UNIX

There are more than 30 commercially available forms of UNIX for systems from PCs to supercomputers. Although the majority are based on BSD 4.2-3 or System V, each is distinct.

Theoretically, system managers, programmers and users should be able to use any UNIX system and perform their jobs with the same ease, except for performance or capacity variations that depend on the system architecture. Operating system differences should be of no hindrance, because they're all based on UNIX.

But this isn't true. The modular nature of UNIX has made it possible for vendors to make enhancements easily. These enhancements vary from version to version, destroying the notion of a totally compatible operating system across hardware platforms.

In 1973, Dennis Ritchie rewrote Ken Thompson's B version of UNIX in the high-level C language. Because the C compiler also was written in C, it produced a portable operating system written in a portable language compiled by a portable compiler. The University of California at Berkeley began modifying an AT&T version in the mid 1970s and made excellent improvements. The two most widely used versions today are the AT&T System V and Berkeley 4.3 BSD. System V incorporated some of BSD's improvements, but it's quite different. The battle still is being fought to establish a standard for UNIX.

Taste Test

Let's compare some versions of UNIX and note how the differences affect system managers, programmers and users (see Figure 1).

IBM threw its hat into the UNIX world with AIX for the IBM-RT (RISC architecture). It's based on System V. Although AIX should almost be classified a hybrid, it appears that IBM is taking UNIX seriously.

Domain, from HP, Apollo Division, is a combination of three versions of UNIX: BSD 4.3, System V and Aegis, all running simultaneously under the same kernel. Aegis is distinct from the other two versions. Such commands as **cd** and **rm** are **wd** and **dlf** in the Aegis environment.

HP-UX, Hewlett-Packard's UNIX, is different again. It combines System V, BSD 4.3 and more than 50 HP-specific commands into one package.

ULTRIX is the result of DEC's porting BSD 4.3 to the VAX and DECstation, based on the Mips Computer Systems chip. Until the recent workstation boom, DEC didn't fully support or care about ULTRIX. Now, the company wants it out front and available.

XENIX is a 16-bit implementation based on System V, without a hint of BSD.

Management Menu

For system management, differences in these flavors of UNIX are pronounced. One of the most common responsibilities of the system manager is performing backups from disk to tape and restoring from tape back to disk. HP-UX and XENIX have native BACKUP utilities to save files to tape, whereas ULTRIX and AIX use the popular **dump** and **restore**. Domain uses **tar**like utilities called **wbak** and **rbak** for writing to and reading from tape.

Another common task for system managers is adding and modifying users on a system. A file **/etc/passwd** contains user information, including an encrytped password. On ULTRIX and HP-UX, you simply edit the file with a program called **vipw**, which uses the editor defined by the environment variable EDITOR. This procedure creates a temporary file to prevent accidental corruption by such events as power outages or two people writing to the file at the same time.

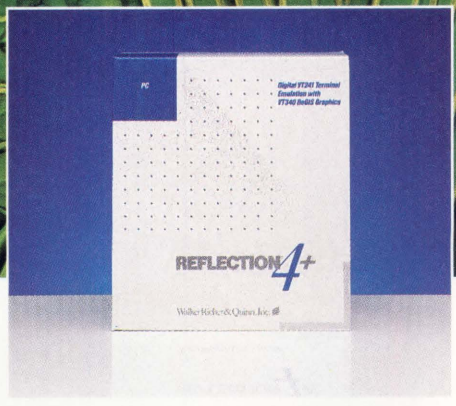
AIX, XENIX, and soon ULTRIX depart from the standard password file format by keeping the encrypted passwords in a separate file. Further, each version has a different shell script to simplify user management. Domain uses a completely different REGISTRY system. There's an **/etc/passwd** file, but it's merely a reflection of the central REGISTRY database. This file is used for reference only and can't be used to manipulate user accounts. A more complicated utility, **edrgy**, is used for adding or modifying user accounts.

System upgrades and updates are applied differently on most UNIX systems. Each has a different utility for performing updates, monitoring what's installed, and loading or unloading only part of the

FIGURE 1.

UNIX Variation	Vendor	Version
AIX	IBM	2.2
Domain	HP, Apollo Div.	7.0
HP-UX	Hewlett-Packard	6.5
ULTRIX	DEC	3.2
XENIX	AT&T, Intel	3.2

Some varieties of UNIX.



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distribution. There's also variation among what site-specific files are saved during the update procedure. AIX uses a utility called **updatep**; Domain has **install**; ULTRIX has **ltload;** and HP-UX just uses **tar**.

Networking on UNIX systems often involves TELNET, FTP and NFS, which are available on all five systems. The installation of these products is done with procedures such as **netsetup** and **nfssetup** on ULTRIX.

Networking maintenance usually involves adding network nodes to the **/etc/hosts** file or serving out new filesystems via NFS by adding names to the

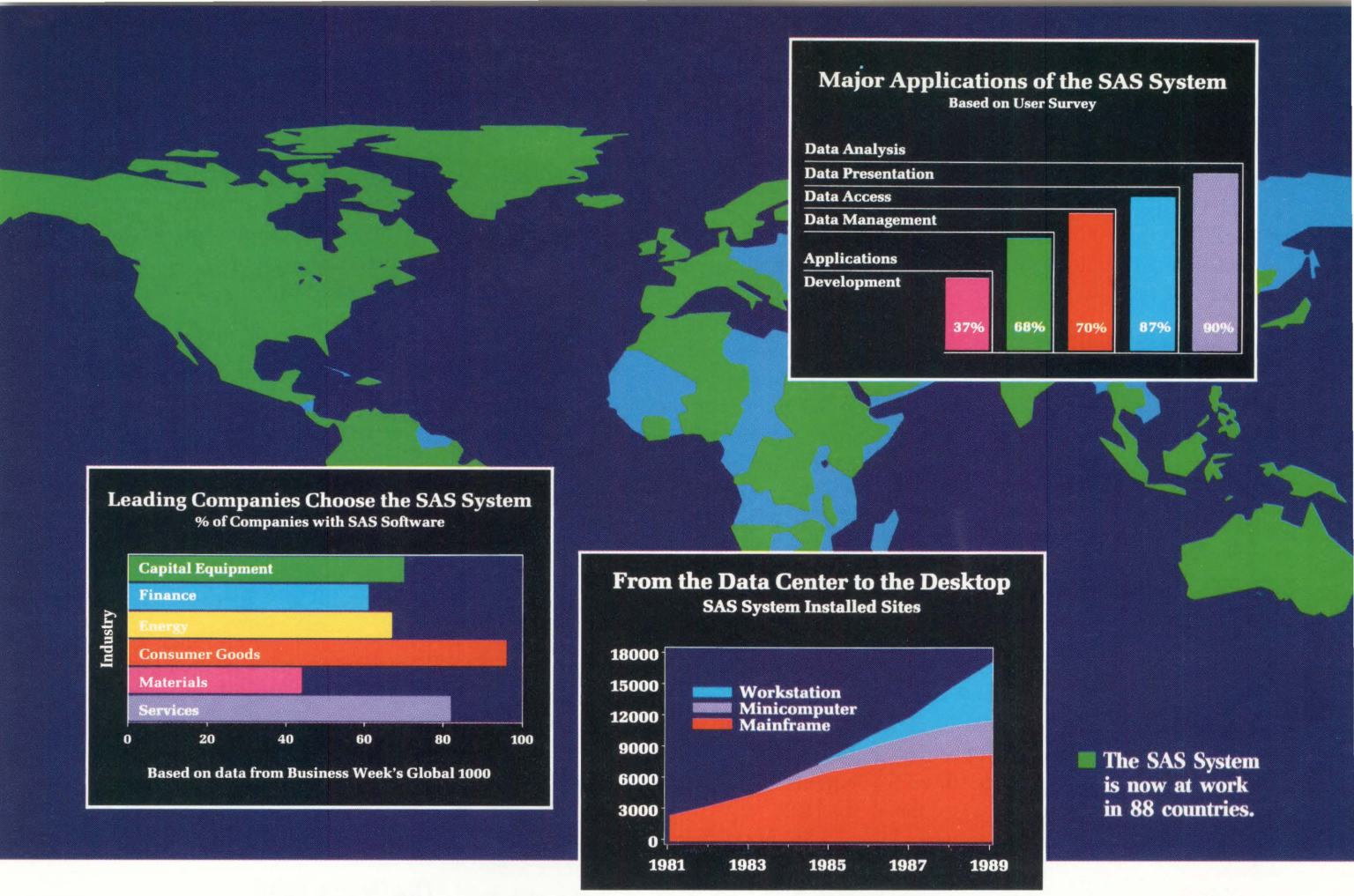
FIGURE 2.

UNIX Command Chart

Command	AIX	Convex	Domain	HP-UX	Sun	ULTRIX	XENIX	Command Description
adb	Yes	Yes	No	Yes	Yes	No	No	general-purpose debugger
adjust	No	No	No	Yes	No	No	No	simple text formatter
admin	Yes	No	Yes	Yes	No	Yes	Yes	create and administer SCCS files
alias	Yes	Yes	Yes	Yes	Yes	Yes	Yes	define command alias (C shell)
ar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	create library archives
as	Yes	Yes	No	Yes	Yes	Yes	Yes	assembler
asa	Yes	No	No	Yes	No	No	Yes	interpret ASA cr
at	Yes	Yes	Yes	Yes	Yes	Yes	Yes	execute command or script at a specified time
awk	Yes	Yes	Yes	Yes	Yes	Yes	Yes	pattern scanning and processing language
banner	Yes	Yes	No	Yes	No	No	Yes	makes large letters - posters
basename	Yes	Yes	Yes	Yes	Yes	Yes	Yes	extract filenames from a path name
bc	Yes	Yes	Yes	Yes	Yes	Yes	Yes	basic calculator
bdiff	Yes	No	Yes	Yes	No	Yes	Yes	big different file comparison
bfs	Yes	No	No	Yes	No	No	Yes	big file scanner
bg	Yes	Yes	Yes	Yes	Yes	Yes	No	resume process in background (C shell)
biff	No	Yes	Yes	No	Yes	Yes	No	enables mail notification
break	Yes	Yes	Yes	Yes	Yes	Yes	Yes	exit from loop
bs	Yes	No	No	Yes	No	No	No	a compiler/interpreter for modest-sized programs
cal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	displays calendar
calendar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	reminder service
cat	Yes	Yes	Yes	Yes	Yes	Yes	Yes	concatenate and display - list file
catman	No	Yes	No	No	Yes	Yes	No	fix man pages to run faster
cb	Yes	No	Yes	Yes	Yes	Yes	Yes	C program beautifier, formatter
cc	Yes	Yes	Yes	Yes	Yes	Yes	Yes	C compiler
cd	Yes	Yes	Yes	Yes	Yes	Yes	Yes	change directory
cdc	Yes	No	Yes	Yes	No	Yes	Yes	change the delta commentary of a SCCS delta
cflow	Yes	No	No	Yes	Yes	Yes	Yes	generate C flow graph
chgrp	Yes	Yes	Yes	Yes	Yes	Yes	Yes	change group ownership file(s)
chmod	Yes	Yes	Yes	Yes	Yes	Yes	Yes	change protections of file(s)
chown	Yes	Yes	Yes	Yes	Yes	Yes	Yes	change ownership of file(s)
chsh	No	Yes	Yes	Yes	Yes	Yes	No	change default login shell
clear	No	Yes	Yes	Yes	Yes	Yes	Yes	clear the screen
cmp	Yes	Yes	Yes	Yes	Yes	Yes	Yes	file comparison
col	Yes	Yes	Yes	Yes	Yes	Yes	Yes	filter reverse line feeds and backspaces
comb	Yes	No	Yes	Yes	No	Yes	Yes	combine SCCS deltas
comm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	displays common lines in two files
compact	No	Yes	No	Yes	No	Yes	No	compress files
cp	Yes	Yes	Yes	Yes	Yes	Yes	Yes	copy command
cpio	Yes	No	No	Yes	Yes	Yes	Yes	copy file archives in and out
crontab	Yes	Yes	Yes	Yes	Yes	Yes	Yes	list of timed chores for system to perform
crypt	No	No	No	Yes	Yes	No	Yes	encode or decode a file
csh	Yes	Yes	Yes	Yes	Yes	Yes	Yes	C shell command interpreter
csplit	Yes	No	No	Yes	Yes	Yes	Yes	file splitter with respect to a given context
ct	Yes	No	No	Yes	No	No	Yes	spawn getty to a remote terminal
ctags	Yes	Yes	Yes	Yes	Yes	Yes	Yes	create a tags file
cu	Yes	No	Yes	Yes	Yes	Yes	Yes	call another UNIX system
cut	Yes	No	No	Yes	Yes	Yes	Yes	remove selected fields from each line of a file
cxref	Yes	No	No	Yes	Yes	Yes	Yes	generate C program cross reference
date	Yes	Yes	Yes	Yes	Yes	Yes	Yes	display or set date
dc	Yes	Yes	Yes	Yes	Yes	Yes	Yes	desk calculator
dd	Yes	Yes	Yes	Yes	Yes	Yes	Yes	convert and copy files with various data formats
delta	Yes	No	Yes	Yes	No	Yes	Yes	make a delta change to an SCCS file
deroff	Yes	Yes	Yes	Yes	Yes	Yes	Yes	remove nroff/troff, tbl and eqn constructs
df	Yes	Yes	Yes	Yes	Yes	Yes	Yes	report free disk space on file systems
du	Yes	Yes	Yes	Yes	Yes	Yes	Yes	display disk use
⋮								

Note: Domain is a combination of System V, BSD and Aegis. Because Aegis has such a unique command set, it isn't referenced. Only commands resident in the other two Domain components are shown.

At the command level, users are exposed to many variations among the different flavors of UNIX.



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/etc/exports file. This is done easily by editing the files on ULTRIX, XENIX and HP-UX. AIX and Domain require more understanding of how their networking is set up and maintained.

Programmer Pickings

Software developers, especially C programmers, also are exposed to the idiosyncrasies found in the different versions of UNIX. If an application is written in generic C, it should be easy to port to any UNIX-based system.

The differences begin to appear during the port. Editing is usually the first hitch programmers encounter. Many editors have been ported to UNIX systems, including versions of EMACS and EDT, but they can behave differently under the various flavors of UNIX because of the type of workstation environment or terminal emulation. Bear in mind that there's a generic editor, vi. It was developed for BSD and is available for all versions of UNIX.

Differences in the compiler options offered on the versions of UNIX are a common headache for programmers. For example, the debug option for Domain is **-db**, whereas for ULTRIX and XENIX the **-g** option is used. ULTRIX's **-Y** option and Domain's **-systype** option allow compilation specifically for System V, while XENIX has no such option. The FORTRAN compiler on AIX has options for specifying internal compiler table limits such as Nx1000 to override the smaller default number of common blocks. Most other UNIX-based compilers have limit settings transparent to the programmer. Another quirk with AIX FORTRAN is that, if an existing sequential formatted file is opened, the pointer is set at the end of file by default.

Nearly all UNIX systems have symbolic debuggers. Surprisingly, the majority of UNIX systems have a common set of commands. With the XENIX debugger, setting a break point is done with the **break** command, whereas the **stop at** command is used on other flavors such as ULTRIX.

One big difference programmers see from one UNIX flavor to another is the format and behavior of **make** and its makefiles. Makefiles are wonderful after they're set up and working, but there are many differences in syntax rules.

FIGURE 3.

ULTRIX

Filesystem	Total kbytes	kbytes used	kbytes free	% used	Mounted on
/dev/rz1a	15551	11361	2635	81%	/
/dev/rz1g	482982	249893	184791	57%	/usr

AIX

Device	Mounted on	total	free	used	ifree	used
/dev/hd0	/	33840	4384	87%	8074	7%
/dev/hd2	/usr	106496	5504	94%	24711	10%

HP, Apollo Div. (BSD Shell)

Filesystem	kbytes	used	avail	capacity	Mounted on
19c01.1	329388	216469	112919	66%	/

XENIX

/	(/dev/dsk/0s1):	116322 blocks	16927 inodes
/usr	(/dev/dsk/0s3):	40312 blocks	47972 inodes

The display filesystems command df is resident on various flavors of UNIX but has varied default output formats, as shown.

Programmers developing software on UNIX systems should always consider portability. Chances are that if an application was created on one UNIX system it will be ported to other UNIX platforms

Programmers developing software on UNIX systems should always consider portability.

soon after completion. Ten years ago, programmers used a less-portable language, such as Assembly, and never had to worry about a change in the development environment. Now they must know the disparities of such tools as compilers, linkers and debuggers.

The User's UNIX

At the command level, the user also is exposed to differences among the flavors of UNIX. The UNIX command cross-reference chart in Figure 2 shows some of the commands and utilities available. A more complete chart is available in download on ARIS/BB. Some commands reside on all versions, while some reside on only one. For example, the display filesystems command **df** is resident on all five flavors, but it has varied default output formats. Examples of output from typing **df** on various versions are shown in Figure 3.

Some versions offer an abundance of information, such as the /dev device entry and number of inodes free and used. Others only display essentials. Compare the minimal amount of information displayed by XENIX to that displayed by AIX.

The mail utility is available on all UNIX systems. But again, its use can vary, usually based on what's contained in the default **.mailrc** file found on each system. For example, when you send mail on ULTRIX or AIX, you're prompted with SUBJECT:. After you type your message,

you're prompted with CC:. There are no prompts when sending mail under Domain or XENIX.

Most versions of UNIX have a lack of batch queues. Convex is an exception, with its proprietary CXBATCH batch queue system. Although batch queues were purposely left out of UNIX, users and system managers are requesting some sort of batch facilities. The public domain software Network Queuing System (NQS) currently is used as a raw generic form of batch queuing on several versions of UNIX.

DON'T ASSUME THAT, because it's UNIX, the environment is generic. No two UNIX systems are identical, because no two vendors are identical. Each tries to meet users' needs with enhanced versions. Ultimately, UNIX users will decide what flavor they like best. Until then, viva la difference! — *Deans is manager of computer operations at CogniSeis Development Corporation, Houston.*

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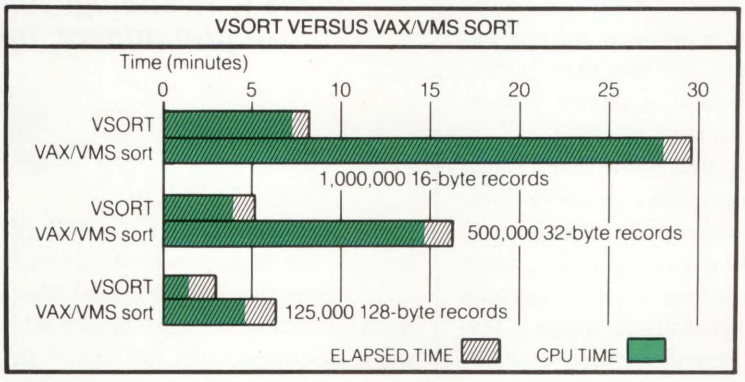

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- *TAM* an efficient screen formatter for transaction processing applications.
- *DIALUP* a data communications package that links VAX/VMS and RSTS/E systems to remote computers.
- *BSC/DV* a device driver for DEC's DV11.

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FIELD SERVICE

Ron Levine

DEC's Move Toward The Self-Maintainer

Almost everyone you speak to in computer service these days views the self-maintenance market as an area of potential growth. As end users take on more maintenance chores, they'll need more products, training and support services. As you may expect, there's no shortage of service/support vendors ready to meet the need.

This wasn't always the case. While depot repair operations (commonly referred to as fourth-party maintenance) always saw self-servicers as new revenue producers, most field service companies didn't take this attitude. Only a few maintenance providers, such as TRW Customer Service Division, sought to establish a foothold in this potentially lucrative market (see "The Growing Self-Maintenance Market," October 1988). Instead of viewing self-service end users as competitors, these few firms saw them as a fresh opportunity to provide training, diagnostics and other service-related products.

Just about everyone is jumping on the self-maintenance bandwagon. With MTBF ratings approaching the product life cycle for many boards and components, more users may attempt some form of self-maintenance — preliminary, intermediate or complete. The service industry is waking up to that fact.

Manufacturers such as Hewlett-Packard and Digital have created strong self-maintainer support programs. They had to, because they were far behind the independents in gaining account control of this growing segment of their user base. DEC's service offering is called the Digital Assisted Services Program (DASP).

DASP provides the self-maintenance user with the same level of hardware support services available to DEC's field service contract customers. Walter Mello, U.S. country manager for Digital Assisted Services, calls it "a Digital branch where the customer provides the labor." DEC always has provided software support and other services to the end user going it alone on a time and materials per-call basis. But this is the first time a full-contract service option has been offered.

> ***"With MTBF ratings approaching the product life cycle for many boards and components, more users may attempt some form of self-maintenance — preliminary, intermediate or complete."***

The objective of DASP is to form a service partnership between DEC and the self-maintenance customer or authorized OEM. The customer provides the first line of support, and Digital assists his efforts with the necessary products and services. Under an annuity plan, the contracted portion of DASP is paid on a monthly schedule. Additional services and products are available on a per-event payment basis.

DASP Contract Segments

DASP can be broken into four segments. Each is available separately or in combination with one or all of the others.

Access to Digital's Customer Support Centers (CSC)— DEC's CSCs are available to assist in solving hardware, software and networking problems on a 24-hour, seven-days-per-week basis. The CSCs provide telephone support and access to Digital's diagnostic tools, which include remote troubleshooting programs and instruments such as VAXsimPLUS, a predictive maintenance monitor.

Board Repair and Field Change Orders (FCO) — Highlights of this segment of DASP are the unlimited use of DECmailer to repair spare parts and free material for FCOs for all equipment under this agreement. Under the DECmailer service, self-maintainers can mail faulty parts to DEC for repairs.

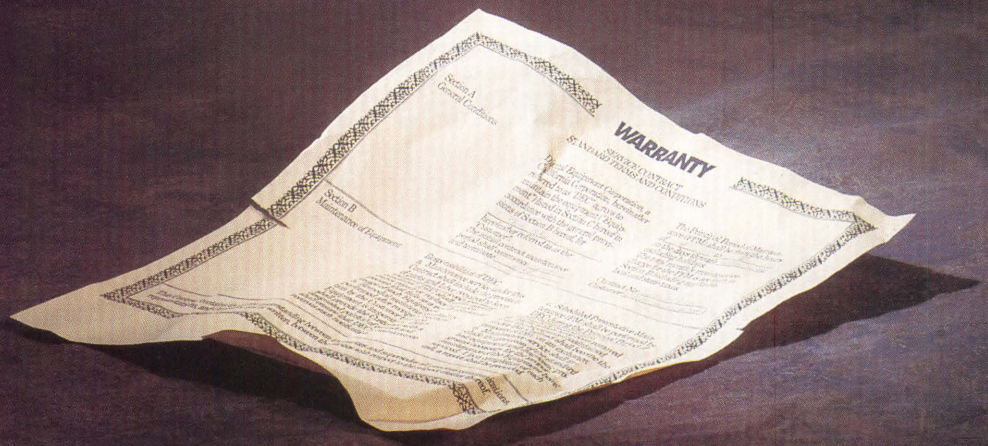
Hardware Diagnostics and Documentation — All required diagnostics and user documentation, including service manuals, come with this agreement. Diagnostics licenses are on a per-CPU basis. One set of diagnostics and documentation is provided per site/location. The customer can make one copy of each piece of documentation and/or diagnostics for each CPU under this agreement.

Hardware Diagnostics and Documentation Update Service — The customer is given one set of updates to hardware diagnostics and documentation per site/location. He can make additional copies of the updates for each CPU under contract.

Per-Event Features

Self-maintainers and authorized OEMs with a valid DASP contract can buy ad-

Just Because The Warranty Expires Doesn't Mean Your DEC Is Ready To Meet Its Maker.



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ditional services/support when needed on a per-event basis. These options include:

Hardware Training — The same hardware courses used to teach DEC's field engineers are available to DASP contract holders.

Back-up Technical Support — Field support by a product specialist is available on a per-call basis, 24 hours, seven days per week. A four-hour response time is guaranteed with continuous problem workthrough.

Spares Purchase Discounts — Discounts are offered when purchasing spare parts for products covered under a DASP agreement.

DEC's standard VAX system per-event minimum service fee isn't applied to DASP customers.

The self-maintainer's responsibility focuses mainly on the labor-intensive side of the service call. To qualify for a DASP agreement, customers must:

1. Provide one central point of contact to handle all service issues between Digital and themselves.
2. Provide the initial labor for each service call, i.e., the first level of maintenance.
3. Have employees sufficiently trained in the use of the service tools provided by DEC.
4. Sign a nondisclosure agreement.

DASP is aimed at the traditional self-maintenance customer. It isn't intended to create new self-maintainers but to add a comprehensive hardware support program to DEC's other self-maintenance assistance offerings. Digital has worked with self-servicers through its Digital Assisted Services group since 1976. This is the latest effort to extend that support.

Other support services available to self-maintenance customers include:

1. Maintenance Product Recommendation Service, which is provided free to assist customers in determining the spare parts level required to meet their system availability needs. Recommended levels of tools and test equipment, preventive maintenance parts and related service documentation also are provided.
2. Training courses for self-maintainers are provided in many formats, including seminars, audio-visual courses, onsite training, self-paced instruction, computer-based instruction and standard classroom instruction.
3. Spare parts and complete spare kits to support a field-replaceable-unit service philosophy are available from DEC for all major CPUs and options.
4. Licensed diagnostics software for all VAX and MicroVAX systems, including the VAX 8xxx.
5. Module and subassembly repair services with a variety of response (turnaround) options.
6. Field service per-call backup support.

Other services provided by DEC include emergency order, maintenance documentation on hardcopy or microfiche, unlisted parts locator, part number assistance and a Digital Assisted Services price book. This book, published twice yearly, contains part numbers and pricing data for self-maintenance products.

With DASP, DEC makes it easier to combine all of the pieces of hardware support into one comprehensive customer assistance agreement. By adding new offerings, such as the CSC and FCO features, Digital has made its site support stronger. Using the DASP hardware support package in combination with existing software support programs such as the VMS support option, the self-maintenance customer gains access to the same level of technical support available to Digital's field service contract customers. The difference is that the customer must supply the first level of service labor.

Editor's note: For more information on Digital's self-maintenance support programs, call (603) 884-5000. ■

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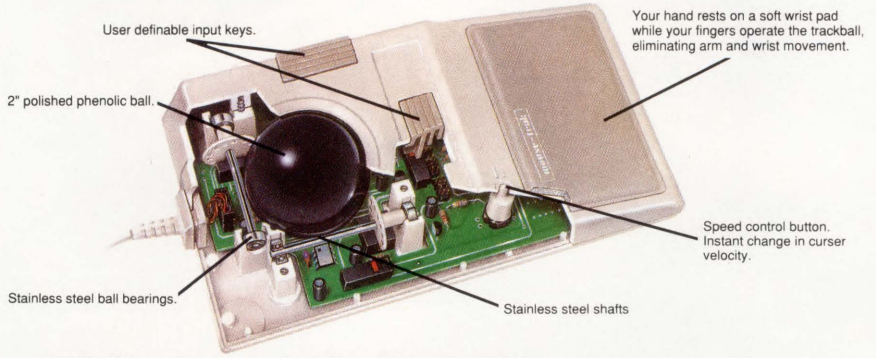

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THE MAC CONNECTION

Al Cini

Programming With AppleTalk For VMS

The collective term for the rules that govern the way Apple Computer's products talk with one another over a network is AppleTalk. AppleTalk is to Apple as DECnet is to DEC.

AppleTalk for VMS (ATKVMS) is a library of software tools that enable a program running on VAX/VMS to speak AppleTalk networking protocols. If you're using Mac-VAX/VMS networking products such as Alisa Systems' AlisaTalk or Odesta's Helix VMX, then AppleTalk for VMS already is working behind the scenes for you, managing various aspects of the dialog between your Mac and VAX. If you're a programmer who'd like to write software like this, then AppleTalk for VMS may be the developer's tool you need.

AppleTalk Basics

In a manner directly analogous to modular application software, AppleTalk networking services are arranged in seven discrete levels following the Open Systems Interconnect model. AppleTalk's lower layers concern themselves with the relatively primitive aspects of sending and receiving packets. AppleTalk's higher layers invoke these lower level services to solve application-related problems such as locating other nodes on a network or sending and receiving whole data files (see Figure 1).

In general, a programmer using AppleTalk's higher level services is spared the lower level details of the protocol and can get something running more quickly and with less effort. However, he's confined to the specific high-level application. A programmer using AppleTalk's lower level services, on the other hand, is free to explore any imaginable use of AppleTalk communications packets. However, he'll have to invest more time and energy in the details of how these raw AppleTalk packets are exchanged.

AppleTalk for VMS provides an array of programmer-CALLable subroutines, offering lower, mid- and higher level AppleTalk protocol capabilities.

Lower Level Services

In the current AppleTalk for VMS V2.0, a VAX/VMS process using the ATKVMS library participates in a "virtual" AppleTalk network using an internal Virtual Link Access Protocol (VLAP). Without getting bogged down in AppleTalk addressing details, this simply means that each VAX-based ATKVMS process behaves like a separate AppleTalk node when it participates in an AppleTalk internetwork. Each ATKVMS process has its own node address and Service Access Points ("sockets" in AppleTalk terms) and is addressed by other AppleTalk nodes as though it were a Mac or Apple LaserWriter printer (see Figure 2).

The first step in using ATKVMS is to initialize the library using the ATK$INIT_ATALK routine. ATKVMS buffers incoming AppleTalk packets, or datagrams, using a separate ring buffer for each VLAP process. One of the arguments to ATK$INIT_ATALK specifies the maximum number of datagrams to be buffered.

OSI Model Layer	AppleTalk Implementation/ Protocol	AppleTalk for VMS V2.0	Planned for AppleTalk for VMS V3.0
Application	AppleShare, LaserWriter		
Presentation	AppleTalk Filing Protocol (AFP) PostScript		
Session	AppleTalk Data Stream Protocol (ADSP) AppleTalk Session Protocol (ASP) Printer Access Protocol (PAP)	ATK$PAP_*	**ATK$DSP_*** **ATK$ASP_*** ATK$PAP_*
Transport	AppleTalk Echo Protocol (EP) Name Binding, Zone Information Protocols (NBP, ZIP) AppleTalk Transaction Protocol (ATP)	ATKNBP_*, ATKZIP_* ATK$ATP_*	**ATK$AEP_*** ATK$NBP_*, ATK$ZIP_* ATK$ATP_*
Network	Datagram Delivery Protocol (DDP)	ATK$DDP_*	ATK$DDP_*
Data Link	LocalTalk Link Access Protocol (LLAP) Ethernet Link Access Protocol (ELAP) Virtual Link Access Protocol (VLAP)	ELAP : AppleTalk Phase I (V2.05) **AppleTalk Phase II (V2.1)**	ELAP : AppleTalk Phase II Only **VLAP Removed (?)**
Physical	LocalTalk Cabling (for ELAP) Ethernet Cabling (for ELAP), VAX/VMS InterProcess Communication (for VLAP)		**VLAP Removed (?)**

Figure 1: Functions supported in current and planned releases of AppleTalk for VMS positioned against the OSI Reference Model and Apple's defined AppleTalk protocols. Boldfaced items are changes from earlier releases.

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MaxNotes is a Macintosh front end application for Digital's VAX Notes electronic conferencing system, using our DECnet package to connect to remote VAX Notes conferencing servers. It's simply the easiest way for Mac users to participate in VAX Notes electronic conferences.

And MaxNotes makes full use of the Mac's graphic interface. So there's no need to learn or use commands. Just point and click with your mouse.

MaxNotes is a powerful messaging tool you can use to promote communication, problem solving, and interpersonal education. And we designed it to be easy for the beginner, yet powerful enough for the experienced user.

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With ATKVMS initialized, the package's AppleTalk Datagram Delivery Protocol (ATK$DDP_WRITE and ATK$DDP_READ) entrypoints can be used to transmit AppleTalk datagrams over the internetwork or to read received datagrams out of the internal ring buffer. Both operations can be performed synchronously or asynchronously, with async operation strongly recommended, especially for read operations.

The asynchronous DDP read function uses VMS Asynchronous System Trap (AST) delivery. The library's ATK$DDP_OPEN_SKT routine accepts as an argument the entry mask of a procedure associated with a specific AppleTalk socket. This "socket listener" procedure is called automatically at AST level when a datagram arrives addressed to its designated socket.

Midlevel Service Entrypoints

Like most AppleTalk link access protocol media (such as Ethernet or Apple's LocalTalk LAN), VLAP is a connectionless service that doesn't guarantee the delivery of a datagram to its addressee. Guaranteed message delivery is left to a higher level AppleTalk protocol, the AppleTalk Transaction Protocol (ATP). The ATP transparently invokes the lower level Datagram Delivery Protocol (DDP) to perform this function.

AppleTalk for VMS provides several ATP entrypoints that collectively support all Apple-defined modes of the ATP dialog, including Exactly-Once mode. The ATK$ATP_OPN_SKT routine allocates an AppleTalk socket, and subsequent calls to the ATK$ATP_GET_REQ procedure prepare this socket to receive and handle the various ATP datagram formats. Conversely, an ATK$ATP_SND_REQ call elsewhere in the AppleTalk internetwork can be used to initiate an ATP transaction, perhaps addressed to our ATP socket.

How might a remote node know which AppleTalk socket in our ATKVMS process to address? AppleTalk for VMS also provides several entrypoints that offer AppleTalk Name Binding Protocol (NBP) network name registry (ATK$NBP_REGISTER) and lookup (ATK$NBP_LOOKUP) functions. A programmer would use ATK$NBP_ REGISTER to advertise an ATP socket by name to other nodes or ATK$NBP_LOOKUP to learn the socket address of a service elsewhere in the network. NBP functions are visible to a networked Mac user through Chooser (a built-in Mac operating system program).

Higher Level Services

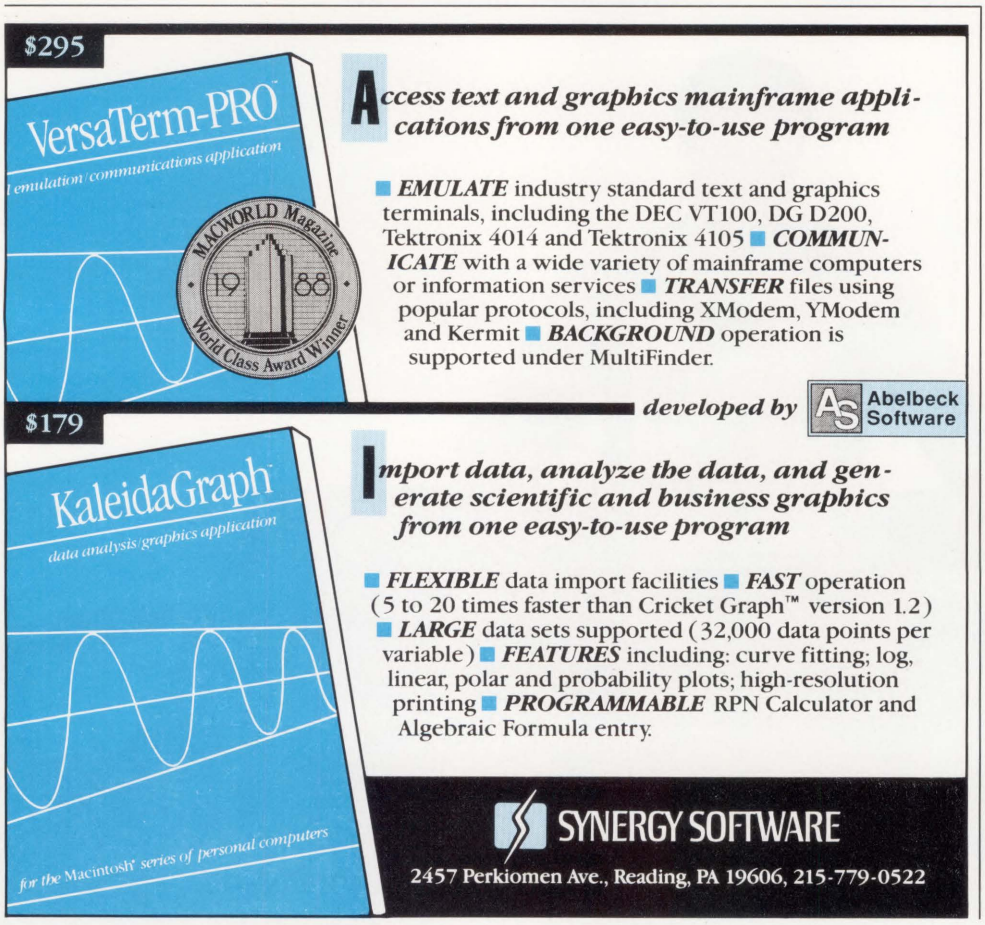
Entrypoints for AppleTalk's session layer protocols, the AppleTalk Data Stream Protocol (ADSP) and the AppleTalk Session Protocol (ASP), are missing from the current major release of AppleTalk for VMS. This has been a problem for Independent Software Vendors (ISV), leaving them with the burden of developing these complicated protocols using lower level ATKVMS functions.

However, the current version includes a comprehensive library of networked printer entrypoints (ATK$PAP_xxx) that allow ISVs to write software that communicates with or emulates LaserWriters.

AppleTalk for VMS follows the VAX/VMS procedure-calling standard and can be invoked from any third-generation VAX/VMS programming language. However, because several of its functions return virtual addresses or pass arguments to user-written routines by value, an implementation-oriented programming language with pointer variables, such as C or BLISS, may be most appropriate. But with a little creativity, even the most advanced functions of AppleTalk for VMS can be used from VAX FORTRAN, COBOL or BASIC programs.

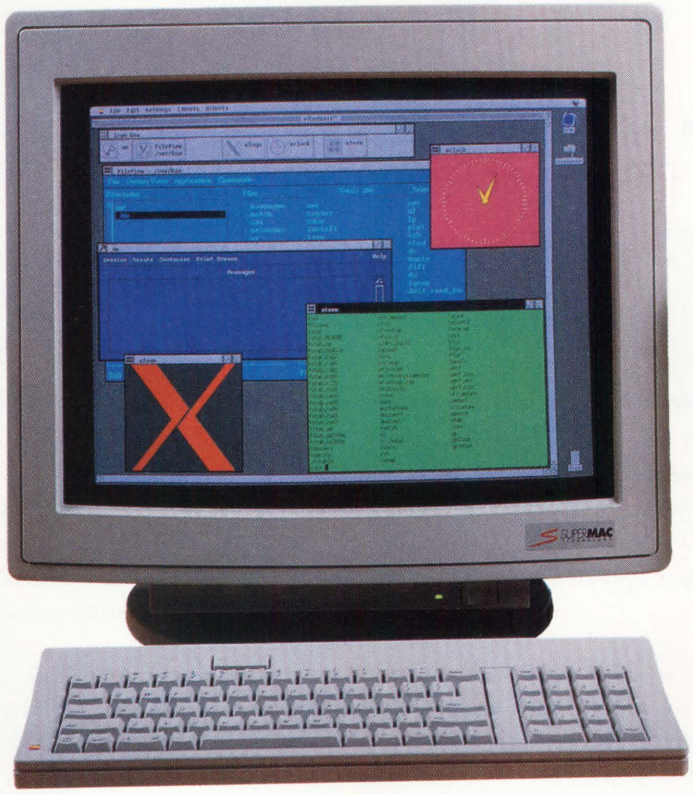
ORIGINALLY DEVELOPED IN 1986 by Alisa under a contract with Apple, AppleTalk for VMS has become a standard Apple developer's tool. The package also has been accepted as a cornerstone of the joint Apple-DEC network development efforts announced in January 1988.

ISVs license AppleTalk for VMS from Apple for use in their products. Users of



CIRCLE 163 ON READER CARD

How to tie your Macs to your VAX without tying yourself to your Macs.



Why limit yourself?

Connecting your Macs to your VAX makes a lot of sense. You can get the economic benefits of centralized storage. You can share files. And you can relieve the VAX of a lot of jobs like file processing, word processing, graphics or spreadsheets.

For a lot of companies, though, that's where it ends. Why not get the full benefits of Mac-VAX communications?

Can you do this?

For example, your Macs could have access to VAX applications, extracting key data for integration into Mac applications.

And you could make VAX-based files and reports available to both Macs and VAX workstation users in their appropriate formats.

And both Mac and VAX users could access electronic mail.

Or use Mac-generated graphics in VAX applications.

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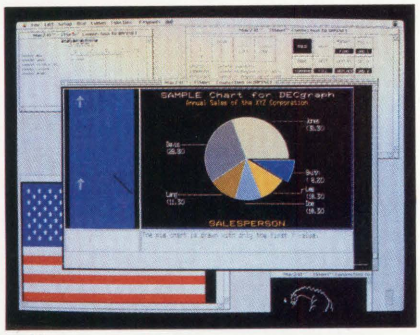

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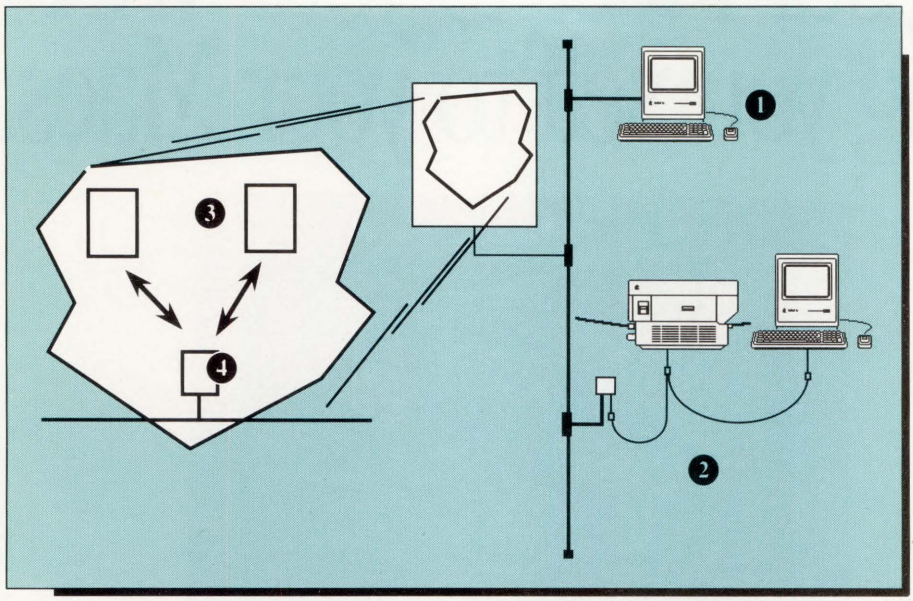

Figure 2: The Mac and LaserWriter connect to an Ethernet either directly (1) or indirectly via an AppleTalk bridge such as Novell's Kinetics FastPath or Cayman Systems' Gatorbox (2). AppleTalk for VMS simulates this in the VAX. VAX/VMS processes, using the ATKVMS Support Library, appear as networked AppleTalk nodes (3) and communicate with other networked devices through an ATKVMS bridge process (4).

these products receive AppleTalk for VMS as part of the product's kit, and the ISV is the first line of support for problems. Licensed ISVs are provided with technical contacts at Apple through which AppleTalk for VMS problems can be reported and resolved.

Apple has announced that AppleTalk for VMS V2.1, codeveloped with Pacer Software, will be made available during the first quarter of 1990. It will be entrypoint-compatible with V2.0, will correct problems reported in the current release and will support AppleTalk Phase II extended Ethernet addressing capabilities. The long-awaited availability of Apple's CL/1 networked database access server for VAX/VMS, which uses AppleTalk for VMS, also has been announced.

Beyond this, AppleTalk for VMS V3.0, available later in 1990, will offer a new Application Programming Interface (API). Although not yet formally announced, a draft version of the API specs has been distributed to developers. This information is subject to change.

In addition to the AppleTalk protocols supported in the current release, V3.0 will support ASP and ADSP. Behind the scenes, it will eliminate the routing overhead associated with the current version's VLAP and will implement the lower level code as a VAX/VMS I/O driver. Together, these two moves should mean significant performance improvements.

Further, V3.0 is expected to eliminate the need for the ATKVMS bridge, allowing each ATKVMS process to communicate directly through a more efficient AppleTalk class driver over the VMS Ethernet driver.

Note that, although functionally very similar to the current release, the new API entrypoints in V3.0 will be different. ISVs will need to modify their V2.0 code.

If you're interested in developing a Mac-VAX/VMS networking product or if you'd like to develop an in-house Mac-VAX software application, you can find out more about AppleTalk for VMS by ordering the V2.0 documentation from the Apple Programmers and Developers Association (APDA). AppleTalk for VMS documentation is reasonably clear and easy to read, patterned after DEC's *VAX/VMS System Services Reference Manual*. If you're serious about developing AppleTalk software, you also should get a copy of *Inside AppleTalk* (Addison-Wesley, 1989).

If an ATKVMS-based product such as AlisaTalk or Helix VMX is installed at your site, you already have AppleTalk for VMS. The kit includes an optional VMS save set with several C programming language examples. If you'd like to license this software, contact the Software Licensing Department at Apple. The license fee to use AppleTalk for VMS for in-house development is $1,000. The fee to use it for commercial distribution with a product is $5,000.

Editor's note: The Apple Programmers and Developers Association (APDA) is located at 20525 Mariani Ave., MS: 33G, Cupertino, CA 95014; (800) 282-APDA. ■

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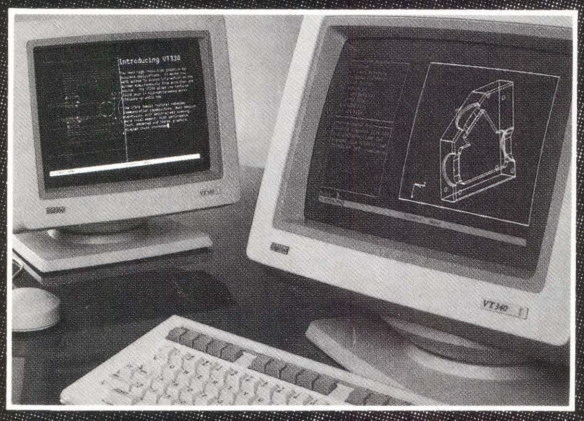

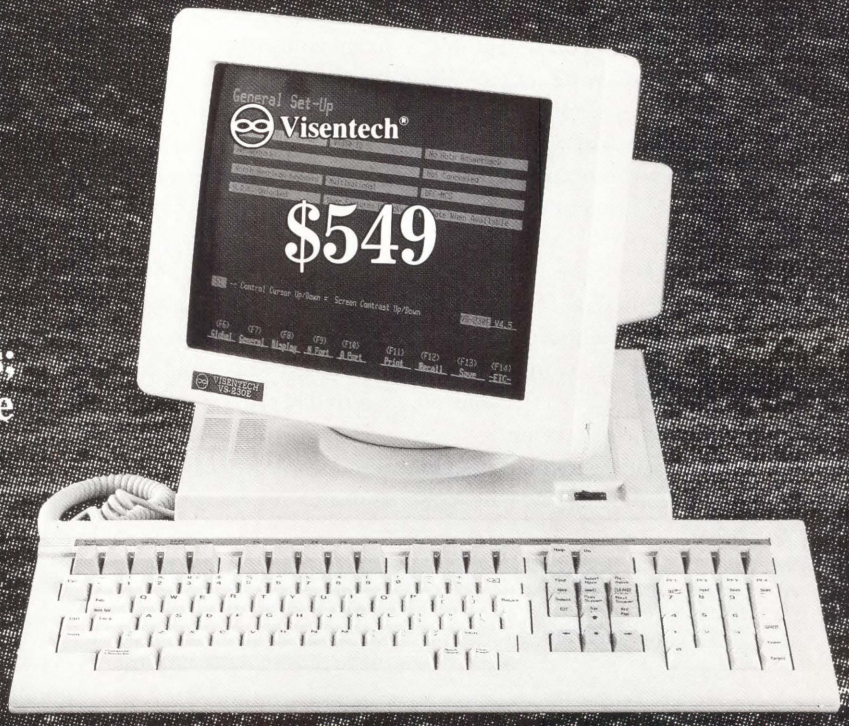

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Rex Jaeschke

Command-Line Argument Processing

Editor's note: This month, C Editor Rex Jaeschke investigates the processing of command-line arguments. Most of the examples were run under VAX/VMS, but comments relating to UNIX and DOS are provided. Mr. Jaeschke also looks at generating inline code in C++ using the ***inline*** *keyword.*

The function **main** is like any other you write. It has an argument list and a return type. The only thing special about **main** is its name. You're required to name your main program **main** using lowercase letters. When writing special programs, such as those intended to execute on embedded systems in special-purpose hardware, you may not need a function called **main**. When this occurs, refer to the compiler documentation.

In most C programs, **main** doesn't have arguments. However, whether you declare them or not, at least two always are passed in by the startup code that transfers control to **main**. These arguments represent the command-line argument count and argument strings which usually are called **argc** and **argv**, respectively. Because they're formal parameters, you can call them what you wish, but the de facto names are preferred because everyone understands their meaning.

Consider the following program run under VAX/VMS using the RUN command, i.e., no command-line arguments were provided:

```
#include <stdio.h>

main(int argc, char *argv[])
{
        int i;

        printf("argc = %d\n\n", argc);

        printf("Command-line arguments\n\n");

        for (i = 0; i  <argc; ++i)
                printf("argv[%d] = >%s<\n", i, argv[i]);

        if (argv[argc] == NULL)
                printf("\nargv[argc] == NULL\n");

        else
                printf("\nargv[argc] != NULL\n");
}

argc = 1

Command-line arguments

argv[0] = >mydisk:[direct]cmd1.exe;4<

argv[argc] == NULL
```

The argument count **argc** has type **int** and represents the number of arguments present when the program was invoked. Here it's 1, the name of the program being executed. ANSI C states that **argc** is greater than or equal to zero, because some systems can't provide access to the first argument. With VAX C, **argc** is at least 1.

The array **argv** contains a list of pointers to null-terminated strings representing the command-line arguments. If **argc** is greater than zero and the name of the program isn't available, ANSI C requires that **argv[0]** point to an empty string. In the above case, **argv[0]** points to the fully qualified name of the executable file cmd1.exe.

The same program run under DOS produced the following for **argv[0]**:

```
argv[0] = >D:\DECPRO\Q1.EXE<
```

If **argc** equals *n*, you'd expect **argv** to have *n* elements. However, ANSI C requires **argv** to have one extra, containing the **NULL** pointer value. This lets the array **argv** be processed without using **argc** — you simply step through the array until a **NULL** pointer is reached. (This convention isn't implemented universally yet.)

You'll find **argv** declared in one of two ways:

```
main(int argc, char *argv[])
main(int argc, char **argv)
```

Both are equivalent. Remember, array expressions are passed as pointers to their first elements. Therefore, if **argv** is an array of pointers, the address of the first pointer, **&argv[0]**, is passed and the type of that expression is **char ****.

Specifying Command-Line Arguments

Systems such as UNIX and DOS automatically let you use command-line arguments when you run a program. This is possible because the syntax to run a program is the same whether arguments exist or not. With VAX/VMS, however, this isn't the case. The RUN command has no facility to allow you to pass arguments. To do this, you must execute the program in a different way. One way is to install the program as a "foreign command." This has nothing to do with the INSTALL command. Foreign commands are well-documented in the *VAX C Manual*. You also can find them in the *DCL Concepts Manual*, Section 5.4, Foreign Commands. However, they aren't in the *VAX/VMS Manual* index.

To execute the program above, install cmd1.exe as a foreign

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command called **doit** as follows:

```
doit :== $mydisk:[direct]cmd1
```

Choose a name for the command and equate it to the string following the :== characters. Start with a dollar sign ($), because it identifies **doit** as a foreign command. Then follow with the device, directory and executable filename. A default system device and directory are used if these are omitted. The .EXE file type is optional, and you should omit the version number because generally you want the highest one that exists.

Now you can run the program via the foreign command by adding command-line arguments, for example:

```
doit abc ABC "abc DEF"
```

which on VAX/VMS produces:

```
argc = 4

Command-line arguments

argv[0] = >mydisk:[direct]cmd1.exe;4<
argv[1] = >abc<
argv[2] = >ABC<
argv[3] = >abc DEF<

argv[argc] == NULL
```

On DOS, the arguments are almost the same, for example:

```
argv[0] = >D:\DECPRO\Q1.EXE<
argv[1] = >abc<
argv[2] = >ABC<
argv[3] = >abc DEF<
```

argv[0] is appropriately different, but **argv[2]** has its case preserved. DOS' command-line interpreter COMMAND.COM does this, but VAX/VMS' DCL doesn't. Be careful when processing command-line strings, because you may want to convert them to upper- or lowercase before using a lookup table to match them.

Both systems preserve casing within double quotes and strip off the quotes. This isn't universally guaranteed. Some systems include the quotes in the argument, while others won't recognize them as anything special, passing in the two arguments **"abc** and **DEF"** instead. As such, casing might not be preserved. On VAX/VMS, it's a function of DCL, while on DOS it's a function of the startup code automatically linked in from your compiler's library. Not all DOS C implementations process quoted arguments (particularly those containing embedded white space) the same way.

Environment Variables

Many implementations, including those running under UNIX, DOS and VAX/VMS, provide a third argument to **main**. Like **argv**, **envp** is an array of pointers to strings with a **NULL** terminator. (ANSI C requires only two arguments to **main**; any extra are implementation-defined. Therefore, using **envp** isn't maximally portable.)

On these operating systems, you can define symbols at the command-line level for use in commands and from programs. What constitutes an environment and which environment variables are defined by the system or user is implementation-defined.

VAX/VMS always has four environment variables defined once you log in, for example:

```
#include<stdio.h>

main(int argc, char *argv[], char *envp[])
{
        int i;


    printf("\nEnvironment strings\n\n");

        i = 0;
        while (envp[i] != NULL) {
                printf("envp[%d] = >%s<\n", i, envp[i]);
                ++i;
        }
}

Environment strings

envp[0] = >PATH=mydisk:[direct]<
envp[1] = >HOME=mydisk:[direct]<
envp[2] = >TERM=vt200-80<
envp[3] = >USER=TESTBED<
```

The same program run on a DOS system produced:

```
envp[0] = >COMSPEC=C:\COMMAND.COM<
envp[1] = >PROMPT=$p $g<
envp[2] = >UUTZ=EST<
envp[3] = >UUC=com1:,1200<
envp[4] = >UUD=E:<
envp[5] = >COBDIR=C:\COBOL<
envp[6] = >PATH=C:\DOS;C:\UTIL;<
```

Although COMSPEC and PATH are predefined by DOS, the other variables are defined using the DOS SET command.

Although ANSI doesn't define **envp**, it defines a library function **getenv** in **stdlib.h**. This lets the programmer search the current environment for a user-supplied string. If the string isn't matched, either **NULL** or a pointer to the expanded definition of that variable is returned. **NULL** can indicate there's no environment, so this function can be used portably. The function **getenv** is more simple to use than **envp**, because **envp** requires you to traverse the table of strings, comparing against each one as you go,

ANSI C++ Meeting

By the time you read this, I'll have attended the first meeting of X3J16, the ANSI Standards Committee for the C++ language. It's scheduled for December 15, 1989. I'll have a report on this organizational meeting in a later issue. According to the proposed agenda, C++ language designer Bjarne Stroustrup will be the keynote speaker. The committee is convened by Dmitry Lenkov of Hewlett-Packard.

while **getenv** does this for you.

```
#include <stdio.h>
#include <stdlib.h>

main()
{
        char *pc;
        char *env;

        env = "HOME";
        pc = getenv(env);
        if (pc == NULL)
                printf("No such environment variable %s\n", env);
        else
                printf("Environment variable %s = >%s<\n", env, pc);

        env = "Home";
        pc = getenv(env);
        if (pc == NULL)
                printf("No such environment variable %s\n", env);
        else
                printf("Environment variable %s = >%s<\n", env, pc);

        env = "MASTER";
        pc = getenv(env);
        if (pc == NULL)
                printf("No such environment variable %s\n", env);
        else
                printf("Environment variable %s = >%s<\n", env, pc);
}
```

When run on VAX/VMS, the output produced was:

```
Environment variable HOME = >mydisk:[direct]
No such environment variable Home
No such environment variable MASTER
```

Spawning Programs

Most systems let one program invoke another directly. In these cases, the first program is suspended until the subprogram completes. (Many systems also allow both programs to execute in parallel.) Such serial execution can be invoked using the ANSI C library function **system**, declared in **stdlib.h**, as follows:

```
#include <stdio.h>
#include <stdlib.h>

main()
{
        int retval;

        printf("calling system\n");
        retval = system("run cmd1");
        printf("retval = %d\n", retval);
}

calling system
argc = 1

Command-line arguments

argv[0] = >mydisk:[direct]cmd1.exe;4<

argv[argc] == NULL
retval = 1
```

If **system** succeeds in sending the command-line to be processed, an implementation-defined **int** value is returned. However, not all systems support this capability. To see if **system** can be used to spawn a program, call **system** using **NULL** as its argument. If zero is returned, no command-line facility is available. On DOS, a command-line facility is available, but you

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might not have enough memory left to load it, depending on the size of your current program and the amount of physical memory you've installed.

```
#include <stdio.h>
#include <stdlib.h>

main()
{
        int retval;

        printf("calling system\n");
        retval = system("doit abc \"ABC def\" ABC");
    printf("retval = %d\n", retval);
}

calling system
argc = 4

Command-line arguments

argv[0] = >mydisk:[direct]cmd1.exe;4<
argv[1] = >abc<
argv[2] = >ABC def<
argv[3] = >abc<

argv[argc] == NULL
retval = 1
```

The above examples were run on VAX/VMS, and in each case **system** returns a value of 1. It would seem that if **system** succeeds, the value it returns is the exit status code produced when the spawned program terminates. Because cmd1.exe has to return value and **main** has **int** type, the return value, and therefore cmd1.exe's exit status, is undefined. However, VAX C forces **main** to have a return value of 1 if none is explicitly supplied. This isn't the case on other systems, which can return 0 or (more likely) some undefined value.

Alternative Command Definition

Recently, VAX/VMS added a Command Definition Utility (CDU), which lets you define your own commands so that they look and are treated like DCL commands. In particular, you can specify valid command-line options and values and have the command-line utility validate any user-supplied command line before calling your program. This is beneficial because your program can work on the assumption that any options passed to it are valid — it's a matter of which options were passed in. CDU uses the VAX/VMS message utility to generate messages so that errors are reported in a consistent way.

Although I was able to use CDU to run programs and pass command-line arguments successfully, I wasn't able to pass in a variable number of arguments to a program. (I was able to pass in a variable number of options beginning with a slash, however.) Because I'd never used CDU, it's possible that I couldn't find the right approach. No matter, the foreign command approach works fine.

The C++ Language: Inline Code Generation

C++ has a keyword **inline** that lets functions be "brought inline" each time they're called. This eliminates the overhead of calling the function and handling its return value at the expense of making the executable code much larger. In computing, it's known as the speed versus space trade-off.

The keyword **inline** is used as follows:

```
inline void f(int i);           /* declaration */

inline void f(int i) { ... }    /* definition */
```

For the compiler to bring a function's code inline, the definition of the function must be in the same source file as the function calling it, because the compiler works on source files in isolation from one another. And if the function is declared **static**, it can be inlined in each place it's called with no code actually generated for a separate function of that name. If, however, the function is **extern**, code for it will have to be generated in case it's called from another source file.

The idea of inlining functions isn't new. It's been implemented successfully without assistance from the programmer, i.e., without using **inline**. VAX C V3.0 has this capability as the default. It inlines all functions in a source file if they are smaller than some given size, aren't called more than a given number of times, and don't call themselves recursively.

Inline Member Functions

Because many functions in C++ programs are member functions, you can expect to have **inline** member functions, for example:

```
class circle {
        ...
public:
          inline void init(long, long, unsigned long);
          inline void init(long, long);
          inline void init(unsigned long);
};

inline void circle::init(long xo, long yo,
          unsigned long rad) { /* ... */ }

inline void circle::init(long xo, long yo) { /* ... */ }

inline void circle::init(unsigned long rad) { /* ... */ }
```

However, you can specify this more easily by writing the definitions of these functions inside the class definition as follows:

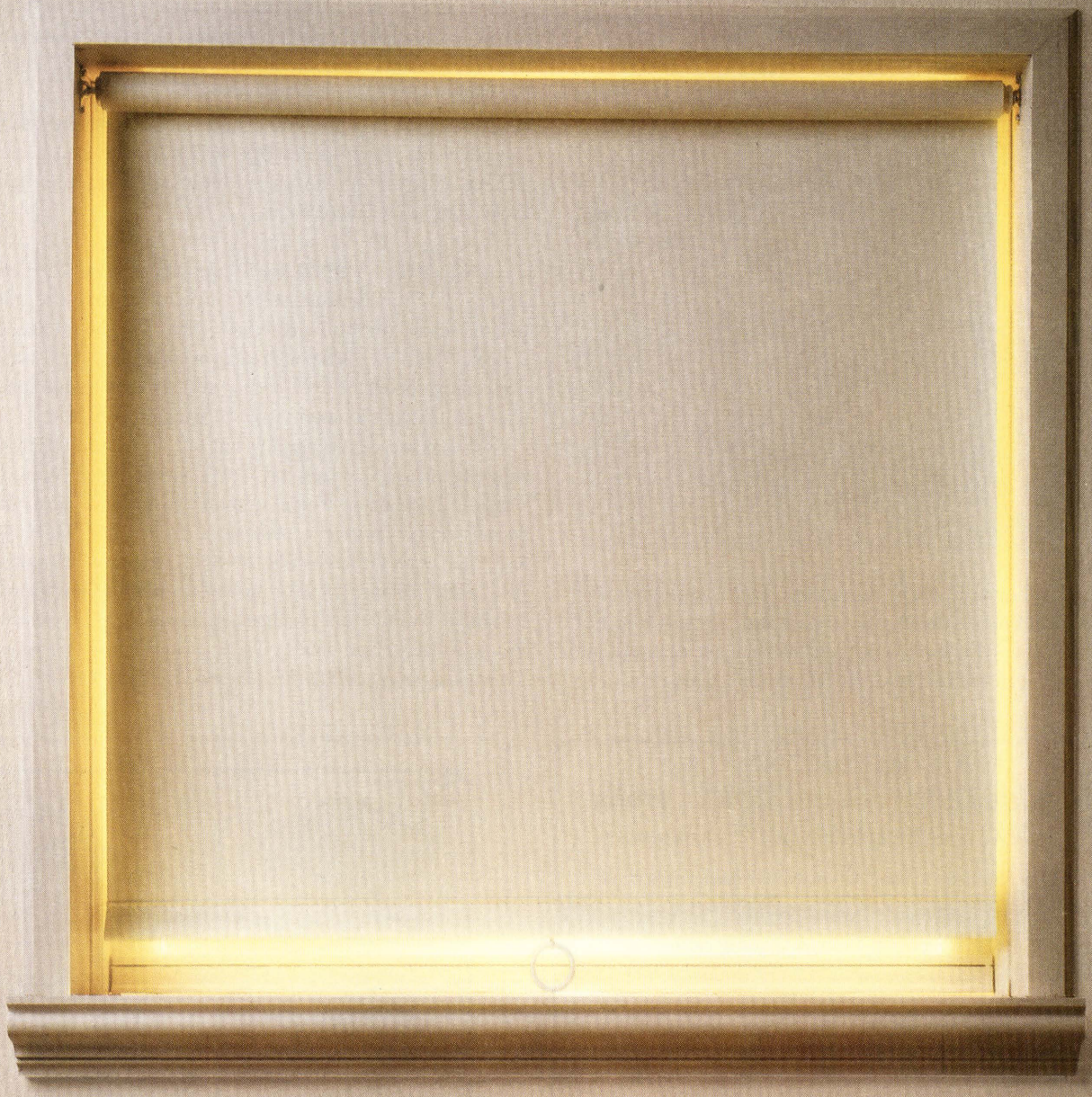
```
// Inline member functions

#include <stdio.h>

class circle {
        long xorigin;
        long yorigin;
        unsigned long radius;
public:
        void init(long xo, long yo, unsigned long rad) {
                printf("init: 3 args\n");
                xorigin = xo;
                yorigin = yo;
                radius = rad;
        };

        void init(long xo, long yo) {
                printf("init: 2 args\n");
```

Continued on page 124.



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Continued from page 122.

```
                xorigin = xo;
                yorigin = yo;
                radius = 1;
        };

        void init(unsigned long rad) {
                printf("init: 1 args\n");
                xorigin = 0;        // default value
                yorigin = 0;        // default value
                radius = rad;
        };
};

main()
{
        circle c;

        c.init(5, 4, 10);
        c.init(5, 4);
        c.init(10);
}

init: 3 args
init: 2 args
init: 1 args
```

The **inline** keyword isn't needed here. Because the member functions are defined in the class definition and the class definition must be in scope whenever objects of its type are declared and used, the code can be inlined easily. Be careful, because it's easy to have an object of class a that contains an object of class b, and so on, with each class having **inline** member functions. Such nesting of classes, each containing **inline** code, can lead to very fat programs.

Inlining code is an interesting and potentially useful idea. However, do your homework with regard to size versus speed efficiency before you adopt it. Get it right first, and then worry about making it fast or small.

THE NEXT C++ TOPIC we'll consider is I/O. C++ provides its own I/O mechanism, which is different than the traditional **printf/scanf** method provided with C. The merits of each approach will be discussed. Later topics will be constructors and destructors, operator overloading and the **new** and **delete** operators that provide an alternative to **malloc** and **free**.

Readers are encouraged to submit C-related comments and suggestions to Rex Jaeschke, 2051 Swans Neck Way, Reston, Virginia 22091 or via e-mail to uunet!aussie!rex. —*Rex Jaeschke is an independent consultant, author and lecturer. He's* DEC PROFESSIONAL*'s representative on the ANSI C Standards Committee and the U.S. Representative for ISO, as well as editor of the* Journal of C Language Translation, *a quarterly publication for C implementers. His new book,* Mastering Standard C, *is available from Professional Press. To place an order, call Trish Dunkerley at (215) 957-4265.*

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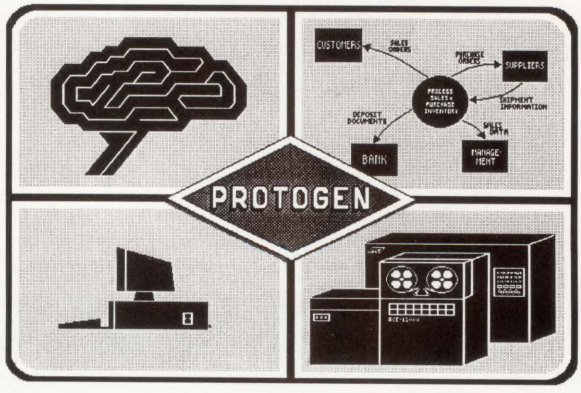

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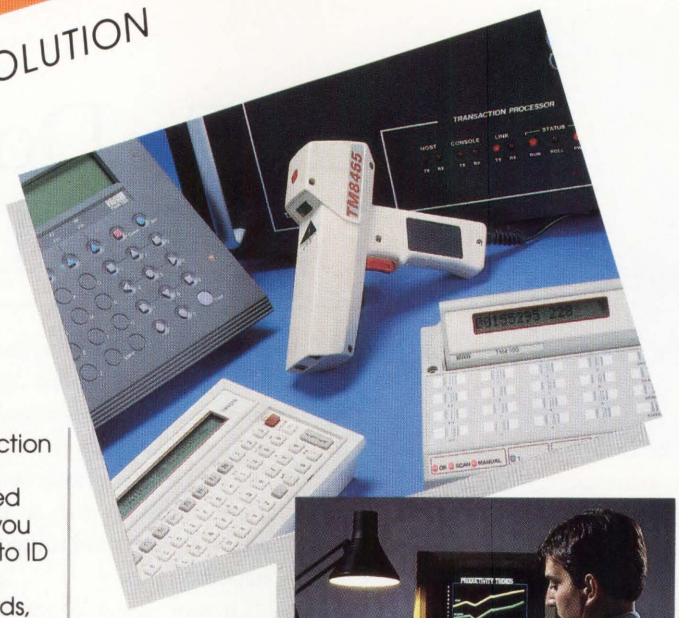

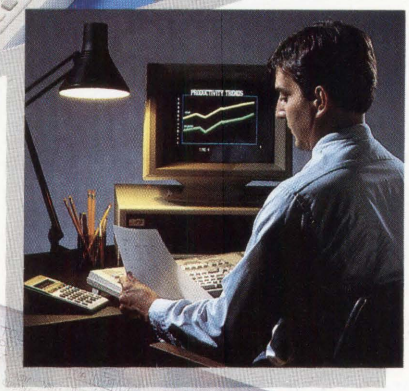

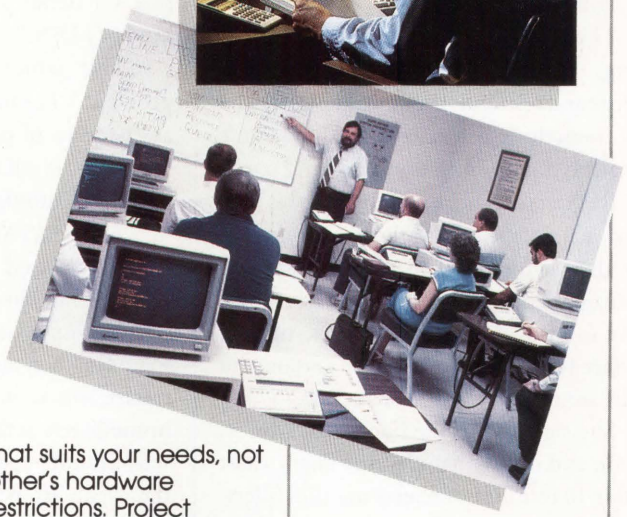

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DCL DIALOGUE

Kevin G. Barkes

What To Do Before The Lights Go Out

I was recently at a customer site, shooting the breeze with the system manager, when the lights flickered for a moment. The MicroVAX went brain dead, then slowly began its inexorable climb to silicon consciousness.

The blood drained from the system manager's face, and she quickly took her phone off the hook. It was an ineffective action, because the first semihysterical user burst through the door seconds after the glitch.

"The accounts payable jobs were running," the user moaned. "We'll have to purge and resubmit them. And we have to get them done before 5:00, or they won't be ready for mailing tomorrow."

Recovering her composure, the system manager assumed that unconcerned air that calms users and unsettles upper management. "No problem," she said. "As soon as the system is back up, I'll restart the queues and make certain the jobs are resubmitted in sequence."

She sighed, put the phone back on its hook and calmly handled the angry calls. After 10 minutes of reassuring the callers, she took her notes, plopped down in front of the console and heaved a big sigh. "I hate this. Now I have to go through all the queues manually, resubmit and restart jobs, and make sure everything picks up from the point the system died."

I was a tad puzzled. "You mean your queues don't restart automatically when the system boots?"

"No," she replied over the console's noisy response to her SHOW/QUEUE/BATCH/ALL command. "We run a lot of batch jobs that get their input from batch jobs that execute immediately before them. It's like dominoes: If the system dies, every batch job after the one killed by the crash is useless. So we restart the queues manually after a reboot." She grabbed the recovery procedures manual from a nearby shelf and dug in. I stood by silently, answering the phone and keeping the more abusive users at bay, while she methodically resubmitted jobs and restarted queues.

It took about 20 minutes. When she was finished, she jotted a note to herself to develop DCL procedures to automate the recovery. "One of these days I'll get around to writing a COM file to handle this. Or better yet, I'll talk the boss into buying a UPS."

"That won't completely solve your problem," I pointed out. "Not all crashes are because of power outages. Why not just use the /RESTART qualifier to the SUBMIT command?"

"The RESTART qualifier?" she asked.

"Yes," I said. "Since VMS V4.0, DCL has had a nifty little feature that lets a batch job pick up at some predesignated point following a system failure. It isn't a true restart, that is, it doesn't begin execution immediately at the point of failure. That's why a lot of people pooh-poohed it when the capability was announced, and that's why it isn't as widely used as it could be. Still, it's a big help and should eliminate all this manual stuff you have to go through."

The system manager was hooked. "How does it work?"

"All you have to do is add a few lines of code to your procedures and submit them with the /RESTART qualifier," I explained. "For example, look at this COM file," I said, pointing to Figure 1.

"Figure 1?" she asked.

"Slight temporal displacement," I replied. "Let's modify the procedure so it will work properly with RESTART." Logging into a VT220 on top of the disk stack, I made a few quick hacks.

"What does Figure 2 do?" she asked.

"Line noise," I replied. "OK, we've submitted this job with the /RESTART qualifier on the SUBMIT command, and it starts executing. When it hits the line with the $RESTART value, it checks to see what that system-maintained symbol contains. If it's blank, it means the job is executing for the first time. So it ignores the GOTO statement.

"The SET RESTART_VALUE = PROCESS1 sets the value of the special system-maintained global symbol BATCH$RESTART to the string PROCESS1. The program PROCESS1 runs and completes. We set the value of BATCH$RESTART to PROCESS2 and begin executing the program PROCESS2. Now let's say the system crashes. When it comes back up and the queue restarts, instead of aborting this batch job, the system will begin re-executing it. The value in the symbol $RESTART will be

FIGURE 1.

```
$! RUNBILLS_DAILY.COM
$! This procedure executes the daily billing programs.
$ SET NOON
$ SET DEFAULT USER4:[BILLINGS.CURRENT]
$ RUN BILLING$PROGRAMS:PROCESS1
$ RUN BILLING$PROGRAMS:PROCESS2
$ RUN BILLING$PROGRAMS:PROCESS3
$ RUN BILLING$PROGRAMS:PROCESS4
$ EXIT
```

FIGURE 2.

```
$! RUNBILLS_DAILY.COM
$! This procedure executes the daily billing programs.
$! Note the restart checkpoints.
$ SET NOON
$ SET DEFAULT USER4:[BILLINGS.CURRENT]
$ IF $RESTART THEN GOTO 'BATCH$RESTART'
$ SET RESTART_VALUE = PROCESS1
$ PROCESS1:
$ RUN BILLING$PROGRAMS:PROCESS1
$ SET RESTART_VALUE = PROCESS2
$ PROCESS2:
$ RUN BILLING$PROGRAMS:PROCESS2
$ SET RESTART_VALUE = PROCESS3
$ PROCESS3:
$ RUN BILLING$PROGRAMS:PROCESS3
$ SET RESTART_VALUE = PROCESS4
$ PROCESS4:
$ RUN BILLING$PROGRAMS:PROCESS4
$ EXIT
```

true, so it will branch to the label contained in the symbol BATCH$RESTART, specifically, PROCESS2:.

"Of course, to make this effective, your programs should be reasonably sized, and you should make certain you don't delete any files until you've passed the restart point where they may be needed. This doesn't solve all the problems involved with recovering batch jobs from a system failure, but it's a major help. It's also handy when you need to stop a job and restart it on another queue. STOP/QUEUE/REQUEUE/ENTRY=nnn batch_queue does that."

"What if I submit a job with the /RESTART qualifier without checking for $RESTART?" the system manager asked.

"Then the command file starts at the first line in the command file and proceeds normally," I explained. "If you submit your 'permanently resident' batch jobs this way, you never have to worry about resubmitting them, unless you ever totally cold-start your system."

"Can you override the restart values?" she asked.

"I think so," I replied, grabbing the *DCL Dictionary* from the shelf and turning to the definition for SET RESTART_VALUE. "Aha!" I exclaimed. "A /NOCHECKPOINT qualifier to SET QUEUE/ENTRY clears the BATCH$RESTART value."

The system manager was effusive with thanks. "Any time I can do anything for you, just let me know."

"Could you possibly arrange to get my retainer check out on time?" I asked politely.

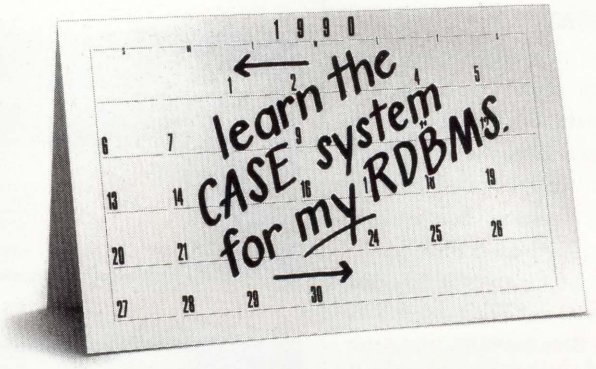
"See Figure 3," she replied.

"There is no Figure 3," I said.

"That's the chart showing how late the checks will be because of this system crash," she explained. "Too bad you missed our appointment yesterday."

The lights flickered again. It was going to be a long month.

FOR YOUR VERY OWN "I Love DCL" sticker and/or a listing of all FidoNet public bulletin board systems in the U.S. featuring message areas with DEC-related topics (VAX, PDP-11 and Rainbow), send a self-addressed, stamped envelope to BBS List (and/or) DCL Sticker, Kevin G. Barkes Consulting Services, 4107 Overlook Street, Library, Pennsylvania 15129. Please don't forget the postage. I can no longer respond to requests that lack a 25-cent stamp. The list is also available online from my SYS$OUTPUT bulletin board system: (412) 854-0511, 1,200/2,400 baud, 8 bits, 1 stop bit, no parity. If you're active on FidoNet, ask your local sysop to file request DECBBS.LST from 1:129/38. —*Kevin G. Barkes is an independent consultant in VAX systems software, management, tuning and training.*



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Mailers: VMS Versus ULTRIX

ULTRIX

Philip E. Bourne, Ph.D.

Editor's note: We continue our discussion of UNIX for VMS users by comparing the mail utilities.

What exactly do my computer users do while hunched over their terminals grumbling softly to themselves? Some time ago, with the help of VMS image accounting, I attempted to find out. Not surprisingly perhaps, over a five-day period on a heavily used VAX 11/780, I found that 6 percent of total elapsed time was spent accessing VMS MAIL. Further probing indicated that a significant number of users did nothing but read and send mail.

What headaches does the transition from VMS to ULTRIX mail present, particularly to occasional computer users?

E-Mail Addresses

The first hurdle is mastering a new mail address format. The novice ULTRIX user will find no surprises when sending mail to users on the local host (host is UNIX parlance for VMS NODE). But sending mail to a user on a remote host isn't as straightforward, as Figure 1 indicates.

ULTRIX uses two forms of address for remote mailing. First, ULTRIX hosts that are part of an Ethernet network using the TCP/IP protocol have a hierarchical mail address. Remote hosts and any aliases for that host are defined in the file **/etc/hosts**. Each line of the file maps the so-called Internet address to an Internet number, which provides the routing information necessary to reach the remote host.

Second, UUCP (UNIX-to-UNIX Co-Py) comprises a number of programs that queue mail, files and commands for later transmission by modem connections. By prior agreement between system administrators, hosts poll each other at predetermined times and exchange information.

We'll discuss networking ULTRIX systems and the use of UUCP in coming months. For now let's concentrate on the features of the ULTRIX mail program for sending mail among users on the local host. Because ULTRIX mail is unchanged from BSD UNIX, the discussion that follows is useful when migrating from VMS to any UNIX derivative of BSD.

Similar Functionality?

ULTRIX and VMS mailers have similar functionality. For example, both support folders for organizing read messages, permit the user to tailor the mail environment and support mailing lists. However, to achieve the functionality of VMS MAIL, the novice ULTRIX user must learn a new syntax and understand something about how the mailer handles messages.

When an ULTRIX mail message is sent to a user, it's stored in the file **/usr/spool/mail/user**, known as the system mailbox (compare the VMS NEWMAIL folder). The command **mail** accesses this file and causes the display of one line of header (address) information for each unread message. The header includes the sender's username, remote computer (if applicable), time the message was sent and subject of the message. The system mailbox also can be accessed with the **from** command, providing header information but no further access to the system mailbox. It's useful to place the **from** command in the hidden file **.login** to display unread mail headers at log in time.

FIGURE 1.

Form			Example
VMS	DECnet	NODE::USER	ADMIN1::SYSTEM
ULTRIX	TCP/IP	user@host	root@admin1.company.boston.com
ULTRIX	UUCP	host!user	boston\!root

Mail addresses.

FIGURE 2.

ULTRIX Modifier	VMS Modifier	ULTRIX Function
~d	-	Include the dead.letter file
~e	/EDIT	Invoke the editor set by EDITOR in .mailrc
~v	/EDIT	Invoke the vi editor
~t user(s)	-	Add user(s) to the list of people receiving the message
~s new_subject	-	Change the subject of the message
~p	-	Display entire message
~h	-	Optionally change all characteristics
~r filename	*INCLUDE FILENAME	Include a file in the message
~m x	-	Include message number x in the message sent

Message modifiers.

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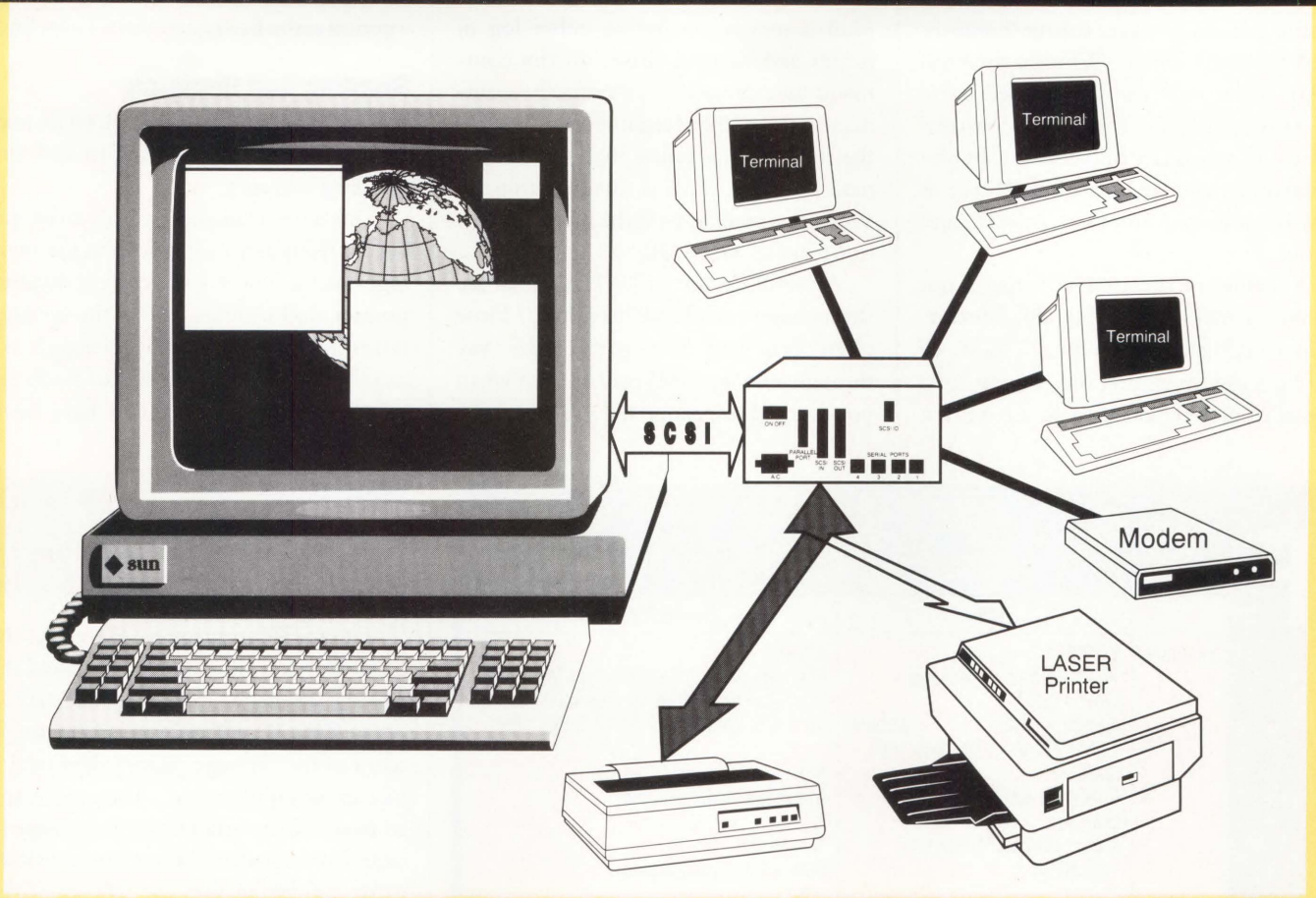

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A message in the system mailbox may be read, replied to, forwarded, deleted or stored. After a message has been read, it's moved to the user's mailbox, which by default is the file **~user/mbox** (compare the VMS MAIL folder). Whereas the VMS MAIL folder only can be accessed using the MAIL utility, the ULTRIX file **~user/mbox** is an ordinary file accessible by any commands that manipulate files. Hence, it may be displayed, searched, printed, and so on.

A feature of the ULTRIX mailer not found in VMS is the file **dead.letter**. When mail is aborted with CTRL-C or during a system failure, the contents of a partially entered mail message are written to the file **~user/dead.letter** for later recovery.

Sending Mail

Mail is sent by including either log in names and/or mail aliases on the command line. Note that entering the command **mail** without arguments will return the shell prompt unless there are unread mail messages. This is disconcerting for VMS users familiar with the more interactive feel of VMS MAIL.

A useful feature of ULTRIX mail are the message modifiers (see Figure 2). How often have you been part of the way through sending a VMS mail message when you wanted to change the subject or the list of recipients? ULTRIX permits these and other changes with a tilde (~) at the beginning of a new line. A message is terminated with CTRL-D or (optionally) a period as the first character of a new line.

Reading And Replying

Figure 3 illustrates a typical ULTRIX mail session for reading, replying to and forwarding messages.

One new mail message has been received from user root as seen in the message header. The **>** is the current message pointer, and **U** indicates that the message is unread. **1** signifies display message **1**. If a number of new messages had been received, a message list could have been invoked, for example:

```
1     message 1;
1 7   messages 1 and 7;
1-7   messages 1 through 7;
.-$   the current message through the
        last message.
```

The **mail** command **r** will reply to the originator and all users who received the original message, including the carbon copy (Cc:). **R** will reply to just the originator of the message. Forwarding mail is just as straightforward. The command **m user1** directs **mail** to send a message to user1, having entered a new subject (VMS MAIL by default uses the subject of the message being forwarded). **~m 1** includes message 1 as part of the text of the current message, which can be modified further.

You also can forward your own mail (compare VMS MAIL command SET FORWARD). The hidden file **~user/.forward** contains a mail address to which mail is forwarded.

Saving And Deleting

As we've seen, mail messages by default are appended to the file **~user/mbox**. Mail messages also can be printed, appended to a file, placed in a folder or deleted, as shown in Figure 4.

The **mail** command **folders** (compare VMS MAIL DIRECTORY/FOLDER) displays existing folders. **s+bugs** (compare VMS MAIL MOVE BUGS) moves the current message to the folder bugs. Similarly, **s 4-6 +bugs** moves the fourth, fifth and sixth messages in the message list to

FIGURE 3.

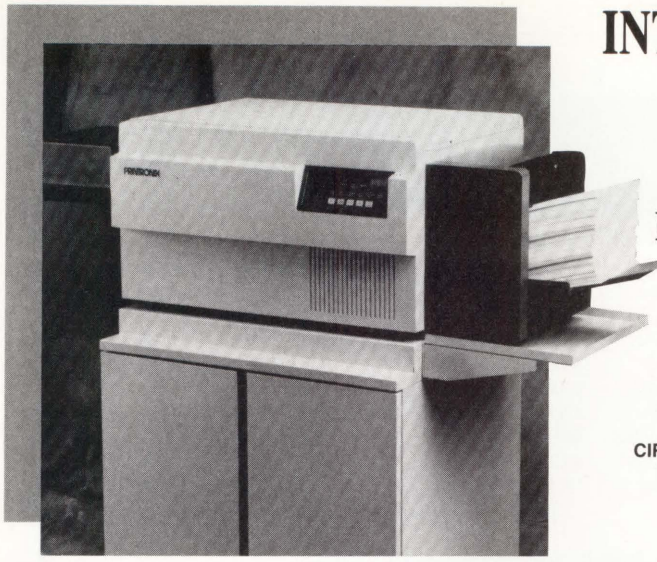
	VMS	ULTRIX
example:	$ MAIL You have 1 new message MAIL> DIR # From Date Subject 1 SYSTEM 27-APR-1988 TEST MAIL> 1 [message displayed here] MAIL> r MAIL> FORWARD/EDIT 1 To: USER1 ... CTRL-Z MAIL>	% mail Mail version 2.18 5/19/83. Type ? for help "/usr/spool/mail/fred": 1 message 1 unread >U 1 root Wed Apr 27 11:13 9/146 "test" & 1 [message displayed here] & r & m user1 Subject: forward message ~m 1 ... . &

A typical mail session.

FIGURE 4.

	VMS	ULTRIX
example:	MAIL> DIR/FOLDER Listing of folders in DUA1:[USER]MAIL.MAI;1 Press CTRL/C to cancel listing BUGS MAIL	& folders bugs
example:	MAIL> MOVE BUGS	& s +bugs
example:	-	& s 4-6 +bugs
example:	$ MAIL MAIL> SET FOLDER MAIL	% mail -f
example:	$ MAIL MAIL> SET FOLDER BUGS	% mail -f bugs
example:	MAIL> PRINT 10	& s 10 foo &! lpr -r foo
example:	MAIL> SET FOLDER WASTEBASKET MAIL> MOVE 4 MAIL	& u 4

Organizing mail messages.



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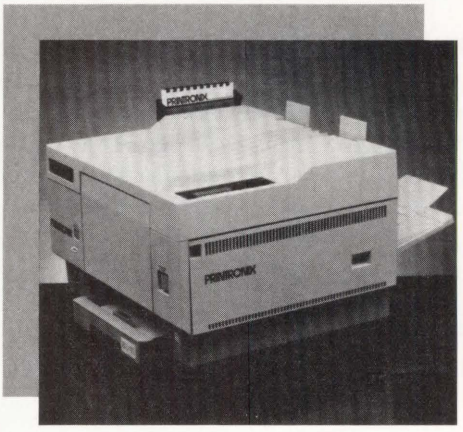

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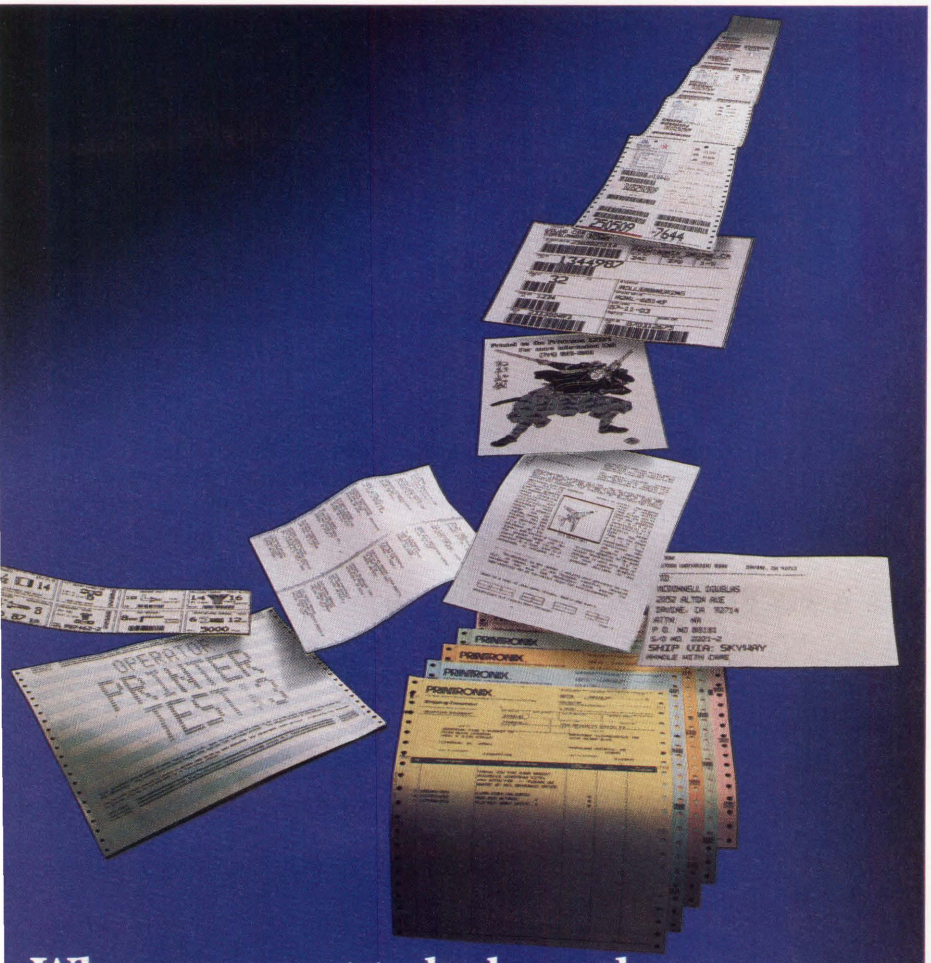

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the folder bugs. The command **mail -f** accesses the **~user/mbox** file rather than the spool directory. Similarly, **mail -f bugs** accesses the folder called bugs.

Printing a mail message illustrates a useful feature of ULTRIX mail not found in VMS: issuing a command to the operating system from within mail. First, message 10 is stored in the file **foo** with the command **s 10 foo** (see Figure 4). Second, that file is sent to the default line printer and deleted with the command sequence **!lpr -r foo**. The metacharacter **!** forces what follows to be interpreted by the shell rather than the mail program — a feature common to a number of UNIX commands.

Note that, until quitting **mail**, the last deleted message list can be recovered with the **u** (undelete) command in the same way a VMS MAIL user would retrieve a message from the WASTEBASKET folder.

Searching Mail

Until the DIRECTORY/EDIT command was added to VMS MAIL with V5.0, VMS was poor at searching old mail messages. ULTRIX mail permits searching messages to locate the sender (**f user**) or header keyword(s) that indicate the sender, subject, time or Cc (**f /keywords**). Further, as messages are stored in ordinary files, the **grep** command for searching files can be used to interrogate the contents of mail messages (**!grep keyword(s) ~user/mbox**). One useful feature that ULTRIX mail lacks is the equivalent of the VMS MAIL DIRECTORY/SINCE=TIME command for previewing header information of messages received since a specified time.

Terminating Mail

Terminating mail illustrates a fundamental and annoying difference between ULTRIX and VMS mail. Deleting a VMS MAIL message moves it to a folder called WASTEBASKET. The command EXIT deletes the WASTEBASKET folder and terminates MAIL. Alternatively, the VMS MAIL command QUIT leaves the WASTEBASKET folder intact so that deleted mail messages can be recovered in a subsequent mail session.

ULTRIX reverses these functions. The command **exit** leaves the mail environment unchanged. Any deleted mail messages reappear in **/usr/spool/mail/user** the next time mail is invoked. The **quit** command moves any messages that have been read to **~user/mbox** and removes messages that were deleted.

Customizing Mail

The ULTRIX System Administrator customizes the mail environment for all users by modifying the file **/usr/lib/Mail.rc**. A user further modifies his own mail environment using the hidden file **~user/.mailrc** (compare VMS MAIL SET commands). Figure 5 illustrates typical **Mail.rc** and **.mailrc** files. The comments following the pound signs (#) indicate the function of each **mail** variable.

FROM OUR DISCUSSION thus far, there's little for the VMS purist forced to learn ULTRIX to complain about when it comes to mailers. Commands are consistent, logical and straightforward. There's even online help by entering **?** to the **mail** prompt. Hence, it's an appropriate time to mention **biff**. **biff** is to ULTRIX what SET BROADCAST/NOMAIL is to VMS. It's a means to toggle incoming mail notification on and off, and a command easily forgotten until you know the story behind the command name.

UNIX folklore tells us that **biff** was the name of a dog owned by the Berkeley graduate student assigned to write a mail notification program for BSD UNIX. Because his dog barked each time the mailman approached, **biff** lives on in the minds of computer users and reminds us that anyone (or any dog) can contribute to a standard.

Information regarding hints and kinks useful to VMS users grappling with UNIX will be received gratefully. Send it via e-mail to SYSTEM@CUMBG.BITNET or pbourne@cunixc.cc.columbia.edu. — *Philip E. Bourne, Ph.D., a senior associate of the Howard Hughes Medical Institute, is author of* UNIX for VMS Users, *published by Digital Press.*

FIGURE 5.

example:

```
% cat /usr/lib/Mail.rc
# append     messages are appended to ~user/mbox rather than prepended;
# dot        . (period) alone on a line signifies end of message and
#              supplements <ctrl>d;
# save       causes the saving of mail messages in a file or folder;
# ask        prompts for subject field;
# askcc      prompts for Cc: field;
# SHELL      shell to use with ! (exclamation) command;
# EDITOR     defines editor (compare VMS MAIL MAIL$EDIT);
# metoo      include sender in recipients (compare VMS MAIL SEND/SELF);
# hold       messages once read do not automatically pass to ~user/mbox
#              but are kept in the system mailbox.
#
set append dot save ask askcc SHELL=/bin/csh
EDITOR=/usr/ucb/ex metoo hold
```

example:

```
% cat ~user/.mailrc
# .mailrc - File to tailor ULTRIX mail environment
#
set folder=mail_folders              # directory for folders
set crt=20                           # number of message lines displayed
set autoprint                        # display next message after delete
set EDITOR=/usr/local/emacs          # define editor
# mailing lists and aliases follow
alias managers george fred
alias cshell jack jill george dragon
alias gripe root
```

ULTRIX** Mail.rc **and** .mailrc **files.

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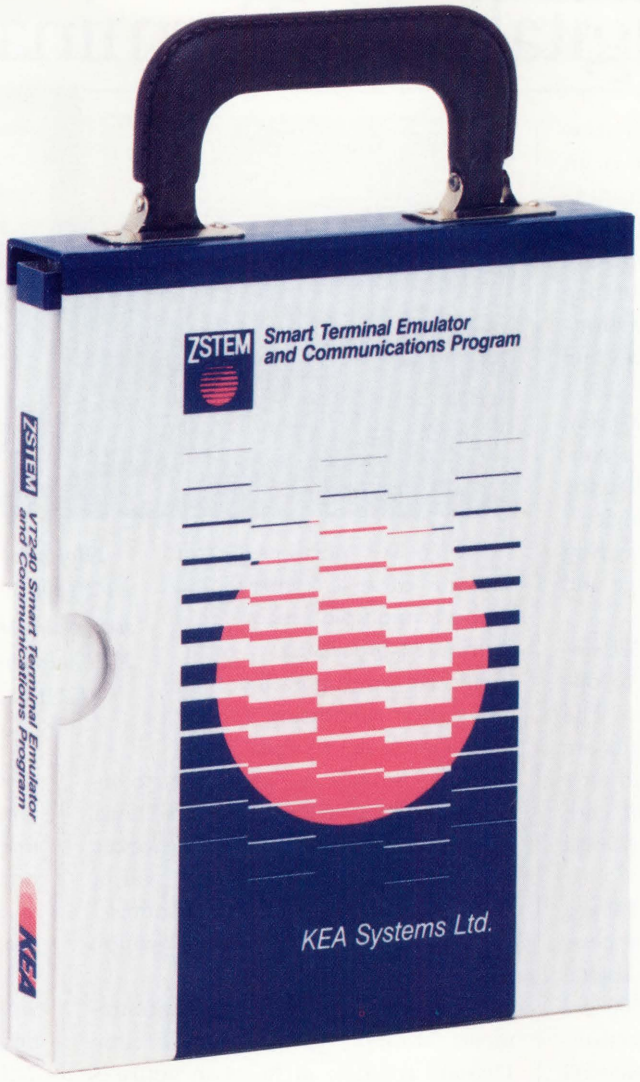

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X

Digital's X Terminal

Evan Birkhead

Digital's new VT1000 is an X server running the DECwindows graphical user interface (GUI). It provides access to applications running in a variety of operating system environments, notably VAX/VMS, ULTRIX and UNIX. Internally code-named DWT (DECwindows terminal), the VT1000 runs over TCP/IP with LAT and TELNET connections. "Any application written to the X.11 protocol will run on this device," says David Upton, video engineering manager of Digital's Video, Image and Print Systems Group.

The terminal allows several VT320 session windows into diverse hosts to operate simultaneously on one screen. The interface and network access utilities are essentially the same as those found on a VAXstation or DECstation front end, without the compute power and local storage.

Digital is positioning the VT1000 as a key element in any distributed processing environment, including non-Digital sites. With a price tag between $2,500 and $3,000 for the monochrome version, Digital plans to compete with PCs and PC networks. The first monochrome units were expected to ship within 60 days, while color versions will be available later in the year.

Prior to the VT1000 introduction, Digital furnished *DEC PROFESSIONAL* with prerelease information. A session with a team of engineers and product managers from Upton's group provided a technical summary and a product demonstration. At the time, the terminal was running OSF/Motif and DECwindows applications at several beta sites.

The VT1000 shouldn't be confused with PCs, workstations or diskless workstations. It's perhaps better thought of as a terminal that supports multiple sessions in a distributed processing environment. By interoperating with any system supporting TCP/IP (see Figure), the terminal is expected to provide an opportunity to enter the UNIX area. However, "traditional sales channels, such as the aftermarket, DECdirect and our distributors, will be as important as ever with this product," explains George Wright, the group's product manager.

Digital's VT1000 X server runs the DECwindows GUI.

The terminal is based on Texas Instruments' 50-MHz 34010 graphics processor. Digital's solution includes an entire X server located onboard the terminal, including clients. The terminal comes with 1 MB of DRAM expandable to 4 MB. Most of the functionality, however, including the window manager and executable code, is resident in ROM. Other X terminals on the market use part of the DRAM for this code.

When the terminal is powered up, the local window manager with local clients comes up immediately. The window manager, based on DECwindows-style pull-down menus, can customize and size windows and fonts. It also has a slide gauge widget that displays the percentage of memory remaining.

The Set-Up window lets you set parameters and preferences for the keyboard, languages, screen pointers, terminal windows, font paths and two serial lines. A security feature includes elements that restrict outside use of the local server. From this window, you can tell the terminal the names of frequently used LAT or TCP/IP nodes for it to "listen" for.

Starting an X session to a VMS host is accomplished with a LAT connection or, more accurately, a broadcast of LAT service availability from the host. TCP/IP hosts are tapped and operated through a TELNET window. The TELNET window can be used to invoke an X session.

One serial line can be designated for a companion printer. The ports are "plumbed like a terminal, not like a PostScript printer," says Upton, so you can access standard printers across a network, as well. The serial ports only support terminal emulations (in the Figure, VTE) and don't support X applications.

It isn't necessary for X to be running on any accessible host for the terminal to operate. In VMS configurations, the drivers for LAT and other protocols that communicate with the VT1000's X server are located on the host operating system.

Inside the terminal, there are ROM modules that separately talk to the X server. Besides the font manager and the VTE, these include the Xlib-based Local Terminal Manager (LTM) and the Local Window Manager (LWM). The LTM allows you to customize setups for the VTE. The LWM manages VT320 windows or lets you select a remote window manager.

Window management is accomplished using Digital's standard three-button mouse. The keyboard and available monitors for the terminal are also Digital-standard, although internally the keyboard features additional functionality. The terminal supports Digital's 15- and 19-inch (1,024 x 864) monochrome monitors, as well as a 19-inch electroluminescent flat-panel display that hasn't yet been announced.

Digital made several changes to its proprietary operating systems to support the new X terminal. (Of course, the existing operating systems also support the terminal.) Coinciding with the VT1000 announcement is the release of VMS V5.3-1, which will include several extensions to LAT. LAT will be enriched to better support both X and traditional ANSI applications.

ULTRIX Workstation Software V2.1 will provide additional X extensions, notably font support. Digital says it will provide customers in foreign UNIX environments with additional fonts.

The X Market

Despite industry commentary to the contrary, the terminal market is hot. Digital has sold more than 1 million VT320s, half of them in 1989. The company estimates that it has more than 3 million proprietary terminals installed, not including third-party terminals or PCs running emulation programs. Wright predicts that most Digital customers will choose to retain their VT300s and move them to other locations after purchasing the VT1000, rather than trade them in. "There's still a need for a single-window device," he explains.

Dataquest Inc. of San Jose, California, estimates that the market for X terminals will reach almost $1 billion by 1993. Research firms report that, in 1989, between 10,000 to 15,000 X terminals were shipped, led in the Digital marketplace by GraphOn, Network Computing Devices (NCD) and Visual Technology. A report from the Technology Group at Paine-Webber Inc. of New York verifies that NCD is the current market leader, with a 50 percent share.

Many system managers, particularly in DEC's large sites (which are largely multivendor), have been waiting for DEC to announce its product before making a purchasing decision. A few months ago, Hewlett-Packard announced its 700/X series of color and monochrome X terminals in the $3,000 to $5,000 price range, although Digital's terminals may ship before HP's. NCR also has introduced an X terminal.

Wright projects that the X market will originate in technical environments and migrate to the commercial space. "The customers that asked for an X terminal generally needed ways to run multiple applications, such as DECwrite and DECdecision," he explains.

For Digital, the trick will be to pull off the VT1000 without harming sales of its own low-end workstations. The terminal connects to any VAX from the MicroVAX on up, which is how Digital previously envisioned its workstations being used.

"The VT1000 is more a device against the PC world than against workstations," says Wright. "In fact, we expect it to encourage workstation sales. It could cause workstations to take off by reinforcing the common user interface." Indeed, the DECwindows management facility of the terminal is identical to that of Digital's workstations in functionality and appearance.

The beauty of Digital's X implementation in the VT1000 is the easy entrance to RISC or VMS platforms from a central location: dichotomous platforms had been a thorn in Digital's side. Pure distributed processing is close at hand. ■

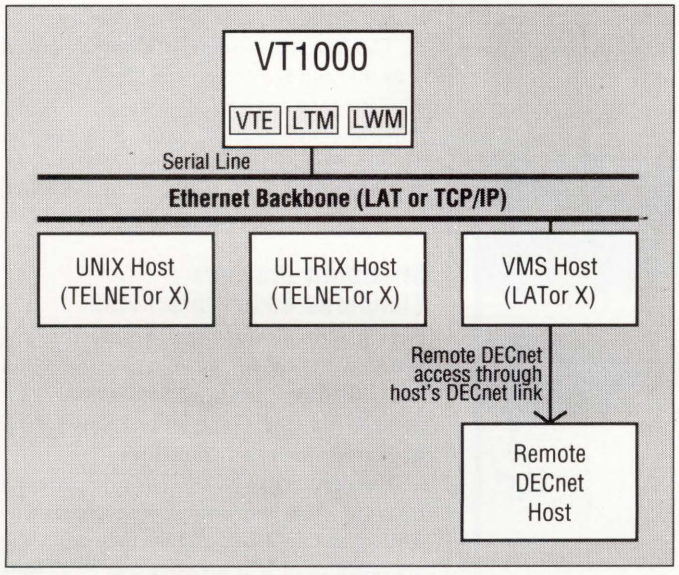

Figure: The VT1000 supports LAT and TCP/IP and features drivers that can access X applications on any host.

Companies Mentioned In This Article

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San Jose, CA 95131
(408) 435-8400
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NCR Corp.
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Dayton, OH 45479
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Network Computing Devices Inc. (NCD)
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Texas Instruments Inc.
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Plano, TX 75023
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Visual Technology Inc.
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Lowell, MA 01851
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PRODUCTS

Ingres Unveils Intelligent Database

Ingres Corporation announced the Ingres Intelligent Database. The product suite includes extended data management facilities and the ability to manage objects and embed extensive rules or knowledge directly into the database. It can model all critical aspects of an enterprise within the database server.

Data management enhancements to the Ingres RDBMS coupled with two new products, Object Management and Knowledge Management, constitute the Intelligent Database. It's based on the Ingres V6.0 Client/Multiserver Architecture. It incorporates I/O reduction techniques, compiled database procedures, online backup, two-phase commit, international sorting sequences and an Intelligent Query Optimizer. Object Management lets the database server manage industry-specific data. Knowledge Management includes business rules that transparently track such things as referential integrity and changes in inventory. The product is available on VAX/VMS.

Ingres prices range from $5,000 to $180,000. Data management extensions are free. Object and Knowledge Management prices are based on platform license.

For more information, contact Kevin Gallagher, Ingres Corp., 1080 Marina Village Pkwy., Alameda, CA 94501; (415) 769-1400.

Circle 409 on reader card

Cabletron Announces DEC-Compatible Bridging

Cabletron Systems Inc. announced access to DEC environments through bridges that feature a DEC-compatible Spanning Tree Protocol.

A user-selectable Spanning Tree Algorithm switch lets you configure Cabletron's NB20E and NB25E local bridges and the NB35E/Ethernet-to-T1 remote bridge to comply with or disable DEC's Spanning Tree Protocol, the IEEE 802.1 Spanning Tree Algorithm standard. The NB20E and NB25E filter at rates of 15,000 and 28,000 packets per second. The NB35E/Ethernet-to-T1 bridge filters at a rate of 15,000 packets per second and forwards data at 1.544 or 2.048 megabits per second across a T1 link. The manageable filtering range has been increased in the bridge's permanent database to include source address, packet type, packet size and data field in addition to its existing method of filtering by destination address.

Cabletron bridges range in price from $2,995 to $7,450.

For more information, contact Robert Monaco, Cabletron Systems Inc., 10 Main St., Rochester, NH 03867; (603) 332-9400.

Circle 400 on reader card

Equinox Systems Inc.'s ELS-48 terminal server uses DEC's LAT protocol.

ELS-48 Terminal Server Substitutes For DECserver

Equinox Systems Inc. announced an Ethernet LAT terminal server and an Ethernet LAT Gateway for Equinox Data PBXs. The ELS-48 server and ELG-48 gateway let you connect async terminals, PCs, printers, modems or non-LAT hosts to an Ethernet LAN using DEC's LAT protocol. This protocol is optimized for PC and terminal connectivity and is supported by virtually all DEC CPUs.

The ELS-48 terminal server is a replacement for DECservers and other LAT-compatible servers. The multiprocessor design dedicates an Equinox Intelligent Communications Processor to every 24 ports. An other processor is dedicated to the Ethernet LAN interface and LAT protocol layers. The ELG-48 gateway is a single-board, 48-port gateway for connecting Equinox Data PBXs to Ethernet LAT-compatible LANs. With the ELG-48, any device connected to an Equinox Data PBX-based network can access any LAT host, LAT terminal server or other Equinox Data PBX connected to the Ethernet.

The 24- and 48-port ELS-48s are priced at $4,400 and $6,500 respectively. The ELG-48 Gateway is priced at $4,800.

For more information, contact A. Joseph Molina, Equinox Systems Inc., 14260 S.W. 119 Ave., Miami, FL 33186; (305) 255-3500.

Circle 420 on reader card

SP-XMotif Provides Standards-Based Interfaces

Concurrent Computer Corporation announced SP-XMotif, an enhanced version of the OSF/Motif graphical user interface, for its 5000 and 6000 family of real-time UNIX multiprocessor-based computers.

Bundled with X, SP-XMotif provides real-time users with complete access to standards-based interfaces while increasing the performance of X at no extra cost. SP-XMotif features X terminal emulator support (xcterm), which guarantees a uniform inter-

face. Improved toolkit performance provides smooth updates of widgets and gadgets. Four major components include Motif Toolkit, User Interface Language, Motif Window Manager and Motif Style Guide.

SP-XMotif is bundled with Concurrent's X Window System and hardware options that support X. SP-X11 is X software for SP-XMotif. It comes with initial Graphics Subsystems at no additional cost.

For more information, contact Concurrent Computer Corp., 106 Apple St., Tinton Falls, NJ 07724; (201) 758-7000.

Circle 401 on reader card

Cyborg Offers Time And Attendance System

Cyborg Systems Inc. announced The Time and Attendance Solution, a time and attendance and data collection system. It's a component of The Solution Series of human resource management, payroll processing and fixed-asset accounting software.

The product is made up of time recorder/data collection hardware, time and attendance software and system management utilities. It lets you track an unlimited number of hourly employees. It features online information processing, uses a high-level 4GL for reporting and offers security access control. It operates on any platform that supports ANSI COBOL and can be integrated with most payroll, accounts payable and general ledger systems, eliminating manual re-entry of data among systems. Access to online labor reporting and data collection helps you determine the cost of labor for a job and provides data for pricing the finished product. The product runs on mainframe and midrange systems and the IBM PC/AT and compatibles.

Licenses are priced from $7,500, depending on configuration.

For more information, contact Ellen Snelling, Cyborg Systems Inc., 2 N. Riverside Plaza, Chicago, IL 60606; (312) 454-1865.

Circle 402 on reader card

Outpost Compatible With ALL-IN-1 PostScript

ECAP Systems Inc. announced an ALL-IN-1-compatible version of Outpost.

The product lets ALL-IN-1 users print their application output on any PostScript printer. You can continue with a familiar style of editing for such things as bold, underscore, italics and vertical spacing and have access to Outpost's batch typesetting facilities. ALL-IN-1 users can use all PostScript-standard fonts in any size, print in portrait or landscape orientation or use any other Outpost features. Users of WPS, WPS Plus and other word processors with ALL-IN-1 support also can use Outpost's features.

Prices start at $400 for a MicroVAX II. For more information, contact Eric Covington, ECAP Systems Inc., 83 Ste Euphemie, Casselman, ON K0A 1M0; (613) 764-3889.

Circle 403 on reader card

Pro-Cure Monitors And Diagnoses VAX Systems

Electronic Service Specialists Ltd. (ESS) announced Pro-Cure, diagnostic software for VAX 11-730/750/780/785 and 8600/8650 systems. It's available in two separate volumes.

The Operating System Independent (OSI), supplied on bootable console media, runs independent of the operating system. The Operating System Dependent (OSD) runs online under VMS V4.0 and later. Both volumes can automatically configure themselves to the system at run time. This eliminates the need for setup or installation procedures when the system configuration or VMS version changes. OSI diagnostics let you troubleshoot the VAX system when it won't boot the operating system. Tests and exercisers interrogate the system. Errors are displayed on the system monitor along with the current status. OSD scans the system for available devices, such as printers, terminals and disk tape drives. Using windows and menus, you choose a diagnostic by selecting the device to be tested.

For more information, contact Mark A. Bauer, Electronic Service Specialists Ltd., N92 W14612 Anthony Ave., Menomonee Falls, WI 53051; (414) 255-4634.

Circle 404 on reader card

Epoch Systems Announces High-Capacity Storage Server

Epoch Systems Inc. announced the Epoch-1 Model 907, a hierarchical storage system for the technical workstation market. It can store nearly one terabyte of online data.

The server can be used with any workstation, mini, mainframe or supercomputer that supports TCP/IP and NFS protocols. It's designed for departmental workstation networks with a chronic shortage of disk space. It uses the InfiniteStorage Architecture to integrate low-cost, high-capacity optical disks as an application-transparent backing storage medium for high-performance magnetic disk drives. It keeps active files on high-performance magnetic disk drives and inactive files on

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FAX: 303-447-1406 (303) 447-9251

Other DCS emulators: EM220 — DEC VT220 Emulation
EM4010 — Tek 4010/VT220 Emulation

Trademarks: VT102, VT220 — Digital Equipment; IBM PC, XT — IBM Corp.; Hercules — Hercules Computer Technology; Tektronix — Tektronix, Inc.; Precision Visuals — Precision Visuals, Inc.

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low-cost optical diskettes. Files are moved automatically by the server between magnetic and optical storage. The physical location of the file is transparent to the user, creating the perception of an infinitely large magnetic disk. For more information, contact Alice Callahan, Epoch Systems Inc., 313 Boston Post Rd. W., Marlborough, MA 01752; (508) 481-3717.

Circle 405 on reader card

Paradigm Incorporates DECwindows Interface

Execucom Systems Corporation announced Paradigm, a workstation-based business intelligence software product that combines the benefits of spreadsheets, financial modeling language and AI, including network support, multitasking, transparent access to remote data, and a windows-based user interface.

Paradigm for DEC workstations incorporates much of DEC's Network Application Support (NAS), including a multitasking DECwindows interface on VAX/ULTRIX, RISC/ULTRIX and VAX/VMS systems. Under the NAS framework, you interact with a DECwindows-based graphical interface that lets you work with data through the spreadsheet-style matrix or through a nonprocedural financial modeling language. Paradigm creates CDA-compliant documents containing reports, data, text and graphics. It uses VAX Rdb VMS for its database and provides automatic database queries to other multiple databases. An object-oriented scripting language allows fully automated application development.

For more information, contact Rich Tuttle, Execucom Systems Corp., 108 Wild Basin Rd., Austin, TX 78766; (512) 327-7070.

Circle 406 on reader card

Inference And DEC Support Large-Scale Ada Projects

Inference Corporation and DEC announced ART-Ada, a high-end expert system building tool that supports the development of expert system applications for large-scale Ada projects on DEC hardware.

ART-Ada lets applications developed in ART-IM be developed in DoD-specified Ada environments. It's an implementation of ART-IM's technology in native Ada code to ensure compliance with Ada standards. It includes Ada source code that's portable to any Ada environment. It's fully integrated with Ada and allows Ada subprograms to be called from ART-Ada rules. It provides a public Ada interface package that can be called from Ada programs. ART and ART-IM are designed for knowledge-level compatibility across ART and ART-IM-based applications. Knowledge-based applications developed in ART on popular engineering workstations and ART-IM applications running on IBM mainframes and PCs as well as VAXs and DECstations under VMS and ULTRIX can be ported to ART-Ada.

ART-Ada is available to qualified beta customers at an introductory price of $17,000 on VAXstations.

For more information, contact Inference Corp., 5300 Century Blvd., Los Angeles, CA 90045; (213) 417-7997.

Circle 407 on reader card

BASISplus Manages Large Amounts Of Data

Information Dimensions Inc. announced BASISplus, a new version of its text information management system. This integrated

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Newsletters
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Search
Keywords
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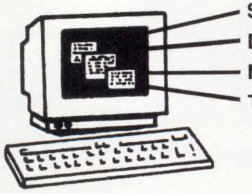
GIVE YOUR USERS THEIR OWN INFORMATION EXCHANGE SYSTEM



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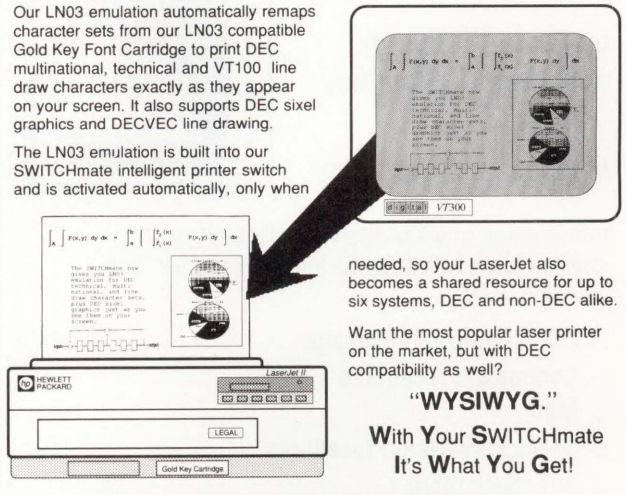

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electronic repository lets you store, retrieve and manage large amounts of documents containing textual and multimedia information such as pictures, charts, line art and handwritten notes.

BASISplus features enhanced user interfaces, CDA support, advanced content-based retrieval and compliance with industry standards. User interfaces meet the needs of casual and frequent users. Express-W features interactive window-based user interface services for PCs running MS-DOS. Express is a full-screen panel interface for ASCII terminals. FQM is its high-level query language for skilled users. BASISplus interfaces with ALL-IN-1 and IBM's PROFS and ISPF office automation systems.

First-copy licenses, including the base system, retrieval and database definition modules, batch loader and thesaurus, cost from $5,000 to $179,000, depending on CPU and number of users.

For more information, contact Dawn Haskins, Information Dimensions Inc., 655 Metro Place S., Dublin, OH 43017; (614) 761-7300.

Circle 408 on reader card

Clip Art Available For WordPerfect VAX Users

Marketing Graphics Inc. announced a clip art product for WordPerfect V5.0 VAX/VMS users.

PicturePaks include more than 900 images in five editions. The Eye Openers Series includes Executive & Management, Finance & Administration and Sales & Marketing. The USA Series includes the Federal Government and State & Local Government. The VAX PicturePak offers all 900 images, each labeled and categorized in a reference manual and image catalog.

Prices range from $595 for a single user to $12,000 for an 8978 multiuser.

For more information, contact Louise Beller, Marketing Graphics Inc., 4401 Dominion Blvd., Ste. 210, Glen Allen, VA 23060; (804) 747-6991.

Circle 411 on reader card

Interlink Connects IBM 3172 With DEC Applications

Interlink Computer Sciences Inc. announced support for the IBM 3172 Interconnect Controller. This support lets Interlink customers with major 3172 networking applications connect with DEC applications via Interlink SNS/SNA Gateway Software.

The SNS/SNA Gateway products provide transparent connectivity and interoperability between IBM's VM- and MVS-based mainframes on an SNA network and DEC computers on a DECnet network. They offer data interpretation, network management, bidirectional file transfer, 327X terminal emulation and security features. Options include VT terminal emulation program-to-program communications, tape backup and e-mail support.

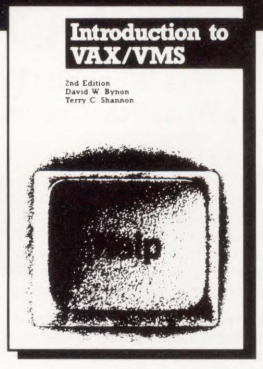
For more information, contact Don Parkman, Interlink Computer Sciences Inc., 47370 Fremont Blvd., Fremont, CA 94538; (415) 657-9800.

Circle 410 on reader card

FAXmail Lets You FAX Text And Graphics

Microsystems Engineering Corporation announced FAXmail, VAX-based fax software that works with Biscom's Faxcom 1000+ hardware unit. It lets Mass-11 users fax documents containing text and graphics directly

You Can Learn VAX/VMS



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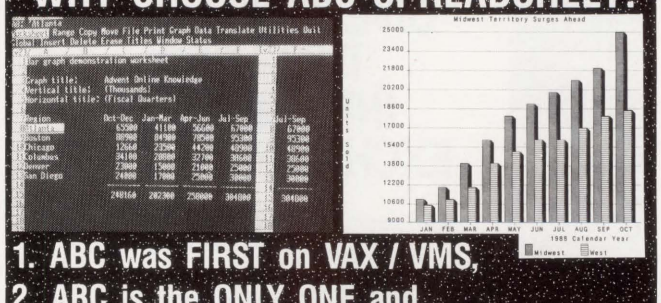

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from their terminals to any fax number.

FAXmail can be accessed by any user on the node by calling up the FAXmail menu, where you can obtain addressing, queue management and status information. If the recipient's number is busy at the time of transmission, the system automatically stores and retransmits the message. A confirmation notice is sent to the sender upon receipt. You can queue faxs using the VMS queue manager or specify delayed delivery to use off-peak phone rates. The product automatically tracks all transmissions. It requires VMS V4.4 or later, Mass-11, Faxcom 1000+ and one VAX serial port and serial cable.

FAXmail is priced per CPU and ranges from $1,725 to $6,900. Faxcom 1000+ costs $4,195 per site.

For more information, contact Carol Karels, Microsystems Engineering Corp., 2400 W. Hassell Rd., Ste. 400, Hoffman Estates, IL 60195; (201) 592-6633.

Circle 412 on reader card

EtherMeter Monitors Ethernet Traffic

Network Application Technology Inc. (NAT) announced the EtherMeter, an Ethernet traffic monitor. It monitors all traffic in an Ethernet LAN segment, reporting station monitoring statistics through the network. EtherMeters in an internetwork are accessible from a central Network Management Station.

Combined with NAT's Network Management Station and Local Ethernet bridge, the EtherMeter helps form a complete network management system for internetworking. Designed for multivendor, multiprotocol networks, the product is available in two configurations: a PC/AT-compatible card that can be installed in any full-length card slot, and a self-contained enclosure with power supply. When installed in a PC/AT card slot, it requires only power and operates independent of hardware and software in the PC. Options include an integrated Thin Ethernet interface.

The EtherMeter costs from $1,295 to $1,495. The Thin Ethernet option costs $150. For more information, contact Homer Jamison, Network Application Technology Inc., 21040 Homestead Rd., Cupertino, CA 95014; (408) 733-4530.

Circle 413 on reader card

NFS-VMS Brings NFS To VAX/VMS Environment

Process Software Corporation announced NFS-VMS, a network file system that brings Sun's NFS protocol to the VAX to let non-DEC users create networks that access and store files on VAX/VMS systems.

NFS-VMS provides the server implementation of the NFS protocol, which lets users on multivendor networked systems have transparent access to files and directories on the local VAX/VMS system. The VMS file system appears as an extension of the client's file system. Users on client systems can read from, write to, create, delete and rename files and directories on the VMS system without logging into the VMS system or moving files between systems. NFS-VMS works with all DEC Ethernet network controllers and is supported on all VAXs. No special hardware is needed.

Prices start at $1,728 for a MicroVAX II.

CIRCLE 133 ON READER CARD

For more information, contact Phil Denzer, Process Software Corp., 35 Montague Rd., Amherst, MA 01004; (413) 549-6994.

Circle 414 on reader card

OOSD/Ada Provides Automated Ada Language Support

Interactive Development Environments Inc. announced the OOSD/Ada Design Editor. It provides basic automated Ada language support for the architectural design of Object-Oriented Structured Design notation software systems.

The product is built on the base components of IDE's Software Through Pictures multiuser CASE environment, which includes the data dictionary, documentation preparation system, multiuser lock facility and version control. Its Ada Guidance System minimizes errors by enforcing Ada-specific syntax rules regarding the interaction among Ada components. Its Ada Reuse Library increases quality and productivity by encouraging reuse of proven design elements. The OOSD notation supports architectural designs of Ada systems, permitting definition and use of Ada program units, including packages, tasks and generics. These can be annotated, decomposed and elaborated so that detailed design information and source code can be attached to each object.

For more information, contact Nobby Akiha, Interactive Development Environments Inc., 595 Market St., San Francisco, CA 94105; (415) 543-0900.

Circle 421 on reader card

Proteo Streamlines Application Development

Proteo Technology Corporation announced Proteo application generation software V1.2. Proteo is a software toolkit that reduces application development time and lets software developers generate user applications that integrate all types of hardware and software into customized PC DOS-based PC work environments.

V1.2 lets application developers integrate more PC software applications by optimizing usage and memory requirements of software programs that must reside in RAM. It offers additional integration kits, which are prebuilt subroutines that incorporate off-the-shelf, PC-based software packages into individual user-specific PC-based work environments. Integration kits include Wordperfect, Microsoft Word, WordStar, RBase 5 and Lotus 1-2-3. Proteo runs on IBM and compatible PCs. Recommended configuration is an IBM PC AT, PS/2 or compatible with 640 KB of RAM, a 20-MB hard disk and PC DOS V2.1 or later.

A corporate license costs $99,000.

For more information, contact Proteo Technology Corp., 210 Carnegie Cntr., Ste. 101, Princeton, NJ 08540; (609) 520-9880.

Circle 415 on reader card

Raxmaster V2.0 Supports VMS V5.2

Raxco Software Inc. announced Raxmaster V2.0, which includes full support for VMS V5.2, automated installation through VMSINSTAL and enhancements to Raxmaster's menu interface.

Raxmaster promotes optimal system performance to support such applications as CAD, relational database, statistical analysis, OLTP and office automation systems. It helps prevent untimely hardware upgrades, proactively manages performance to prevent prob-

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lems and frees system management time by handling the time-consuming aspects of performance management.

Raxmaster V2.0 is available for VMS V4.x and V5.x. Prices range from $3,486 to $11,088, depending on configuration.

For more information, contact Bill Joyce, Raxco Software Inc., 2440 Research Blvd., Ste. 200, Rockville, MD 20850; (301) 258-2620.

Circle 416 on reader card

The ServerCharger Enhances Oracle Applications

Real Database Corporation announced the ServerCharger, a distributed database peripheral. It enhances Oracle database applications.

The ServerCharger plugs into departmental VAX, IBM or UNIX computers to offload 95 percent of back-end database processing. The product is made up of a Sun workstation front end for the DBA and a RISC-based, multiple-CPU back end optimized for database processing. The back end multiprocessor improves Oracle performance by assigning functions to one of four or more processors designed specifically for that function. The ServerCharger 50 and 100 each come with an embedded Oracle V6.0 license with the transaction processing option. Both can be custom-configured to suit corporate or departmental requirements.

The ServerCharger 50 features 50 tps performance and is priced from $85,000. The ServerCharger 100 features 100 tps performance and is priced from $145,000.

For more information, contact David Coleman, Real Database Corp., 320 Soquel Way, Sunnyvale, CA 94086; (408) 720-9900.

Circle 417 on reader card

Xtouch Develops Touchscreen Applications In X

Trident Systems Inc. announced a solution for implementing surface acoustic wave (SAW) touchscreens in the X environment. Xtouch software lets X application developers under UNIX, VMS or Sun OS develop touchscreen applications the same day the SAW hardware is installed.

Using Xtouch, applications written for mouse input run without modification. Developers who want to use the touchscreen's 3-D coordinate output can receive client messages directly from Xtouch. Features include X compatibility, concurrent mouse and touchscreen operations, mouse emulation with touch under X, touchscreen initialization and reassignment, and x, y and z touch coordinates. The SAW touchscreen can use finger pressure to drag the cursor over touch zones without activating them. By pressing harder, an operation can be actuated. Touch thresholds are user-defined. The pressure-sensing ability can be used to generate 3-D touch coordinates.

The product is priced from $1,095.

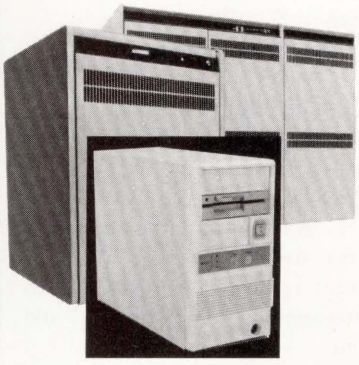
For more information, contact Peter B. Snyder, Trident Systems Inc., 3554 Chain Bridge Rd., Ste. 200, Fairfax, VA 22030; (703) 273-1012.

Circle 419 on reader card

Recital DBMS And 4GL Runs On ULTRIX

Recital Corporation announced that Recital V6.0, a dBase-compatible DBMS and 4GL, is available for ULTRIX workstations. Recital users can move dBase applications from a

NOW! Computer/Fax integration for your VAX® System



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PC to ULTRIX with no modification.

Recital features a library, an encryptor, a data dictionary, SQL, an application development environment and expanded assistant mode. It's compatible with Ashton-Tate's dBase III Plus, Fox's Foxbase+ and Nantucket's Clipper. It's available for VAX/VMS, ULTRIX and many UNIX computers, including 386 UNIX system V.3.2.

Prices for the ULTRIX version range from $1,500 to $45,000.

For more information, contact Tony Giannelli, Recital Corp., 85 Constitution Ln., Danvers, MA 01923; (508) 750-1066.

Circle 418 on reader card

ASA/Omtool Announces Portable Code Processing

ASA/Omtool announced portable code processing for the IBM RT/AIX version of SOFTBOL. Resellers that program in DIBOL can use the SOFTBOL cross development system on VAX/VMS to generate programs that run on IBM RT and other systems.

Portable code processing is based on the concept of compiling and linking programs on one computer system, then moving the finished product to another. The portable code strategy of program development lets you build software for each system simultaneously. It lets you compile, link and test steps once, then port the finished product to each target system. Programmers don't need to learn each system, and you don't need to buy additional computers.

The SOFTBOL cross development system with portable code processing costs from $2,500 to $5,000 for VAX/VMS; from $950 to $2,500 for IBM RT/AIX; and from $625 to $2,500 for MS-DOS, PC Networks, UNIX, XENIX and ULTRIX.

For more information, contact Marty Schultz, ASA/Omtool, 13 Industrial Way, Salem, NH 03079; (603) 894-4579.

Circle 422 on reader card

Braintree And AIM Announce Resource Accounting System

Braintree Technology Inc. and AIM Technology Inc. announced that Braintree will be the exclusive distributor of AIM Technology's AIM Resource Accounting, a resource accounting system for ULTRIX. It lets system managers monitor UNIX computer use and track bill-back charges online and through hardcopy reports.

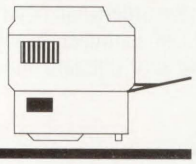
AIM Resource Accounting records log in time, CPU and disk use by individuals and groups. It tracks projects and tasks within projects. Accounting information is stored in compact files and can be accessed by system managers or users, depending on authority. Flexible rate structures let you adjust rates within time periods for different users and projects. Use and charge information can be viewed on a monitor, saved in a file and formatted to produce charge statements. The product works with VAX and Mips ULTRIX as well as System V and 4.X BSD.

Prices range from $1,350 to $9,900, depending on machine classification. The product can be licensed on a per-CPU and site basis.

For more information, contact Braintree Technology Inc., 600 Cordwainer Dr., Norwell, MA 02061; (617) 982-0200.

Circle 435 on reader card

Connect any PostScript Printer to your VAX Network with . . . ScriptServer Software for VMS



Supports PostScript printers from third party vendors

ScriptServer provides a seamless interface for local or network attachment of PostScript printers to VAX systems. The software supplies extensive error reporting and manages printer synchronization, avoiding the problems of data loss and partially completed PostScript documents often occurring when files are printed using traditional VMS spoolers.

Converts ASCII to PostScript

ScriptServer software handles print spooling functions and acts as a filter to convert straight ASCII text to PostScript output on Adobe PostScript-compatible laser printers. PostScript files created by user applications can be intermixed in the print queue and are printed directly.

Supports LAT, PCSA, & SNA

ScriptServer features full LAT support and compatibility with terminal emulation products, allowing sharing of printer resources by users from workstation, Mac or PC. The PCSA and SNA Gateway products from DEC are also supported.

PostScript Formatting Utility

The SCRIPT menu facility provides a user interface for printing options such as typefaces, job priority, paper size, orientation and margins, giving users control over the printed page. It also allows the user to store form setup modules, for custom forms or company letterhead.

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The OpenWare family of products offers a full range of local area network solutions. It provides a common set of user services such as file sharing, electronic mail and terminal emulation for DOS, UNIX® and now VMS. And, perhaps most important, OpenWare comes with CMC's outstanding service and support.

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Comboard/3780 Runs Under VAX/ULTRIX

Software Results Corporation announced the Comboard/3780 under ULTRIX. Designed for RJE batch communications, Comboard/3780/ULTRIX allows data transfers to and from a VAX ULTRIX environment to non-DEC computers such as CDC, Honeywell-Bull, IBM, Prime, Unisys and other mainframe and midrange computers supporting 3780 communications. File transfers are generated from either the remote or host computer system.

The Comboard/3780 features functions not available on DEC's 3780 solution. Line speeds of up to 64 Kbps are supported. It can run in Central Mode to operate as the host. Routeback, a function that lets you route output to specified locations, is provided. The user queue lets you queue jobs and files for review or later transmission. This turnkey system consists of an intelligent front-end processor board and 3780 emulation software. Using the Motorola 68000 microprocessor, communication processing resources are offloaded from the VAX to the Comboard/3780.

The product costs from $10,500 to $13,400.

For more information, contact Matthew Drayer, Software Results Corp., 940 Freeway Dr. N., Columbus, OH 43229; (614) 785-0282.

Circle 440 on reader card

RoboMon V2.0 Automates System Management Tasks

Computer Information Systems Inc. announced RoboMon V2.0, an automatic monitor for VAX/VMS. It features a new queue, job and file monitoring capabilities, and the ability to monitor more than 400 new statistics.

RoboMon automates routine system management tasks. It detects changes in system conditions and reacts to them automatically through user-defined actions. The queue option lets selected print, batch, terminal and server queues be monitored individually to automate queue scheduling and management. RoboMon can monitor individual batch and print jobs to ensure proper job sequencing and completion. It can detect queue-related bottlenecks and recommend corrective action. It monitors individual files for size, fragmentation and use, providing performance management and analysis. New statistics let you monitor more than 1,200 conditions.

The product is priced from $750 to $20,000.

For more information, contact Mary Masi-Phelps, Computer Information Systems Inc., 120 Wells Ave., Newton, MA 02159; (617) 527-1550.

Circle 423 on reader card

Viva Model 8520 Allows High-Speed Communications

Aeon Systems Inc. announced a Q-bus intelligent link controller in its Viva family of bus-to-bus links. The Model 8520 interfaces to Viva link controllers on VAXBI, VMEbus, MultiBus II or other Q-bus systems, allowing high-speed communications among distributed hosts.

Viva link controllers consist of a bus interface controlled by a local processor and a piggy-backed Link Personality Module that handles flow control, error correction and data serialization. Using the ALPS standard, the controllers pass messages among multiple applications on the distributed hosts. The Model 8520 is based on the AMD 29000 RISC processor and uses the AMD TAXI chip set for parallel-to-serial conversion. It can support multiple logical connections between MicroVAXs and other systems at sustained data transfer rates of 2 Mbps. DMA support allows for high transfer rates with minimum CPU overhead. The VAX host software provided supports VMS V4.7 and later.

Viva link systems cost from $10,000 to $25,000, depending on backplane interface.

For more information, contact Mark Bronson, Aeon Systems Inc., P.O. Box 10300, Albuquerque, NM 87184; (508) 828-9120.

Circle 436 on reader card

Fornax Announces A Series Of Portable VAXs

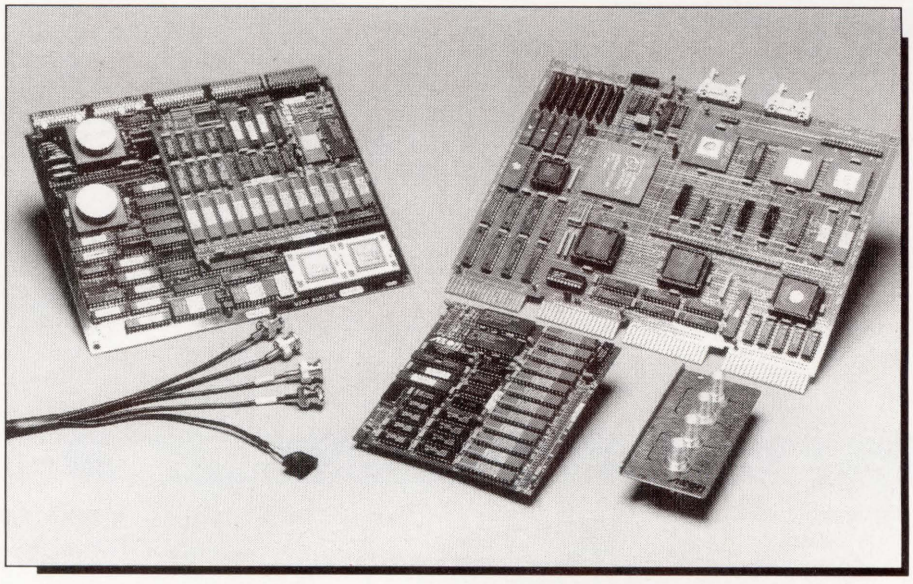
Fornax Computer Corporation announced a series of portable VAXs. Fieldsystems are based on VAXstation 3100 motherboards and integrated Toshiba laptops. Datability's RAF provides communication over a local Ethernet for linking the Fieldsystem VAX with the laptop.

A Toshiba T3100e or T1200FB can act as the local terminal. The T3100e package is optimized for use by field activities requiring heavy MS-DOS and VAX/VMS use and applications. The T1200FB handles multiple VAX connections. DOS capabilities are determined largely by the processor speed of the Toshiba system. Each laptop uses remote RAF virtual disks residing on the 200-MB Fieldsystem VMS disk. Fieldsystem comes custom-configured with VMS installed and licenses registered. SCSI devices can be added, and VR1xx and VR2xx workstation heads can be added to let it function as a workstation.

The product comes with a one-year warranty and unlimited telephone support.

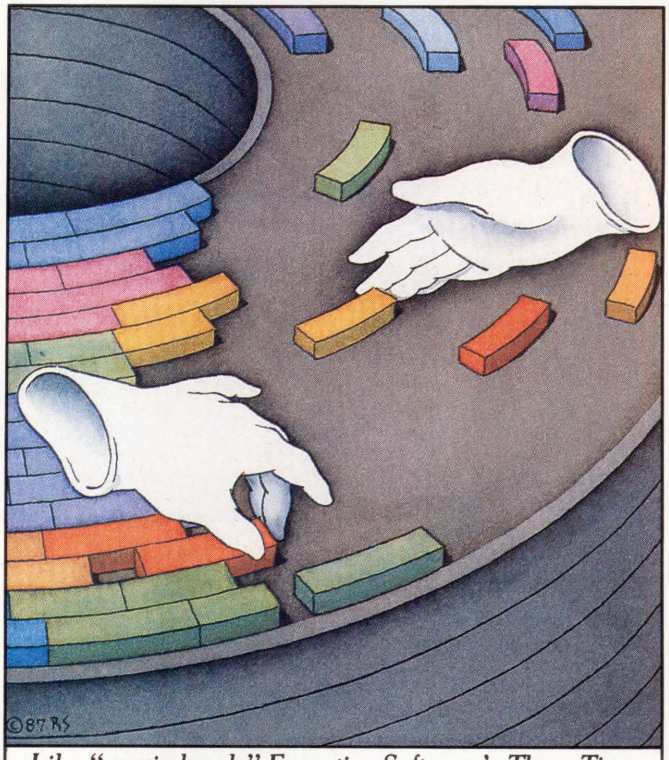
For more information, contact Fornax Computer Corp., 17 Van Doren Dr., Somerville, NJ 08867; (201) 874-7122.

Circle 424 on reader card



Aeon Systems Inc.'s Model 8520 interfaces to Viva link controllers.

"How Badly Is File Fragmentation Slowing Down Your VAX™?"



Like "magic hands" Executive Software's Three Time Award Winning **DISKEEPER/*Plus*™** *eliminates file and free space fragmentation on your disks.*

Users of Digital's VAX/VMS™ systems have long complained of performance problems stemming from the gradual fragmentation of disk files. Every VAX/VMS Files-11 ODS-2 disk tends to fragment with use. It might take a month or it might take only a few days, but sooner or later the disk will have to be defragmented.

With **DISKEEPER/*Plus*** customized online defragmenter, all the disks on a VAX/VMS system can be kept defragmented indefinitely. **DISKEEPER/*Plus*** cleans them up and keeps them that way. Running as a low-priority background job, **DISKEEPER/*Plus*** carefully rearranges files on a disk so they consist of as few pieces as possible, and attempts to combine spaces on the disk into a single large contiguous space. Because of its customization features you decide when and how **DISKEEPER/*Plus*** is to run on your system. It is a true set-it-and-forget-it approach to defragmentation.

How Does Fragmentation Occur?

VAX/VMS tries to allocate space for a file as close to the beginning (logical block number zero) of the disk as possible. It does so even if there is plenty of free space near the end of the disk and placing the file near the beginning requires that the file be split up into many pieces.

When you consider the long-term effects of this allocation strategy on a disk in continuous use, you can readily see that fragmentation can become extreme. Before **DISKEEPER/*Plus***, the recommended remedy for disk fragmentation was to backup the fragmented disk to tape (or another disk), reinitialize the disk and restore the files from the backup save-set.

How Does Fragmentation Affect Performance?

Every disk has fragmentation unless it has just been defragmented and not used since. A file fragmented into two pieces can take twice as long to access as a contiguous file. A three-piece file can take three times as long, and so on. Some files fragment into hundreds of pieces in a few days' use. Imagine the performance cost of 100 disk accesses where only one would do! Defragmentation can return a very substantial portion of your VAX to productive use.

Finding Out About Fragmentation

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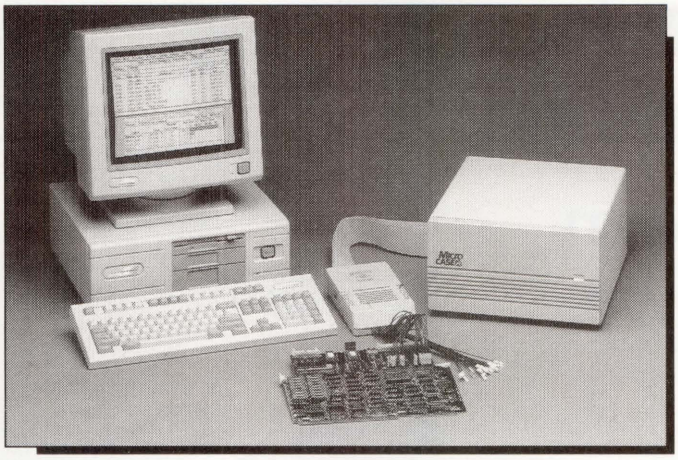

Cadre Technologies Inc.'s P1750A Probe reverse-engineers software for 1750A-based applications.

The P1750A Probe Debugs And Tests Software

Cadre Technologies Inc. announced the addition of the P1750A Probe and ISA-1750A Disassembler software to its Software Analysis Workstation (SAW). The probe, used with SAW, reverse-engineers, debugs and tests software for 1750A-based applications.

The P1750 Probe's cables acquire signals from the target system, which are fed back to SAW via the probe's four 25-conductor ribbon cables. It supports data acquisition on up to 24 address lines, 16 data lines and eight status/control lines. It tailors the PC-controlled SAW to handle the 1750A instruction set by providing an interface with the target system. Using SAW, the P1750A provides four measurement modes that trace high-level and assembly-level program flow and show a real-time symbolic trace of program and data flow. The P1750A Disassembler software provides 1750A assembly language trace, including user-defined symbols, using IEEE or MIL standard mnemonics.

For SAW users, the P1750A Probe costs $3,500, the ISA-1750A Disassembler software costs $765 and SFA-1750A Accessory Kit software costs $145. Prices for complete systems start at $17,000.

For more information, contact Ted Gary, Cadre Technologies Inc., 19545 N.W. Von Neumann Dr., Beaverton, OR 97006; (503) 690-1300.

Circle 437 on reader card

Logicraft's 386Ware Server Supports Local Hard Disks

Logicraft Inc. announced that its 386Ware DOS server supports local hard disks. The hard disk is designed around the ESDI interface for maximum throughput and capacity.

The 386Ware data and program files typically are stored on the VAX hard disk. The new feature enables a local hard disk to be added to the 386Ware network server and provides users with high-speed access to large data files. The hard disk supports up to 64 partitions. Each can be set up for read/write or read-only access. Read/write lets one user access the disk partition at a time. Multiple users can access the disk partition when it's set up in read-only mode. Passwords can be assigned to each partition, providing another level of protection. System managers can back up the local hard disk to a VAX disk.

Three sizes are available. Pricing is $2,795 for a 179-MB hard disk, $4,495 for a 410-MB hard disk and $7,495 for a 768-MB hard disk.

For more information, contact Jennifer Tyrrell, Logicraft Inc., 22 Cotton Rd., Nashua, NH 03063; (603) 880-0300.

Circle 426 on reader card

JMM Connects DEC To LAN-Based Mail Systems

Joiner Associates Inc. announced an e-mail gateway product that connects MAILbus to NetWare and other LAN-based mail systems using the NetWare Message Handling Service (MHS).

Jmail-MHS (JMM) is a VAX-resident software product that lets PC or Mac LAN users transfer e-mail to the DEC environment. Mail can consist of textual information such as memoranda, documents and program source. PC LAN e-mail vendors that use MHS as a transport or are gatewayed to MHS are supported. JMM is designed to maintain all information as e-mail moves from one environment to another. It maintains as much functionality as possible and preserves investments in user experience and training.

JMM licenses are each priced at $9,800 per system. Software support with maintenance updates is priced at $1,500.

For more information, contact Joiner Associates Inc., 3800 Regent St., Madison, WI 53705; (608) 238-8637.

Circle 425 on reader card

True Data Announces Standard Product Interface

True Data Corporation and Effective Management Systems (EMS) announced a standard product interface between True Data's TDC Perform integrated software system for data collection and the VAX-based EMS Manufacturing System V4.0.

The result of this joint effort is a PC-based, online, real-time implementation of data collection in the DEC environment. The announcement marks True Data's entry into the DEC marketplace. EMS is True Data's only DEC data collection partner. EMS provides manufacturing solutions through integrated, real-time operations. True Data provides fully integrated, PC- and PS/2-based data collection systems.

For more information, contact Thomas Carpenter, True Data Corp., 2901 Daimler St., Santa Ana, CA 92705; (714) 261-9281.

Circle 491 on reader card

Oregon C++ For VMS Features Source-Level Debugger

Oregon Software Inc. announced Oregon C++, a C++ compiler for VAX/VMS. Features include a source-level debugger, the NIH OOPS class library and support of shared libraries and VAX C calling sequence.

Oregon C++ can call any DEC language as well as Oregon Software's C, PASCAL-2 and MODULA-2. It runs on VMS V5.0 and later and includes an ANSI C and a K&R C compiler. It's compatible with AT&T's cfront V2.0. Oregon C++ is also available on the Motorola 680XO Delta Series, Sun-3, Sony NEWS, HP 9000/300, NCR Tower 32 Series and XENIX/386. Its portability lets you run the same application on different machines.

License fees range from $2,000 to $34,000, depending on machine, cluster or network configuration.

For more information, contact JoAnn Bertram, Oregon Software Inc., 6915 S.W. Macadam Ave., Ste. 200, Portland, OR 97219; (503) 245-2202.

Circle 429 on reader card

SPSS Graphics V2.1 Improves Product Integration

SPSS Inc. announced a release of its presentation graphics software that features fully integrated interfaces to popular DBMSs and improved interaction with the SPSS statistical data analysis system.

SPSS Graphics V2.1 is designed for use on workstations, minis and mainframes and is available for UNIX and ULTRIX. It offers interfaces to Oracle, Ingres, Sybase and Informix that let you read data directly from the database into SPSS Graphics. There, you can use SPSS Graphics' aggregation facilities to summarize and organize the data as you choose. Improved access to the SPSS statistical data analysis software package lets you move more freely between SPSS Graphics and the SPSS data analysis and reporting system.

For more information, contact Randolph Pitzer, SPSS Inc., 444 N. Michigan Ave., Chicago, IL 60611; (312) 329-2400.

Circle 432 on reader card

Target Systems Offers Interactive User Forum

Target Systems Corporation announced Target->Bulletin Board V1.0. This information exchange software is designed for distribution of company/group news and data.

Target->Bulletin Board offers interactive user forums, a centralized or distributed database in a DECnet environment, VMS Mail exchange, online surveys with complete response tracking, and a windowing environment for VT terminals. It features flexibility in application documentation, company newsletters, announcements, project scheduling, question and answer dialogues, user how-to forums, and information sharing between groups in local and remote locations.

An online demonstration is available by calling (508) 481-8960 with a 1,200/2,400-baud modem and a VAX-compatible terminal.

For more information, contact Dick Harlow, Target Systems Corp., 33 Boston Post Rd. W., Marlboro, MA 01752; (508) 460-9206.

Circle 490 on reader card

AP:Millenium Controls Accounts Payable Process

McCormack & Dodge Corporation announced AP:Millennium (AP:M) for VAXs. AP:M is an accounts payable information system that provides control over the accounts payable process from invoice receipt to general ledger payment and post.

AP:M processes invoices, calculates optimum payment dates and generates payments. It's fully integrated with the company's GL:M, so all invoice activity is reflected within the general ledger system. Invoice processing features include high-volume invoice entry and online edits. To calculate optimum payment dates, it reviews options for early payment discounts and terms of payment on the invoice. It then automatically writes a check for the optimal payment date in accordance with your bank payment schedule. It contains standard Millennium features, such as HELP and QUERY. The VAX and IBM mainframe versions are identical. AP:M runs on a range of VAXs starting with the VAX 3600.

The product is priced from $39,000.

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For more information, contact Margot Carlson, McCormack & Dodge Corp., 1225 Worcester Rd., Natick, MA 01760; (508) 650-2256.

Circle 428 on reader card

Intelligent Query Supports Oracle Versions 5.0 And 6.0

Programmed Intelligence Corporation announced that its VAX version of Intelligent Query (IQ) supports Oracle V5.0 and V6.0.

Reasoning-based menu pop-ups and a visual screen painter interface let novice users produce complex reports and graphs. Built around a universal integration module, IQ combines an ad hoc query, custom report writer and graphics utility with the ability automatically to reformat host-based information directly to PC-based applications. Users can extract and customize any information desired with little if any support from DP. Programmers and developers can use IQ in production reporting. It reduces total system development time for new applications by eliminating traditional report requirements almost entirely. Reports that would take days to prepare in a COBOL or 4GL structured language can be prepared in minutes with IQ.

For more information, contact Pamela King, Programmed Intelligence Corp., 3295 River Exchange Dr., Ste. 550, Norcross, GA 30092; (404) 446-8880.

Circle 430 on reader card

TPC 884 Features Voltage-Selectable Power

Pulizzi Engineering Inc. announced a voltage-selectable power distribution and control system. The TCP 884 can have either 120V or 240V input and output. You select the voltage for input/ouput via the selection switch on the front panel.

The TCP 884 is designed with IEC-, UL-, CSA- and VDE-approved components. It can operate up to 16 amps in Europe and 20 amps in North America. The chassis size is 19 x 1.75 x 7 inches. EMI/RFI filtering spike/surge suppression and overload circuit breaker protection are standard. Remote on/off control is optional. Two IEC 10-amp outlets are on the front panel, and eight outlets and the inlet receptacle are on the rear panel. You attach the power cable and plug required to the mating power inlet plug, select the voltage and plug it in. An indicator light for each voltage option provides visual confirmation of your selection.

For more information, contact Pulizzi Engineering Inc., 3260 S. Susan St., Santa Ana, CA 92704; (714) 540-4229.

Circle 431 on reader card

SCO Enhances Grafkit Visualization Package

SCO Inc. announced Grafkit V3.1-2. Enhancements include support for Open Look, improved SunView support, device drivers and features that improve functionality.

GRAFkit is a GKS-based visualization package that organizes multidimensional data to produce scientific, engineering and technical graphics. It includes a GKS foundation, CGM output format and utilities that overlay GKS to form graphics with a single call. It supports Open Look on Sun architectures and DECwindows on VMS and ULTRIX. It also supports Encapsulated PostScript, which lets graphics be imported into desktop publishing packages and viewed, sized and repositioned in a WYSIWYG manner. Device drivers include CalComp Thermal Transfer Devices and 906/907 PCI. DEC LJ250 and HP PaintJet printer drivers include a Save Ink option.

For more information, contact Leslie Ross, SCO Inc., 740C S. Pierce Ave., Louisville, CO 80027; (303) 666-5400.

Circle 439 on reader card

Natural V2.1 Improves VAX Processing Performance

Software AG announced Natural V2.1, a 4GL for VAX/VMS. It's designed to reduce CPU use and improve processing performance.

Natural V2.1 supports VT330/340 block mode terminals, which package a screen or block of data at a time to send to the CPU. With more processing on the terminal, there's reduced traffic across the network and on the CPU. Features that automate functions include support for all structure programming constructs; dictionary-based processing and validation rules that can be dynamically created and automatically applied; and a set of editors for program and data definition. By providing a more structured approach to program development, structured mode encourages top-down analysis and modular design, leading to application implementation that closely resembles system design.

License fees range from $6,250 to $50,000, depending on CPU.

For more information, contact Mary Kirkman, Software AG, 11190 Sunrise Valley Dr., Reston, VA 22091; (703) 391-6739.

Circle 433 on reader card

Marc Software Enhances WordMarc Word Processing

Marc Software International Inc. announced a new version of its WordMarc Composer+ word processing program for VMS, ULTRIX, UNIX and MS-DOS-based PCs.

The release includes desktop publishing features and expanded integration with applications and operating environments. Desktop publishing features are available on all supported computers. WordMarc supports Adobe's type library by offering a utility that automatically calculates the font metrics for a new typeface. Fonts are scalable in point sizes from 1 to 999. Line and box drawing is available. A GEM graphics interface lets you import, scale and rotate graphics files. WordMarc is integrated with Ventura Publisher, Interleaf Desktop Publishing, ALL-IN-1, Oracle, the 20/20 spreadsheet and Lotus graphics.

The product is priced from $495 on a PC to $19,000 on a VAX. It's available on the VAX 9000 for $25,000.

For more information, contact Wendy Wytyshyn, Marc Software Int'l Inc., 260 Sheridan Ave., Ste. 309, Palo Alto, CA 94306; (415) 326-1971.

Circle 427 on reader card

U.S. Design Announces 4mm Tape Drive

U.S. Design Corporation announced the expansion of its Q-Stor family of products with a 4mm tape drive. The drive's DAT storage method provides a true capacity of 1.2 GB.

The 4mm tape product operates with U.S. Design's family of Q-bus and UNIBUS host adapters with a TS11 or TMSCP device. It emulates a TK50 and operates on the DEC and VAX families of workstations via the SCSI port. The 4mm drives consist of the QT1230, QD1230, QS1230, Q1230 Kit and QK1230. The QT is a single-drive enclosure with power supply and a 4mm tape drive. The QD is a two-drive enclosure with power supply and a 4mm tape drive. The QS1000 is a four-drive rack-mount or pedestal unit with power supply and a 4mm tape drive. The Q1000 kit includes a Q-bus host adapter, a 4mm tape drive and cable for operation on a MicroVAX II. The QK is a 4mm tape drive that can be added to a Q1000 kit, QD1000 and QS1000.

For more information, contact Harry Garonzik, U.S. Design Corp., 4311 Forbes Blvd., Lanham, MD 20706; (301) 577-2880.

Circle 492 on reader card

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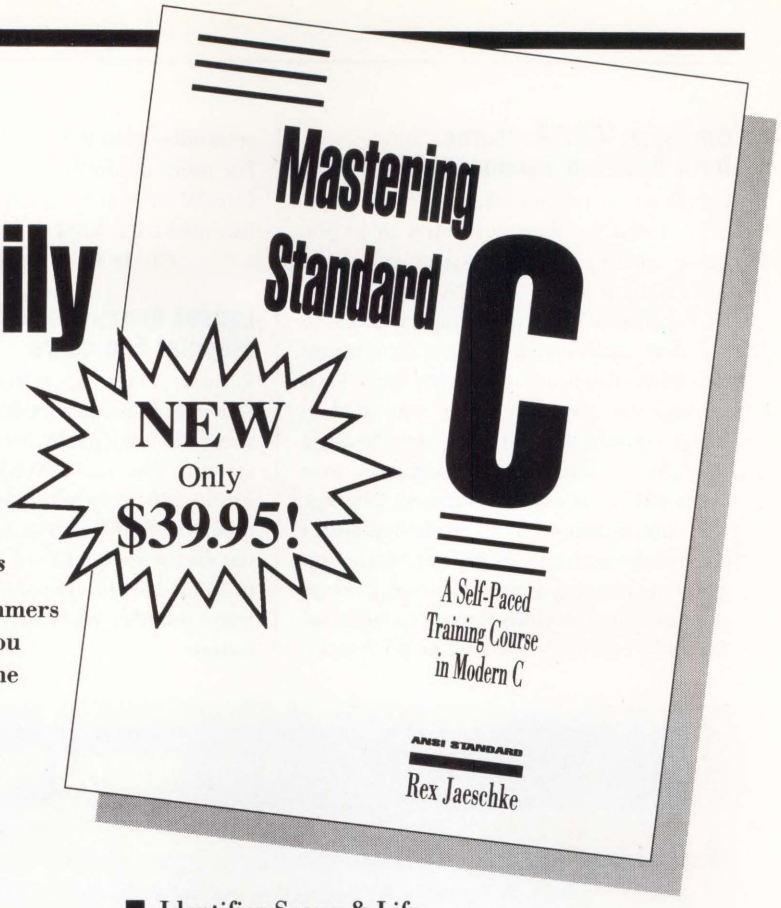

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Gembase V2.2 Features Data Auditing Enhancements

UserWare International announced Gembase V2.2, a 4GL for Rdb. It features an ad hoc query utility, a report writer, graphics, application generators and CASE interfaces.

Gembase V2.2 includes improvements to the data auditing and report generation functions. Applications written for a local language environment can be converted to run in a multilanguage environment. Multiple users can access the same data using the same application code but with different language text and prompts. The product features advanced auditing capabilities, with data auditing occurring at the field level. It keeps an audit trail of all changes made to metadata. Gembase runs on VMS V4.2 to V5.2 and is compatible with Rdb V2.1 to V3.1.

For more information, contact Sheila Haff, UserWare Int'l, 2235 Meyers Ave., Escondido, CA 92025; (619) 745-6006.

Circle 434 on reader card

Lannet Announces MultiNet Modular Enclosure

Lannet Data Communications Ltd. announced a modular enclosure for MultiNet, a modular multimedia network connectivity system. The LE-3 Modular Active Star Enclosure accommodates up to three modules. MultiNet's standard modular active star enclosure, the LE-18, accommodates up to 16 modules plus two slots. The LE-3 serves fewer modules while maintaining MultiNet features.

MultiNet modules support Ethernet and Token Ring. Manageable local repeaters and departmental hubs for Ethernet or Token Ring using all media types can be implemented. The bus topology of Ethernet is converted to a manageable star topology with modules and transceivers that accommodate fiber optics, unshielded and shielded twisted-pair, thick and thin coax, and direct AUI cable. Token Ring over MultiNet is implemented in much the same way, with manageable modules that serve as workstation access units or interhub links. MultiNet is compatible with Ethernet V2.0 and IEEE 802.3.

The LE-3 costs $900.

For more information, contact Avi Fogel, Lannet Data Communications Ltd., 151 W.

DIGITAL PRODUCTS

■ The VMS/ULTRIX Connection V1.2 is a VAX/VMS layered software product that promotes resource sharing between VMS servers and ULTRIX or UNIX clients. It supports networking, file access, remote terminal access and applications development between VMS and ULTRIX or UNIX.

Enhancements include TELNET networking protocol support, TCP/IP support for DECwindows V2.0 software, C language socket interface support and clusterwide pricing. The product lets UNIX systems exploit the availability and reliability of VAXclusters using TCP/IP networking protocols. It provides a distributed computing environment in which VAXclusters are servers for UNIX worksystems.

Prices start at $1,205 for a 10-unit cluster.

■ ULTRIX Worksystem Software (UWS) V2.2 is a windowing environment for workstations that incorporates Abode's Display PostScript for accurate WYSIWYG screen displays. UWS is DEC's implementation of UNIX for the open systems market. It runs on VAX and RISC-based workstations.

UWS lets you view your document onscreen exactly as it appears on paper. It lets you write applications that can scale or rotate text, use a range of colors, offer complex curve and path filling and insert half-toned and rotated images into documents. It complies with X, IEEE 1003.1, FIPS 151 and X/Open Portability Guide 3. Heterogeneous networking capabilities are provided by TCP/IP and DECnet. UWS supports the OSF/Motif user interface and NFS, which allows diskless boot functionality and point-to-point file access. DECwindows provides a development environment that includes the XUI toolkit, UIL and a developers style guide. Display PostScript has been integrated with X and tuned for performance and appearance on workstations screens. It's compatible with the software that drives a PostScript printer.

■ MUMPS is now available for DEC's RISC-based systems. InterSystems Corporation's M/SQL complements DEC's high-speed RISC computers. With the M/SQL, MUMPS runs on the full range of DEC processors.

M/SQL is an advanced RDBMS and application generator. By merging SQL and ANSI MUMPS, it provides a standards-based system with high performance. The extension of M/SQL to the RISC/ULTRIX platform is expected to yield a 3 to 4 x increase in number of users per dollar or a 3 to 4 x decrease in system size required to run the M/SQL-based application. Applications on PDP-11s and VAXs run virtually unchanged in the M/SQL RISC environment on the DECsystem 3100, 5400, 5810 and 5820.

■ *Digital's Customer Update*, a biweekly business publication, is available through DEC's Electronic Store. It's aimed at users and decision-makers and contains technical, pricing and availability information on DEC's latest products and services. It will be supplemented throughout the year with special issues devoted to high-impact products. The offering is free of charge.

The Electronic Store is DEC's online product information, quoting and ordering service. For access, you need a DEC-compatible terminal or PC and a 1,200- or 2,400-baud modem. Dial (800) 234-1998 to register.

■ DEC increased storage capacity for the MicroVAX 3300, 3400 and 3800 and established new VMS user licensing for the MicroVAX 3800 and 3900.

Mass storage in the MicroVAX 3800 has been increased from a maximum capacity of 2.4 GB to 7.2 GB. The MicroVAX 3400 also has been increased from 2.4 GB to 7.2 GB. The MicroVAX 3300 has been increased to 6.3 GB.

The MicroVAX 3800 now includes a 40-user VMS license standard. The MicroVAX 3900 includes unlimited user licensing. The result is savings in software licensing of up to $15,000 for the MicroVAX 3800 and $25,000 for the MicroVAX 3900.

For more information, contact your local DEC sales office or call (800) DIGITAL.

Passaic St., Rochelle Park, NJ 07662; (201) 587-8822.

Circle 438 on reader card

Fujitsu Drive Provides IBM 3480 Alternative

Fujitsu America Inc. announced the M2480, a compact IBM 3480 format-compatible half-inch cartridge tape subsystem for mini, workstation and mainframe applications that require backup/archival and data interchange among IBM or DEC computers.

The M2480 is an alternative to IBM's 3480 and 3490 tape drives. Available with data transfer rates of 1.5 or 3 MBps, it can back up 16 GB of data in one hour. It has two components: the tape drive and controller. The drive is the size of an eight-inch disk drive, and the controller fits in a standard 19-inch rack. Diagnostics include power up, online, inline, offline and background. The data compression option can double the data transfer rate of the 1.5-MB version to 3 MB and increase the cartridge capacity to 400 MB per cartridge. Decompression is handled automatically within the controller to ensure interchange of data among computers.

For more information, contact Holly Bourne, Fujitsu America Inc., 3055 Orchard Dr., San Jose, CA 95134; (408) 432-1300.

Circle 525 on reader card

Protogen Generates COBOL Source Programs

PJR Software Consulting has announced Protogen, a PC AT-based expert system prototyping tool that generates COBOL source programs for PC-DOS or VAX/VMS environments.

Protogen maintains a database of specifications, by project, that's used to produce detail design documentation, analysis reports and operational COBOL source programs on demand. After specification review, the source code is generated and tested on the PC or VAX. Specification changes are entered, and updated source code is regenerated. After user acceptance, the full detail specifications can be printed. Time savings can range from 25 to 75 percent, depending on specification reusability. The product includes an interactive panel painter and generation tools to develop modifiable default specifications to further reduce development time.

Protogen costs $4,250.

For more information, contact PJR Software Consulting, 2060-d Avenida De Los Arboles, Ste. 242, Thousand Oaks, CA 91362; (805) 493-4681.

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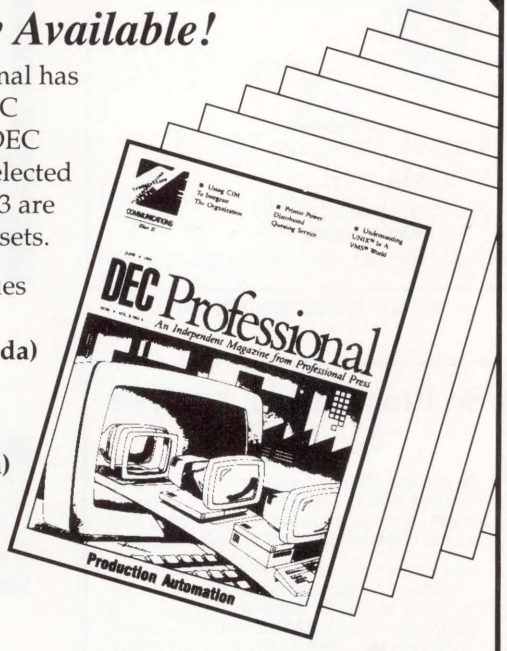

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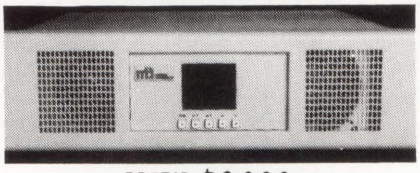

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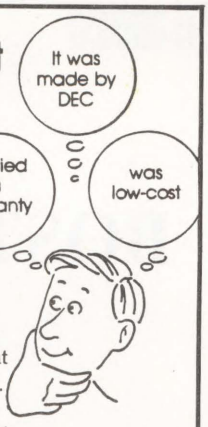

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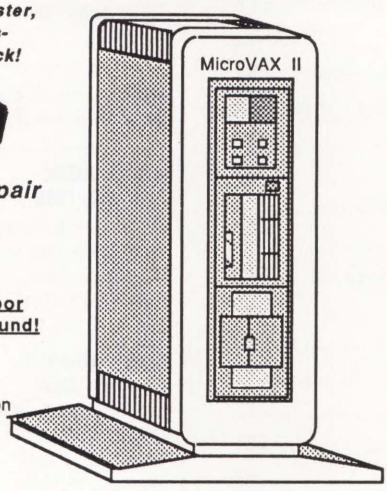

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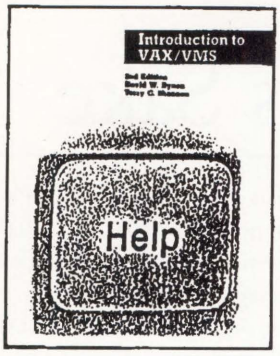

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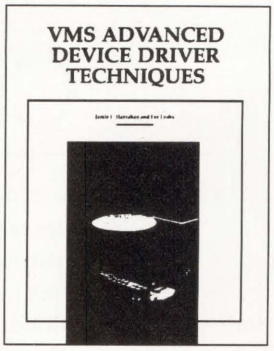

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BACK END

John C. Dvorak

Change For Change's Sake

Near the end of the recent San Francisco 49ers' defeat of the New York Giants on "Monday Night Football," an announcer referred to statistics by saying, "They're putting the numbers in a Univac blender." "Yeah, yeah, that's it ... a Univac," said another.

Univac? Have these guys been living under a rock?

The joke, of course, is on Sperry, which is now Unisys. Most companies *want* to establish a brand name. But we've watched the management at Burroughs-Remington-Rand-Sperry-Rand-Sperry-Univac-Unisys deliberately give up a name that was synonymous with computers.

Today, renaming companies after their leading product has become trendy. SSI became WordPerfect, MicroPro became Wordstar and Relational Technology recently became Ingres.

We've seen the mistake that Sperry made appear in the small-computer business, as well. MITS, the original microcomputer firm, produced the Altair computer, a prestigious machine and the industry leader. When Pertec Computer purchased MITS, one of the first things it did was to drop the name Altair. Who makes a decision like this?

One of the biggest fiascoes in business history occurred when Personal Software, which invented the spreadsheet, spent millions developing the name VisiCorp. Fortunately for VisiCorp, its name became synonymous with spreadsheet leadership. But the developers of the VisiCalc program and the management of VisiCorp got into a beef and the company fell apart. VisiCorp reorganized, and guess what? It changed its name to Paladin Software. What prompted this, after the effort that went into turning VisiCorp into a household name?

I don't understand the rationale behind such activities. It's probably the result of marketing "experts" who want to make a name for themselves at the expense of the company.

One favorite example is the Byte Shop of Berkeley, California. A money-maker for the owner, it was the leading firm in the area even though it failed to switch to the IBM PC clone world. Business was good enough that it could afford to bring in a consultant to upgrade its image. The first thing he did was to change its name to Trak Computers. The store soon folded.

What's In A Logo?

This problem extends beyond brand names. Sometimes a logo is changed and the company is ruined. You don't see IBM changing its sideways pin stripe logo. Some logos aren't important, but others, such as McDonald's golden arches, are groomed carefully. Bank of America changed a beautiful Old English script to a modern design. The company has suffered ever since.

It's amazing that many old logos look more interesting and modern than some of today's professional designs. The *San Francisco Examiner* upgraded its image some years ago. The newspaper's circulation slipped from 550,000 to 150,000 before it wised up and went back to the classic design.

Names, logos and images cast a spell on potential customers. Some names and designs are awful from day one and should be changed immediately. Others have been nurtured carefully and ingrained into our society's collective unconscious. If a company doesn't realize the effect of consistency and the charm of stability, perhaps it *should* fail after a decision to change for change's sake.

> ***If a company doesn't realize the effect of consistency and the charm of stability, perhaps it should fail ...***

This reminds me of a curious phenomenon in California that epitomizes such idiocy. Some years ago, redesigning wine labels became a big deal. Everyone had to have a fancy label. Wineries thought that, because some people actually buy wine because they like the label, it couldn't hurt to upgrade the look. The labels were improved, but it seems that what was in the bottle had more effect on sales than the label itself. Surprise, surprise.

The key to success is to look within. Like the wine, the product and service are what need attention when business is slack. Superficial changes usually work against you if they're the primary focus. ■

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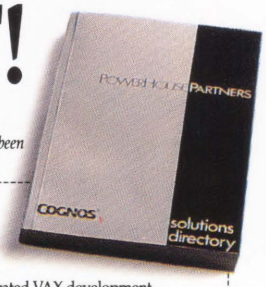

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To find out which tape cartridge backup subsystem meets your application needs, write or call Micro Technology today at 800-999-9MTI.

MA24, 8mm on the HSC

MA40, 4mm DAT on the HSC

Micro Technology

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