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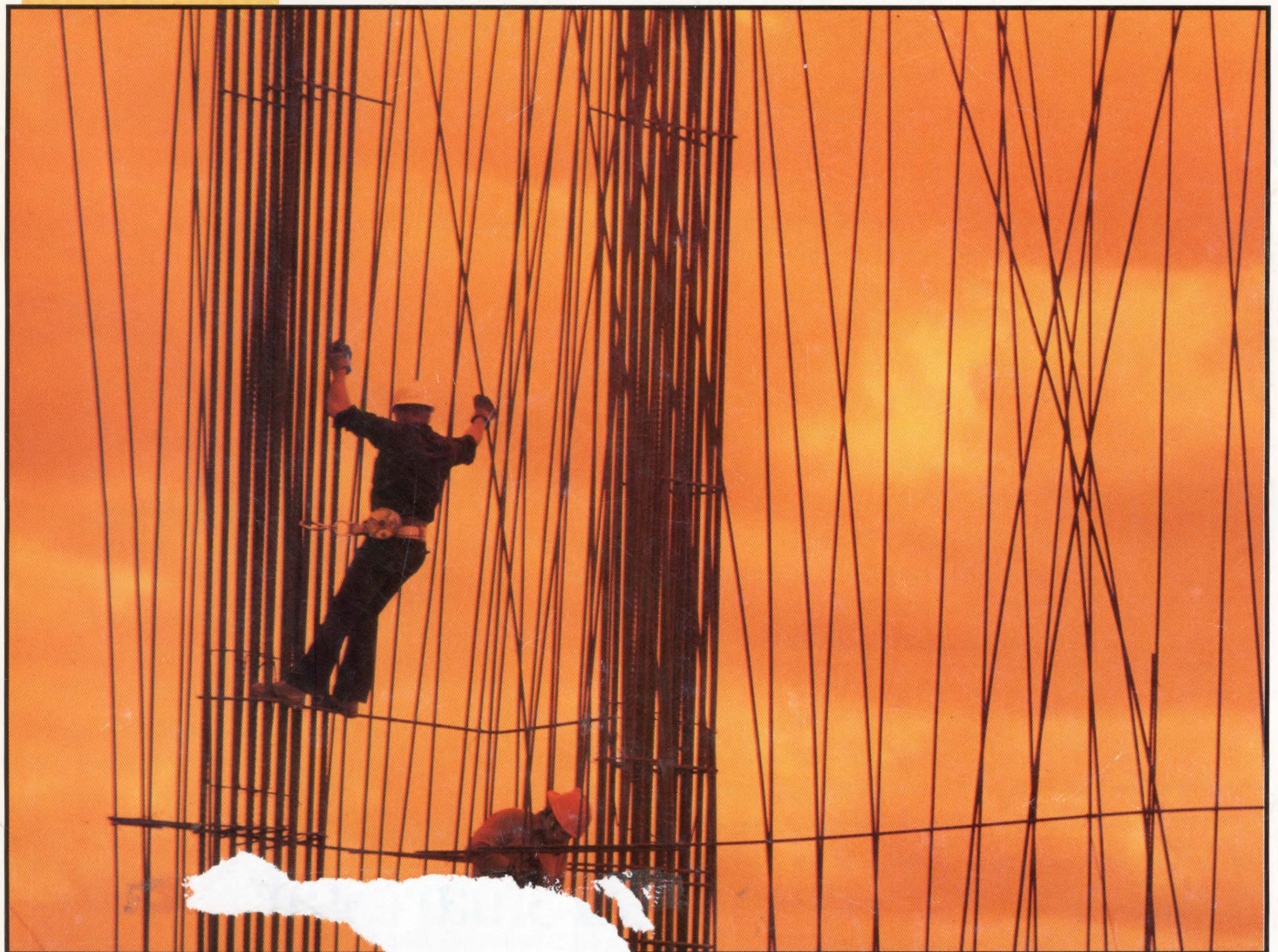
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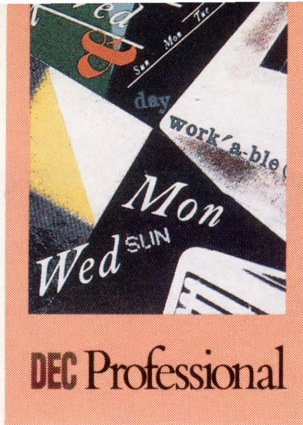
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# C ONTENTS

JANUARY 1990

VOL. 9, NO. 1

## NETWORK ARCHITECTURE

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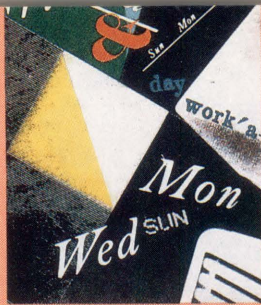
Here are two simple procedures that provide much-needed wildcarding/qualifying file-selection power.

#### ON THE COVER:

Robert Lewellyn/  
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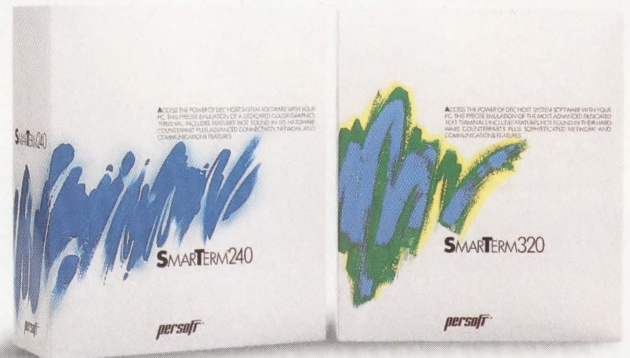
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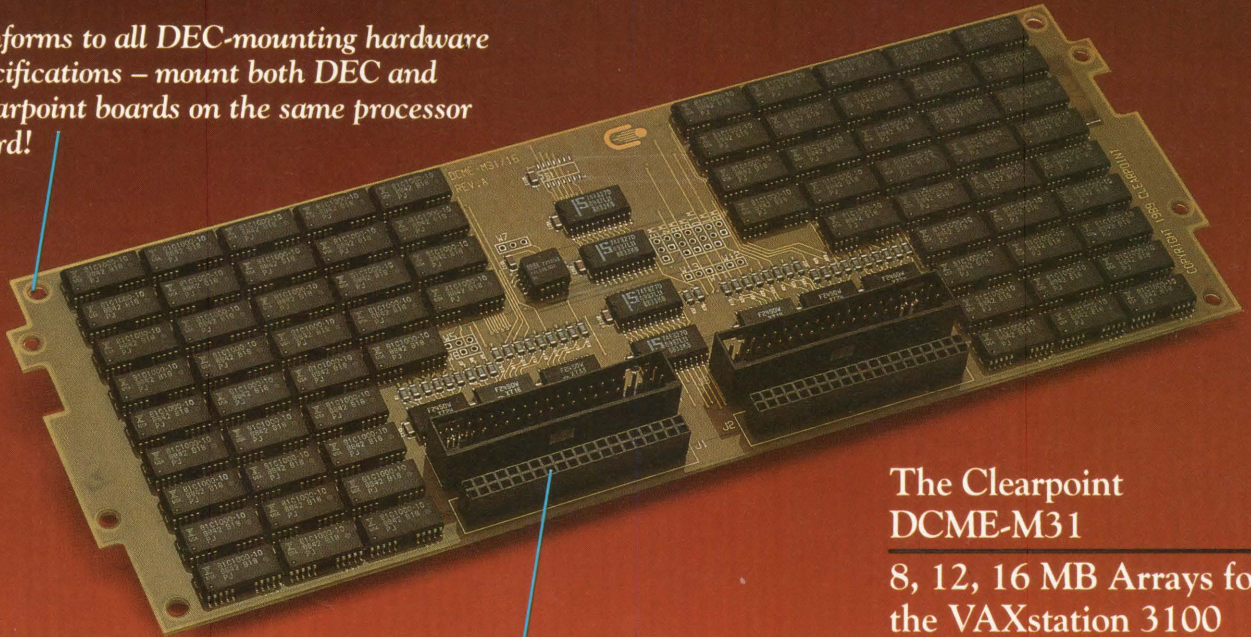
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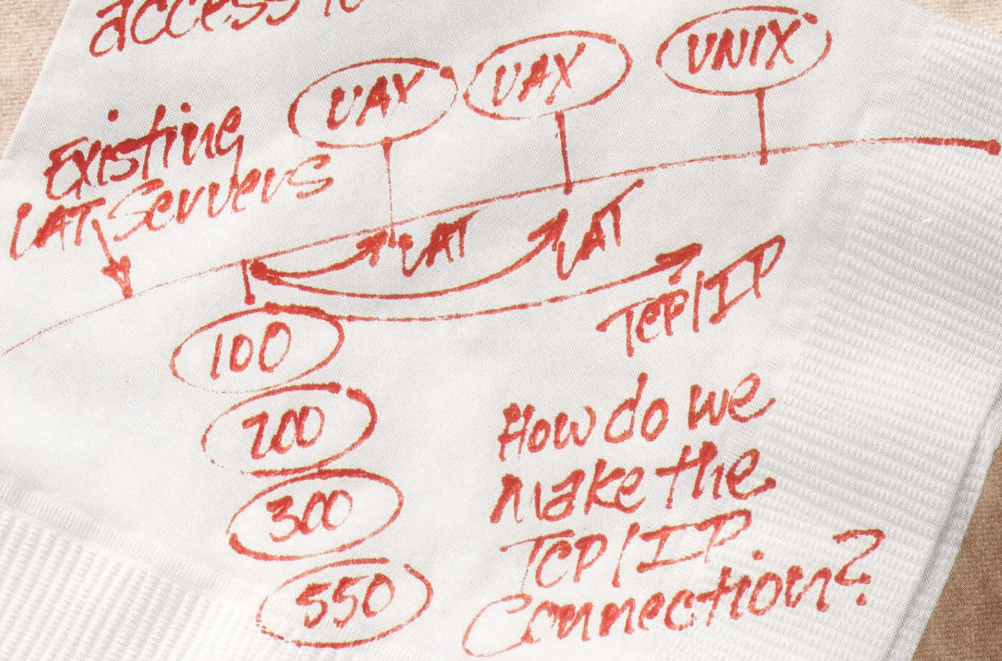


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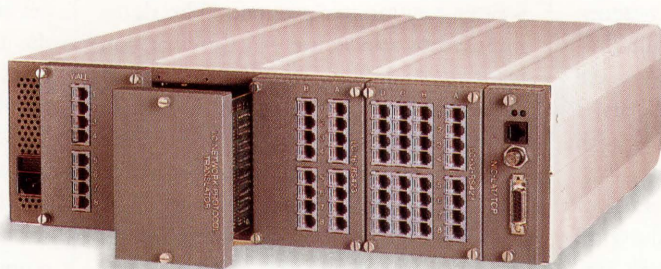
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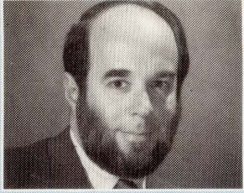
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# Educating The Next Generation

When I write about the next generation, I'm usually referring to the next wave of computer systems. But this month, I'm referring to our children, who will follow us into the world of computing. Like some educators, I worry about what they'll bring with them from their school days.

Recently, when I visited several secondary schools, each wanted to show off its computer department. I wasn't impressed. I've written before that the *New York Times*, *The Wall Street Journal* and others believe that PCs will take over the minicomputer market as soon as those PCs become powerful enough. They think PC networks will take over everything except the mainframe world — until we have 500 mips on our desks for \$999, at which time they'll replace everything. Baloney!

Midrange computers *are* networks from the ground up, designed for multi-user use and file serving. PC networks link PCs and allow them to share resources and data, but they don't come close to the performance necessary to serve hundreds of users doing the work most of us expect and get from our DEC systems.

Schools seem to have bought into the popular scene. When I visit them, I see Macs, IBM PCs and compatibles, and not much else. RSTS, the first real timesharing system on a minicomputer, began with a four-user educational system. Why don't we see more PDP-11s or VAXs doing real computing in our schools? Students learn word processing, spreadsheets and graphics — that's considered computing. What happened to FORTRAN, COBOL, BASIC and C? We're training end users, ignoring the people who make the computer do useful tasks.

Programming is a useful discipline beyond the coding of instructions for a computer. A step-by-step, exact solution to a problem is well-understood if you've written a computer program. The rigors imposed by specifying exactly what you want done, leaving nothing out, aren't experienced anywhere as clearly as they are in writing a computer program. We aren't used to specifying things exactly or thinking logically about solutions.

Some argue that programming should be taught in college. But children interested in computers shouldn't have to wait until they get to a university to learn about them. How computers work and how to program them should be taught early. The curriculum should keep tomorrow's talented computer people in school and motivated.

To find a solution, you must understand the problem. First, there's a lack of training for teachers. Some years ago, a local school district sought to purchase a "programmable calculator." I suggested a PDP-8 that could be used to teach programming and other things. The school superintendent summed it up: "The math teacher knows about the calculator. He doesn't know anything about the computer. Why should we buy him what he doesn't want?" Good point. If we want to improve computer training, we must start with the teachers.

Second, school boards think that PCs are the wave of the future. If you have PCs and Macs in your computer department, you're on the leading edge of technology.

Let's do some arithmetic. What could you configure a 16-seat MicroVAX for? Include 16 VT320 terminals and one printer. It's pretty inexpensive, and it stacks up well with 16 Macs or PCs, which won't share anything. Now for the software: trouble city. Software for Macs and PCs is cheap, particularly compared to VAX software. But how many

schools buy 16 Lotus licenses, as opposed to "sharing" just one? If you match those 16 VAX seats against 16 copies of the PC software, it gets interesting. Before we get into a price war, we must convince the teachers and the school board that real computing can exist in their school. It even can coexist with PCs and Macs.

There's a part for all of us to play if we want to improve how we teach our children about computers. DEC can start with an aggressive discount plan for schools. A high school I recently worked with got a discount, but it wasn't large, and DEC seemed to treat it like just another commercial sale.

Software companies should offer similar large discounts. Furthermore, training companies should offer summer courses for teachers at reduced rates. DEC should do its part by offering such courses during school vacations, and a school that buys a DEC system should have free teacher training forever.

We all should get involved by asking our local school districts what they teach about computers and how they teach it. Maybe they need volunteers for after-school clubs. Possibly we could make some of our computer time available for teachers and students to let them find out what kind of computing we do. Tour your schools, attend school board meetings and get involved.

I used to think that the next generation would take my place with insight gained from exposure to computers since their early school years. But I'm not sure that the insights and experiences they get are preparing them to move us into the next computer generation, whatever that will be. There are more PCs than ever, but the adage "Some's good, more's better" doesn't hold true here. PCs are only a part of the computing solution, and I want our successors to see the whole picture. ■





MA92, 3480 on the HSC

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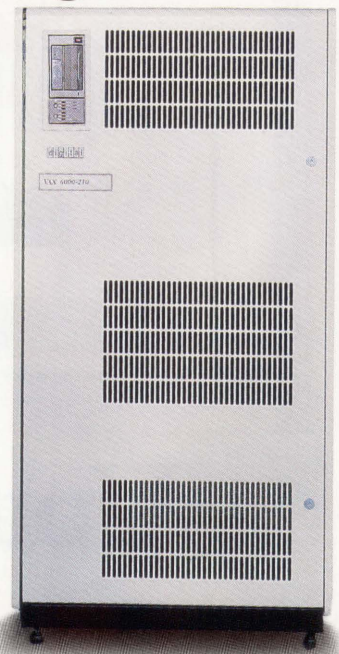
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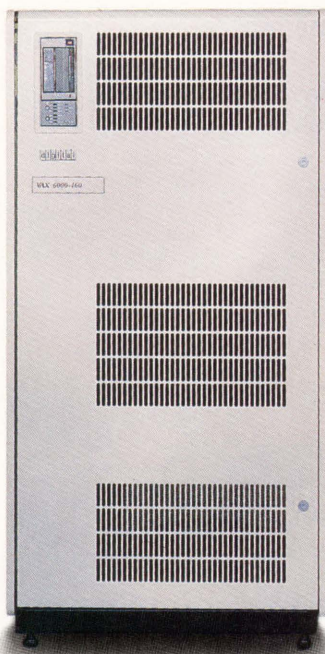
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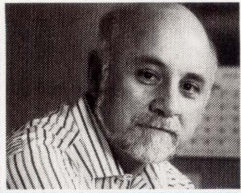
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## EDITORIAL

Dave Mallery

# Big Bargains On Big Machines

At the beginning of 1989, Professional Press upgraded its 8250 to an 8350. One year later, we've outgrown it. Sound familiar?

It's the natural progression in every growing company. You can never afford enough computer power to really fix your performance, only enough to bandage the wound for six to nine months.

We started investigating our next machine a few months ago. We tracked the prices of used 8350s and 8530s to see what was happening. It seems we've stumbled on a major opportunity.

According to a research report from Computer Intelligence, there are 20,814 VAX 8xxx machines installed in the United States. At the high end, 3,000 87xx/88xx machines were purchased for a total of about \$1.4 billion. Forget the 86xx machines, which are old enough to be nearly depreciated, and there's another \$2.2 billion in 82xx through 85xx. That's a total investment of roughly \$3.7 billion. Assuming that these machines are half-depreciated (perhaps a rash assumption), you have \$1.8 billion of book value.

The current retail price of these machines is nowhere near half the purchase price. In fact, the retail price (that is, the published asking sale price) is rapidly passing one-quarter of list and is dropping every week. Subtract another 40 percent and you'll get the price that a broker will pay for a machine. The liquid value of all those machines is only about \$270 million — a loss of \$1.5 billion in liquidity.

This is without considering the effect of the VAX 9000 machines, which are sure to replace most of the very high-end 88xx machines installed in big clusters. Just wait until those machines come flooding onto the market looking for a buyer!

Imagine that you are a fund manager running a portfolio full of 88xxs owned by the widows and orphans whose money you've promised to protect and nurture. Most of these machines are already in your warehouse, courtesy of the 6000 series, and the rest are coming off lease within the next six months. If you liquidate those machines now, you're doing the right thing, but you'll be fired for losing your clients' money. If you wait, at least you'll collect a few more paychecks before being fired. What would you do?

Financial people are caught in a terrible bind. Large machines depreciate in two or three years. However, our obsolete tax code forces them to depreciate in five to seven years.

Computers depreciate at amazing rates and always at the worst possible times. They *never* track their book value. When they fall, they fall because of the change in their *real* value. Real value is determined by the marketplace, by factors such as the current cost of the same VUPS power, the size of the footprint, the cost of service (and the cost of service to the new machine) and the heat and power. Additional factors such as sudden oversupply can multiply the effect of the others and push the prices much lower much more quickly.

I see a fantastic buyers' market developing in VAX 8xxxs. It's silly to buy into a falling market too soon. The prudent will watch and wait.

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## LETTERS

### TUNING TROUBLE?

I read with interest Philip A. Naecker's "Adventures In RISC Land" (October 1989), which benchmarked the Mips Computer Systems M/120 RISC Computer. I fully expected the Mips machine to outperform a MicroVAX II.

However, the author's table describing his MicroVAX timings shows what I consider an inefficient run. Assuming his test program was run in a fresh process, 1.6 million pagefaults in fewer than four hours yields a fault rate of more than 118 per second, near the saturation point of a 1-VUP-class machine (with unknown disks). This observation is reinforced by the fact that the peak working set size was only 900 KB of physical memory for a 20-MB benchmark. On an 11-MB MicroVAX, VMS occupies 2.5 MB, so plenty of memory should have been free.

As a system manager, it's my responsibility to tune my machines for an average workload. Several of my machines are set up for large numerical simulations, and there are well-known techniques for memory tuning:

1. Be sure that users' SYSUAF entries specify sufficient WSQUOTA and WSEX-TENT.
2. Check the SYSGEN parameter WSMAX and raise MPW\_HILIMIT to cache out-bound blocks of memory.

VMS is shipped with conservative parameters so that it can run on a wide spectrum of VAX hardware. These parameters are rarely optimal for one's own needs.

**Christopher Ho**  
Los Angeles

*Philip A. Naecker:* Mr. Ho is correct — the soft fault rate shown is excessive. In checking my accounting logs, I found that the MicroVAX run I chose for comparisons was executed in conflict with other jobs consuming large amounts of memory.

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.

Thus, the peak working set of only 1,863 is too small for maximum efficiency.

However, software faults don't have a dramatic effect on system or application performance. I made other runs that showed a peak working set of 5,000 pages (a reasonable limit in a a multiuser environment) and a corresponding decrease in total faults from 1.6 million to 87,000. There's very little improvement in elapsed time in these runs, however, and only a modest decrease in CPU time (3:03 versus 3:13). This is because the high soft fault rate has only a weak effect on overall performance. Further, there were only about four fault I/Os per second in the run with WSEXTENT of 5,000, and from the fact that neither CPU nor elapsed time changed much between the two runs you can see that disk performance isn't of particular interest in this benchmark.

The point of the article was to illustrate that a program that flushes cache won't yield "normal" speedup when moved to a RISC machine that's heavily cache-dependent. Mr. Ho is correct that an environment tuned for a particular application will yield better performance than one that isn't, but that would only further reduce the speedup factor.

### APPLYING SCRUTINY TO SABER-C

I read Evan Birkhead's "Product Watch" article on Saber Software's Saber-C, "Applying X To C" (October 1989, p. 22), with great attention. To a software developer, acceleration tools are enormously welcome. However, I don't understand what the novelty of Saber-C is. Any compiler worth having gives compilation error messages that refer to the source code. The DEC C compiler constructs a separate file with the suffix LIS, which shows the errors and repeats the line responsible. Does Saber-C provide the line number in the source code? Is that what we're paying for?

When people are well-trained in a language, syntax errors are trivial and few. They aren't the bottleneck in development. The bottleneck is the constant revision of code because of such things as overlooked cases. Often these overlooked cases are exposed by run-time errors. As for run-time errors, the DEC software refers you to the line in the .LIS file responsible for the error and notes what the error is. The stack of calling routines that led to the execution of that line of code also is noted.

Perhaps Saber-C points out nonconformities when a program has no syntax or run-time errors but doesn't conform to an X interface standard. It seems this is the only functionality not already provided by DEC.

**Malcolm Bersohn**  
Toronto, Ontario

*Evan Birkhead:* Perhaps Mr. Bersohn answers his own question as to the "novelty" of Saber-C: System managers should look at Saber-C primarily because it accelerates things tremendously compared to the DEC C compiler. It lets you prototype applications and is reminiscent of LISP in its ease of execution.

I agree that the bottleneck is rarely



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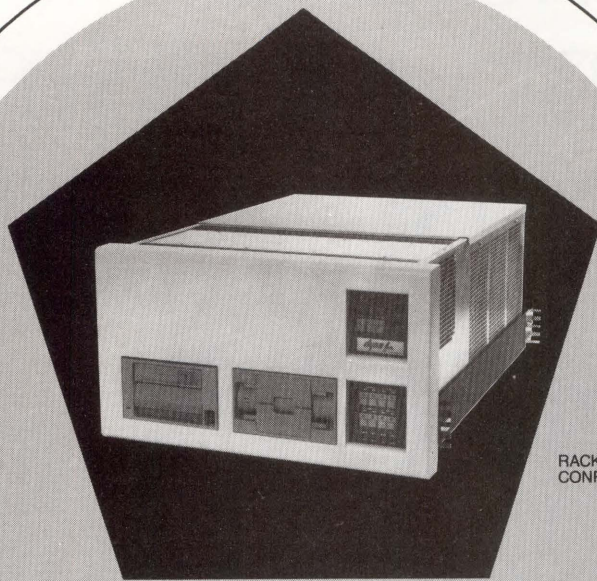
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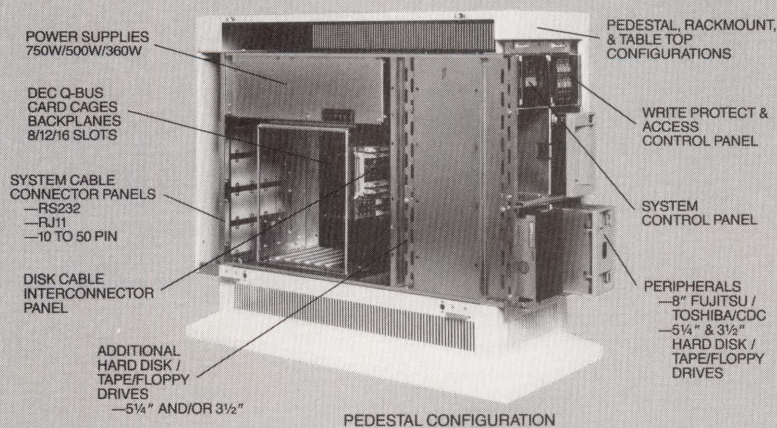
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syntax problems but rather the constant revision of code because of overlooked cases that can be exposed by run-time errors. In handling these problems, Saber-C uses methods similar to DEC's C compiler. A main benefit of Saber-C is its ability to aid in X development. This is an important capability, given the growing interest in X.

## A PAT ON THE BACK

Here's a letter of appreciation for John Dvorak's excellent Back End column. I'm glad someone out there has an enlightened sense of humor.

"The Stupidity Factor" (September 1989) was great but too close to the truth. Look at where many software packages are heading. Icons are in, language is out.

You often can describe a complex function more easily with a picture than with words, but there's no set of rules to govern what an icon represents. It's like speaking English without grammar rules.

But why worry? There's always the foolproof documentation that comes with the software. Only who has time to read documentation? Wait a minute: It seems we've stumbled around that pattern-filled circle again.

Society is slowly replacing language with pictures. You needn't know English to drive a car — but just try to figure out how to turn on the defroster in a rental car. When was the word *defrost* replaced by a strange-looking object with squiggly lines? Weren't we once taught that language was an indication of higher intelligence?

Maybe this is trivial, but it substantiates the national trend Mr. Dvorak wrote about. It's frightening when 36 percent of the population believes boiling radioactive milk makes it safe to drink. I can't imagine what percentage has misconceptions about computers and technology.

Mr. Dvorak, thanks for your articles and keep up the good work. Too bad I can't get anyone else in my office to see my point. Maybe your next article could be written in picture-graph.

**Jim Erjavec**  
Mason, Ohio



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## WHERE HAS ALL THE CPU TIME GONE?

### QUERY:

**Mark Stone** (SIG 37/MESS 1064): How can I determine the amount of time the CPU has spent in its various modes (USER, KERNEL, EXEC)? I know MONITOR and SPM can do it, but can an average system manager? I'm looking for more than just the idle time.

### REPLIES:

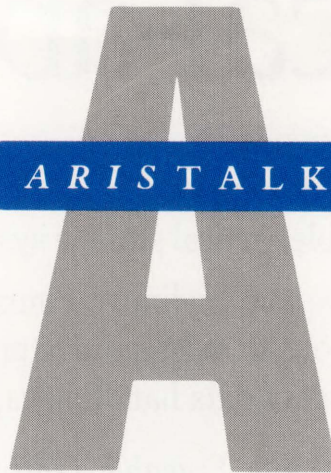
**Abraham A. Suleiman** (SIG 37/MESS 1066): I was annoyed by the removal of the NULL process, which told me the wasted CPU time since the last boot. To monitor CPU time spent in USER, KERNEL, EXECUTIVE, IDLE, and so on, try:

```
$ MONITOR SYSTEM /ALL
```

**Richard B. Gilbert** (SIG 37/MESS 1067): MONITOR MODES is how the average system manager would do it. Is there a reason why you can't use MONITOR? You can get either a real-time display or have MONITOR record to a disk file and summarize later. The real-time display is good for a quick peek. The recording mode is used when you want to see how the system behaved over several hours. You can get the minimum, maximum, average and current values for the percentage of time spent in any mode.

I think MONITOR gets its information by grubbing around the system data structures. The average system manager seldom gets that deep into the system.

**Phil Gravel** (SIG 37/MESS 1069): For a single-processor system, the segment of FORTRAN code shown in the Figure returns the CPU ticks (10 ms time slices) of the processor in the various modes (K,



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## SIG Identification

The SIG categories referenced in this month's ARISTALK are:

24 .....	PCs
33 .....	RSTS
37 .....	VMS

E, S, U, I, C, SL, N) and calculates the total CPU time. The spinlock time is included in the kernel mode time and the null time is included in the interrupt stack time. From there you can do what you like. Compile your program and then link it with the options seen at the bottom of the Figure.

*Editor's note: See "Where Has The CPU Gone?" by Betty Steele Walker (July 1989) for information on observing CPU fluctuation and usage.*

## K WORDS

### QUERY:

**Kim Green** (SIG 33/MESS 457): I have a PDP running RSTS. How do I convert K words to MGs? I type SHOW MEMORY and get it in K words. I need to know how much memory we're currently running on without looking at my boards.

### REPLIES:

**Bruce Abels** (SIG 33/MESS 458): Words are 2 bytes, therefore K words are 2 KB. There are 512 K words in 1 MB of memory. The most memory your machine can have is 4 MB, so use that as a guideline.

**Brett Bump** (SIG 33/MESS 459): The following are three quick ways for a novice to get memory information:

1. SHOW MEMORY is transformed by DCL into the more terse SYSTAT/C. The end of the table shows total memory. Each job's total memory in bytes can be calculated by multiplying by 2.
2. Run the MEMORY program. Some SYSOPS have this program installed so that you can call it from the command MEM.
3. When bringing the machine up or down, the MEMORY suboption of





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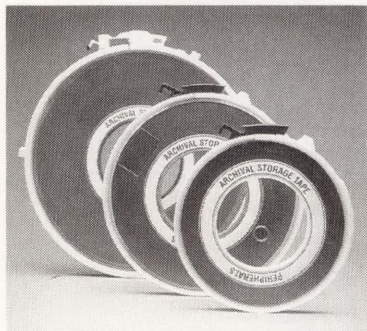
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CIRCLE 151 ON READER CARD

```
EXTERNAL SMP$GL_CPU_DATA,CPU$L_KERNEL
INTEGER*4 CPU_DATA,KERNEL_OFF,ACT_KERNEL
INTEGER*4 CTIME(8),TOT_CPU,NULL_CPU
```

```
CALL LIB$MOVC3(4,SMP$GL_CPU_DATA,CPU_DATA)
CALL LIB$MOVC3(4,%LOC(CPU$L_KERNEL),KERNEL_OFF)
ACT_KERNEL = CPU_DATA + KERNEL_OFF
CALL LIB$MOVC3(8*4,%VAL(ACT_KERNEL),CTIME)
TOT_CPU = CTIME(1)+CTIME(2)+CTIME(3)+CTIME(4)+CTIME(5)+CTIME(6)
NULL_CPU = CTIME(8)
```

```
$ LINK program_name,SYS$SYSTEM:SYS.STB/SELECTIVE,SYSDEF.STB/SELECTIVE
```

Figure: FORTRAN code for CPU ticks.

DEFAULT displays where memory is located. Any memory that isn't present (or locked by the SYSOP) is shown as nonexistent memory (NXM) in the two displays above.

**Kelvin Smith** (SIG 33/MESS 461): The MEMORY program that Brett mentions is found in the UNSUPP\$: library (somewhere in the [0,\*] series). It shows everything currently loaded into memory (jobs, run-time systems, libraries) rather than just the items permanently locked into memory as \$SHOW MEMORY (or SYSTAT/C) does. Neither shows jobs swapped out of memory. It's to be hoped that you have enough memory that nothing gets swapped out. A normal SYSTAT (or \$SHOW USERS) shows the memory used by each job, whether swapped in or out.

## PC SERIAL PORTS

### QUERY:

**Dennis Haugh** (SIG 24/MESS 238): I'm trying to use my MicroVAX 3600 as a print server for ATs using the COM ports on the PC. I want the PC and all applications on it to think there's a printer connected to the COM port. The PC isn't cooperating. When I try to send data out of the COM port, it tells me, "printer not online or not turned on."

Can I set up the COM port so that it doesn't look for a signal (on what pin I don't know) from the printer? I only have four wires to work with: one to transmit, one to receive, one for ground and one I'm not using.

### REPLY:

**Phil Anthony** (SIG 24/MESS 240): Why do you only have four leads in your

cable? Most RS-232C cables come with eight: TD, RD, CD, SG, DSR, DTR, CTS and RTS. What command are you using to output data? If it's COPY, you'll need to hold DSR high, and I think PRINT requires RTS/CTS handshaking. Make sure you've used the DOS MODE command to set your speed, parity, data bits and stop bits. You may have to add the P argument, which tells the PC to ignore timeouts when trying to connect.

The software looks at the COM port registers. There's nothing in the hardware to keep you from issuing an OUT instruction, if you want to, without first finding out what state the lines are in.

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High 466 Medium 467 Low 468

[ Report From Dr. R. ]

## ULTRIX Gotcha

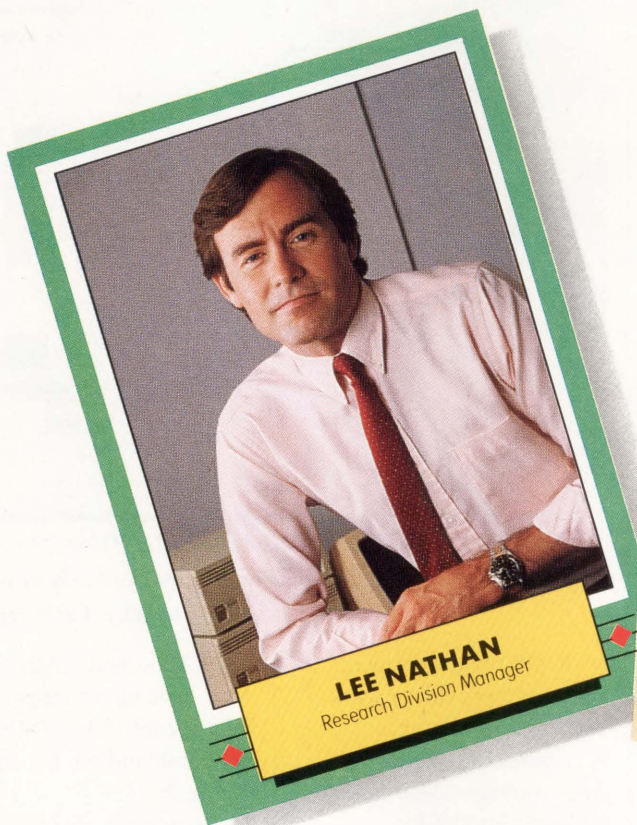
*Editor's note: Dr. R. contributes timely information about upcoming Digital products and strategies. Look for his insights on ARIS/BB and in ARISTALK.*

■ The version of ULTRIX that will be available on the VAX 9000 approximately one year from now will support only 256 MB of physical memory. This doesn't bode well for VAX 9000 multi-processor configurations running ULTRIX.

■ Speaking of which, the ULTRIX version of the FORTRAN High-Performance Option won't incorporate automatic decomposition. If you want to do it in parallel, you'll have to slice and dice your code the old-fashioned way.



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# Communications Connection

*Racal-InterLan's VMS Software Solutions Bring Interoperability To VAXs And MicroVAXs*

Racal-InterLan announced VMS software solutions that use TCP/IP protocols to link VAXs in multivendor environments with other systems, including PCs running MS-DOS and UNIX-based systems. The NP121, NP221 and NP221-MVIII protocol packages provide interoperability for users of VAX/VMS, MicroVAX/VMS and MicroVAX 3500/3600 systems, respectively. The packages consist of standard DoD TCP/IP protocols and operating system-based diagnostics. Each package runs on Racal-InterLan's Protocol Processors, which enhance system performance by offloading protocol processing from the host.

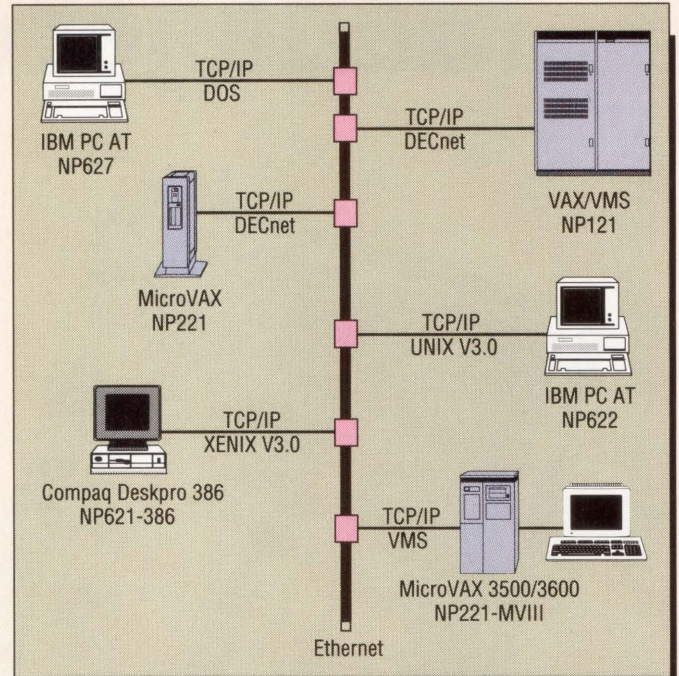
The Protocol Processors feature 512 KB of RAM, 32 KB of EPROM and intelligent DMA interfaces. Their components include Intel 80186 microprocessors and 82586 Ethernet interfaces. They support IEEE 802.3 Ethernet guidelines and feature on-board, OS-based diagnostics that verify installation, operation and access to the network data link.

Racal-InterLan's implementation of TCP/IP allows communication among a variety of computer systems

in multivendor environments. VAX and MicroVAX systems using the protocol packages can communicate, exchange files and share network resources such as printers and plotters with UNIX, MS-DOS or any other system that uses TCP/IP.

TCP/IP is distributed on MT-16 magnetic tape for VAX/VMS systems and is available in tape cartridge form (TK-50) for MicroVAX/Q-bus systems. It includes various applications:

1. File transfer — FTP lets up to 16 files and directory lists be transferred simultaneously between local and remote hosts on the network.
2. Terminal emulation — TELNET allows up to 32 active terminal users to access and log into a remote host.
3. E-mail — SMTP lets you send mail throughout the network using the standard VMS mail user interface.
4. Network management — Berkeley R-utilities are included in these packages.
5. Transmission control — TCP is a sliding window protocol that provides basic host-to-host packet communication, including connection, reliability, flow control and multiplexing.
6. User datagram service — UDP provides a connectionless service for sending and receiving internet messages.
7. Internet message control



*The NP121, NP221 and NP221-MVIII TCP/IP protocol packages extend interoperability functions to VAX as well as to MicroVAX systems.*

- ICMP reports datagram errors and provides packet routing information.
- 8. Address resolution — ARP converts 32-bit internet addresses into 48-bit Ethernet addresses.
- 9. Data link — DLP provides a connectionless service for sending and receiving diagrams.

For systems integrators and OEMs who develop TCP/IP-based applications, the company's TCP/IP software includes a Berkeley-compatible Socket Library. The library is compatible with 4.2 BSD system calls. A QIO interface is provided for use with such languages as FORTRAN,

PASCAL, C and MACRO-32. You have direct access to board-level TCP, UDP and IP protocols and the Ethernet data link.

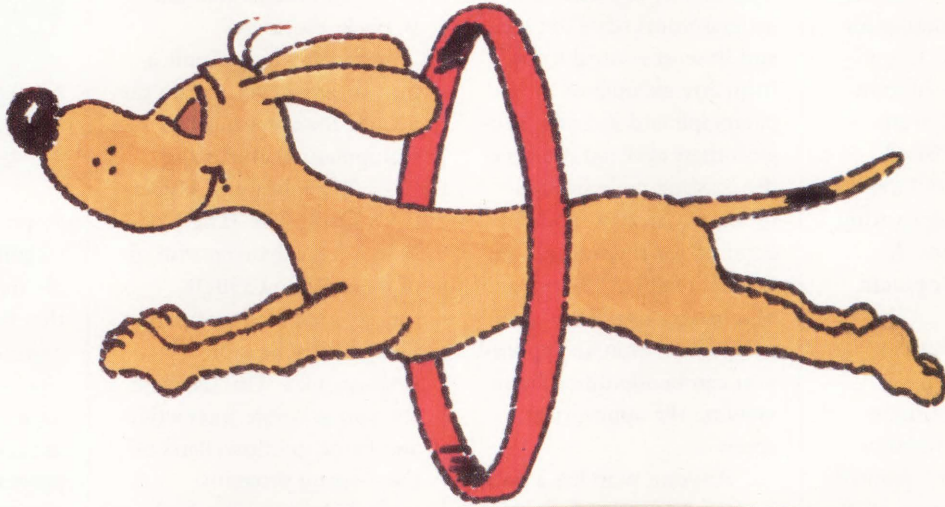
Pricing for the protocol packages varies according to hardware and software needs. A complete TCP/IP protocol package for UNIBUS uniprocessor systems running VMS V5.x, which includes the NP100 Protocol Processor, NP100 diagnostics, NP121 TCP/IP protocol Executive, VMS drivers, documentation and software license, costs \$5,990. A similar package for MicroVAX Q-bus systems costs \$3,990.

**FOR MORE INFORMATION**

**Racal-InterLan**  
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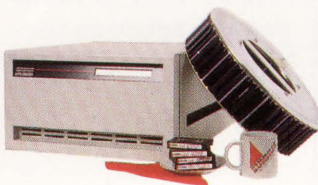
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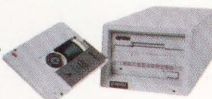


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# Just Browsing

*Hypersoft Corp.'s Application Browser Reverse-Engineers Existing COBOL Applications*

If you're up to your elbows in COBOL code waiting for revision, Hypersoft Corporation may have a solution. Hypersoft's Application Browser is a VAX-based interactive CASE tool for reverse-engineering existing COBOL applications. It supports any development methodology.

Application Browser presents a top-down approach for maintaining existing COBOL programs. Each application is separated graphically into program modules in the overview or Call Chart (see Figure). Go To and Perform Charts are similar but show the structure within any module.

Programmers can familiarize themselves with an application and its capabilities.

Application Browser lets programmers trace the logic and flow of control to or from any module or paragraph and its code. Programmers also can examine the existing code in each module. Code in modules targeted for revision can be located readily. The impact of changes in related programs within an application can be identified by reviewing the appropriate chart.

"Anyone who has a good deal of COBOL and more than three or four programmers can benefit from Application Browser. Large shops need something like this to go through large amounts of code. Small shops need this if they spend a lot of time going through documenta-

tion," comments Barbara Bersack, president.

After installing Application Browser, you create the vehicle for accessing and manipulating an existing COBOL application, Hypersoft's Code Base. The Code Base is a database consisting of the existing COBOL source code, documentation files and Application Browser files. This database lets you generate interactive and hardcopy flowcharts of the existing program.

You can navigate easily within the Code Base. You switch between graphics and code text with one or two keystrokes. Application Browser enables you to broaden or narrow your original code selection. Selected code is indicated by a

## FOR MORE INFORMATION

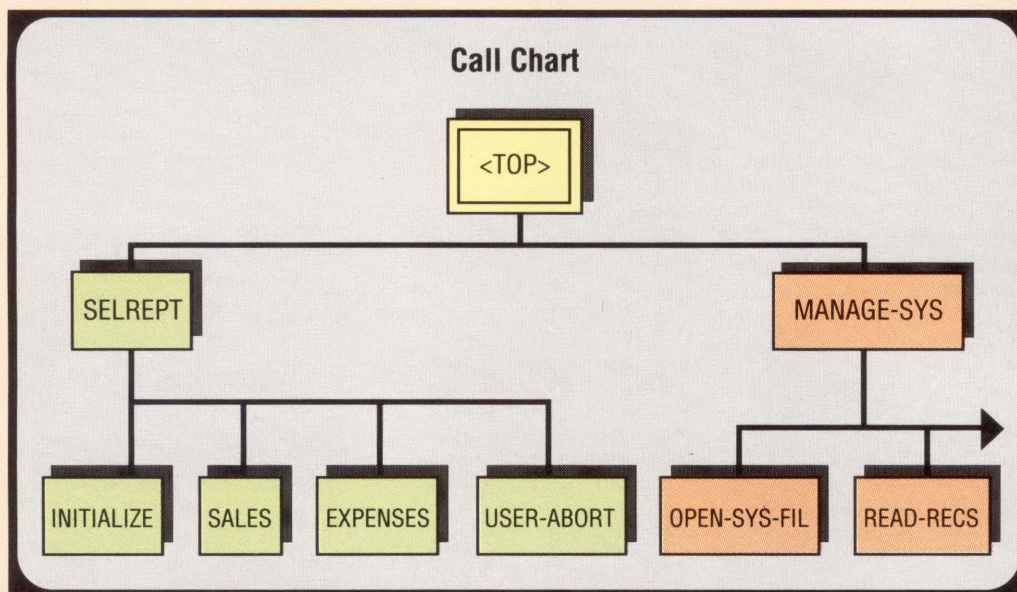
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stripe to the left of the code. Comments within the code are indicated by diamonds in the left margin and can be expanded when needed. You can zoom in to view your code selection outside the context of the entire program. Any screen can be output to a printer.

The long-term benefits of Application Browser include improved software quality, increased developer efficiency and increased project control. This results in lower development costs, reduced maintenance workload and fewer project backlogs.

The product runs on VAX/VMS with VT100/200/300-compatible terminals or IBM PCs or compatibles or PS/2s running MS-DOS. It currently handles COBOL from the VAX, DECsystem 10s and 20s and IBM mainframes. Support for additional languages is scheduled for release.

Prices for Application Browser start at \$3,000 for the PC license and range from \$5,800 for the Micro-VAX II to \$40,200 for the VAX 8840.

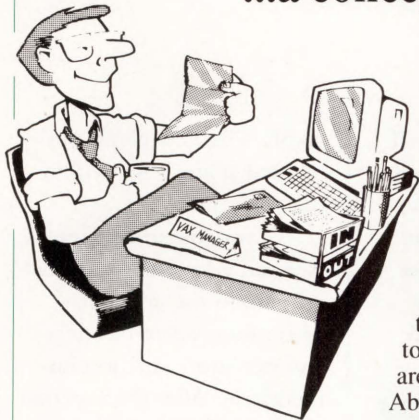


*A COBOL application is broken down into program modules in the Call Chart.*



# 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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*of others have purchased AbilityVMS.*

**CIRCLE 106 ON READER CARD**



# Spruce Up Your Image

*Paragon Imaging's Visualization Workbench Enables Nonprogrammers To Develop Complete Imaging Applications*

If you're looking for a software system that targets the growing defense, geophysical, industrial, laboratory, graphic arts applications and medical imaging markets, consider the Visualization Workbench from Paragon Imaging Inc.

The Visualization Workbench is an applications-oriented imaging software system that integrates image processing, graphics, a visual programming language and a personal programming system. It enables application developers and researchers to analyze imaging problems and development application programs quickly. It provides OEM designers a system foundation on which they can build competitive products and reduce product development time.

The product is based on such industry standards as the X Window System, C, UNIX and PostScript (for hardcopy). It's available for the DECstation 2100 and 3100, Sun 3, 4 and SparcStation, Data General Aviiion, Sony News, Concurrent 5000 and 6000 and Stardent (formerly Ardent) Titan.

"Through visual programming and automatic program-generation features within the Visualization Workbench, nonprogrammers can build their own imaging application solutions," claims John Monte-

lione, president.

The Visualization Workbench provides three user interfaces: Paragon Pipes, a visual programming system; an automatic program gen-



*Paragon Imaging's Visualization Workbench incorporates a visual programming system and automatic program generators that let nonprogrammers develop imaging applications.*

erator; and a user interface editor for rapid application development. Extensive instructional and learning aides provide online guidance and application support.

Paragon Pipes lets you program complete image processing applications through object manipulation. To develop the program, interactively select, via mouse, the functions (i.e., algorithms) that constitute the processing task. Each is displayed as a "glyph," a symbolic repre-

sentation of the function. If the function doesn't exit, it can be generated through a high-level CASE tool. You can create processing pipes by connecting the glyphs in the desired processing

order. Within the pipe, you can visualize intermediate results, change parameters and efficiently implement What-If processing strategies.

There's no limit to the number of multiple processing pipes or algorithms employed in a pipe. This flexibility allows the simultaneous processing of multiple pipes (processes) and can be implemented efficiently in a multiprocessor environment.

When building a compete application, a processing task can be saved and assigned to a user-created

glyph. The new glyph can be used at any stage within the application.

A form/menu user interface can generate glyphs for use within the visual programming system or select and execute a function immediately. After the function set heading is selected, a form is displayed.

The automatic program generator, through a series of prompts and user responses, creates new application-specific functions that automatically are integrated with the system's library of more than 130 imaging functions. In addition, by editing an information base, you create new application-specific graphical user interfaces.

The Visualization Workbench is available for all DECstations and MicroVAXs running ULTRIX and the X Window System. It includes an imaging system, plotting system and one copy of the image algorithm library sources. Prices range from \$2,500 to \$9,000 on a single-user system and from \$5,000 to \$32,000 on a multiuser system.

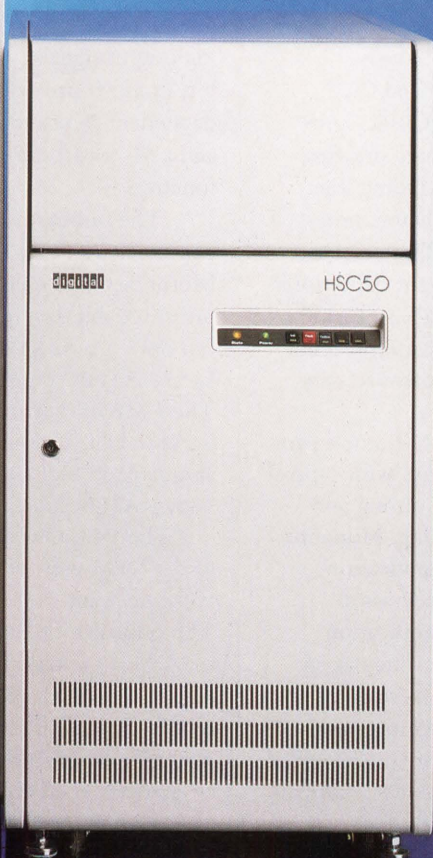
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**CIRCLE 143 ON READER CARD**



# A Grip On Graphics

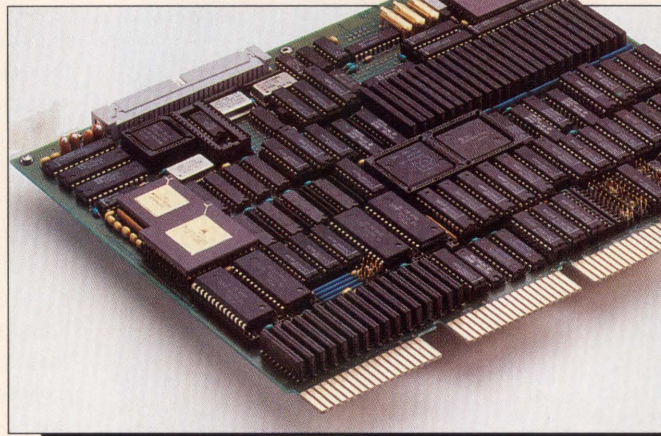
*Peritek Corp.'s VCL-Q Display Controller Gives You A Handle On Graphics Applications*

Peritek Corporation has added the VCL-Q graphics display controller to its series of video color controllers for MicroVAX and LSI-11 computers. The VCL-Q, which resides on a single 10.4- x 8.9-inch Q-bus board, contains an advanced color display controller, an onboard 68030 microcomputer and high-speed interfaces.

VCL-Q applications include CAD/CAM/CAE, animation and special effects, image processing, simulation, process control, image database, video archiving and terrain mapping.

The VCL-Q supports X and DECwindows under ULTRIX and VMS. A graphics subroutine package supports customer applications programs on ULTRIX, VMS, RSX and RT/TSX. It features built-in functions and a high-level command structure that let you readily develop software to support a variety of graphics monitors.

The high-resolution graphics of the VCL-Q feature 1,024 x 1,024 x 8 bits/pixels for primary graphics. Graphic overlays are 1,024 x 1,024 x 4 bits/pixels. You can expand display memories to 2,048 x 1,024 pixels. A separate color map for the overlay ensures that you can distinguish the overlay from the primary graphics. Display memories use special arbitration logic and two-port



*Peritek Corp.'s VCL-Q graphics display controller contains an advanced color display controller, an onboard microcomputer and high-speed interfaces.*

VRAM technology that enable the CRT controller, onboard CPU and host CPU to access the memories almost simultaneously.

The Advanced CRT Controller (ACRTC) provides 23 onboard drawing functions, including line, rectangle, polyline, polygon, circle, ellipse and arc. It provides eight conditional drawing functions, including drawing patterns, color mixing and software windowing.

The VCL-Q features panning capabilities with 4-pixel resolution, zooming and vertical scrolling. Horizontal zooming magnification ranges to 16x. Vertical zooming magnification ranges to 32x. The display timing supports screen resolutions from 64 to 1,024 pixels at 30- or 60-Hz vertical and 15.7- to 58-KHz horizontal refresh rate.

An advanced color map controller (Brooktree BT459) converts primary and overlay graphics data into 24-bit analog output signals (RGB at 8 bits each). It provides an independent 2-bit cross-hair and a 64- x 64-bitmap function.

The onboard microcomputer uses a 20-MHz Motorola 68030 CPU with a private 32-bit data bus. You can opt for a 40-MHz 68030 and 68882 FPU coprocessor. The 1 MB of dynamic RAM is expandable to 8 MB. You also can add high-speed static RAM or EPROM.

"The VCL-Q is directed to the OEM user who has work he wants to offload. The onboard intelligence of the VCL-Q relieves a large part of the VAX's processing overhead generated in such activities as clearing a screen or drawing vectors," notes Victor Gold, president.

You can upgrade a

MicroVAX II to a graphics display workstation by adding a VCL-Q board, keyboard, mouse and Peritek's X server. The VCL-Q software can support multiple VCL-Q boards, enhancing your graphics display capabilities geometrically. The onboard microcomputer can function as a parallel processor with a DEC computer system in one arrangement and act as a standalone graphics workstation in another. The VCL-Q also includes a two-channel DMA controller, high-speed 8-bit SCSI port and four serial I/O ports.

Prices for the VCL-Q start at \$4,870.

## FOR MORE INFORMATION

**Peritek Corp.**  
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Oakland, CA 94619  
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# 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

## The MAXserver 1000 Series.

You thought DEC™ was going to deliver both LAT™ and TCP/IP in the same 16-port box. And you thought it was going to be priced very affordably.

Well, DEC didn't do it. But Xyplex®, the leader in multi-protocol communication servers, did. Introducing the MAXserver™ 1000 Series. It's got every feature you were hoping for. Including LAT and

TCP/IP, and a great price. Plus it's got a lot of other features DEC never even dared to offer:

- An incredibly compact package that's 1/3 the size of the DECserver™ 300.
- A network connection that can tell whether it's thickwire or ThinWire™ and adjust automatically.
- A self-loading version that's host-independent so your VAX™ works less.
- All with Xyplex's 3-year warranty, the best in the industry.

And in case you want just LAT after all, we've still got DEC beat. The MAXserver 1000 Series includes a LAT-only version. For hundreds of dollars less than DEC. And with the ability to grow into TCP/IP later.

So if you want the industry's best 16-port terminal server, forget DEC. The real news is at Xyplex. To learn more, call our toll-free number today. Or write Xyplex, Inc., 330 Codman Hill Road, Boxborough, MA 01719.

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# Filling Old Wineskins

*Nemonix Inc.'s Enhanced VAX Upgrades Bring New Spirit To The VAX 8600*

Nemonix Inc. has carved a market niche by breathing life into older processors, such as the VAX 11/7xx and 86xx series, with performance upgrades. Using DEC boards as mandatory trade-ins that are souped up with additional intelligence and accelerators, Nemonix has built its business around providing system performance figures that DEC couldn't.

Nemonix reports that this strategy appeals to a variety of DEC customers, because it preserves investments in equipment that DEC no longer manufactures or supports with performance en-

hancements. Nemonix is unearthing a range of users who don't plan to upgrade to the VAX 6000 or who require cost-effective destinies for their existing machinery.

Nemonix recognized that system I/O, not CPU power, was the primary limiting factor of the VAX 8600 series. Its modification of the VAX 8600/8650 memory module, a system accelerator first available one year ago, has been upgraded to include a cache data board and an address path with a translation buffer. The original configuration, called the NX860-XL, costs \$45,000.

Nemonix has expanded

the NX860-XL to a two-board set called the NX860-XLC. Priced at \$80,000, this configuration yields performance increases of up to 78 percent, according to Nemonix benchmarks. The company says that it optimized the boards to run on a single processor and that the upgrades were benchmarked in single-processor environments.

The new cache data board consists of a 64-KB cache data path (32 KB on each side), compared to 16 KB provided by DEC. The larger cache was made possible by changes to the microcode that expanded

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the physical address space. The board also features a 1,024-page translation buffer (compared with 256 pages provided by DEC).

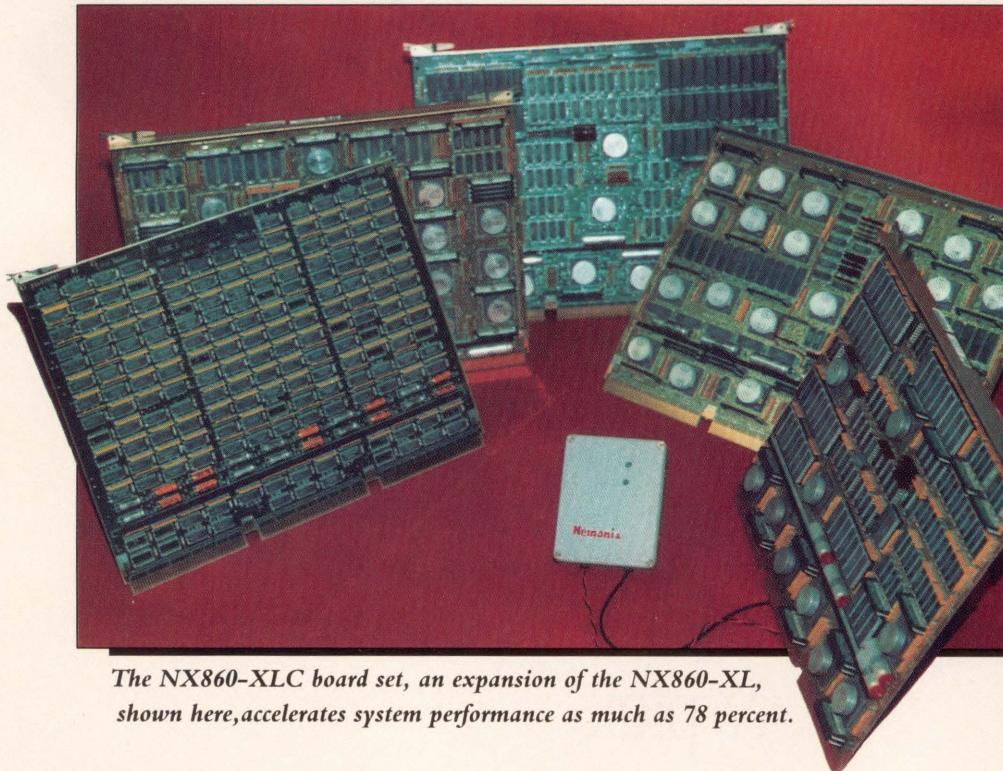
A separate configuration without an accelerator module, called the NX860-CTU, is capable of 38 percent performance improvements. It costs \$45,000. This board set replaces DEC's L0204 and L0205 processors.

The clock accelerator alone improves speeds by 40 percent. It attaches to the side rail of a VAX 8600 with fasteners and plugs into the clock port via coaxial cable.

The VAX boards come with a lifetime warranty and 24-hour replacement service.

Nemonix has applied its accelerator technology to the Mac environment, as well. A 68020-based card for the Mac Plus and Mac SE combines Nemonix's video driver with an accelerator and a math coprocessor. The card costs \$600.

It also comes with a lifetime warranty and 24-hour replacement service.



*The NX860-XLC board set, an expansion of the NX860-XL, shown here, accelerates system performance as much as 78 percent.*



# Terminal Emulation



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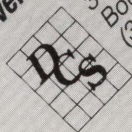
**4010**

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# An O/S For Real-Time

*Wind River's VxWorks Uses VMS As A Host Development Platform*

One of the top complaints in computing is that the giant leaps in hardware processing speeds and sizes are negligible, because advancements in software haven't kept pace. The search for software environments that accommodate the development of powerful applications that can optimize today's potent processors is challenging, even in the world of VAX/VMS development.

A recent code conversion of Wind River Systems Inc.'s VxWorks that allows applications developers to program real-time systems for VAX/VMS provides a step in the right direction. VxWorks is a proprietary networked operating system environment with a real-time kernel that until now was UNIX-oriented. Called VxWorks/VMS, the new software package provides a development and debugging environment designed to generate code for real-time applications.

Wind River's native kernel is optimized to run with VxWorks. It provides task management and semaphores, which are the building blocks for all higher level facilities. The premise is that the kernel provides minimal capabilities, but the hierarchical structure of the system addresses many of the real-time requirements.

The kernel provides the

following real-time capabilities:

- Multitasking.
- Pre-emptive scheduling.
- High-speed task context switching.
- Low-interrupt latencies.
- Minimal pre-emption and interrupt lockout.

Ethernet connectivity is provided through TCP/IP, remote procedure calls and sockets, which allow two tasks to communicate simultaneously. Software object modules are loaded directly over the network, where they can be compiled, edited and stored.

VxWorks programming languages include C, FORTRAN, Ada and a handful of other high-level lan-

guages. The environment has a large installed base on UNIX workstations, particularly those manufactured by Sun Microsystems. The list of host development environments for VxWorks is growing and includes the Mac 2, HP 9000, Sun-3, Sun-4 and SPARCstation 1, among others. It has been optimized to run in real-time on a variety of other RISC architectures, including the Intel 80960 and the Motorola 68000.

The program's code conversion to VAX/VMS, which integrates TCP/IP networking and a 68000 cross-compiler, was implemented by Software Leverage Inc. of Arlington, Massachusetts.

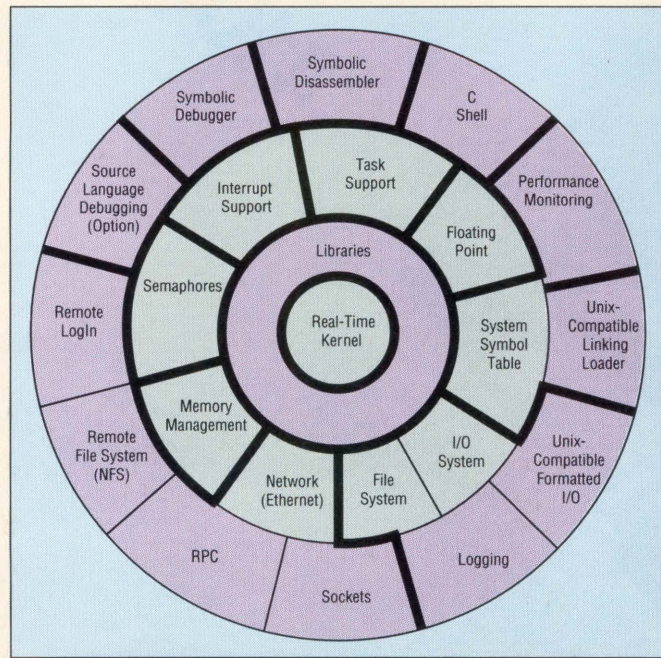
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 1351 Ocean Ave.  
 Emeryville, CA 94608  
 (415) 428-2623  
 Circle 526 on reader card

Besides TCP/IP, VxWorks is compatible with other industry software standards, including FTP, the MIT X Window System, NFS, RPC and MAP. Wind River and Software Leverage plan to support future networking technologies, such as ISDN and FDDI.

As part of the standard VxWorks license, developers are provided with the object code; source code for configuration modules and other key software portions; the right to develop one application; two manuals and the right to reproduce them internally; and customer support for one year. Additional target system licenses can be purchased.

VxWorks users include the Jet Propulsion Labs, Pasadena, California, which is designing a real-time land rover for the Mars project, and the Loma Linda University Medical Center, Loma Linda, California, which used VxWorks to develop a proton accelerator that destroys cancer cells in brain tumors. Wind River claims that VxWorks is the third-party real-time operating system of choice in Japan.



*The VxWorks real-time kernel is the hub of a hierarchical UNIX-based programming environment.*



BUILDING

Integrated  
SYSTEMS

WHAT DO WE MEAN when we say that something is the greatest thing since sliced bread? We aren't talking about the bread. Bread as a commodity dates back several millennia, and the recipe hasn't changed much. We're referring to the slice. Because all bread slices are basically the same size, we can drop our favorite brand of bread into any toaster. The independent relationship between bread and toaster vendors, based on the de facto standard slice, has advanced the bread industry, prompting the development of many unique pastries and muffins which, from a toaster's point of view, are interchangeable with a simple slice of bread.

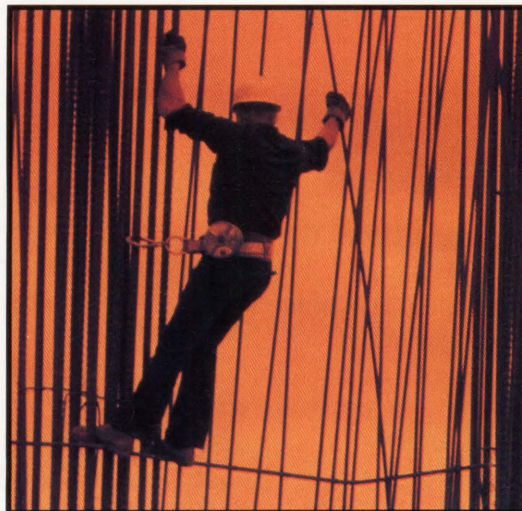
Similarly, the computing industry is driven by two opposing forces. The pursuit of competitive advantage spurs vendors to develop proprietary technologies, while the need to interconnect these advances has led to the development and enforcement of various computing standards. We refer to the art of managing these opposing forces (i.e., of building functional, interconnected computer solutions using various proprietary computer products) as systems integration.

**No Turning Back**

Who needs to integrate computer systems? Why not buy everything from one vendor and let the vendor worry about integrating the parts?

*How to manage  
the opposing forces  
of proprietary  
technologies  
and computer  
standards.*

BY AL CINI



Computer users such as scientists, accountants and artists have become literate enough to make intelligent computer purchases and militant enough to hold out for the hardware and software products best suited for their jobs. In the modern enterprise, biochemists may choose to model molecules with UNIX software on RISC machines, while financial analysts plan their cash flow in Lotus under MS-DOS, and graphic artists develop ad layouts using Aldus' PageMaker on a Mac.

Corporate MIS directors no longer can lead through legislation. Today, MIS leadership means knowing how to deliver DB2 database data from IBM mainframes or Rdb data from a VAX to the people who need it, no matter what kind of computer, terminal or workstation they've chosen. MIS leadership equals service delivery equals systems integration, and the days when we bought everything from one computer company are almost gone.

**Becoming A  
Systems Integrator**

The International Standards Organization (ISO) has developed an Open Systems Interconnect (OSI) computer networking reference model (see Figure 1). The model is aimed at promoting the functional cooperation, or interoperability, of diverse vendors' computer hardware and software



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- **Portable across portables!** ZSTEM 240 runs on portable PCs, letting you connect to your office systems when you're on the road.
- **Portable across video adapters!** ZSTEM 240 supports all standard video adapters: VGA, EGA, CGA, MCGA, AT&T, Hercules and many extended adapters. No matter what adapter/monitor combination you use, ZSTEM 240 displays double-high/double-wide characters, 132 columns,

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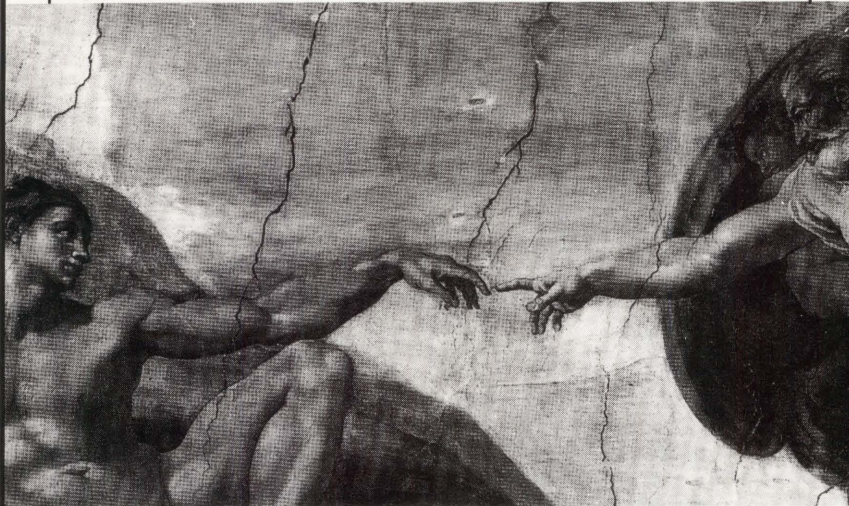
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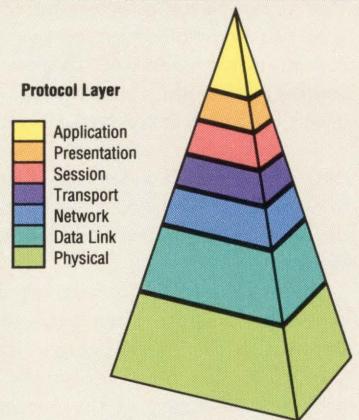
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Figure 1.



The Open Systems Interconnect (OSI) computer networking reference model.

products (see box, "Understanding The OSI Model").

Digital and most other vendors incorporate the tenets of the OSI model in the design of their hardware and software products, and the interoperability of these products can be understood in OSI terms. The following example shows that systems integration is a straightforward, common-sense process.

Suppose John and Karen use the same VAX, but John uses WordPerfect and Karen uses Microsystems Engineering's Mass-11 to create documents. The first step in integrating John's and Karen's work is to draw an interoperability diagram (we'll call it an integram) of the characteristics of their chosen products (see Figure 2).

The integram's Application layer has two sublayers: The upper sublayer is the application software being used (WordPerfect for John and Mass-11 for Karen), while the lower sublayer describes the computer environment in which the applications are running (VMS).

The integram's Presentation layer also has two sublayers: The upper, logical sublayer refers to the format, or syntax, in which an edited document is saved, while the lower sublayer refers to the physical form this saved information takes when stored on a disk or transmitted



## Understanding The OSI Model

The Open Systems Interconnect (OSI) reference model offers a seven-layer stack of communication services. In general, the services at the bottom pertain to the physical means by which computers are connected, while the top layers refer to the data formats they exchange. To develop a working understanding of the OSI model, consider this analogy with a real-world example (see Figure A).

In London, Colin has been asked by his superior Denise to attend an important Euromarket planning meeting in Paris. He can't make the meeting, but he has to provide a summary of the proceedings. Colin asks a French associate Pierre to fax the minutes to him so that he can write a summary. Denise's need for this summary and the procedures Colin and Pierre follow to fill this need correspond to the topmost Application layer.

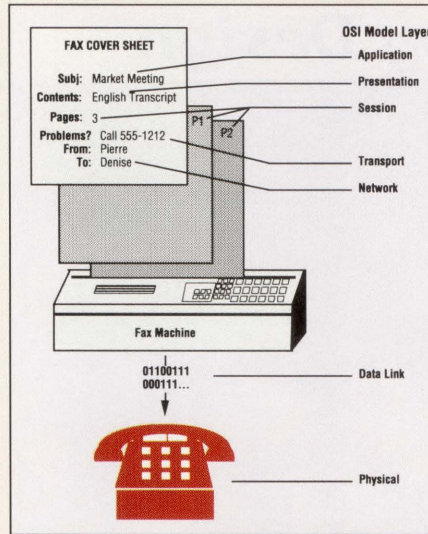
Before Colin and Pierre can correspond, they must agree on a common language. Because Colin speaks only English and Pierre speaks French and English, English is the obvious choice. Pierre selects an English transcription of the minutes and writes his cover note in English. The logical language spoken between two communicating parties, as well as its physical format (in this case, letter-sized paper), correspond to the Presentation layer.

With a common presentation format established, the data can be exchanged. The next two OSI layers deal mostly with the reliability of this exchange.

Because the meeting's minutes consist of several pages, and because each page can be transmitted or received out of its original order, each page must be numbered and the fax cover sheet must tell the recipient how many pages to expect. The Session layer is concerned with the correct sequence of the elements of a communications dialog and guarantees that the recipient can reassemble an unordered transmission reliably.

The sender and receiver must agree on what to do if pages must be retransmitted. Problems observed with an incorrectly received page and the in-case-of-problems procedure specified on the fax cover sheet fulfill this purpose and correspond to the Transport layer.

Although Colin



**Figure A. The procedural agreement (protocols) of both sides of a fax transmission correspond to the communications service layers of the OSI reference model.**

and Pierre are communicating via fax, they probably aren't manning the fax stations. The fax dialog usually is handled by secretaries who refer to each other by their respective fax numbers. Pierre assembles the minutes, composes a cover letter and sends the package to the mail room with instructions to fax it to Colin in London. The Paris secretary uses a directory to find Colin's company fax number. When the London secretary receives the document, he or she uses the address information to route the document to Colin.

The names Colin and Pierre and their respective mail stop or office addresses correspond to the logical addressing provided by the Network layer, and the fax numbers correspond to the hardware addressing aspects of the Data Link layer. Both secretaries use their local employee directory conventions to translate between these physical and logical addresses.

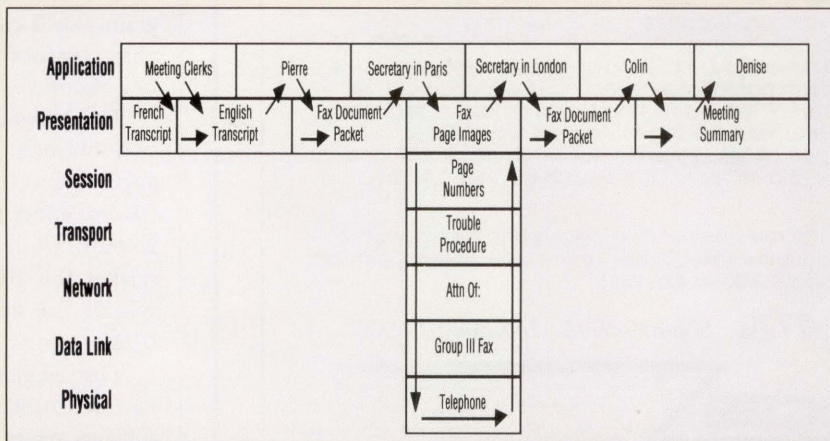
Invisible to everyone at the Network and higher layers, both sides of the fax transmission need to agree on the binary data format (Group I, Group II, and so on) into which the page images are encoded (another aspect of the Data Link layer) and the physical wiring scheme between the two stations (the Physical layer).

### OSI Dynamics

The set of conventions in use under a particular application is called a protocol stack. In our example, Colin, Denise, Pierre and the secretaries are applications. In OSI terms, information starts at the Application layer of an initiating stack and flows downward until it reaches a level in common with the next stack of the next Application layer. (In data communications, this is called encapsulation.) Data then can move across the common layer

between these two adjacent stacks and can move up the stack (decapsulation) to the Application layer. The data can be used by this application or forwarded to another application in the chain.

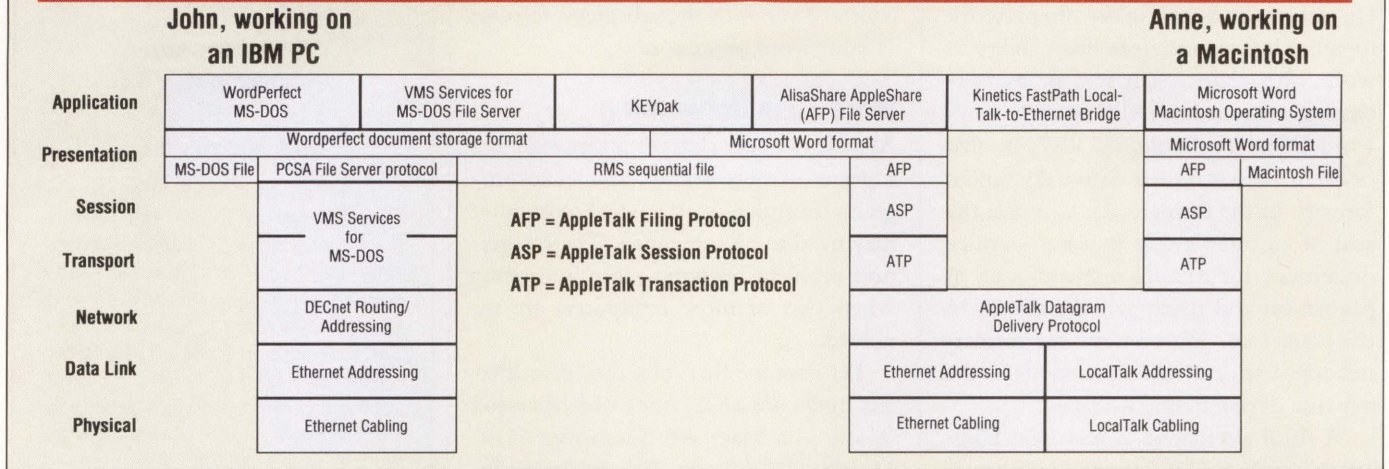
Figure B shows that the persons involved in our example transaction present a unique OSI profile, which shows how their individual jobs interoperate to perform the overall objective of providing Denise with the meeting summary she requires.



**Figure B. Communication can take place only when the parties involved agree on the procedures, or protocols, for exchanging data. In OSI terms, data starts with an application (in this case, the meeting clerks at left) and flows downward through a stack of such protocols, across matching protocol layers and up the stack to the next application. Several intermediate format-conversion and routing steps may be required.**



**Figure 3.**



Integram showing how an intermediate VAX running two different file servers and simultaneously supporting two different protocol stacks can be used to integrate incompatible desktop computing devices. VAX-based Mass-11 user Karen could exchange files with either John or Anne via KEYpak.

tem and RMS file structures must be considered. And we've added a new document format, Microsoft Word, to the interoperability problem.

**Weighing The Options**

A VAX/VMS system simultaneously can look like an NFS server to UNIX workstations, an MS-DOS file server to IBM PCs and an AppleShare server to Macs. Using today's products, you can save an EMACS document from your UNIX workstation to your NFS server on the VAX, and someone on a Mac or IBM PC can open that file directly in his chosen word processor using AppleShare or VMS Services for MS-DOS. In an enterprise-wide network, VAX/VMS systems offer common, RMS-file-based Presentation layers, which can be used to integrate a wide variety of user environments.

A network of diverse user problems usually can't be integrated with a single protocol stack. John, Anne and Karen are probably more productive using the software products, networking hardware and communications protocols that best suit the work each does. Figure 3 shows one of several possible ways to solve the example problem. We could have implemented DECnet protocols on our Mac or AppleTalk protocols on our IBM PC. We

**Figure 4.**

OSI Layers	OSI Products	Digital Network Architecture/OSI Phase V Functions		M	
7	Application	OSI File Transfer (FTAM) Electronic Mail (X.400)	Networked Office Systems Videotex Electronic Mail Computer Conferencing Remote Database File Transfer Virtual Terminal Network Management SNA Interconnection DECnet System Services Others	OSI FTAM CCITT X.400 Others	A
6	Presentation	OSI Applications Kernel (OSAK)	DECnet Session Control	OSI Presentation	N
5	Session			OSI Session	A
4	Transport	VAX OSI Transport (VOTS)	Common Transport Interface		G
			DECnet Transport (NSP)	OSI Transport	
3	Network		ISO Connectionless Service ISO Connection-Oriented Service (over X.25) ISO ES-IS Routing Protocol IS-IS Routing Protocol		M
2	Data Link	X.25	DDCMP		E
			X.25		
1	Physical	OSI-Standard Ethernet	OSI-Standard Ethernet		N
			HDLC		

DNA/OSI Phase V products available from Digital.



through a network.

As the integrum shows, WordPerfect and Mass-11 don't naturally interoperate. However, you can make them work together by using their built-in ability to work with plain ASCII text or by purchasing a translation utility, such as Key-word Office Technologies' KEYpak, that converts between their native document formats. In the former case, you save the cost of an intervening step but sacrifice document formatting features such as pagination and paragraph alignment. In the latter case, you preserve the formatted appearance of the documents at the expense of purchasing KEYpak.

A third alternative is based on Digital's Compound Document Architecture (CDA) standard. Assuming Mass-11 and WordPerfect support CDA, John and Karen can exchange formatted documents. Bear in mind, however, that Mass-11, WordPerfect, DECwrite and other word processing packages will offer CDA as an alternative to their own, built-in, proprietary document storage formats, along with older document stan-

dards such as RFT. If you save your documents in CDA format, you can exchange them, but probably at the expense of some of the advanced features of your word processor.

### More Than Networking

As you can see, systems integration is a superset of networking, and even programs running on the same computer may need to be integrated. The integration problem becomes more interesting when two or more computers are involved.

Let's assume that John uses WordPerfect under MS-DOS, Anne uses Microsoft Word on a Mac, and Karen uses Mass-11 under VAX/VMS. This example's integrum shows that several hardware and software products are required to reconcile the differences among the various protocol stacks (see Figure 3). Anne's Mac can be connected to Apple's twisted-pair LocalTalk LAN cable, while Karen's VAX and John's PC are connected to an Ethernet. Also, various differences among the MS-DOS, Mac Operating Sys-

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- Hardware pan and zoom
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The VCL-Q prices range from \$4,870 to \$6,795. A complete package with software and monitor starts at \$7,790.

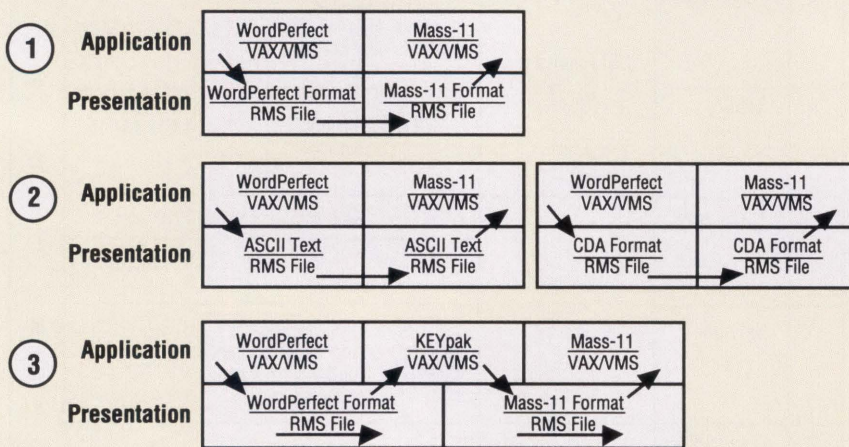
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Figure 2.



Integrum showing interoperability between word processing packages. 1. Mass-11 and WordPerfect use different techniques for storing editable documents. Because their underlying protocol stacks don't agree, information can't flow between these applications. 2. One approach to interoperability is a common, neutral document format, such as ASCII text or Digital's Compound Document Architecture (CDA). 3. Another approach is to interpose a conversion procedure between two incompatible elements, in this case the KEYpak document conversion software package.



could have used a foreign protocol, such as TCP/IP, on all three systems. Which solution is best?

Sketch an integrum of the user communities in your network that need to exchange information. Start with the Application layer and work your way down.

Your integrum will show you which users can communicate with each other by exposing where their selected application products can and can't interoperate. Where the integrum shows incompatible protocol stacks, consider the cost aspects of hardware and software prod-

ucts that might reconcile them. How much user training is involved in applying the product to your problem? Does the product need to be configured? How is this done and under what circumstances (e.g., power failure, configuration change, system software upgrade) must this process be repeated? How long has the vendor been in business, and what do reference sites say about the product?

In our example, we could use IBM PC- or Mac-based document conversion software instead of KEYpak. This would save us the cost of a KEYpak license, but it would require us to train our Mac and

PC users to convert documents. These two functionally similar integrums present very different cost considerations.

At first, you'll probably have to develop integrums for every contending product. Perhaps vendors will one day use integrums in their product literature so you can tell at a glance how to fit them into your computer culture.

Knowing that OSI is coming, you may wonder how much longer systems integration will be an issue. The answer is, probably forever. When OSI arrives, it will be an alternative protocol stack to existing standards and not a replacement.

## Digital: Devoted To DECnet/OSI

Digital's deep involvement with the International Standards Organization (ISO) is an example of its extensive work with international standards committees, notably ANSI, OSF, X/Open, NIST and IEEE POSIX. Even those most critical of Digital's policies are quick to acknowledge the company's strength in developing and promoting open systems, particularly for networking.

The significant events in Digital's history of OSI product development underscore a relationship with the seven-layer Open Systems Interconnect (OSI) model that's unequalled among system and networking vendors. In fact, the framework for the Digital Network Architecture (DNA) was introduced while the OSI model was still under discussion and development at the ISO in Geneva in 1977. But Digital accepted the working model and has evolved DNA along with it.

The decision to change its family of networking products to comply with OSI specifications was made in July 1985. The eventual result was DECnet Phase V, the OSI-compatible bundling of network products, which began shipping in September 1987. Phase V refers to the fifth generation of DNA, which is upwardly compatible with the fourth generation and adheres layer by layer to the OSI model (see Figure 4, page 40).

Also in 1987, Digital announced a major undertaking to develop an OSI migration path for the U.S. Defense Communications Agency. This involved designing and testing gateways and protocols that made the Department of Defense (DoD) OSI-compliant.

The project led to the development of two gateways that eventually became part of Digital's commercial product set. The first linked the DoD's Simple Mail Transfer Protocol (SMTP) to the OSI Message Handling Facility/X.400 protocol. The other connected the military's File Transfer Protocol (FTP) to the OSI's File Transfer Access and Management Protocol (FTAM). Both SMTP and FTP are TCP/IP-based.

The project was funded by the OSINET program, which was begun by the National Institute of Standards and Technology (NIST) to implement OSI in federal government installations. It had the participation of more than 20 industry and federal organizations.

Last year, Digital implemented the OSI Backbone Strategy, which stepped up its devotion to OSI with a slew of new integration and interoperability products. The OSI backbone is a marketing term which implies that DNA uses the OSI standard as its basic WAN

protocol and easily can access other network architectures such as TCP/IP, X.25 and SNA (including 3270 terminals) using portals, routers and gateways.

Important DECnet/OSI backbone components include:

1. Digital's MAILbus, distributed applications software that ties ALL-IN-1 users to users of IBM SNADS and DISOSS or other X.400-compliant mail systems. This includes the Message Router X.400 Gateway.
2. DECnet System Services (DSS), which lets DECnet users access remote printers and disks. It includes VAX Distributed File Service (DFS) for distributed file sharing, VAX Distributed Queuing Service (DQS) for sharing distributed printing resources, and VAX Distributed Name Service (DNS), which ensures a consistent system of naming network resources.
3. VAX OSI Application Kernel (OSAK), Digital's product set for the Session layer.
4. VAX FTAM, which copies, deletes, transfers and displays statistics about files.
5. VAX Packetnet System Interface (PSI), which connects VMS to standard packet-switching networks.
6. X25router 2000, the software that lets DECnet/OSI users connect to X.25 networks.
7. X25portal 2000, a box that provides packet-switching among X.25 networks.
8. The Internet Portal, based on the DECsystem 3100 RISC machine, which facilitates communications between TCP/IP and OSI networks.
9. DECnet/Internet Router 2000, a package that combines the DECrouter 2000 for DECnet with the Internet Portal. The result is one routing protocol suite for DECnet and TCP/IP.
10. IBM 3270 Terminal Emulators, which let users access IBM hosts from VMS, ULTRIX or MS-DOS. These include emulators for DECwindows ULTRIX, VMS and DECnet MS-DOS.
11. WANcontroller 220, a two-line synchronous communication controller that connects VAXBI computers to DECnet, X.25 and IBM networks using DECnet and VAX PSI.
12. Ethernet Extensions, which are upgrades for currently installed telephone wiring.

The OSI-compliant transition products are available in one giant off-the-shelf package called the VAX OSI Applications Package. This includes the VAX MRX Gateway V2.1, FTAM V1.1 and the VAX OSAK V1.1. —*Evan Birkhead, Senior Editor*



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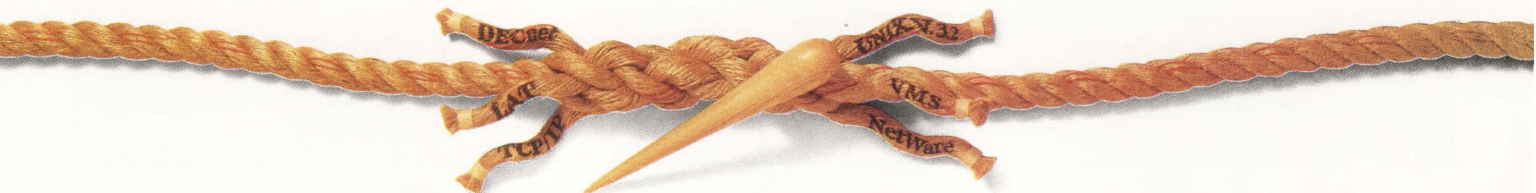
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It will be years, if ever, before every computer environment fully supports it. And even then, there will be protocol differences to resolve, because proprietary developments in computer products always will seek to advance the standards our industry writes.

As we've learned in software development, networks should be built from the top down. People who start with wires, gateways and routers and work upward can end up with little more than a pile of unused, state-of-the-art junk and a community of irate users. Successful systems integrators start with what their users need to do and work down the OSI model.

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**OSI Model: A Software Engineer's View**

The Open Systems Interconnect (OSI) model promotes more than communications standards among cooperating, networked computers. It presents standard software interfaces to programmers developing network-functional applications. The traditional concepts of structured programming and top-down design perhaps offer the most descriptive ways to view an OSI-based system.

**Old Wine In New Skin**

Software operating in the OSI model's Application layer, such as a word processor or the front end of a relational database, invokes the services of the Presentation layer using a standard procedure call mechanism. In this transaction, the Application layer is considered a client of the Presentation layer server subroutines. Important standardized Presentation layers in the Digital world include:

1. Adobe's PostScript, supported by various laser printers and typesetters.
2. MIT's X Window System, the foundation for DECwindows workstations and terminals.
3. SQL, a standardized access language for Digital's Rdb/VMS and third-party relational databases such as Sybase, Oracle, Empress and Ingres.
4. Compound Document Architecture (CDA), which standardizes revisable complex documents containing text, scanned images and sound and is crucial to integrated electronic mail.

**Data On The Move**

For programs running on an unnetworked, single system, the Presentation layer calls the services of the local file system to write its contents to a disk. In a network, this layer calls communications services to "packetize" its contents and reliably transmit the contents to a remote host elsewhere in a computer network. The reliable

electronic interchange of data is the responsibility of the Session and Transport layers.

DECnet's Network Services Protocol (NSP) and Transmission Control Protocol (TCP) used by the Defense Advanced Research Project Agency (DARPA) typify such standards. When structured properly, these communications services function transparent to their client. The Application and Presentation layers don't care (and may not even know) whether they're handing their material to the local file system or NSP or TCP.

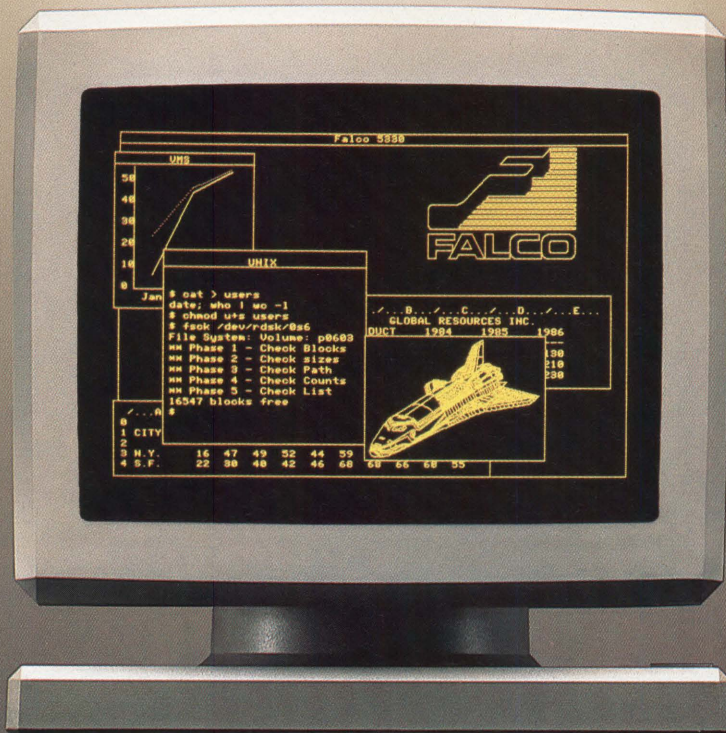
As computer networks grow, the interconnections among them become more complex. An enterprisewide network's topology can consist of dozens of individual LANs interconnected by numerous network routers and bridges. In such an internetwork, specialized message-forwarding services are required to route the higher layers' communications packets over long distances through several intermediate points. The Network layer assumes this responsibility. Familiar implementations include Digital's DECnet routing services, in which each interconnected computer is identified by a unique 16-bit node number (Phase IV), and DARPA's Internet Protocol (IP), in which each host is identified by a 32-bit address.

Given a properly addressed data packet from the Network layer, physical transmission is the responsibility of the Data Link and Physical layers. Familiar implementations range from low-speed RS-232 point-to-point links to X.25 packet-switched networks and LAN architectures such as Ethernet and Token Ring.

Any DECnet user knows that, with all the supporting communications layers in place, he can run a client Application layer program on one Digital computer and use the resources of a server Digital machine elsewhere in his organization. As the supporting communication layers conform to OSI standards, universal interoperability among all vendors' networked software products will become a reality.



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# Straight *Talk*

## *About Gateways*

Properly selected and configured, gateways can provide

useful features and services. BY BILL HANCOCK

VENDORS SEEM TO BE gateway-happy these days. There's a gateway for every purpose: for TCP/IP, SNA, X.25, and so on. There are application gateways that allow connection from one type of database to another and language "gateways" that allow one programming language to interface to another.

Ask someone what a network gateway is, and the typical answer is, "It converts protocols from one to another" or, "It connects IBM networks to Digital networks." But few people realize what a gateway is. We're wrapped up in marketing hype, and the definition is lost in the mire of network terminology. Simply put, a gateway is the connection between one network and another. No

implied protocol conversion is involved, but one often takes place.

### **Handle On Gateways**

I first heard a sensible definition of a gateway at a NATO conference in 1975 in Brussels. A scientist was explaining work being funded on packet radio. A box would be used to allow connection among networked entities in a radio environment to entities cabled together (it was a radical concept then). He called the box a gateway, because one medium (airwaves) had to be converted to a cable. Because the two were in different "space," there had to be a gateway. He illustrated the technique by referring to a "Star Trek" episode in which the En-

terprise crew traveled through a time portal, or gateway. The idea was that there were two entities connected via a special box.

Since then, many vendors have developed gateways of their own and have defined them in their own image. Some of the first commercial gateways were needed to connect X.25 networks because of various options allowed in X.25 and other standards. The problem for these networks was (and still is) that a variety of capabilities were optional on a packet-switched network covered by X.25 and other standards and didn't have to be standard-compliant. As a result, some networks have certain options implemented, and others don't. This leads to



problems, because the implementation of some networks requires that the connection to the network implement the options the network vendor specifies. But not all networks using X.25 have all options.

Adapter boxes, called gateways, adjusted the X.25 options on both sides of the connection so that connected X.25 networks could exchange packets with each other. Although the X.25 protocol isn't being converted, it's definitely being adjusted, and that's what the gateway is supposed to do in that environment.

Some vendors thought they could increase their network market share by creating software that converted one protocol set to another. At first they were called protocol converters, although there was little conversion going on. For instance, one vendor had a 3270 protocol converter on its operating system. The protocol was generated from scratch on the system, so what was being converted? What some vendors call a converter often isn't in a strict sense. The converter may offer a connection path to remote systems in a manner compatible with the protocol used on the remote system, but if the protocol is created from scratch, what's being converted?

In the IBM and other worlds, a system communicates with a terminal using a strict method. This method may require that data be sent in a predefined order, which is essentially what a protocol is: data sent in a predefined order. Soon users demanded terminal connectivity from their VT52s, VT100s and other terminals directly to a remote non-Digital system.

This caused the first true protocol converters to appear. When a VT-

## A GATEWAY converts the connection at the hardware level.

type terminal connects to a Digital system, the manner in which escape sequences are handled is incompatible with an IBM 3270 Type 3 stream protocol, for example. This means that a Digital terminal would have difficulty with escape sequences and display characteristics, because they're foreign. It also means that the hardware connection would require a special hardware converter, because most terminals in the IBM environment are connected with coax or twinax rather than Digital's standard twisted-pair. By converting protocol streams from a coaxial connection to an IBM to valid Digital escape sequences and vice versa, a protocol conversion was performed. This wasn't DECnet-to-SNA, it was one terminal escape sequence method to another.

Other protocol conversions followed

for different systems and terminal types. Some companies built hardware boxes that performed the conversion transparent to the systems on both sides of the connection. In all cases, conversion is rarely easy.

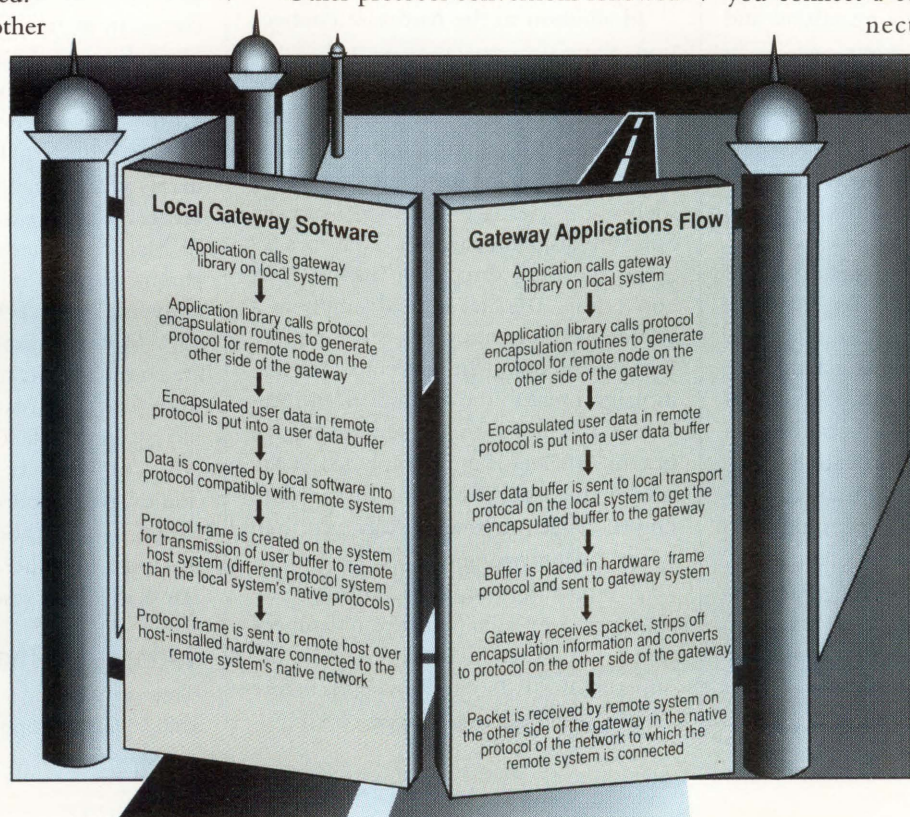
Over time, the need to support more than terminal emulation crept into network plans. Different systems needed to send files back and forth, databases on dissimilar systems required a connection capability, and so on. Vendors responded with more protocol converters and conversion-access methods. It was necessary for one side of the connection to have an initiation procedure for the connection to take place. Usually, because of conversion of session initiation, the connection was initiated only by one side of the conversion process. The other side couldn't initiate a connection, because the connection methods most likely couldn't identify the proper program to receive the connection either way. This led to the creation of gateways.

### The Open Gateway

A gateway converts the connection at the hardware level (see Figure, page 50). An SNA gateway from most vendors lets you connect a coaxial or modem connection to a box from

the IBM side. The gateway frequently looks like a terminal cluster controller called a 3274 in IBM terminology. The 3274 in the SNA environment typically is connected to a communications controller such as the 3725, which eventually is connected to a mainframe or other systems.

A 3274 may support a number of sessions at a time (the most common being 32) depending on gateway charac-





## Connection Countdown

A typical connection works as follows:

- 10 — A program on a VAX system accesses a local SNA library that preprocesses connection information into an SDLC packet that IBM's SNA understands.
- 9 — A connection between the VAX and the gateway is established via DECnet.
- 8 — The SNA connection-request SDLC packet is sent from the VAX to the gateway via a DECnet connection to ensure that the gateway receives the message (DECnet guarantees delivery of data to the destination).
- 7 — The gateway uses a virtual session on the gateway to manage the DECnet connection to the VAX and issues a connection to another Network Addressable Unit (NAU) in the IBM network via the System Service Control Point (SSCP) in the SNA network. This means that SNA thinks the gateway is a 3274 and that one of the terminals has issued a connection request to a location on the network.
- 6 — The connection request is authorized by SSCP and the NAU, and an SDLC message is sent back to the gateway.
- 5 — The gateway takes the connection-accept message and sends the SDLC message back to the VAX via a DECnet packet.
- 4 — The VAX breaks down the SDLC message and provides the program feedback that the connection was accepted. The program then issues an SNA BIND command to set the session properly. This is placed in SDLC and forwarded via DECnet to the gateway. The gateway forwards the BIND to the SNA SSCP and remote NAU.
- 3 — A positive acknowledgement is sent back that the BIND was accepted by SNA, and the gateway forwards this to the VAX system via DECnet.
- 2 — The VAX program now can send and receive data from the VAX to the remote NAU.
- 1 — When the VAX is done, it breaks the connection and the gateway shuts down the session and deletes the DECnet connection to the VAX.

teristics and network parameters on the IBM side. Each session must follow IBM terminal session rules for connection, transfer, destruction of connections, and so on. The rules are cryptic and, as an IBM communications expert friend of mine says, "It all depends." This means there are many variables that may not be properly accounted for in the connection mechanism. This causes serious overhead in the conversion effort.

Today, a gateway provides a series of connection capabilities. For example, most SNA gateway vendors use a VAX, PDP-11 or other system as a hardware connection between a common type of Digital network (such as Ethernet) and a hardware connection compatible with another vendor's network (such as a coaxial connection to a 37xx system). To the Digital network, the system is another Ethernet node. To the IBM network, through the magic of hardware and software, the connection looks like a 3274. Emulating a 3274 isn't trivial. IBM networks poll their nodes and require

definite responses in a specifically formatted fashion. This must happen even if no connections are in progress.

In addition to the hardware connection, there's an operating kernel in the gateway (loaded via a remote system or through a local disk), connectivity software to the IBM environment and connectivity to a standard Digital interface, such as DECnet (see the Local Gateway Software diagram, page 47). This does *not* mean there's a direct DECnet-to-SNA conversion. DECnet is used simply as a carrier of information from the remote Digital system to the gateway. The information sent to the established IBM session is generated on the remote Digital system. DECnet is used simply to get the session information from the remote Digital system to the gateway and then to the IBM environment.

A typical gateway isn't an almighty protocol converter (see box, "Connection Countdown"). It requires that the initiating node do up-front work before a session can be set up properly and com-

munications handled. Not all the work is done by the gateway to convert protocols. The gateway only converts "hardware" protocols. The software protocols are generated by the VAX before the message even arrives at the gateway.

The SNA side thinks there's a 3274 with 32 (or more) terminal session connections. The SNA side doesn't see that each allowed session is a virtual connection from a VAX or other system that knows how to talk to the gateway. As a result, initiation of a connection from the IBM side is difficult, because the IBM side would have to know to which program on which VAX system to connect, and this isn't a normal IBM connection function. A few vendors provide gateways that allow the IBM side to initiate the connection, but these products are complex. If you require a gateway that provides a connection-initiation capability from the IBM side, understand what the gateway provides before purchase.

In short, a gateway isn't always a direct protocol-to-protocol converter. Most often, a gateway is a hardware connection method with host software on one side providing the basic connection method to the other network and the gateway handling low-level functions for connections (see Gateway Applications Flow diagram, page 47).

Some new gateways are sophisticated protocol converters. An example is the Cayman Systems GatorBox. Used primarily with Mac networks, it lets an NFS file server be seen as an AppleShare server to Macs on a network. This is a transparent gateway in which there's a real conversion between two separate protocols. More of these beneficial gateways are coming to the market. GatorBox customers who already have Macs don't have to purchase TCP/IP or some other NFS connectivity method. NFS users don't have to purchase an AppleShare connection method for UNIX/ULTRIX machines (or other NFS users). Yet both can share a disk resource.

### Gateway To The Future

Because gateways can cost more than \$100,000, one important question is how



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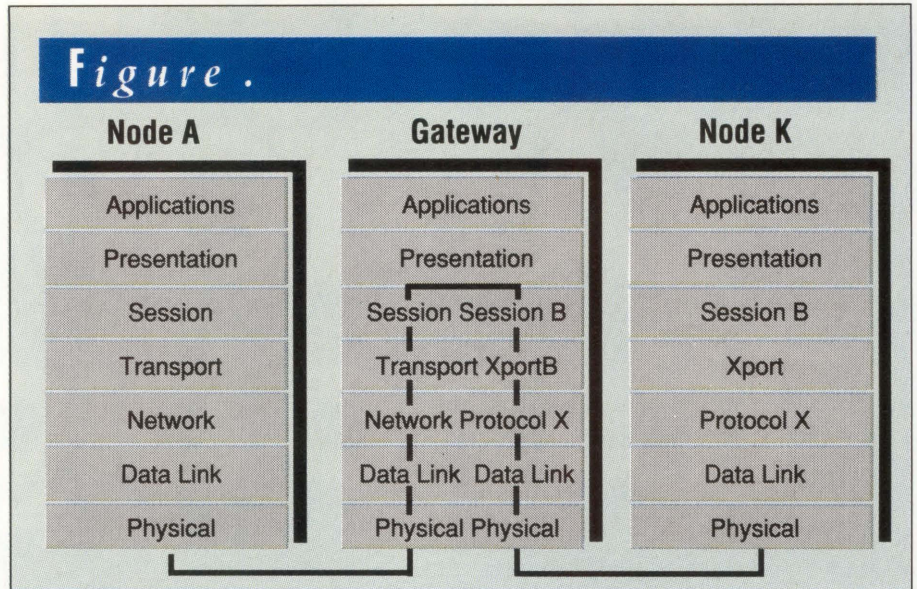


long will a gateway last? With OSI looming on the horizon, the question becomes, if all nodes are on OSI, why is a gateway needed? It isn't. There will be OSI-to-SNA, OSI-to-TCP, OSI-to-whatever, but how long will gateways last? Probably two to five years, because companies will migrate to OSI to gain the benefits of add-on features not available in other network architectures.

Like it or not, OSI is coming. When it does (1990 is the year of the show-down), what will happen to gateways? If nodes that were DECnet Phase IV or SNA suddenly become OSI, there's no need for a gateway except for possible hardware connections. But OSI covers that, too (layer 2 LLC). What happens to the DECnet-to-SNA gateway? Eventually it becomes obsolete.

However, there's still need for gateways in the next two to five years, for several reasons:

1. OSI is untried in real networks. We see the tests and vendor results, but



Gateway general path.

where's it running now? Who's using it for all network needs? Do all OSI protocols work as advertised and specified? After years on standards committees, I know that standards have "broken" over

the years for political reasons or unforeseen issues that arose at implementation time.

2. OSI overhead may be intolerable for smaller systems. Until those systems upgrade to more powerful processors, current networking architectures may be better-suited for networking needs.

3. Not all systems will support OSI. Ask any PDP-11 operating system user. As a result, these systems will require existing networking methods to keep connected to existing systems.

4. Some network connections using gateways are too critical to chance with OSI. I know of systems that until recently still had tubes in them, because the companies were afraid of problems resulting from a system upgrade.

5. Gateways provide the services needed among networks, and they work now. Who wants to wait for a network that's untried, unproved and still a few years from fruition?

No company wants to buy a gateway or protocol converter with the Sword of Damocles hanging over its head, just waiting for obsolescence to hit. Therefore, let me offer the following suggestions:

1. Buy a gateway that provides the required facilities and can be upgraded to OSI. This may be very handy. Let's say that you upgrade your DECnet environment to DECnet/OSI (Phase V) and the

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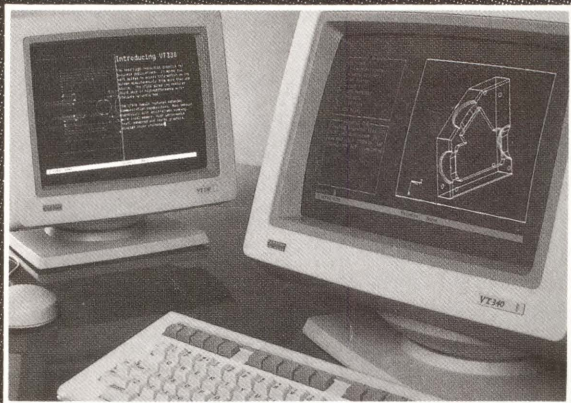


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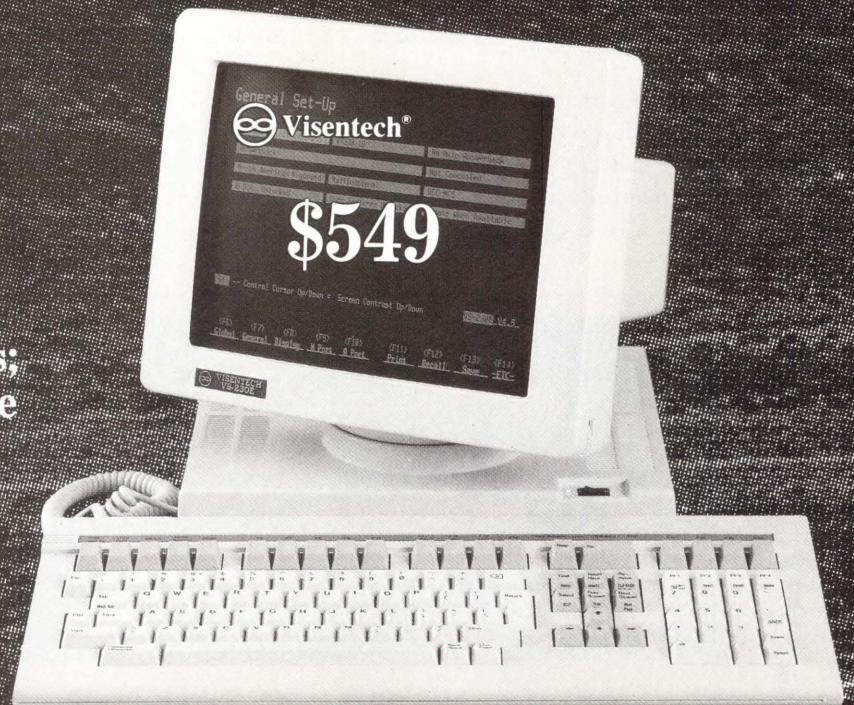
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IBM environment stays with SNA for a while. By upgrading the gateways to OSI on one side and SNA on the other, there's a boost to the network. If other OSI nodes have gateway access routines, many types of operating environments running OSI can connect to the SNA environment.

2. Buy a gateway that can be converted to another useful network component with little hardware or software. For example, if the hardware is obsolete as a gateway, can it be upgraded with a new

operating kernel to an OSI router? OSI routing is difficult and compute-intensive. Further, with OSI directory services, management protocols and other vendor-specific product requirements, dedicated OSI routing will be a real need. If the gateway can be upgraded, it will be a boon to the network.

3. Find out if your vendor offers credit against other products or services or a trade-in. Make sure that any deal you strike is in writing.

4. Settle on a "software only" gateway. By purchasing system software that allows your system to connect directly to another network without a special, dedicated box, you may be able to connect to your favorite network architecture but not have to dispose of or convert a dedicated gateway system in the future. This technique can, however, add serious overhead to your system, so be sure you understand what you're getting into.

5. Decide on how quickly you'll migrate to OSI. The sooner you move to OSI, the greater the chance of your gateway becoming obsolete. Many vendors will ship OSI products in fiscal year 1990. These products are supposed to connect without gateways as currently used. So how soon your company migrates to OSI will dictate how critical a gateway is to your operation.

PROPERLY SELECTED AND configured, gateways can provide useful features and services. The biggest problem today is that networks will change rapidly in size and profile during the next few years. As a result, you must consider carefully the purchase of an expensive or protocol-specific gateway. Plan ahead for long-term benefits and network economy.

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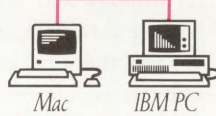
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## GRAPHICS

# V VIDEO VAX

By Robert P. Marcus

### **A New Generation Of Video Scan Converters Lets You Videotape From A VAX Workstation With Superior Results.**

Until quite recently, videotaping from a VAX workstation was complicated, time-consuming, inconvenient, and yielded marginal results. Fortunately, video scan converters now offer superior results and improved ease of use.

The traditional method for videotaping was to point a video camera at the computer screen, that is, "shoot the screen." This approach led to such problems as missynchronization (resulting in "roll bars"), geometric distortion and color desaturation. Sometimes these problems could be addressed by video professionals using specialized equipment. But using outside professionals was costly and intrusive.

A variation of the shoot-the-screen approach was to use a film camera and then do a film-to-video transfer. But the results and costs were similarly unsatisfactory.

Commercially available video scan converters emerged during 1986 and 1987. The first was an analog system that used shoot-the-screen technology and was packaged in a box containing a camera and CRT. More important, we saw the emergence of the first digital scan converters. Unfortunately, these early systems were unsatisfactory. For example, they discarded lines of information, rather than using line-averaging algorithms, or were incapable of keeping up with the computer system's refresh rate. They also cost more than \$25,000.

#### **A Fresh View**

In early 1988, a new generation of video scan converters became commercially available. These systems serve as interfaces between the

VAX's high-resolution display and composite video devices such as TV monitors, recorders and projectors. They take a full-screen color or grayscale input, perform line and pixel averaging, and provide genlock, sync generation and encoding to output standard composite video. They accomplish the conversion in real-time and without interruption or processing burden on the host.

Applications include scientific visualization, military simulation, training, product design, image processing, CAD/CAM, motion analysis and sales and marketing.

Designers of all VAX workstations and other high-end computer graphics displays diverged from the video standards used by broadcasters, TV cameras and videotape recorders to achieve the steadier images and higher resolutions preferred by engineers and other computer users. From a technical viewpoint, there are many differences between the analog RGB signal generated by a workstation and composite video.

Composite TV video is an interlaced video system. This means that a video frame comprises two separate fields: one displaying odd-numbered video lines, the other displaying even-numbered lines, at a display rate of 60 fields (30 frames) per second. This rate prevents flicker, and we perceive the separate fields as full frames. By comparison, the VAX displays all video lines 60 times per second. This is known as a 60-Hz noninterlaced display, as compared to 30-Hz interlaced for composite video.

VAX displays provide a screen resolution of 1,024 x 864 pixels or 1,280 x 1,024 pixels. Standard composite video has only half the resolution in both the x and y direction.

The VAX display feeds red, green and blue



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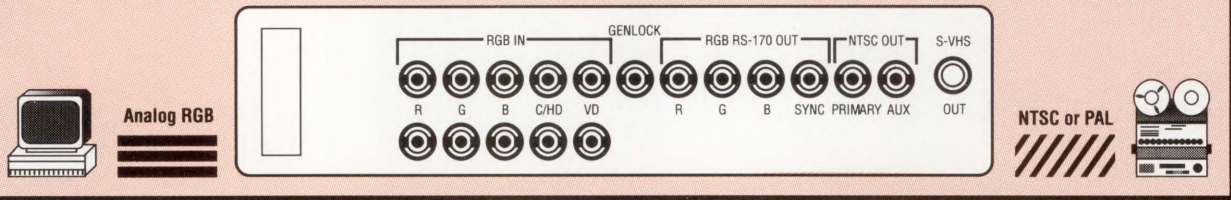
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F

## FIGURE .



The rear panel of a video scan converter. The connection to the workstation is over the RS-343 analog RGB lines.

signals to the monitor separately. Composite video encodes the three into one signal. Composite TV monitors contain the circuitry to decode this signal back into separate red, green and blue signals.

### Scanning The Scene

Whatever the advantages of computer displays in terms of high resolution and steadier imagery, composite video is the most commonly used communications medium for animated visuals, and will be for the foreseeable future. The problem is how to convert the high-resolution computer graphics information into a lower-resolution video, a process known as scan conversion, and to do so in a way that doesn't lose critical information.

To accomplish this, the video scan converter first inputs the VAX's analog RGB signals (see Figure). Each RGB input is digitized, compressed and antialiased, using line- and pixel-averaging techniques, and stored in a compressed format. The digitized image then is converted by D/As to RGB signals and encoded into NTSC (or European standard PAL) composite video. Input and output signals are fully asynchronous, and the output is genlockable. Complete conversion and encoding are accomplished in real-time.

The scan converter doesn't drop lines of video, as an earlier generation of scan converters did. It averages the information on the workstation screen in both the x and y direction. An attribute of the process of averaging is that the picture is antialiased.

The video scan converter connects to

the VAX the same way a monitor does, at either the primary RGB monitor or the frame buffer. In the latter case, the host monitor is reconnected using the loop-through connectors on the scan converter. There are no software drivers or software modifications required, and there's no interference with the normal operation of the primary RGB monitor.

Some systems offer two important corrections to the VAX's raw composite video output to improve picture quality:

1. Aspect ratio correction optionally changes the aspect ratio of the image to fit NTSC's 4:3 aspect ratio.
2. Flicker filtering ameliorates flicker in the NTSC image. Flicker is an artifact of composite video caused by the interlaced structure of broadcast video standards. The problem manifests itself most noticeably in the flickering of hard-edged computer-generated graphics and, especially, thin horizontal lines.

The modern scan converter captures and presents a graphic image in a composite video format without flicker and in the correct aspect ratio for NTSC video, in full color and real-time. Performance is limited somewhat by the NTSC standard, which has inherent limitations in spatial and color resolution. However, considering these inherent bandwidth limitations, the results can be excellent.

Fully featured scan converters are designed to be complete solutions to making effective videotape presentations. For example, some scan converters are equipped with a video-mix option to allow integration of external live or pre-recorded video with the output of the

workstation. This capability can be used to put a video background behind a computer-generated image or to provide a video insert in the image. With such capabilities, you can generate effective videotape presentations without ancillary equipment, video engineers or post-production services.

Most scan converters are configured to work with a particular computer display. Reconfiguring them for alternative displays usually is a nuisance. However, some scan converters feature autosyncing over the full range of DEC displays as well as workstations displays from other manufacturers.

THE PERCEPTION, based on past reality, that videotape production is difficult, time-consuming and expensive, that it requires outside professionals and unwieldy equipment, has retarded the use of this medium. This perception has resulted in its use being limited to elaborate corporate presentations that are updated infrequently.

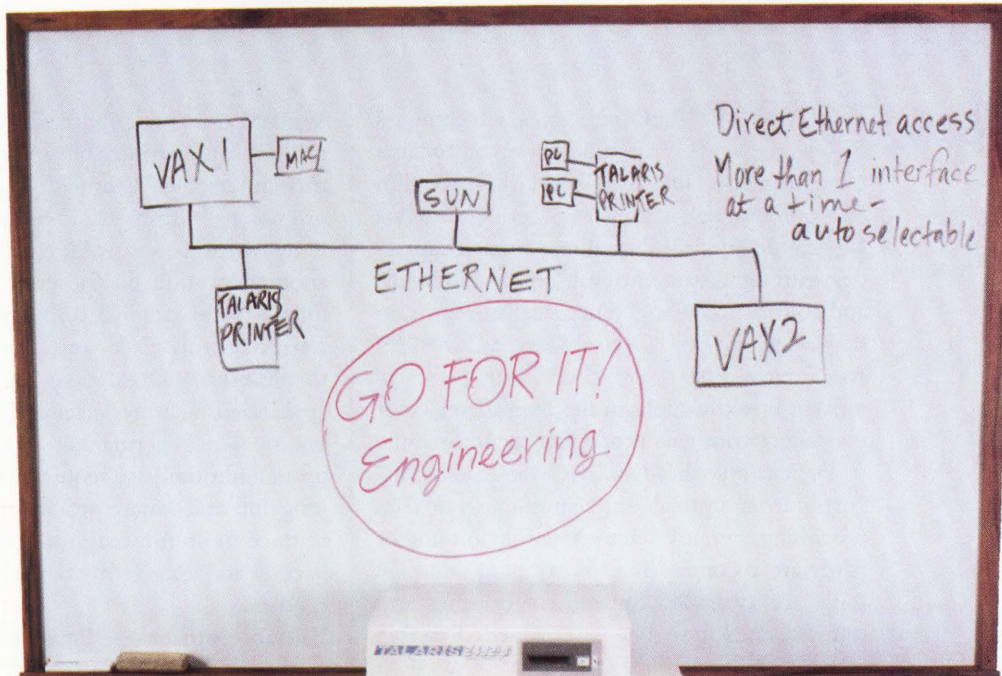
The modern video scan converter changes this. You can record videographics on demand, without significant pre- or post-production time. You can view, transmit and share even preliminary and intermediate work. Videotape has become a practical medium for the exchange of ideas. —Robert P. Marcus is president of RGB Technology, Berkeley, California.

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## STORAGE

# T HE OPTICAL OUTLOOK

By Ron Levine

### Evolving Technology Ensures A Bright Future For The Optical Storage Industry.

Optical storage techniques offer numerous advantages over magnetic tape, magnetic disk, microfilm and other types of long-term storage media. Optical devices combine huge storage capacities with rapid data retrieval, removable media and compact handling. Since our last report on optical storage (see "Optical Storage Comes Of Age," November 1988), there have been significant breakthroughs in the optical arena that may affect your data processing environment.

For example, headway has been made in incorporating optical units into existing data processing systems without reprogramming or hardware reconfiguring. Many plug-and-play units are available. Speed, access times and transfer rates have been improved. Erasable optical disks have joined CD-ROM and WORM drives as standard commercially available products for Digital systems. And optical tape drives and floppy disk drives provide an alternative to magnetic media.

The "big three" in optical disks are compact disk read-only memory (CD-ROM), write once read many (WORM) and erasable optical (sometimes called rewritable). Each has unique properties and specific application niches.

**CD-ROM** — CD-ROM offers prerecorded optical storage. It's a read-only device: The information on the disk can't be altered. It's frequently used to distribute a common database that doesn't have to be updated constantly to multiple divisions, departments or branch offices. CD-ROM ensures that data is protected against tampering or accidental erasing and is ideal for archival purposes.

**WORM** — These optical storage devices permit one-time writing but unlimited reading of data and images. Although you can't overwrite or erase previously stored data, you can update it by writing new information into a file at another location on the disk. The new file is linked to the original through software and is retrieved in its place, an operation transparent to the user. WORM disks are appropriate for applications that need data updated and changed but in which permanent records or tamper-proof audit trails are required. WORM media's long life and large capacity make it a viable replacement for magnetic tape for system backup and long-term archival storage of critical data.

**Erasable optical** — Erasable optical media is used in applications in which the stored data requires frequent change or is continually updated. Its huge storage capacity makes it a daily system backup solution. With improved speed and access times, it can be used where Winchester magnetic disks now are employed.

### CD-ROM Breakthroughs

Meridian Data made a major advance in bringing CD-ROM applications to the desktop with a recordable compact disk system called CD Professional. Until now, mastering and replicating compact disks was performed at facilities with millions of dollars in equipment. CD Professional eliminates the mastering and replicating process because it produces an original master disk each time.



# MAX YOUR VAX.

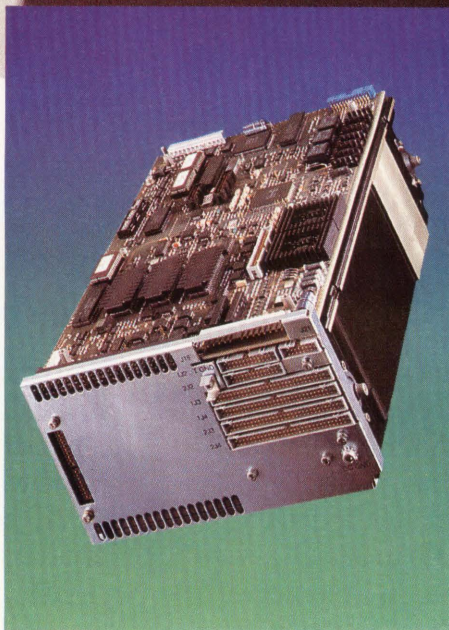
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DEC VAX systems have the power to place enormous demands on a disk drive subsystem. But, with Sabre's advanced design, 24 hour-a-day duty cycle and 50,000 hours-plus MTBF, Sabre is built to accept the challenge.

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For small-scale CD-ROM production, the system brings the same capabilities found in a mastering facility to the desktop at a fraction of the price. With CD Professional, CD-ROM can be created in a typical office environment without outside services. The information resides on CD-ROM and is accessible and electronically searchable through a standard PC and CD-ROM drive.

For sensitive information, this in-house mastering system maintains the CD-ROM publishing process in a controlled environment. This is an important consideration for government agencies and some corporations.

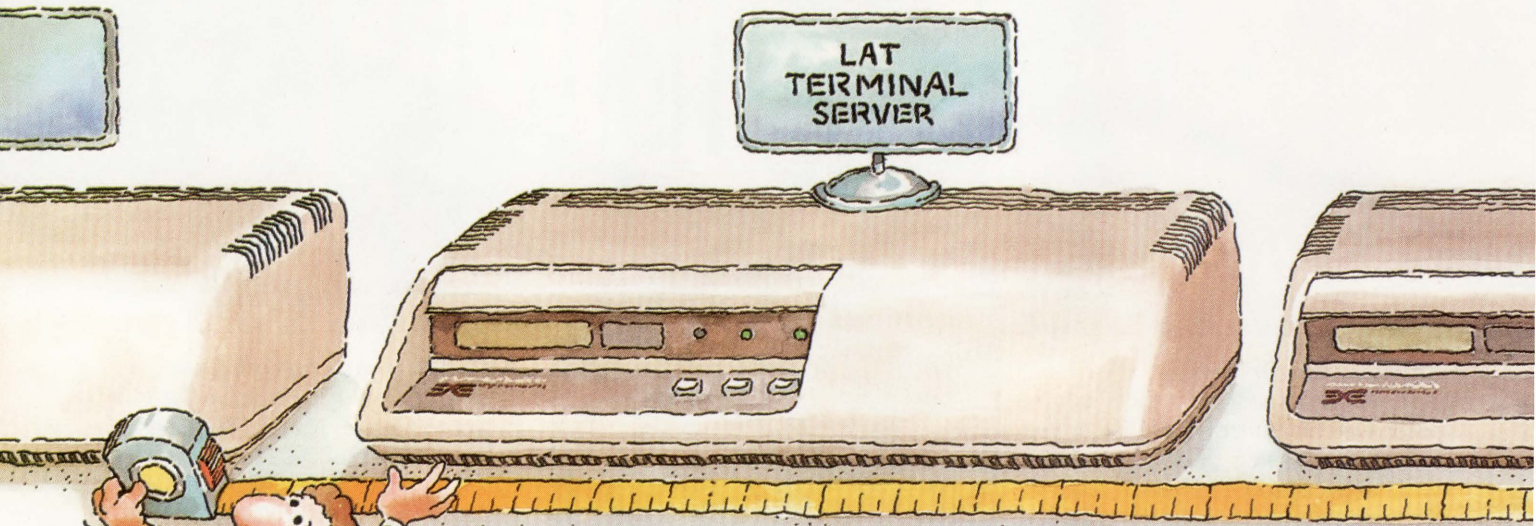
### WORM Update

Toshiba America introduced a 5 1/4-inch WORM drive for VAX and other computers that encompasses standard ISO formatting. The WM-S070 features a 90 ms average seek time and a 10,000-hour MTBF. This plug-and-play optical device consists of a 5 1/4-inch drive, WORM disk, power supply and embedded SCSI controller.

The drive records in either ISO-standard constant angular velocity (CAV) format or Toshiba's modified constant angular velocity (MCAV) mode. In CAV mode, the drive provides a data transfer rate of 5.5 MB per second and a storage

capacity of 600 MB. In MCAV mode, it provides a data transfer rate from 2.6 to 5.2 MB per second and a storage rating of 900 MB.

Laserdrive also improved 5 1/4-inch optical technology in the Digital market. Its Model 840 WORM disk drive, unlike many other WORM devices, appears erasable to the host. Winchester emulation software embedded in the unit's controller allows the optical device to be treated as a standard magnetic peripheral. Thus, it operates in the same environments as magnetic hard disks but eliminates the need to add optical file managers or make other changes to the host operating system or existing application software. The Model 840 appears erasable to the host system via its ability to relocate logical sectors internally. The relocating capability is a substitute for rewriting the sectors. The drive stores up to 810 MB of data per cartridge.



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## For sensitive information, this in-house mastering system maintains the CD-ROM publishing process in a controlled environment.

Optimem Products Group announced a 5 1/4-inch optical WORM drive compatible with its 12-inch devices. The 600 series is available in full- or half-height configurations and includes a controller and optical media with storage capacity of 654 MB. A fully configured two-drive system stores 1.3 GB. The drives feature an average access time of 77 ms and a data transfer rate of 725 KB per second.

A hardware device called the Optical Conversion Unit (OCU), produced by

Ten X Technology, lets WORM drives be used on host SCSI buses without operating system or application software modifications. The OCU simplifies the problems associated with installing WORM devices on some systems. It operates at the SCSI level and doesn't reside in the host. OCU is transparent to the host and the WORM drive.

The OCU is a half-height ST-506 configuration that can be mounted in a standard peripheral enclosure. ROM-based

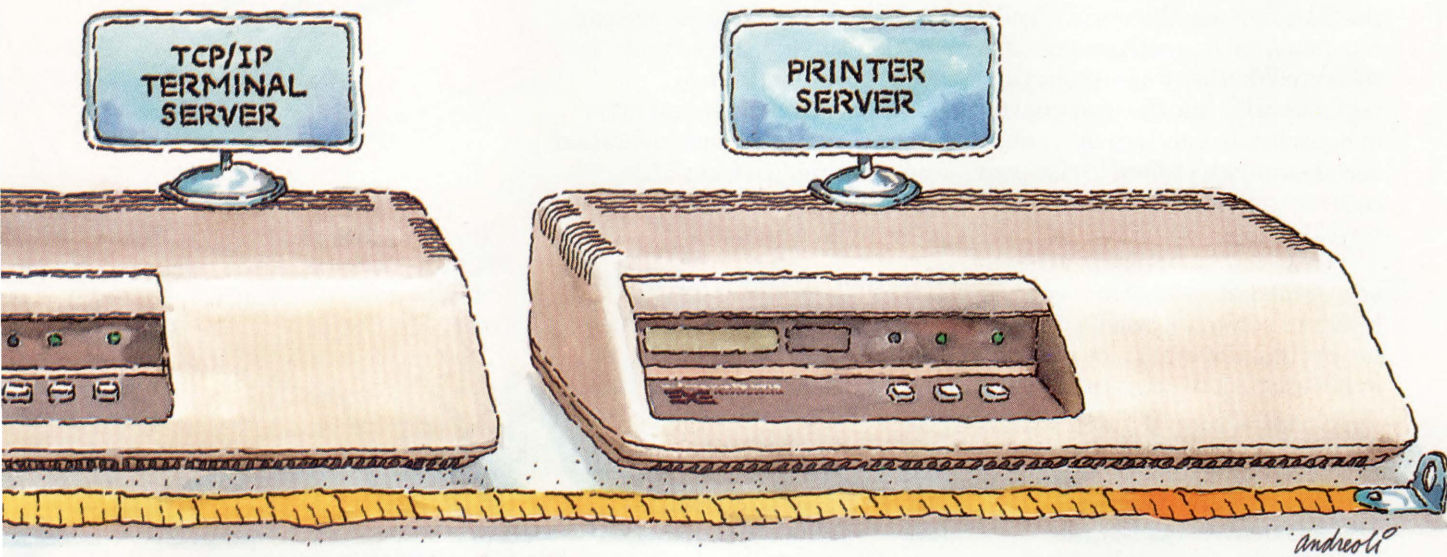
features remap and link written blocks and perform indexing and data management functions required for the WORM drive to respond to the common command set for SCSI Winchester disks. The result is a WORM drive that appears re-writable on any host system.

Ten X Technology claims that a byproduct of the OCU is increased WORM drive performance by as much as 100 percent, making WORM technology a practical storage alternative to Winchesters for a variety of applications.

### The Erasable Scene

In November 1989, Eastman Kodak began shipping its 5 1/4-inch erasable optical disk jukebox. The unit is made by Kodak with erasable media supplied by Verbatim, Kodak's subsidiary.

Kodak's 3 1/2-inch erasable technology is being joint-ventured with Laserdrive. Laserdrive will market the prod-



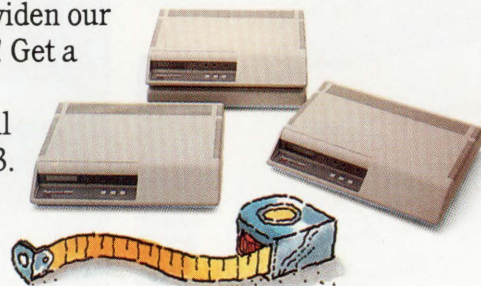
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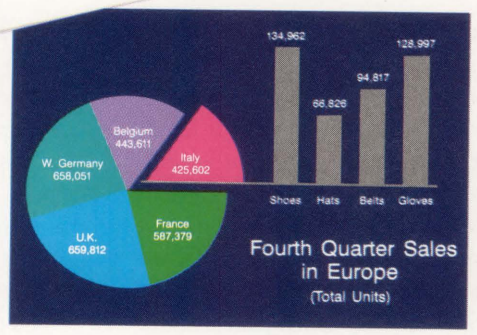
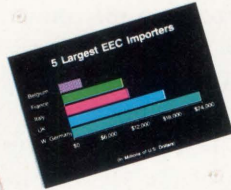
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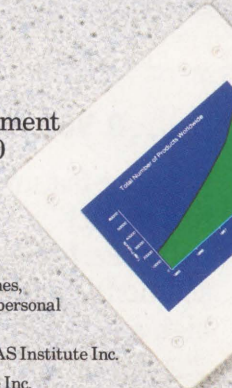
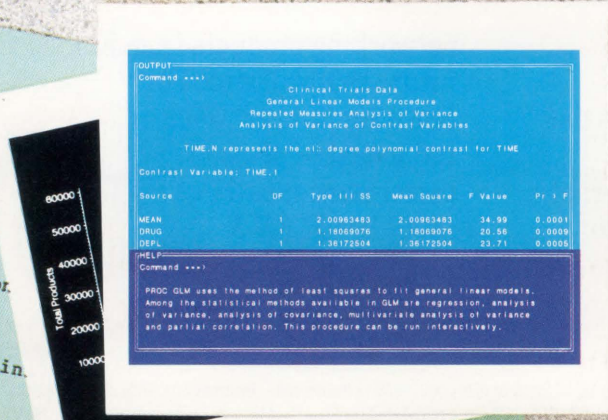
TO: Drug Application

FROM: Lab 041B

RE: Product #2298 Clin.

Attached are the clinical trials results for FDA submission. We will have results from remaining test groups by Friday...two weeks of schedule!

Note that the initial lab results are ahead





uct and provide the drives, and Verbatim will supply the media. No release date has been set.

In May 1989, Summus Computer Systems began shipping its LightDisk-512

rewritable magneto-optical disk drive. This 5 1/4-inch erasable disk conforms to the ISO-standard continuous composite format. LightDisk is for use with Q-bus and UNIBUS systems, Mac Plus, SE and

II computers and Sun Microsystems' workstations.

The RO-5030E is one of the latest optical drives from Ricoh. Shipments of this erasable, full-height, 5 1/4-inch unit

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began to OEMs in 1989 for packaging into the Digital marketplace. The drive is compatible with Q-bus and UNIBUS products and incorporates an internal SCSI controller and ISO-approved standard cartridge.

Alphatronix entered the erasable optical foray in 1989 with its Inspire series.

Originally introduced as the Infinity series, the Inspire series was designed specifically to support PDP, MicroVAX and VAX systems as plug-and-play devices. The 5 1/4-inch drives employ standard 650-MB removable cartridge storage media and offer 1.3-GB capacity in dual-drive configurations (up to 4.55

GB when daisy-chained). The company also announced a jukebox version of the product.

Sony's 5 1/4-inch erasable drives and

**Digital paper is a flexible, nonerasable (WORM) optical storage material...**

media were packaged into a jukebox by Cygnet Systems last year. The Cygnet Model 5250 has a capacity of 25 cartridges, providing up to 16.25 GB of storage. The device can be mounted in a standard 19-inch rack.

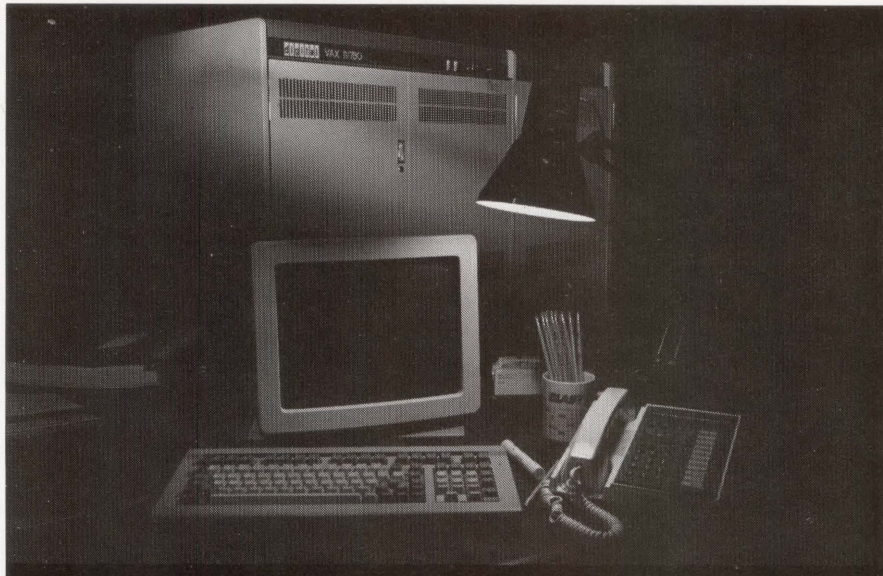
Sony's SMO-D501 5 1/4-inch rewritable optical drives employ a standard SCSI interface, allowing easy integration into a reseller's system. They can access up to 3 MB of data in fewer than 30 ms.

### Digital Paper

Digital paper is a flexible, nonerasable (WORM) optical storage material that provides dramatic advantages in storage capabilities and cost. It offers the data density of optical disks and is readable by digital devices with fast access and transfer rates. In tape format, it costs less than a half-cent per megabyte of stored information. This is cheaper than any storage media in use, including paper. Digital paper can be cut into lengths as tape, stamped into disks or inserted into cassettes.

Developed by ICI Imagedata, digital paper is a dye polymer optical recording material coated on a polyester-based substrate. It features sensitivity for laser writing and a 20-year life span. Data is stored on the media using a solid-state laser of the kind used with rigid optical storage media. Recordings are indelible.

Digital paper lends itself to the creation of flexible optical disks and tapes that



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can hold unprecedented volumes of data. For example, a 2,400-foot reel of half-inch digital tape (of the same width as a conventional 10 1/2-inch magnetic tape) can store 600 GB of data, the equivalent of 1,000 compact disks. Only the resolution of laser writing devices prevents even higher volumes of data being stored. Developments in laser technology are expected to boost these figures.

Two drives, one a tape and one a floppy disk, already use digital paper. Creo Products uses ICI's 1012 tape storage medium as part of its high-capacity optical tape data storage system and will ship this month to the Canadian Center for Remote Sensing in Ottawa.

The tape has a storage capacity of one terabyte (1,000 GB) on a 12 1/2-inch open reel. This is the equivalent of 5,000 conventional magnetic tape cartridges or 1 billion sheets of paper.

The Creo drive features an average access time of 28 seconds to any byte on a full tape and a sustained data transfer rate of up to 3 MB per second. The op-

tical tape recorder employs forward error correction, so the data is fully protected. Industry-standard SCSI, VAX and

optical disk on a hub adjacent to a specially formed Bernoulli Plate on a common axis. As the disk spins, the plate

By flying the head close to the surface, a high-numerical-aperture, low-mass lens delivers more power to the disk...

IBM interfaces are available.

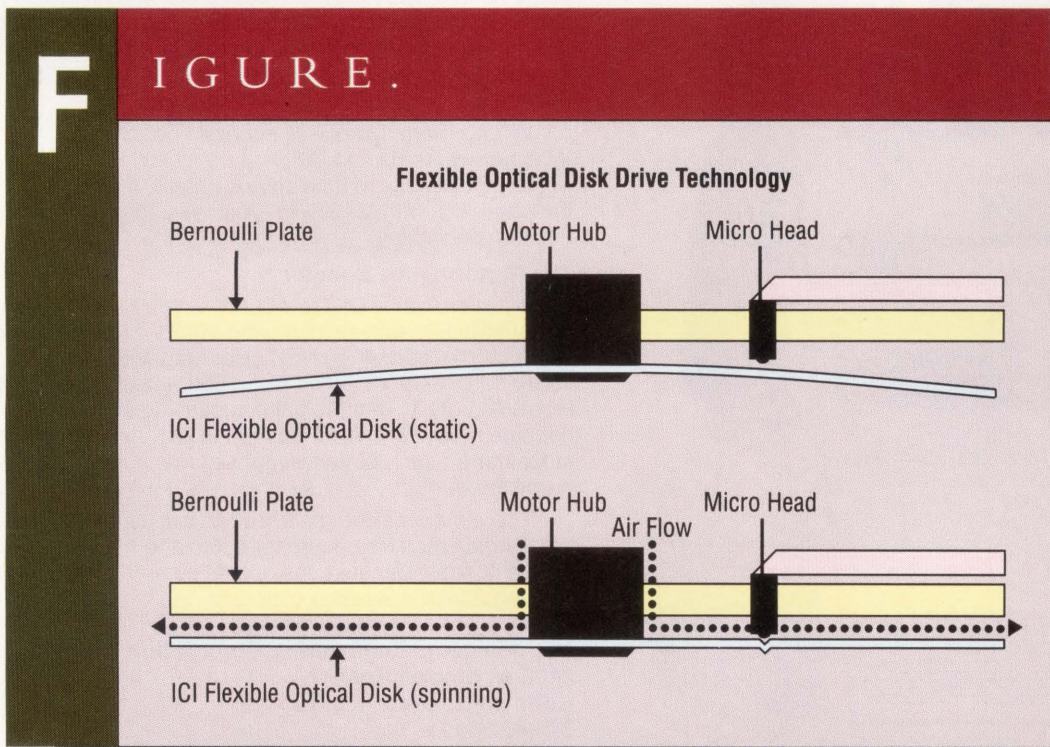
A flexible optical disk that uses digital paper is under development at Bernoulli Optical Systems Company (BOSCO). The 5 1/4-inch drive features an average access time of 40 ms and a storage capacity of 1.5 GB. It's estimated that storage costs for the media will be three cents per megabyte. The drive will be introduced during 1990.

The BOSCO drive mounts the flexible

channels the air flow and increases its velocity, causing a pressure differential that lifts the disk toward the plate (see Figure). At a given speed, the spinning disk is stabilized by the air flow in a very close, stable proximity to the optical head. By flying the head close to the surface, a high-numerical-aperture, low-mass lens delivers more power to the disk from the laser and increases the data rate.

The Bernoulli method of air flow eliminates the danger of a head crash. If the pressure differential is lost, the head and media separate instead of colliding. The BOSCO drive replaces the standard heavy focusing servo with a lightweight fixed-focus device. Secondary fine-positioning mechanisms are replaced by a servo-system tracking unit.

EVOLVING TECHNOLOGY in the optical storage industry ensures a bright future for each type of optical device. From CD-ROMs and WORM drives to erasable optical devices and digital paper, optical media continue to bring new dimensions to data storage.



The flexible optical disk drive is based on the Bernoulli principle of fluid technology: When the air above a surface moves faster than the air below, it causes lift. This principle is applied to enable the disk to rotate in stable, close proximity to the read/write head.

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# DATABASE PERFORMANCE

By Karl K. Kirk and  
George E. Bachtold

## RMS Or Rdb? Understanding And Evaluating Traditional Record Managers Versus Database Managers.

A principal concern of DP administrators is the problem of changing from traditional record managers such as RMS to database managers such as Digital's Rdb or DBMS or third-party products.

The main objection against using a product such as Rdb is its lower performance, primarily in terms of updating and reading from the user's standpoint. Database managers operate more slowly than traditional nonrelational record managers without database management capabilities. The DP administrator often must choose between supplying users with slower response time or lobbying for a larger, more expensive hardware platform to reach and maintain user performance standards.

The performance cost of a database manager such as Rdb over RMS is hard to quantify. For applications that do a lot of online transactions using keyed access, benchmarks show that Rdb takes about three times longer to update data because of snapshot and journaling management capabilities. Read-only retrievals can vary from slightly faster to about 50 percent longer. On the other hand, sequential access through a record stream in RMS is much faster.

Performance varies with the database design, hardware configuration, tuning, the level of database consistency and correctness desired, and the application's use of the database. In general, the overhead of desirable database management support using Rdb results in slower response times than RMS, which doesn't supply many database management features.

### Why The Slowdown?

Rdb is slower than RMS because, as a database manager, it supplies several important capabilities

that solve problems not addressed by traditional record managers.

New requirements and higher standards for data consistency, concurrency and uptime have evolved in many DP environments. Historically, the DP environment consisted of eight hours of terminal-oriented record processing followed by nightly batch processing and reporting. Because computers are being used for more time-sensitive applications, data processing may be required to service 24-hour transaction processing needs with little or no downtime while maintaining batch-reporting and record-purging functions.

Examples include factory management information systems, automated teller machine networks and debit-card systems. New requirements and higher standards have introduced technical problems that are hard to resolve using simple record managers such as RMS.

The array of technical challenges includes maintaining report consistency and correctness (reliability and validity), sustaining transaction consistency in case of software or hardware failure, and reusing deleted record space. Backing up a database without denying access to users and easing the chore of modifying data definitions as application needs change add to the list of challenges.

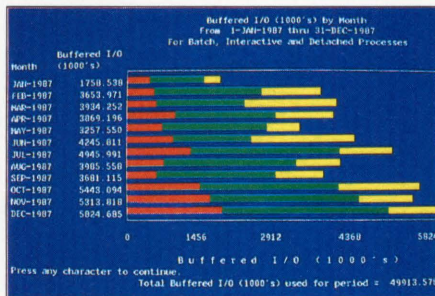
Database managers such as Rdb incorporate facilities that resolve these problems, but with a cost to transaction throughput. Simpler record handlers, including RMS, have provided extended utilities, such as the RMS journaling facility, to solve some of these problems. However, the utilities quickly reduce performance in RMS, because the same technical solutions used in relational database managers are used in



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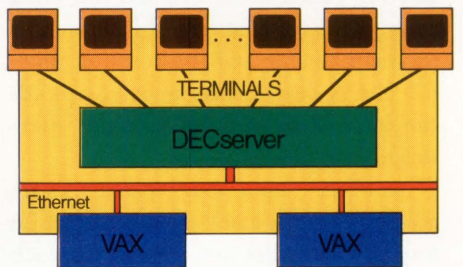
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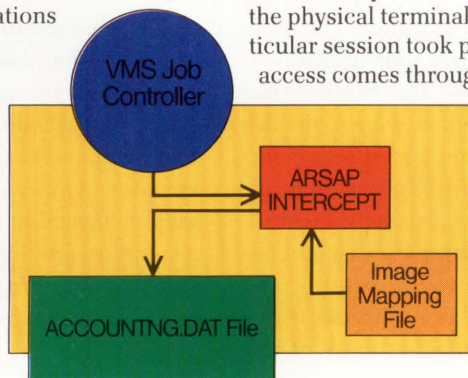
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these extensions.

On a more technical level, the primary cause of slower updating in Rdb and other database managers is the occurrence of multiple file updates to different files.

Rdb has four file types. First, the database file or files contain all the record and index structures. Second, the snapshot file contains historical copies of records that provide for a consistent view of the data by each user. Third, the run unit journal files allow transaction management so that partial updates of a series of records can be backed out in case of failure. Finally, the after-image journal file is used to support disaster recovery. These file types are available for most database managers.

## How Rdb Works

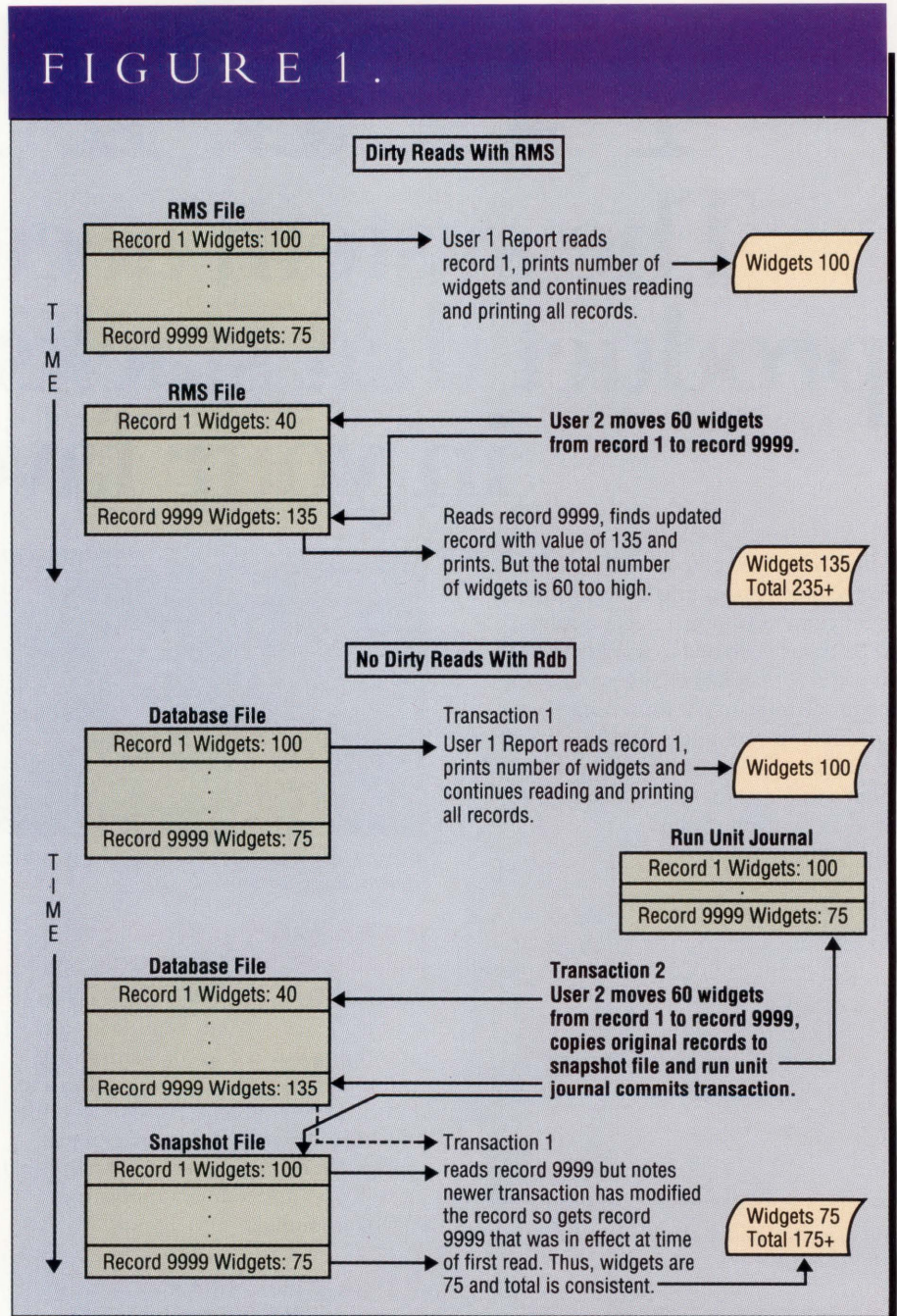
An Rdb transaction is made for each access to do work in the database. Each transaction is stamped with a unique sequential number. Records can be updated or added to the database file, but a copy of the original record is written to the snapshot file and the run unit journal file. A copy of the updated records can be written optionally to the after-image journal file.

As a result, up to four separate files are accessed, and as many as four records in four separate files are written for each record changed in the database. The result is heavier disk traffic, visible to the user as slower performance.

Each file plays a significant role in many high-uptime environments. All of these files are necessary for a database manager — the performance impact isn't only a result of the relational schema. Database management attributes, more than the relational qualities of RDBMSs, are the major contributing factors to slower performance. This is why nonrelational database managers such as DBMS have performance characteristics similar to those of Rdb.

The four file types in Rdb that can be accessed are:

**1. Database file** — Database files contain indexes and records to be saved. This is a permanent record versus the tempo-



Comparison of record reads with and without a snapshot file.

rary nature of the snapshot, run unit journal and after-image journal files.

**2. Snapshot file** — The snapshot file provides for consistent viewing of the database from each user's perspective and supports the capability of generating correct and usable online backups. Figure 1 shows how the presence of a snapshot file maintains the integrity of record reads. The read function scans updated information from the snapshot copy of the original record.

To avoid spurious or "dirty" reads and support online backups in a traditional nondatabase manager, the system manager must schedule regular downtime that denies users access and updating of the data. RMS with journaling doesn't support a snapshot file, and dirty reads are a common problem. Because Rdb has a snapshot file, dirty reads won't occur. Snapshot files allow system managers to



snapshot file in Rdb typically can be turned off for nightly batch processing. Rdb also allows the snapshot file to be turned off completely if users and designers of an application feel that the resulting inconsistent data won't impact their operations severely.

**3. Run unit journal file** — The run unit journal file provides for transaction consistency and recovery in case of virtually any software or hardware failure (see Figure 2). Rdb supports such recovery across a VAXcluster even if all computers on the cluster go down because of a site power failure. Rdb recovery is automatic and requires no human intervention.

Traditional record managers require that data be corrected manually by users or programmers. Often, special fix-up programs in record managers are written to handle the most common problems, usually developed after the problems occur and affect users. Too often, such problems in record managers are ignored, and the resulting inconsistencies are unacceptable. Even the so-called nonstop computers can return a corrupt database in a power failure, but only if simple record managers are used. Rdb ensures that the problems are resolved automatically and that the database is always left in a consistent state.

**4. After-image journal file** — The optional after-image journal file lets the system manager create a log of every record change for disaster recovery. Most Rdb sites have found the run unit journal and online backups supported by the snapshot file to be sufficient for their needs. Rdb's after-image journal gives the system manager an additional level of safety.

Rdb and other database managers have additional capabilities that make life easier in a high-uptime environment.

First, Rdb continually reclaims data record space, sometimes referred to as garbage collection. A little extra processing occurs in each transaction, but the CONVERT utility performed on most

file recovery occurs. Rdb removes the daily downtime inherent to the reorganization, although some users find it advantageous to back up and restore an Rdb database two or three times yearly

such as SQL, making use prototyping, maintenance and modification easier than not using a database manager. In particular, fields, relations and other definitions can be modified readily in Rdb with little or no file rebuild time.



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is lack of adequate training of the base design team and programmers that implement the final application. Programmers accustomed to traditional record managers sometimes implement retrieval algorithms that are inappropriate in a relational schema.

Code should be reviewed by knowledgeable staff for correct accessing of the database under a query language such as

also supplies a variety of debugging tools, such as `rdms$debug_flags` and Rdb/VMS Management Utilities (RMU), which can be used to optimize performance.

Technical staff creating an application often introduce RMS and memory-resident records to augment Rdb or other database managers in an attempt to increase performance. But there are dan-

tain high-update information, such as balance totals, or if they control information for inventory flow, the speedup merely is working around the safeguards supplied by the database manager.

Avoiding the snapshot and run unit journal rollback functions will result in potential loss of data consistency and correctness. Such techniques used incorrectly will defeat the primary gains achieved by using the database manager and jeopardize network or cluster access to the data in an OLTP environment.

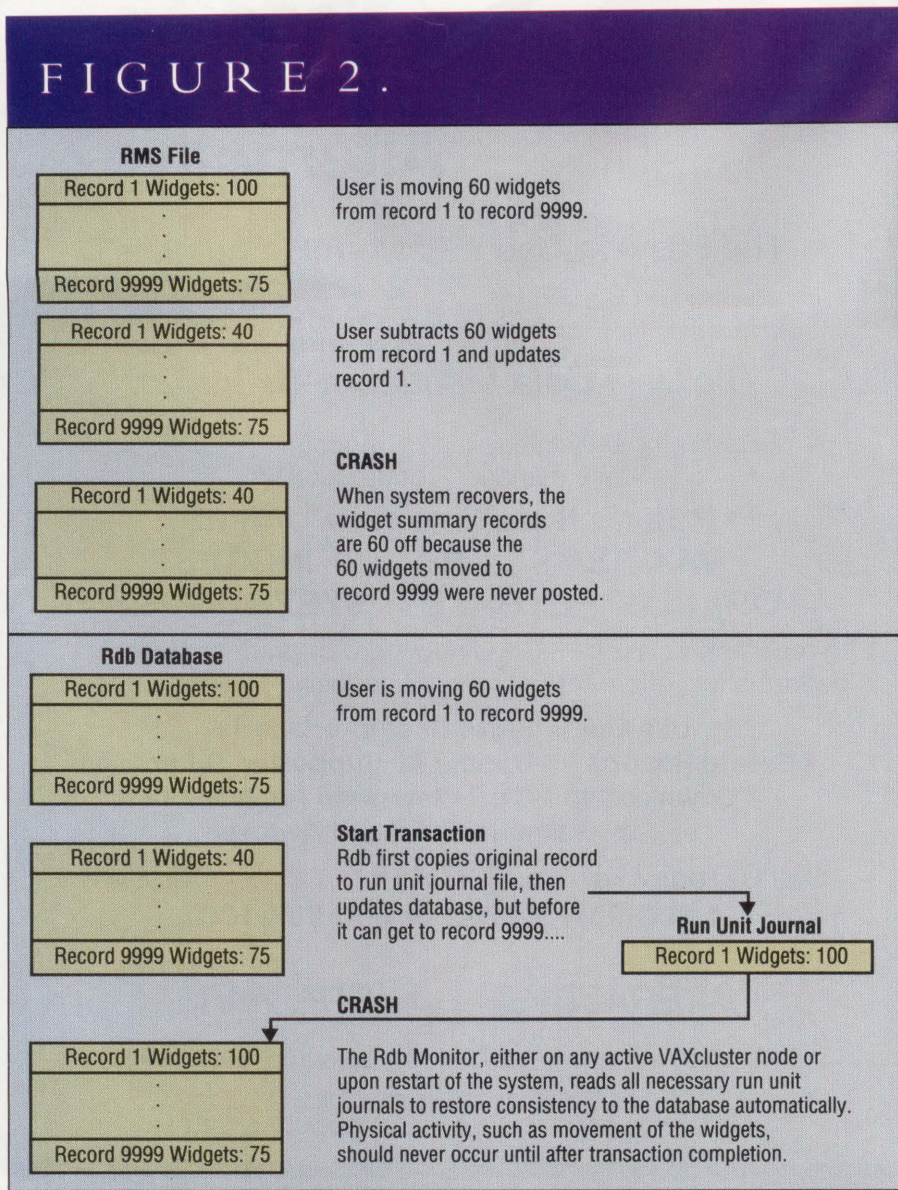
Database and account parameters can slow retrievals. Each should be tuned by personnel familiar with the application and how the data is accessed.

Also, disk fragmentation often is a culprit in slow Rdb access. A correctly presized database and snapshot file built contiguously will respond much faster than fragmented files.

Further, distributing the different files across separate disks ensures that any single disk won't be overloaded by update requests that will stall reads when the load is heavy.

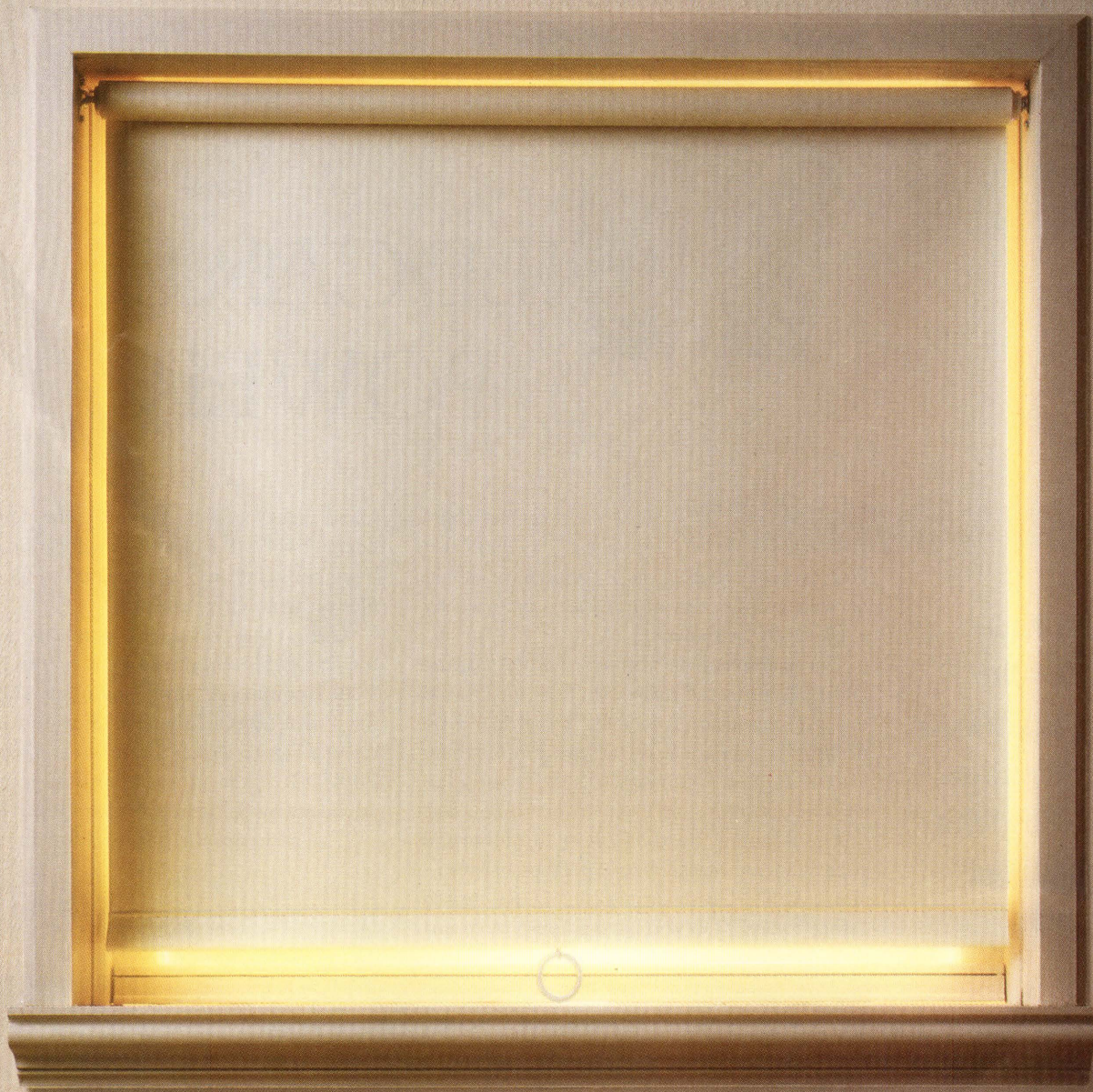
A properly configured Rdb database environment with a well-written application has read performance similar to RMS. Using hash keys, Rdb can outperform RMS in certain situations.

Many applications have been implemented successfully without the features that Rdb as a database manager supplies. However, administrators of an application operating in a high-update, zero downtime, 24-hour transaction processing facility should review their database needs carefully. Rdb, with its snapshot and journaling facilities, ensures that you'll have safe, consistent and uninterrupted data available for your users. — Kirk is senior programmer and Bachtold is senior technical writer for Diamond Automation, Bellevue, Washington.



**Loss of consistency in RMS is seen at the top. At the bottom we see how Rdb ensures consistency.**





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FILE HANDLING

# WILDCARD POWER

By John Gunther

## PIPE\_DIR And PIPE\_SEARCH: Sharing The Wealth Of File-Selection Possibilities With Less "Qualified" Commands.

Have you ever been disappointed to find that your favorite DIRECTORY command qualifier or wildcarding convention isn't supported by another VAX command?

For example, have you ever wished that the DELETE command had a /SELECT qualifier so that you could use it to DELETE all files with nothing in them as easily as you can list them via DIR/SELECT=SIZE=MAX=0? To use a less esoteric example, have you ever wished that you could simply use the FORTRAN command with wildcard filespecs and, perhaps occasionally, a /SINCE to recompile all \*.FORs created "since today"? Do you have a non-VMS com-

mand that would get a boost if the power and flexibility of DIRECTORY's wildcarding/qualifying conventions could be used to specify the files on which it would act?

Using PIPE\_DIR.COM, you can "pipeline" the lists of files produced by the VMS DIRECTORY command "into" any other VMS command that takes a "filespecs" as its first parameter (see Figure 1). Let's look at example uses of PIPE\_DIR. (The programs that appear in this article are available in download in ARIS/BB.)

This addresses the first question above:

```
$ @PIPE_DIR DELETE [...] *.*; *
/SELECT=SIZE=MAXIMUM=0/EXCLUDE=*.DIR
```

## FIGURE 1.

```
#!
#! PIPE_DIR.COM ("Pipeline output of the DIR command into another VMS command.")
#!
#! Applies any VMS command (P1) repeatedly to the list of files generated
#! by the completion of the "DIR/COL=1/NOHEADER/NOTRILING " command passed
#! as P2. Whereas P2 stands in lieu of the "filespecs" of the 'P1' command,
#! other parameters (P3, P4, ...) are passed as given to the command.
#!
#! Allows the use of wildcard filespecs and your favorite DIRECTORY file
#! selection qualifiers (i.e., /SINCE, /EXCLUDE=filespecs, etc.) with commands
#! (such as FORTRAN, FMS/TRANSLATE, etc.) that may not always support
#! either wildcarding or these nice DIRECTORY qualifiers.
#!
#! Example: $ @PIPE_DIR mail/subject="Today's Memos" *.mem/since=TODAY boss
#!
$ REASK:
$ if p1.EQS."" then inquire p1 -
  "Enter the BCL Command you want to 'act' on all 'DIRed' files"
$ if p1.EQS."" then goto REASK
$ if p2.EQS."" then inquire/nopunctuation p2 -
  "Complete the DIR command to generate the files to 'act' on: $ DIR "
$ if p2.EQS."" then p2="*.*"
.
.
.
```





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This addresses the second question above:

```
$ @PIPE_DIR FORTRAN/LIST
*.FOR/SINCE=TODAY
```

Also consider:

```
$ @PIPE_DIR @MY_COMMAND *.FRM FMS.FLB
```

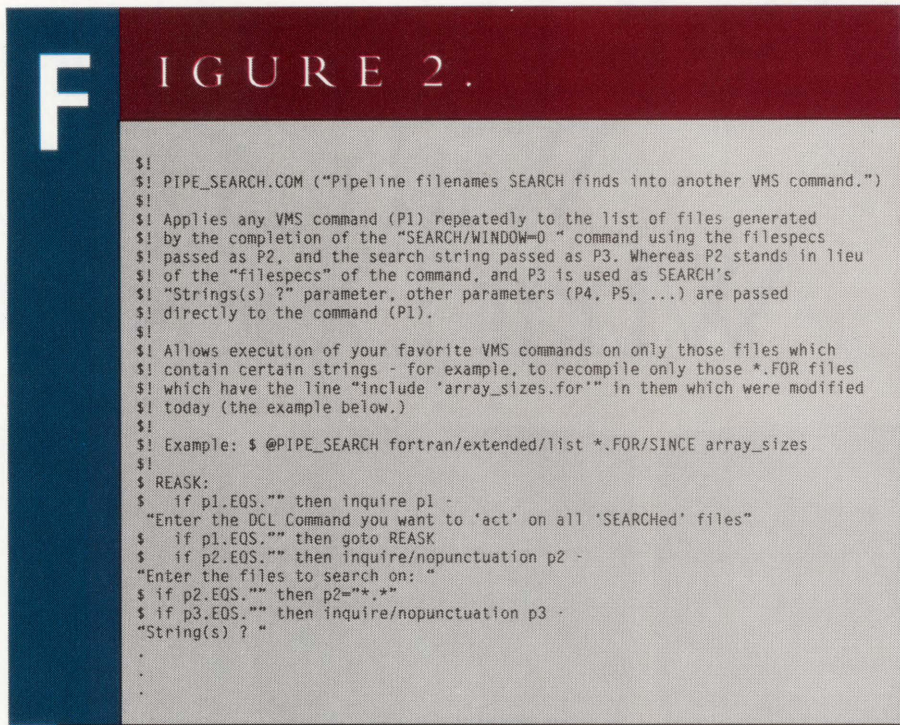
where MY\_COMMAND.COM might contain a single line:

```
$ fms/library/log 'P2' 'P1'
```

as a workaround to the fact that VMS "library" commands tend to take the "interesting" filespecs as their second, rather than first, parameter, and don't allow wildcarding.

Intuitively, you simply preface an @PIPE\_DIR in front of any command with less-than-impeccable wildcarding and/or qualifying conventions, and you instantly have "grafted" DIRECTORY's powerful wildcarding and file-selection qualifiers onto that command.

IF PIPE\_DIR, why not PIPE\_SEARCH? PIPE\_SEARCH.COM is the same as PIPE\_DIR.COM except that the source of the filenames it places "in the pipeline" is the VMS SEARCH command (see Figure 2). Basically, PIPE\_SEARCH gives you most of PIPE\_DIR's capabilities, plus the ability to have a command act on only those



files that contain certain strings.

For example, you could use it to recompile all source files that had "included" a file of array dimensions you had just changed. Or, using a short TPU or EDT command file, you could use it to replace the header text of only those files that contain the string PRODUCT: XYZ.

SEARCH's /MATCH qualifier alone could generate quite a few interesting

questions that I'll leave to your imagination. These short procedures can bring much-needed wildcarding/qualifying file-selection power to a host of otherwise excellent commands. —*John Gunther is a programmer in the Research and Development Division of Betz Laboratories, Treviso, Pennsylvania.*

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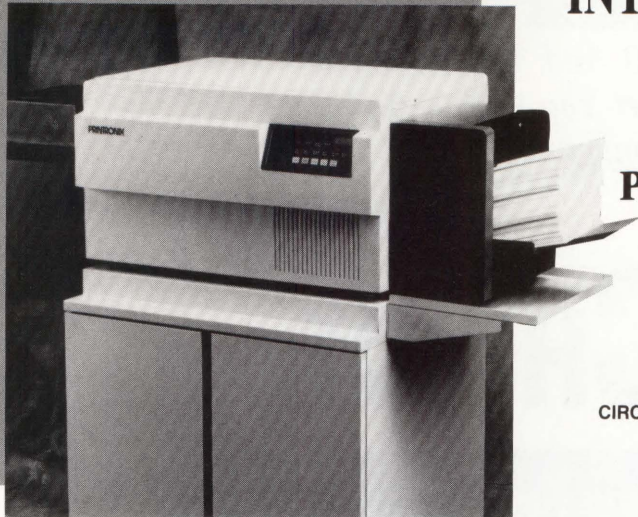
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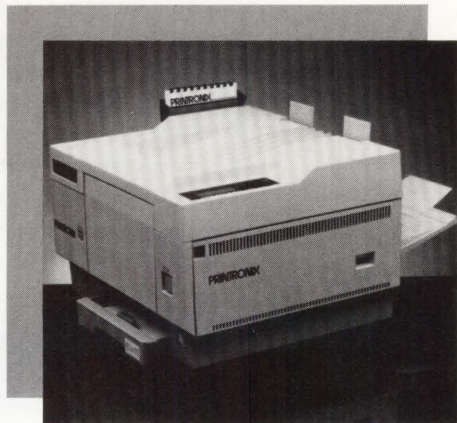
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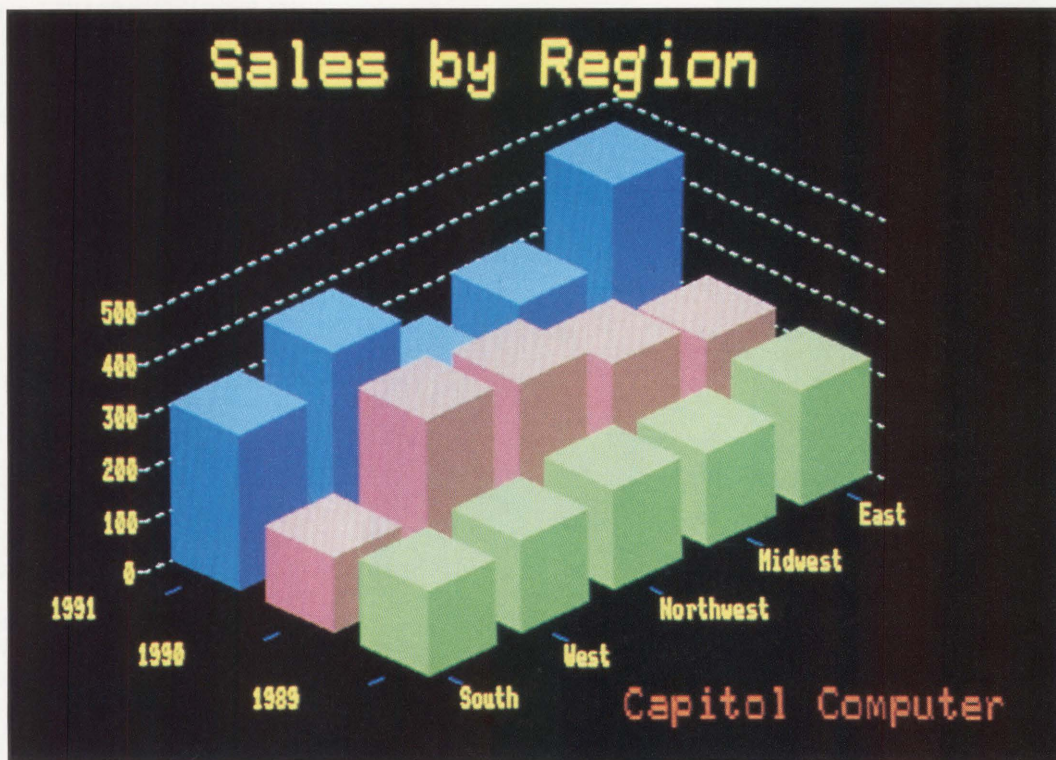
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## FROM THE LAB

*Persoft Inc.'s SmarTerm 240 And 320 Terminal Emulation Software Packages Let You Create And Save Eight Terminal Configurations*

# SMART CHOICE

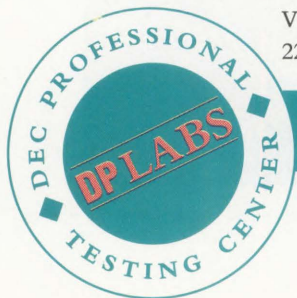


*SmarTerm 240 simulates the 16-color ReGIS graphics of a VT340.*

SmarTerm 240 V3.0b and SmarTerm 320 V1.0a, from Persoft Inc., are terminal emulation software packages for your IBM PC or 100 percent compatible. SmarTerm 240 provides an extensive range of terminal emulations, including VT52/100/220/240/241/340 and Tektronix 4010/4014 graphics terminal emulation. A TTY (teletype) mode lets your PC emulate a dumb terminal. SmarTerm 320 features VT320 text emulation and VT52/100/102/220 and TTY terminal emulations.

Software installation is fast and easy. SmarTerm 240 software is available on four 5 1/4-inch or two 3 1/2-inch diskettes. We installed the 5 1/4-inch disk set on three PCs, each with a hard disk. You also can run the package from a high-density 1.2-MB diskette or a 3 1/2-inch 720-KB diskette. The 5 1/4-inch disk set contains two installation disks, a master disk and a utilities/sample program disk.

For hard-disk installation, you first create a subdirectory to hold SmarTerm



GEORGE T. FRUEH





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240. We called our subdirectory SMAR-TERM. With installation disk 1 in the default drive, you type INSTALL <CR>.

A menu appears with the options Total Installation Procedure, Step by Step Installation and Exit to DOS. Keyboard help is located at the bottom of the screen. Persoft recommends the Total Installation Procedure when you install SmarTerm 240 for the first time. It walks you through the entire installation procedure, providing helpful information at the bottom of the screen. The two installation disks and the master disk are required for installation. At the end of the installation procedure, SmarTerm 240 returns you to DOS.

## Startup And Setup Windows

Following installation, you can start by entering ST240 <CR> at the DOS prompt. If you're using a composite monitor, you enter ST240-C <CR>.

The SmarTerm 240 logo appears, followed by the Startup menu. The Startup menu shows the SmarTerm version number and eight Configuration Name fields. These fields are numbered one through eight and are blank when you run SmarTerm 240 for the first time.

## SmarTerm 240

**PLATFORMS:** IBM PC, XT, AT, PS/2 or 100 percent compatible with 512 KB of RAM minimum, at least one high-density drive (5 1/4- or 3 1/2-inch) or hard disk, monitor and graphics adapter, async I/O board and PC DOS V2.0 to 4.0

**PRICES:** SmarTerm 240 V3.0b, \$345 (single user); \$1,495 (file server startup kit). SmarTerm 320 V1.0a, \$195 (single user); \$895 (file server startup kit)

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**PRODUCT LINE:** Connectivity and personal-productivity software for PCs

**BRANCHES:** Princeton, NJ; West Germany

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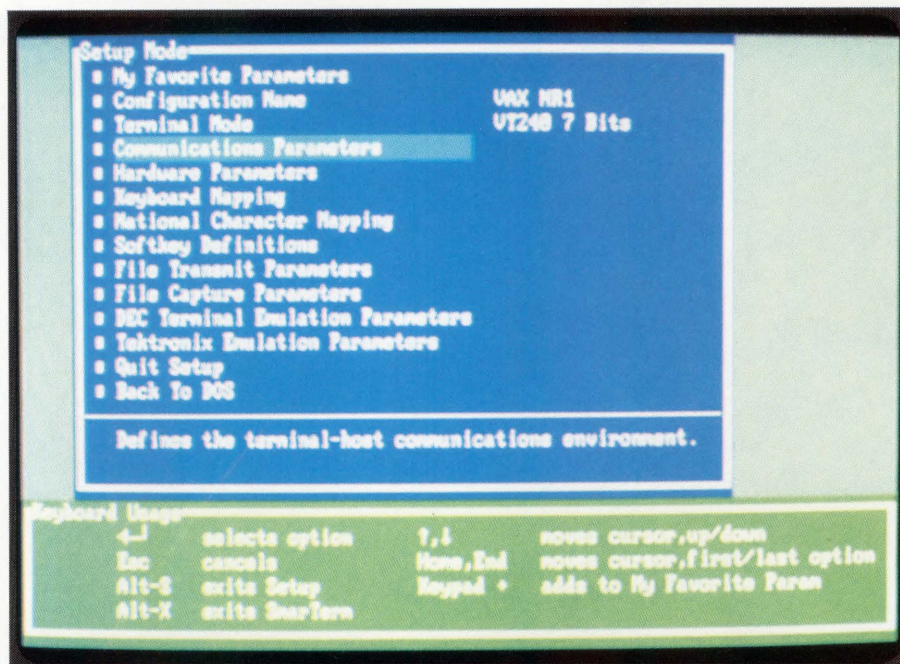


Figure: SmarTerm 240's Setup Mode lets you create and save eight terminal configurations.

With the Setup Mode, you can create and save eight terminal configurations. After you choose a configuration number with the number keys, SmarTerm 240 responds by displaying the Setup Mode main menu (see Figure). The Setup Mode main menu displays a list of options. These options are the names of windows that you can select to set terminal emulation parameters.

To highlight an option, you move the highlighted bar cursor over the desired option using the Up and Down arrow keys. In the Figure, the bar cursor highlights Communications Parameters. Pressing the Return key opens a window labeled Communications Parameters, which partially overlaps the Setup Mode window.

The Communications Parameters window lets you set the personality of PC-to-host or PC-to-PC communications. These include specifying a communication port (com port) 1-4, baud rate, number of data/stop bits, parity, auto XON/XOFF threshold and online/local. Parameters displayed in the Setup Mode menu are described in detail in the *Reference Manual*.

Selecting Terminal Mode from the Setup Mode main menu lets you specify

the type of terminal emulation desired, e.g., VT240 7 bits. The terminal emulation type you select will appear on the Setup Mode main menu to the right of Terminal Mode as shown in the Figure.

After you define the parameters for a given Setup Mode main menu, you can name the configuration using the Configuration Name option. SmarTerm 240 lets you specify a name with a maximum of eight characters. The configuration in the Figure has been named VAX NR1.

You exit the Setup Mode main menu by pressing ALT-S.

You can create seven additional setup configurations in the same way for a total of eight completely different terminal emulation configurations.

To begin an emulation, you simply press the number that corresponds to the configuration name you desire. You do this from the Startup menu.

## Graphics And File Transfer

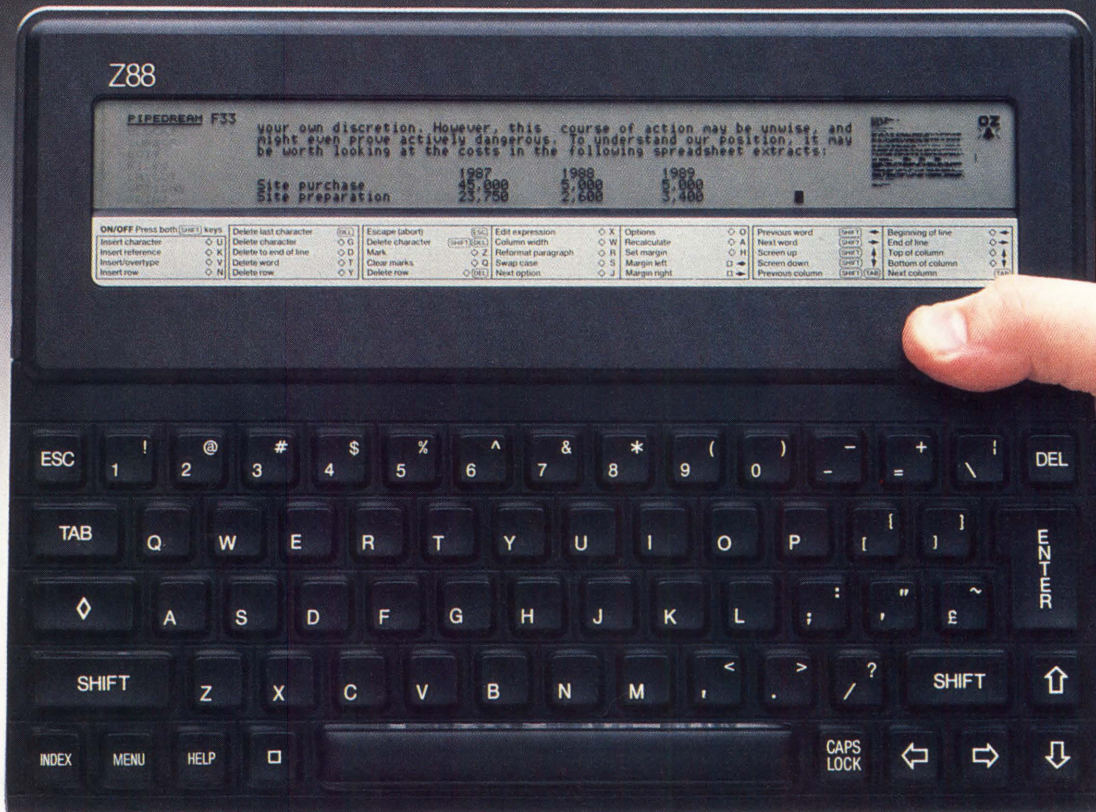
SmarTerm 240 supports Tektronix and ReGIS graphics. If your PC has an EGA and an Enhanced Color Display or is a VGA system, you can choose the VT241 or VT340 setting.

In VT241 emulation, ReGIS graphics can be displayed in four colors. A mono-



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“

**SmarTerm 240 provides normal and binary encoded file transfer modes to transfer files between the PC and another computer.**

”

chrome display is produced when viewing ReGIS graphics in VT240 emulation, but you can choose different foreground colors by pressing ALT-G.

In VT340 emulation, ReGIS graphics can be displayed in 16 colors. The photo on page 78 shows a 16-color ReGIS graphics image in VT340 emulation. You can change these colors choosing any of the colors that your monitor supports. A program called SETCOLOR lets you choose the 16 colors you want.

In VT240 and VT340 emulation, press-

ing ALT-G toggles between a graphics screen and a text screen. Both emulations let you zoom in on a displayed image.

SmarTerm 240 also can emulate Tektronix 4014/4010 graphics terminals. These terminal emulations support Tektronix graphics and have a zoom feature that lets you enlarge portions of a screen display.

The software allows you to “capture” both ReGIS and Tektronix graphics images from the host and store them in a disk file. You then can replay these im-

ages or examine any PC file that contains ReGIS or Tektronix graphics using the Local Transmit option.

SmarTerm 240 provides normal and binary encoded file transfer modes to transfer files between the PC and another computer. These modes don't provide error checking.

For transferring text and binary files over noisy long-distance telephone lines, SmarTerm 240 supports three error-free file transfer protocols: PDIP, XMODEM and KERMIT. All three include error checking.

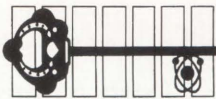
### Network Support

SmarTerm 240 runs on Datability Software Systems' RAF, DECnet-DOS CTerm, DECnet-DOS LAT, DECnet-DOS LAT and CTerm combined, FEL Computing's Mobius, IBM LANACS, Novell NACS and NetWare VMS, and Ungermann-Bass' Net/One. It also supports the Banyan, Excelan and Wollon-

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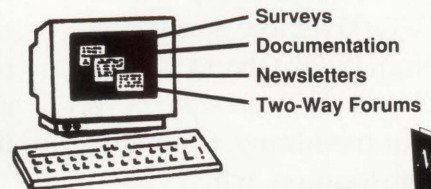
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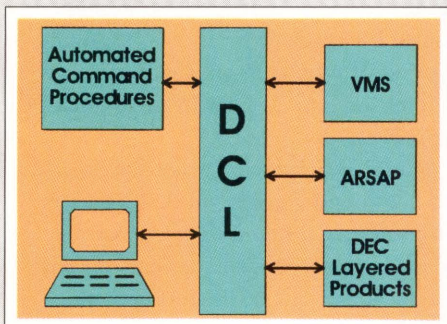
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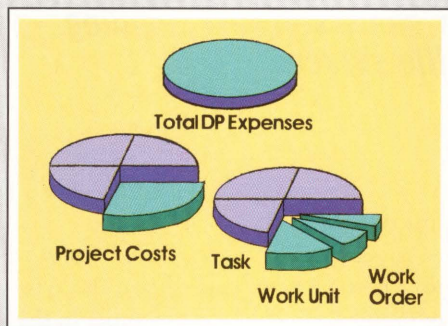
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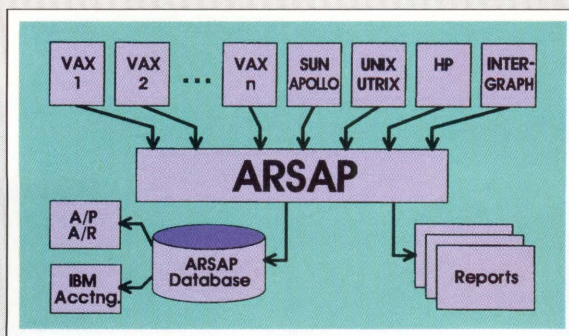
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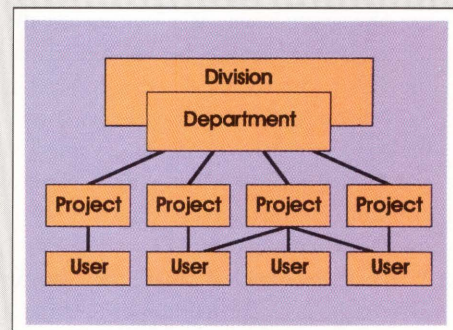


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gong WIN/TCP networks.

We installed the package on three IBM-compatible PCs and used the Total Installation procedure. First we installed SmarTerm 240 on an AST Premium/286 PC with 640 KB of RAM and an AST VGA video adapter. An AST ASTKB101

video adapter and an internal 300/1,200-baud Hayes-compatible modem. An IBM XT keyboard and a Packard Bell color monitor also were used. In this instance, we used the PC as a remote dial-in terminal running at 1,200 baud. Data, stop and parity bits were the same as in the

video adapter we were using was incompatible with SmarTerm 240.

SMARTERM 240 OFFERS several methods of emulating 132-column mode, depending on the type of hardware your PC is using. With an EGA, VGA, CGA or Hercules adapter installed, SmarTerm 240 can draw 132-column characters on the graphics screen. If you have a special 132-column video display board, you can produce true 132-column displays on the text screen.

The *Reference Manual* is complete and provides helpful information for installation and use, a troubleshooting section and an extensive appendix covering interface specifications, character sets and graphics drivers.

On-line help screens assist in ALT key use, keyboard mapping and softkey definitions.

We tested SmarTerm 320 and found it to have many of the features found in SmarTerm 240, including the ability to create and save eight terminal configurations. It's available on three 5 1/4-inch diskettes or two 3 1/2-inch diskettes and requires the same PC hardware as SmarTerm 240.

Multiuser file server versions of SmarTerm 240 and SmarTerm 320 let users share software residing on a network file server. Each server provides customized individual user setups, supports any number of nodes and lets users access information simultaneously. ■

## Multiuser file server versions of SmarTerm 240 and SmarTerm 320 let users share software residing on a network file server.

keyboard and Wyse WY650 color monitor also were used. We connected the COM1 serial port of the PC directly to the Lab's MicroVAX II using RS-232 at 9,600 baud, specifying 8 data bits, 1 stop bit and no parity. Later, we connected the PC to our VAXcluster via a Xyplex communications server using the same interconnect and protocol.

Next we installed SmarTerm 240 on a Wyse pc286 with 640 KB of RAM and an EGA video adapter. A Wyse keyboard and Thomson 4460D color monitor also were used. This PC was connected to our VAXcluster via the Xyplex communications server again using the same interconnect and protocol.

Finally, we installed SmarTerm 240 on an IBM XT with 640 KB of RAM, an EGA

first two cases.

In all three cases, we could connect to a host or hosts and change the type of terminal emulation at any time. In the first case, however, we encountered a problem with screen displays when emulating VT terminal emulations in text mode.

Upon entering terminal emulation, the first screen appeared normal. However, each line of subsequent screens began with Ø. In most cases this symbol replaced one or several letters. The situation disappeared when we toggled to graphics mode (for VT240/241/340 emulations) or entered Tektronix emulation.

Persoft's technical support made several suggestions but wasn't able to solve the problem. We concluded that the

### Companies Mentioned In This Article

AST Research Inc.  
2121 Alton Ave.  
Irvine, CA 92714  
(714) 863-1333  
CIRCLE 471 ON READER CARD

Banyan Systems Inc.  
115 Flanders Rd.  
Westboro, MA 01581  
(508) 898-1000  
CIRCLE 472 ON READER CARD

Datability Software Systems Inc.  
322 8th Ave., 11th Fl.  
New York, NY 10001  
(212) 807-7800  
CIRCLE 473 ON READER CARD

Excelan Inc.  
A Novell Co.  
2180 Fortune Dr.  
San Jose, CA 95131  
(408) 434-2300  
CIRCLE 474 ON READER CARD

FEL Computing  
10 Main St.  
Williamsville, VT 05362  
(802) 348-7171  
CIRCLE 481 ON READER CARD

Hayes Microcomputer Products Inc.  
P.O. Box 105203  
Atlanta, GA 30348  
(404) 449-8791  
CIRCLE 475 ON READER CARD

Hercules Computer Technology  
921 Parker St.  
Berkeley, CA 94710  
(415) 540-6000  
CIRCLE 476 ON READER CARD

Novell Inc.  
122 E. 1700 S.  
Provo, UT 84606  
(801) 379-5900  
CIRCLE 470 ON READER CARD

Packard Bell  
9425 Canoga Ave.  
Chatsworth, CA 91311  
(818) 704-3905  
CIRCLE 479 ON READER CARD

Tektronix Inc.  
P.O. Box 1000  
Wilsonville, OR 97070  
(503) 685-3180  
CIRCLE 480 ON READER CARD

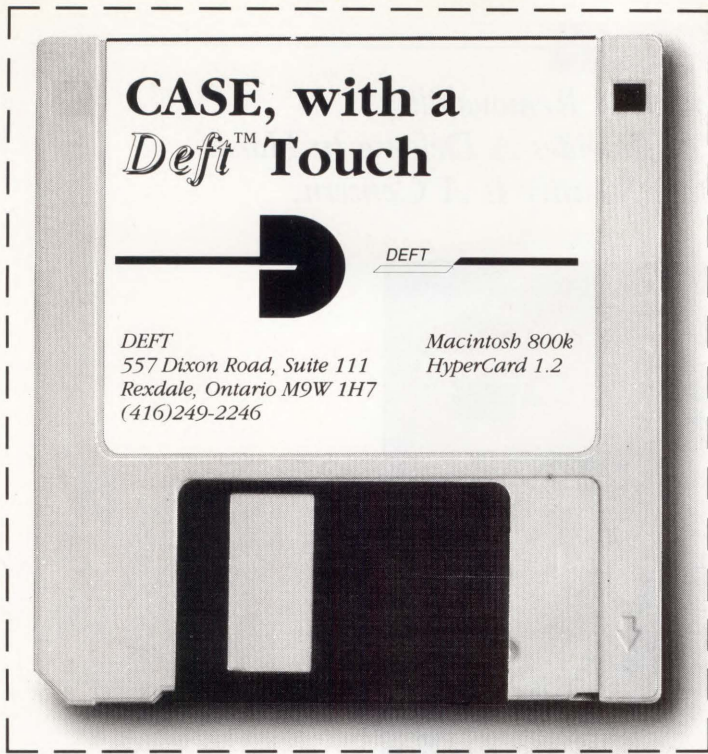
Ungermann-Bass Inc.  
3990 Freedom Cir.  
Santa Clara, CA 95052  
(408) 496-0111  
CIRCLE 482 ON READER CARD

Wollongong Group Inc.  
1129 San Antonio Rd.  
Palo Alto, CA 94303  
(415) 962-7200  
CIRCLE 483 ON READER CARD

Wyse Technology  
3571 N. First St.  
San Jose, CA 95134  
(408) 473-1200  
CIRCLE 484 ON READER CARD

Xyplex Inc.  
330 Codman Hill Rd.  
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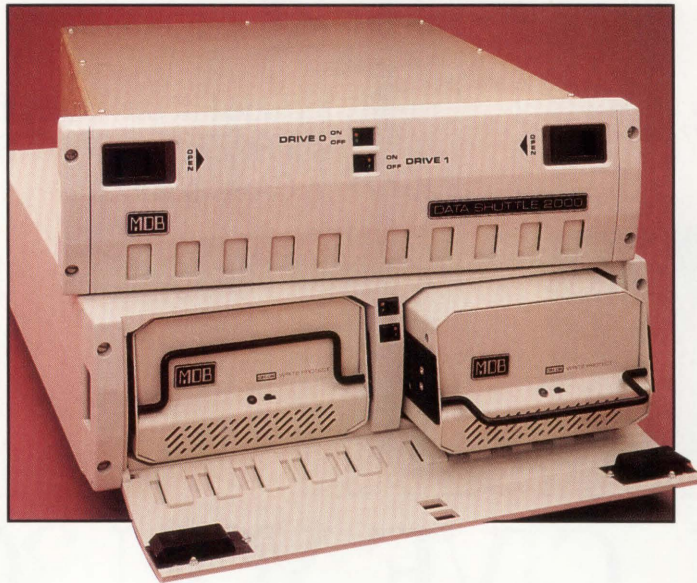


## CASE, with A Deft Touch...



## FROM THE LAB

*Offering Shock Protection And Removability,  
MDB Systems' Data Shuttle 2000 Provides A Defense In Harsh  
Environments Or Where Data Security Is A Concern.*



# SHOCK SURVIVAL

Outside physical shocks can be lethal to disk drives. Many system managers are all too aware of how sensitive their storage devices are to these unfriendly forces.

MDB Systems Inc. provides shock protection for disk drives with the Data Shuttle 2000. This Winchester disk subsystem can provide shock protection for one or two 5 1/4-inch disk drives. Each drive is contained in a removable shock-mounted canister.

MDB's proprietary shock-mounting method can attenuate a 180-G shock to

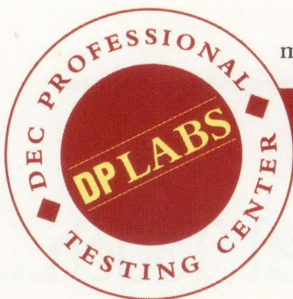


less than 20 G. MDB claims that a Data Shuttle 2000 can withstand a five-inch drop. The canisters have been tested to MIL STD 810D Bench Handling criteria.

The canisters are equipped with low-insertion-force connectors requiring no cables. Each connector can withstand 25,000 insertions. In addition to disk drives, canisters are available to house tape units such as 8mm Exabyte drives, TK50s or optical disks.

The subsystem chassis mounts easily in a rack. The unit measures 20.7 inches

DAVID B. MILLER







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CIRCLE 186 ON READER CARD



deep x 19 inches wide x 5.25 inches high. With two canisters, it weighs 35 pounds. A drop-down front cover reveals the canister cavities. Two front-panel switches control the DC power to the

“

**The Data Shuttle 2000 can be configured to accommodate ESDI, ST506 or SCSI disks.**

”

drives, so you know when the drives can be removed.

Each cavity contains a set of configuration dip switches and its own fan. Each canister has a write-protect switch and an LED indicator. You lower the chassis door to access the write-protect switch.

Two 50-pin connectors are located at the rear of the chassis. One connector provides the host-to-chassis connection. The other is used to daisychain additional chassis.

Our subsystem came with an Imprimis Wren VI (766 MB unformatted) and Wren V (383 MB unformatted) in an ESDI configuration. We were also supplied with an Andromeda Systems ESDC 1-MB cache controller. The drives were installed on LABDOG::, our MicroVAX II. They became our system and user disks.

### Flexibility

The Data Shuttle 2000 can be configured to accommodate ESDI, ST506 or SCSI disks. From the factory, ESDI drives are supported. Chassis can be daisychained to accommodate up to four ESDI drives or up to seven SCSI drives. A DEC RA-compatible model is available for connecting drives to HSCs, KDAs, KDBs and UDAs. Appropriate cable kits are available from MDB to accommodate a wide variety of needs.

Easily accessed jumpers allow you to convert the chassis from ESDI support to ST506 or SCSI. The switchpacks inside

each canister cavity are used to change drive-select information. The documentation provides clear instructions about how these jumpers and switches should be set.

The canisters allow simple installation of disk drives of your choice, should you want to create your own configuration. No special tools are required.

Although the Data Shuttle 2000 supports a variety of drives, consult MDB Systems about compatibility before you go on your own. Currently, tested drives include those from DEC, Fujitsu, Imprimis, Maxtor, Micropolis, Priam, Seagate and Siemens.

Although most subsystems can be purchased preconfigured, you should have no trouble assembling your own by following MDB's excellent documentation. Step-by-step instructions clearly show how to install drives in canisters, set switches to install the different drive types, and daisychain chassis.

THE DATA SHUTTLE 2000 provides a flexible system to meet your storage needs. Its shock protection and removability make it attractive in harsh environments or where data security is a concern.

If you require more protection, MDB offers the Data Shuttle 4000 and Data Shuttle 3000, which provide further defense against shock. They also provide protection against vibration.

The Data Shuttle 4000 adheres to MIL Spec design and manufacturing standards. It uses a MIL Spec power supply and con-

### Data Shuttle 2000

**PRICE:** Empty chassis, \$3,660; each canister, \$485. Fully configured system prices will vary depending on drive options

**PLATFORMS:** A variety of platforms, including DEC, VME, Multibus and PC systems

### MDB SYSTEMS INC.

**HEADQUARTERS:**

1110 W. Taft Ave.  
Orange, CA 92665  
(714) 998-6900

**FOUNDED:** 1970

**OWNERSHIP:** Private

**BRANCHES:** Sales and marketing divisions in England and Ireland; manufacturing facilities in Ireland, Mexico and Puerto Rico

CIRCLE 505 ON READER CARD

tains no PVC wiring. Zero Insertion Force (ZIF) connectors, allowing more than 100,000 insertion/removal operations, are used.

The Data Shuttle 3000 is a commercial version of the 4000, employing the same shock and vibration damping techniques but using commercial power supplies, interface connectors and slides.

In November, at DEXPO West 89, MDB announced the Data Shuttle 2000-RF, allowing Data Shuttle subsystems to connect directly to DEC's DSSI controller. The company also announced the Data Shuttle 1000 and 2000 for SCSI-based DEC 3100 systems. ■

### Companies Mentioned In This Article

Andromeda Systems Inc.  
9000 Eton Ave.  
Canoga Park, CA 91304  
(818) 709-7600  
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Exabyte Corp.  
1745 38th St.  
Boulder, CO 80301  
(303) 442-4333  
CIRCLE 497 ON READER CARD

Fujitsu America Inc.  
3055 Orchard Dr.  
San Jose, CA 95134  
(408) 432-1300  
CIRCLE 498 ON READER CARD

Imprimis Technology Inc.  
8100 34th Ave. S.  
Minneapolis, MN 55440  
(612) 853-8100  
CIRCLE 499 ON READER CARD

Maxtor Corp.  
211 River Oaks Pkwy.  
San Jose, CA 95134  
(408) 432-1700  
CIRCLE 500 ON READER CARD

Micropolis Corp.  
21211 Nordhoff St.  
Chatsworth, CA 91311  
(818) 709-3300  
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Priam Corp.  
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San Jose, CA 95134  
(408) 434-9300  
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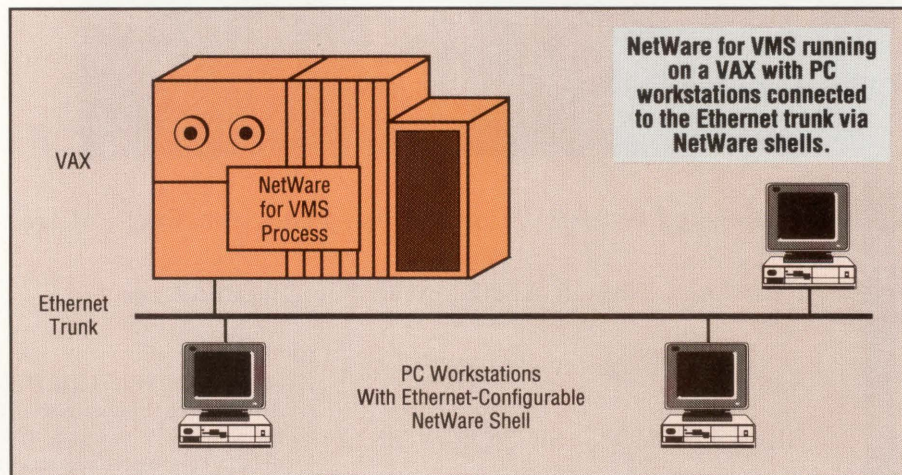
## FROM THE LAB

Novell Inc.'s NetWare For VMS Lets Your VAXcluster  
And PC LAN Share Computing Resources

# The Best Of Both Worlds

Do you ever wish your PC users could print their documents on the same LPS20 PostScript laser printer as your VAX users? Or, do you wish the WordPerfect files stored on your VAX were available to your VAX and PC users?

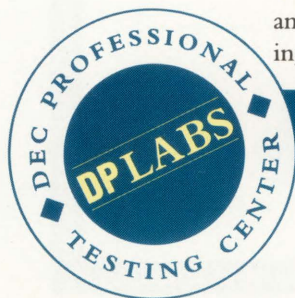
With Novell Inc.'s NetWare for VMS V2.01, a LAN of PCs can be tied into your Ethernet trunk, allowing your PC LAN and VAXs to share each other's computing resources.



NetWare for VMS is a software product that runs on any VAX under VMS. A NetWare for VMS network consists of one or more linked VAX processors, each running NetWare for VMS and acting as a file server for a network of IBM and IBM-compatible PC workstations.

Files on a VAX file server appear as

GEORGE T. FRUEH





# “How Badly Is File Fragmentation Slowing Down Your VAX™?”

**U**sers 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.

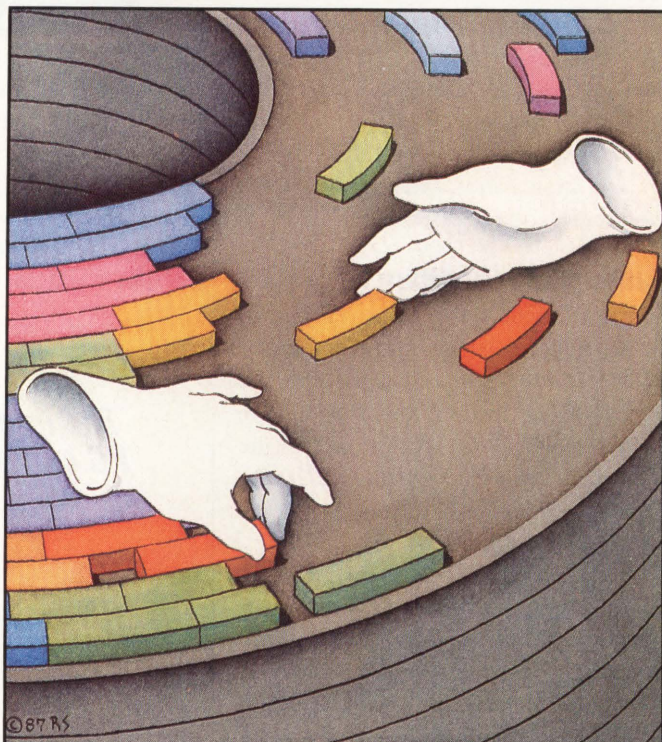
## How Does Fragmentation Occur?

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



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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

### File Fragmentation Analysis Utility

You can find out how fragmentation slows down your system’s performance.

By obtaining a copy of the File Fragmentation Analysis Utility, you will be able to determine the degree of file and free space fragmentation on your disk. It can provide anything from a quick summary to a very detailed analysis.

## Free Offer

If you are running VAX/VMS you may be qualified to receive a **free** copy of our File Fragmentation Analysis Utility to determine the extent of fragmentation on your disks.

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ext. 2324.



standard files to DOS and VAX users. This enables all users on a NetWare for VMS network to share local hard disks, printers and applications, whether at a DOS workstation or a VAX terminal.

### Casting Your NetWare For VMS

Software for the VAX host is available on a nine-track, 1,600-bpi magnetic tape or TK50 cassette. You install it using the VMSINSTALL utility located in the SYS\$UPDATE directory. We loaded the nine-track magnetic tape on LABDOG::, the Lab's MicroVAX II. This let it act as a file server in our NetWare network.

Each PC is connected to the NetWare network via its own slot-in network interface board. The interface board used determines whether your PC can operate as a file server or a PC workstation.

The following interface boards can be used in a NetWare network: Racal-InterLan NI5010 and NP600A; 3Com EtherLink 0345, 34-0780 and 1221 and EtherLink Plus 1194 and 1212; and Novell Ethernet NE1000, NE1000A and NP600.

We used the Novell Ethernet NE1000A board supplied by Novell in our AST Premium/286 PC and configured it so that the PC functioned as a workstation. We connected our PC

workstation to the Ethernet trunk and used Novell's Netware for VMS GENSH diskettes to generate the NetWare shell files ANET2.COM and ANET3.COM. The PC software is available on 5 1/4- and 3 1/2-inch diskettes.

The NetWare shell files are programs

VAX environment, the DEC Ethernet controller is serviced by a VMS Ethernet device driver. The Ethernet device driver sends all NetWare packets to an IPX/SPX driver. This driver routes these packets either to the terminal emulation services (TES) driver (if the packets are from

**“  
The interface board used determines whether your  
PC can operate as a file server or a PC workstation.  
”**

that you load into your PC workstation's memory, allowing it to send valid NetWare data packets through the network interface board in the PC to your NetWare file server. You execute ANET2.COM if you're running DOS 2.x, ANET3.COM if you're running DOS 3.x.

The diagram on page 90 shows NetWare for VMS running on a VAX with three PC workstations connected to the Ethernet trunk via NetWare shells.

### NetWare For VMS Components

The Figure on page 94 shows the components of NetWare for VMS. In the

a terminal emulator) or the server process (if the packets are for file or print requests). Both IPX/SPX and TES drivers conform to DEC's standard for VMS-loadable device drivers.

The TES driver processes the TES protocol and routes characters to the VMS terminal class driver. This driver sees these characters as if they came from terminals connected to standard DEC terminal ports.

The server process performs file and print services and returns data to the IPX driver for transmission to PCs over the network. The server process also per-

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In other words, the company that proved that the VAX is the perfect platform for a



forms all administrative commands and routes IPX packets via DECnet to NetWare for VMS server processes operating in other VAXs. This is for "server-to-server communication."

The administrative program provides a console interface for VAX/VMS and PC users to control the server process.

### Menu Utilities

The five NetWare menu utilities, SYSCON, SESSION, FILER, QUEUE and MENU, let you execute command line utilities. With the exception of MENU, the menu utilities appear as pop-out menu screens from which you can select specific items.

The SYSCON menu utility is used for system configuration. Screens let you see information about yourself and other users on the network. You can display a list of all users on a file server in addition to each user's full name and the group to which he belongs.

The SESSION menu utility lets you change your current file server, view current drive mappings, add or delete search mappings and send a message to another user.

The FILER menu utility lets you view your effective rights in your current di-

rectory, add or delete trustees of a directory and list, delete, copy and rename files.

The QUEUE menu utility lets you control the print queues of all file servers attached to the network. You can add and delete information from the print queues, view information about queue entries and choose the printer you want.

MENU is a menu-execution utility. It lets you create customized menus to suit your networking needs. You create your menu using any text editor that can create ASCII text files and then execute the menu with the MENU utility.

### E-Mail

NetWare's Electronic Mail System (EMS) lets you compose, send and file network mail. You enter EMS by typing MAIL <CR>.

There are four types of network mail: File, Document, Letter and Memo. Files, Documents and Letters are standard DOS files that you can create using any program, editor or word processor. Memos are created only with the EMS memo editor. Files are used for nonmessage-oriented files such as raw data, program source files and binary image files. Documents are used for word processed docu-

## NetWare For VMS

**PLATFORMS:** Supports IBM PCs and compatibles, including MS-DOS 2.x and 3.x, Windows/386, and OS/2 Standard Edition. It also supports DEC-supplied Ethernet controllers

**PRICES:** From \$5,500 to \$26,500, based on server

NOVELL INC.

**HEADQUARTERS:**  
122 E. 1700 S.  
Provo, UT 84601  
(801) 379-5900

**FOUNDED:** 1983

**PRODUCT LINE:** PC networking and connectivity products

**OWNERSHIP:** Public

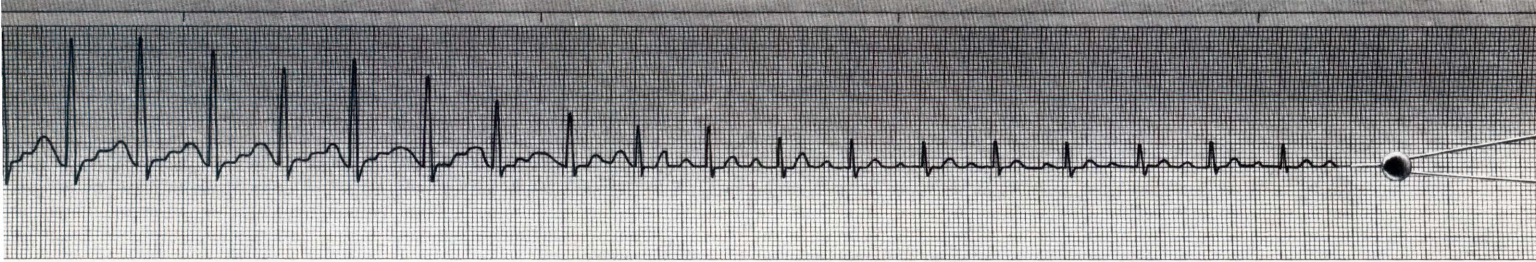
**BRANCHES:** Mountain View, CA; Austin, TX

CIRCLE 470 ON READER CARD

ments or text files. Letters are used for lengthy message-oriented text files. Memos are used for relatively short messages addressing specific subjects.

The EMS commands are straightforward and can be combined to form English phrases. For example, you can type LIST MEMOS for a list of all the memos sent to you. Or, you can type LIST MY MEMOS for a list of memos that you

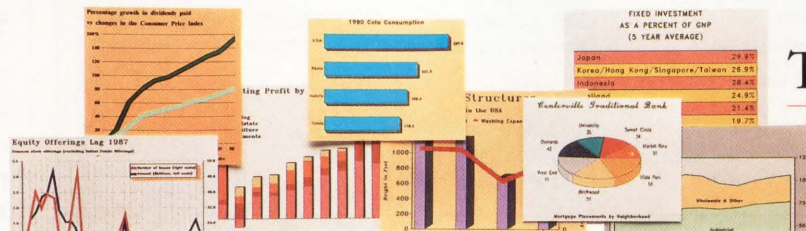
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have written.

To remove mail sent from specific individuals or divisions within a company, type:

REMOVE ANY MAIL FROM JOSH,  
ERIN OR MANAGEMENT

“  
...PC users don't have to understand anything about VMS to store and access MS-DOS files on a NetWare for VMS VAX server.  
”

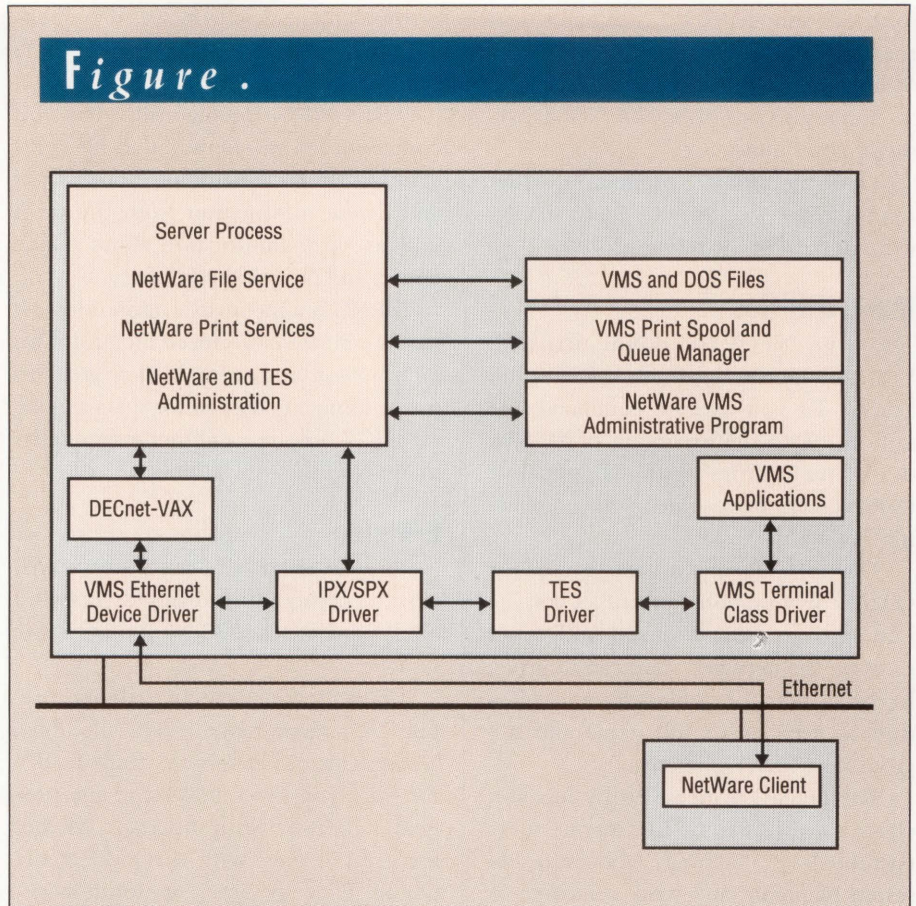
To remove mail sent to you before a specific time, type:

REMOVE EVERYTHING MAILED  
BEFORE OCTOBER 24, 9:00 am

### Documentation

NetWare for VMS comes with extensive documentation. A *Guide To NetWare Manuals* is included. It begins by determining whether you're a NetWare novice, experienced NetWare user, installer or network supervisor. It then directs you to the manuals that apply to your specific needs.

The documentation includes installation supplements for configuring the various slot-in network interface boards, console and supervisor references, a manager's guide and a five-part user reference. The user reference describes the menu utilities and e-mail functions in detail.



These components make up NetWare for VMS.

A KEY BENEFIT of NetWare for VMS is that your PC users don't have to understand anything about VMS to store and access MS-DOS files on a NetWare for VMS VAX file server. The VAX simply appears as an extension of your users' PCs.

VAX printers are available to PC users as if the printers were attached directly to the PCs. PC printer output is spooled to the VMS print spooler and is

controlled by the VMS queue manager and print spooler facilities.

Because NetWare for VMS server data is stored as normal VMS files, data is subject to standard VMS security, backup and archival procedures under the control of the VAX system manager.

NetWare for VMS gives your PC and VAX users increased computing flexibility by allowing them to gain access to more of your computing resources.

*Editor's note:* Novell recently announced NetWare for VMS V2.1. It features NetWare V2.12 compatibility and support for DECnet routing. It provides 40 percent better performance in sequential writes to the disk, such as copying files and closing application files. Workstation memory requirements to support NetWare's TES have been reduced from 48 to 32 KB. Also, optional pricing based on number of users is now available. ■

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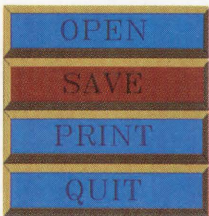
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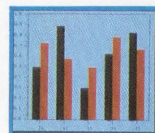
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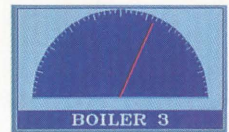
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## FROM THE LAB

*The Random Access Capabilities And Erasability Of  
Alphatronix Inc.'s Inspire Erasable Optical Mass Storage System  
Could Make Backup Less Burdensome.*

# INSPIRED BACKUP



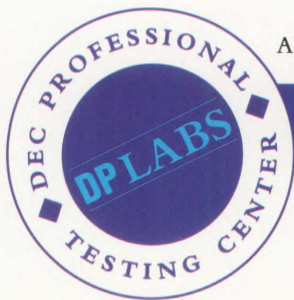
Did you ever dream of backing up a whole disk without changing tapes or getting up and running after a crash without a lengthy restore? Wouldn't it be great if you could reboot your system quickly after your system disk gets trashed — and not have to use standalone BACKUP? Rewriteable optical storage, in the form of the Inspire Erasable Optical Mass Storage System from Alphatronix Inc., may provide the solution.

Inspire systems for DEC use ISO/ANSI/ECMA/JC23-standard 5 1/4-inch

erasable optical disks with 325 MB per side for a total capacity of 650 MB. The disks come either blank (unformatted and uncertified) or precertified (or formatted). If you buy blank disks, you'll have to certify/format them yourself through Inspire's service port. Inspire systems come in single-, dual- and seven-drive configurations for a maximum storage capacity of 4.55 GB. Inspire for DEC supports Q-bus and UNIBUS and provides full emulation of DEC's MSCP.

We tested the dual-drive version on

**BARRY SOBEL**





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**CIRCLE 192 ON READER CARD**



our Lab's MicroVAX II. Our cabinet had the two drives mounted side by side. A tower cabinet with the drives mounted on end and a cabinet with the drives mounted horizontally one above the other are available.

### Catch The Bus

The Q-bus Inspire V1.30 comes with the drive cabinet, a host adapter board to be mounted on the MicroVAX II's backplane and a controller. Necessary cables and hardware are included, as is firmware to provide transparent functioning with VMS.

Installation consists of first using SYSGEN to obtain the bus address. VMS sees Inspire as a UDA device. Consult the Inspire documentation or DEC's SYSGEN documentation for details on how to use SYSGEN's CONFIGURE command. Inspire uses the standard VMS DU device driver. In our configuration, the two Inspire drives were DUC0: and DUC1:.

You next set jumpers on the host adapter board for the bus address. The host adapter board then is installed in the appropriate slot. Now you're ready to attach your cables and power up. The power switch is on the front of the cabinet. The installation procedure is detailed thoroughly in the Inspire documentation.

### Inspire/Rapidstore

PLATFORMS: Q-bus, UNIBUS, SUN SCSI, IBM PC

PRICE: Inspire V1.30 — from \$8,900 for a single-drive Q-bus to \$16,900 for a dual-drive UNIBUS; Rapidstore V1.04 — \$1,900 (Q-bus), \$2,900 (UNIBUS); 650-MB cartridge — \$250, formatted and certified.

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(919) 544-0001

PRODUCT LINE: Erasable optical storage systems

FOUNDED: 1987

OWNERSHIP: Private

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Figure 1.

	DUB1: (Wren V)	DUC1: (Inspire)
Average Access Time	27.3 ms	121.1 ms
Average Transfer Rate	452.84 KB/sec.	151.8 KB/sec.

Random access performance comparison between magnetic media and Inspire using VAX Disk Benchmark V1.0

An RS-232 service port is on the back of the system cabinet. This allows the connection of a VT100-compatible terminal for direct access to the system. The port is configured DTE. Commands executed through the service port let you verify correct installation, fix configuration problems and perform offline disk operations.

To use the drive, simply insert the optical disk into the slot as you would a floppy disk. An LED below the drive flashes briefly to let you know the drive is spun up and ready. To remove a disk, DISMOUNT it and press the eject button below the drive slot. You'll hear the drive spin down. It will eject partially, so you can remove it like a floppy.

### Put To The Test

We conducted a series of tests using the Inspire drive as a replacement for a normal magnetic disk and as a backup medium in lieu of a tape drive. We also created a bootable system disk out of one of the volumes and rebooted our MicroVAX with it.

Although access time for optical disks is much slower than for magnetic disks, we decided to run a comparison of the random access read/write capabilities of Inspire as a baseline. For our benchmark, we used the VAX Disk Benchmark V1.0 (see "Disk Benchmark," October 1988). We obtained figures for average access time (seek test) and average transfer rate (random read test), which measures the throughput of the CPU controller and disk combination. Because the VMS/controller overhead test assumes a high-performance hard drive with a relatively

high rotational speed, the benchmark couldn't compute average controller/VMS overhead for Inspire. Figure 1 compares Inspire's results with the MicroVAX's DUB1:, an Imprimis Wren V5.0 1/4-inch ESDI drive.

Our Inspire came supplied with a backup utility, Rapidstore V1.04, written in FORTRAN. Rapidstore claims a 300 to 700 percent increase in speed compared to normal VMS BACKUP to an Inspire disk. We ran informal tests to bear this out. For all the tests, we backed up 52 files in the [USERS.SOBEL] and [USERS.SOBEL.UTILS] directories from DUB1: to DUC1:. The total size was 589 blocks.

For the first test, we initialized a new optical disk using default VMS qualifiers. We then mounted the disk normal Files-11 and did a plain vanilla BACKUP of the files to a save set. It took 37 seconds to back up the 52 files. A BACKUP/VERIFY took 51 seconds.

The Inspire documentation suggests using the following qualifiers when initializing an Inspire disk for BACKUP to a save set:

```
INITIALIZE/CLUSTER_SIZE=4/NOHIGHWATER
DUC1: MYDISK
```

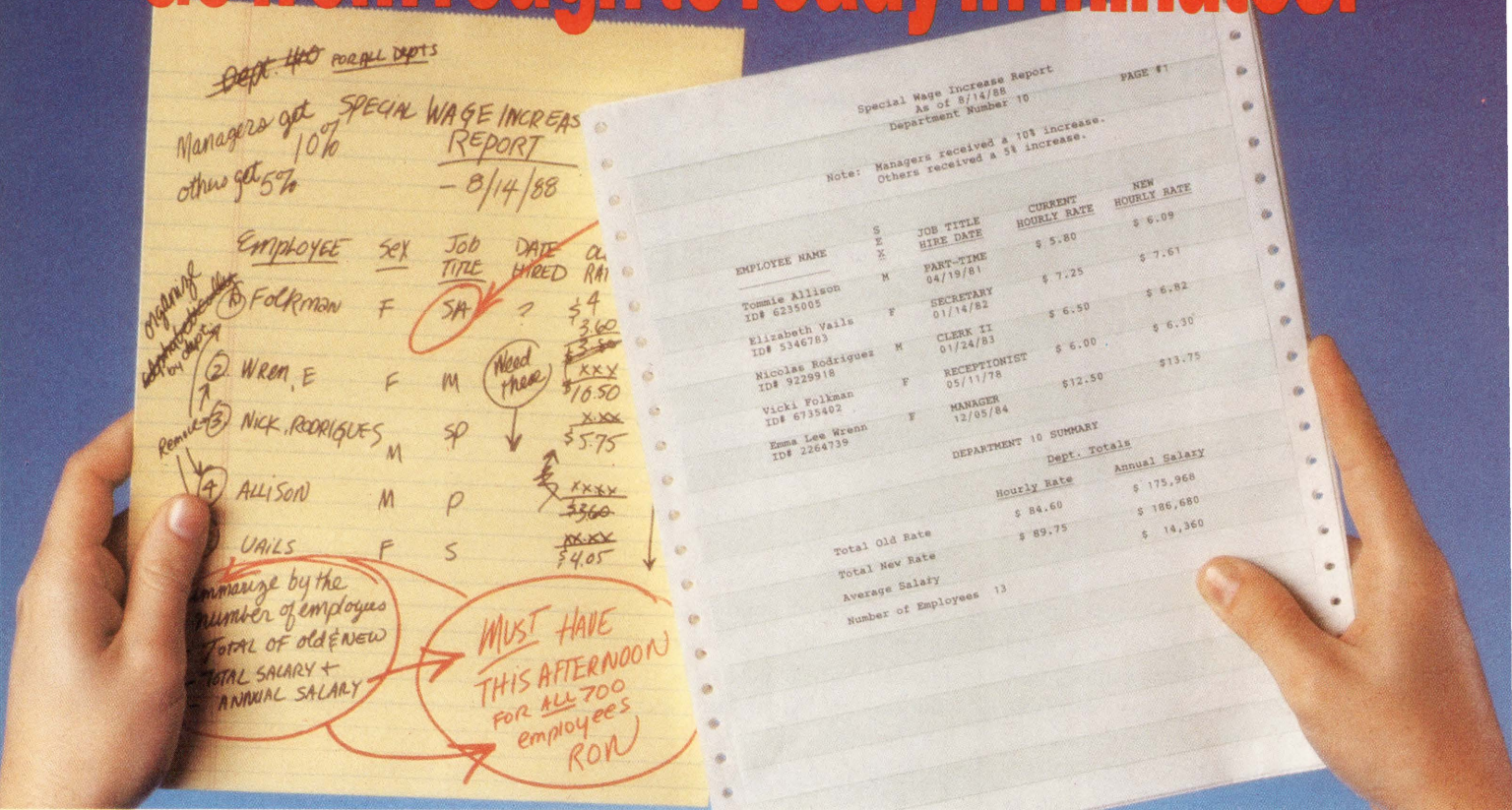
Then use the /NOCRC qualifier when running the BACKUP. This allegedly will decrease BACKUP time. We tried it and reduced the time to 23 seconds:

```
BACKUP/NOCRC [USERS.SOBEL...]
DUC1:TEST.SAV/SAVE_SET
```

For a verified BACKUP, Alphonix suggests letting the Inspire subsystem do



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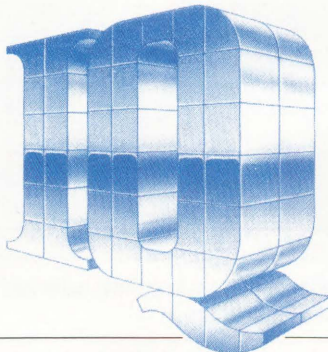
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block-by-block verifies at the controller level by initializing the disk with the /DATA\_CHECK qualifier and omitting the /VERIFY from the BACKUP command. The other initialization qualifiers would remain the same:

```
INITIALIZE/CLUSTER_SIZE=4/NOHIGHWATER
/DATA_CHECK DUC1: MYDISK
```

A verified BACKUP done this way took 29 seconds:

```
BACKUP [USERS.SOBEL...]
DUC1:TEST.SAV/SAVE_SET
```

Alphatronix does a fairly good job of explaining its qualifier choices. For a full explanation, consult your VMS documentation.

### Fast Backup

After squeezing all the optimization we could from our BACKUPS, we used Rapidstore. The installation procedure uses VMSINSTAL to copy the executable to your system. The documentation recommends copying it to SYSS\$SYSTEM. It also recommends setting the FILLM quota in UAF for the accounts that will be using Rapidstore to 200 or greater. We chose not to. We wanted to simulate an environment in which the system manager might not want the limit set that high for all user accounts using Rapidstore. During the course of the installation, it asks if you want "a new DCL command to invoke RAPIDSTORE." If you answer "yes," it adds the command to DCLTABLES.EXE.

To back up the files in my directory to a clean disk, we issued the following command (the file wildcard spec '\*.\*' is necessary with Rapidstore):

```
RAPIDSTORE [USERS.SOBEL...]*.*
DUC1:/INI
```

The INI qualifier tells Rapidstore to create a valid VMS Files-11 structured disk by initializing it with the following parameters:

```
/CLUSTER_SIZE=4
/NOVERIFY
/NOHIGHWATER
/INDEX=548
/HEADERS=5000
```

Again, check your VMS documentation for a full explanation of these qualifiers.

Rapidstore then prompts for a volume name and checks if the drive is mounted. If not, it asks if you'd like it mounted. If it isn't mounted FOREIGN, it asks if you'd like the volume remounted. It then copies the files. This is a handy feature. How many times have you started BACKUP only to realize you haven't MOUNTed the disk or MOUNTed it the way you wanted to?

If you issue the command:

```
RAPIDSTORE [USERS.SOBEL...]*.*
DUC1:TODAY /INI/ISO
```

Rapidstore will use the isolate (/ISO) qualifier to create a directory [TODAY] below the root directory of the optical disk and copy the entire directory structure of your files beginning at that level. This is handy if you want to organize your backups by day, date, user group or other criteria:

```
DUC1:[000000.TODAY.USERS.SOBEL.UTILS]
```

If the disk already has been initialized by Rapidstore, you should leave out the /INI qualifier.

We timed the Rapidstore backup of the files to a separate directory as indicated above (see Figure 2). It backed up the 52 files, 589 blocks in two directories in 10 seconds. When we let Rapidstore mount the disk it added another five seconds to the operation. Compared with the 37 seconds for a normal VMS BACKUP, the result is a 270 percent speed increase. We then did a regular VMS BACKUP to the same optical disk after Rapidstore initialized it. Because the disk already was mounted, it took 20 seconds. But even in this scenario, Rapidstore yields roughly a 100 percent speed increase. Note, however, that your results may vary.

### Quick Recovery

The best thing about backing up to Inspire is that, because the files are on a valid VMS Files-11 disk, no lengthy restore procedure is necessary. Files can be accessed using VMS DIRECTORY and

Figure 2.

Initialization Qualifiers	Backup Command	Elapsed Time (Approximate)
(VMS default)	BACKUP [USERS.SOBEL...] DUC1:TEST.SAV/SAVE_SET	37 sec.
(VMS default)	BACKUP/VERIFY [USERS.SOBEL...] DUC1:TEST.SAV/SAVE_SET	51 sec.
INITIALIZE/ CLUSTER_SIZE=4/ NOHIGHWATER/	BACKUP/NOCRC [USERS.SOBEL...] DUC1:TEST.SAV/SAVE_SET	23 sec.
INITIALIZE/ CLUSTER_SIZE=4/ NOHIGHWATER/ DATA_CHECK	BACKUP [USERS.SOBEL...] DUC1:TEST.SAV/SAVE_SET	29 sec.
(See Text)	RAPIDSTORE [USERS.SOBEL...]*.* DUC1:TODAY /INI/ISO	10 sec.
(Initialized by Rapidstore)	BACKUP [USERS.SOBEL...] DUC1:TEST.SAV/SAVE_SET	20 sec.

Comparison of backup times with and without Rapidstore and using various initialization and BACKUP qualifiers.



## FROM THE LAB

COPY commands. And if you plan ahead when you back up your data, in the event of disaster you can redefine logicals and point directly to your last backup copy of the corrupted files on the applicable Inspire backup volume.

We made an image backup of our system disk to the Inspire drive to see if we could boot off it and to see how long

“

**Inspire is ... an alternative to nine-track tape backup.**

”

it would take in comparison to our Imprimis Wren VI. Process accounting showed CPU E.T. for the Wren VI of 3:19.23. The Inspire disk took 6:10.71. This might seem slow, but it beats booting standalone BACKUP from a TK50, and you get a full system. If you go with Inspire, you should make an IMAGE BACKUP of your system on an Inspire volume and put it in a safe place.

DOCUMENTATION FOR INSPIRE and for Inspire and for Rapidstore comes in two flexible binders. Installation instructions are concise. Suggestions are offered for integrating Inspire and Rapidstore into your daily routine, and a quick introduction to related VMS commands is offered for novice users.

Inspire is worth considering, especially as an alternative to conventional nine-track tape backup. Because of the large capacity of the optical disk compared to tape, even at 6,250 bpi, unattended backup at night could become one of your options. Coupled with its random access capabilities, erasability, security in removable media, the reliability of optical read/write and a formidable backup utility in Rapidstore, Inspire could make a system manager's wishes a reality. ■

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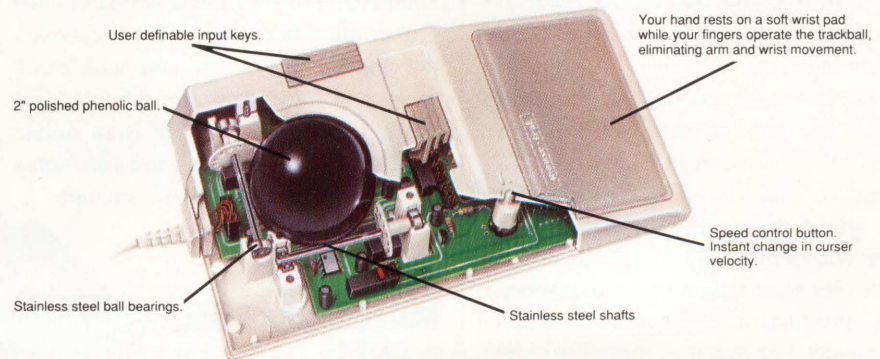
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**Evan Birkhead**

# The ABCs Of Digital Agreements

Digital Equipment Corporation recently overhauled the nomenclature for its third-party relationships in an effort to eliminate the alphabet soup. It simplified the number of agreements to three basic types: ISVs, CMPs and OEMs.

However, there's still some overlap and market confusion. If a DEC or third-party salesperson has been trying to close a deal with you by slipping in these terms, here's what they mean.

## Independent Software Vendors

The one-year-old ISV program is available to ULTRIX and VMS software vendors and developers. DEC will enter a company into its ISV program after testing and approving its software application. Approval means that the company is eligible to be referred by DEC sales and marketing people and has access to DEC's technology labs.

There are several sidelights to being an ISV. ISVs have access to two Developer Technology Centers in Marlboro, Massachusetts, and Mountain View, California, where they can build their applications with senior engineers. ISVs also receive prerelease training on unannounced DEC products and discounts on developer's kits. For example, more than 1,000 programmers from ISVs had early release training on DECwindows and could begin developing DECwindows applications as soon as the program was available. The ISVs must purchase their development equipment like everyone else, but they get discounts — about 40 percent off VAXstation and DECstation 3100s, for example.

The ISV program isn't a legal agreement. It's only an indication that DEC agrees that the ISV's software runs on VAXs and that it's compliant with DEC software standards and architectures. In particular, DEC reports that it's looking for applications that can grow with its Enterprise Networking program.

ISVs undergo a relatively painless approval process to determine if their applications fit into the program. "We wanted to expand our marketing base on DEC equipment," explains Ed Gaudet, marketing manager for Boston Business Computing (BBC). "DEC sent a three-page ISV questionnaire that asked specific questions about our financial information, corporate history and VAX product line."

"After that, the approval process took about two weeks," he continues. "We already had a lot of contact with their salespeople, so they knew firsthand what our product was about. We received a developer's kit, which came with order forms and information on the ISV Network." The ISV Network is an online forum with Notes, e-mail and a Videotex bulletin board where ISVs exchange ideas about technology.

## Cooperative Marketing Program

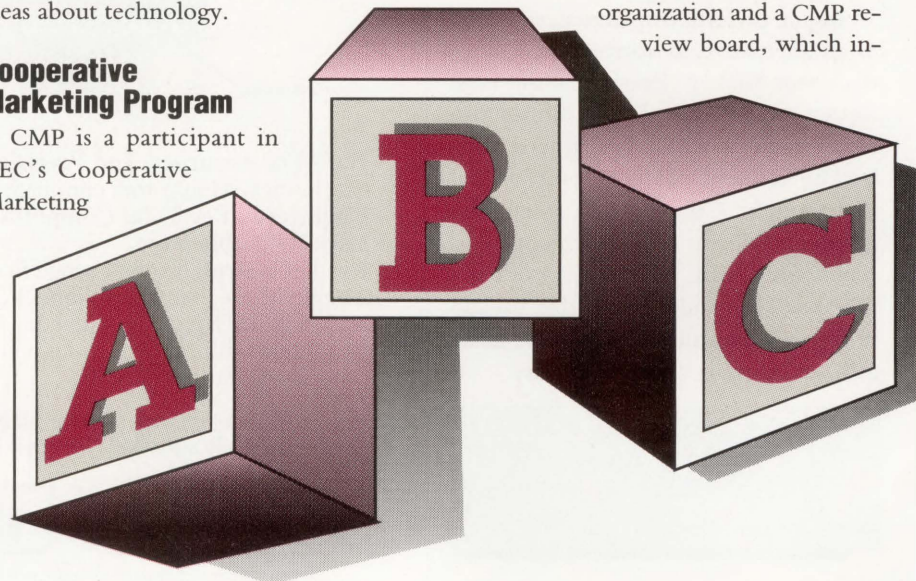
A CMP is a participant in DEC's Cooperative Marketing

Program, which began in 1977. DEC claims to have coined the terms CMP and OEM, but both have undergone several redefinitions and revisions. A CMP is a legal agreement that specifies how DEC will work with a third party to market and sell its products jointly. No reselling or value-adding of equipment is implied by a CMP agreement. It's fundamentally an outline for a cooperative sales effort.

DEC carefully selects and reselects candidates for this program. "They used to be evergreen [permanent]," recalls Joe Lawrence, applications marketing manager for the Engineering Systems Group. "But now we have renegotiations with all vendors after one year."

DEC looks for the same basic characteristics in CMPs as it does in ISVs, but includes additional, more stringent requirements. In many instances, the ISV program is a steppingstone into the CMP program. "CMP is definitely the next step for us," surmises BBC's Gaudet.

Many CMPs enter the program on the recommendation of a local DEC sales representative. They're then subject to a fairly rigorous analysis by an applications marketing group, the Channels organization and a CMP review board, which in-





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## Industry Watch

**Network Blueprint Progress** — Recently, DEC showed off the progress it has made during the first year of development on its Enterprise Management Architecture (EMA). EMA, which spans five ISO categories, is building a family of products called DEC Management Control Center (DECmcc). Although many of EMA's interface protocols to important network submodules won't be ready for another year or more, some completed technologies have been previewed, including its two basic software technologies:

■ The DECmcc Management Station V1.0 is a package of familiar site management software (VAX Ethernim, LAN Traffic Monitor, Terminal Server Manager and Remote Bridge Management Software) combined with the DECnet monitor. It will be available at a flat price: \$20,400 for the LAN version and \$35,700 for the Enterprise version. The program uses a DECwindows interface to access other network software programs and a 3270 terminal emulation through the DECnet/SNA gateway. All DECmcc packages will provide transition paths for DEC's current networking software customers.

■ The DECmcc Director is DEC's name for the suite of all networking protocol interfaces being designed. A developer's toolkit will be available to guide users and vendors through the design of compatible applications. The modules in this portion won't be completed for at least two years.

**Object Operations** — The newest release of the Ingres RDBMS from Ingres (formerly Relational Technology) includes objectlike rules that set the table for the object-oriented system that will probably be available with V7.0. This significant upgrade, which at first was called V7.0 but will officially be the lower profile V6.3, is an intelligent database with "knowledgeable" features such as cascading, nesting and recursion built into the rules system.

The system includes user-defined data types and functions and a Resource Control System that sets and enforces limits. The company says that the new version is faster on parallel processing systems and has improved locking for VAXcluster configurations.

**And The Winner Is ...** — The Open Software Foundation (OSF) may have lost a step to AT&T in the widely publicized duel for a standard UNIX operating system. While AT&T released a new version of System V that incorporates many state-of-the-art UNIX features, OSF pushed back the date of its full operating system delivery by dropping IBM's AIX as the core technology and replacing it with Carnegie-Mellon's Mach. Mach is better optimized for multiprocessing systems and has a tighter security system. It's the operating system of the Encore Multimax multiprocessor and the Next workstation and is

compatible with UNIX 4.3BSD.

**Unified Testing** — OSF, UNIX International and X/Open announced an agreement to work toward a comprehensive, integrated conformance testing environment for open systems. The goal is to provide a worldwide standard of quality and functionality for open systems and provide hardware and software vendors with a common base for verification technology.

The first task will be the specification of an architecture for a verification/test environment. The specification will include a user interface to verification suites that will give conformance testers a consistent approach for executing suites and determining results as well as a developer interface to verification suites that will give programmers a consistent specification for writing conformance tests.

**Parity Line** — While rolling out Parallel Architecture Extended (PAX), a specification for software on the i860 microprocessor codeveloped with Alliant (which uses the i860 in its parallel systems), Intel was forced into an unplanned diversion by recalling and redesigning its parity-deficient 486.

**X-Terminators** — C.Itoh is one of the latest VT-compatible terminal manufacturers to ship a client/server X terminal. The \$2,795 Network Display Station supports Ethernet, TCP/IP and LAT. GraphOn introduced a new version of its host-based implementation with a lower price. And Network Computing Devices has announced a program that establishes that terminal producer as a single source of information on available application programs that implement DECwindows.

**From Blue To You** — Another company that historically has developed software for the IBM mainframe market has decided to release a functionally identical version for the VAX. AICorp produces Knowledge Base Management System/VAX (KBMS/VAX), a C language object-oriented expert system development tool with database hooks. The program uses a natural language user interface called Intellect.

**SPECTator Sports** — The organization that's developing a suite of consistent workstation benchmarks is called Systems Performance Evaluation Cooperative (SPEC). Governed by DEC, HP, IBM, Intergraph, Mips, Sun and others, SPEC recently released a suite of UNIX-coded benchmark tapes for equal comparisons.

Release 1.0 consists of 10 scientific and engineering benchmarks and encompasses 150,000 lines of C and FORTRAN code. It costs \$450. Future suites will measure system performance in multiuser and networked environments as well as performance of disks, graphics and communications systems.

cludes representatives from other CMPs. There are about a dozen marketing groups, which are divided by application, e.g., banking and insurance, scientific, engineering, and communications.

For the CMP program, DEC looks for companies that will provide a strategic sales advantage. According to Lawrence, DEC evaluates each product from the perspective of how it will leverage sales. "We're looking for a certain degree of

commitment," he explains, "and a reasonable level of penetration."

Lawrence says that his group looks beyond a company's stable financials and Enterprise Network compliance to its reputation with customers in such areas as maintenance, upgrades and response to problems. "We get close to the [market share] leaders first," he acknowledges. "Then we determine if it's worth our while to have a relationship."

The more than 150 CMPs break down into three basic groups:

1. CMPs that offer strategic products on which DEC relies to sew up sales to certain markets. Some third-party products fill gaps in areas in which DEC is barren. For example, Palette Systems, which integrates CAD/CAM and CAPP programs with factory floor databases, is pivotal in sales to the CIM industry. In scientific laboratory sites, DEC would be hung out to dry without its team of laboratory



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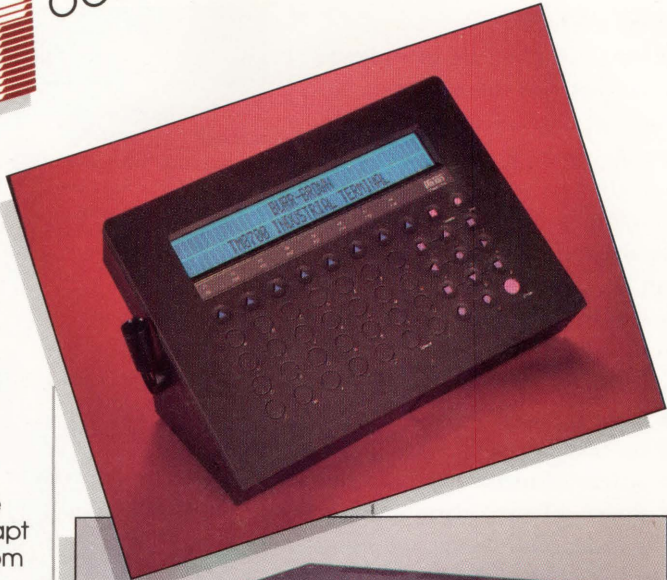
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applications vendors.

2. CMPs that DEC needs in order to show customers that there's a wide selection of VAX software packages targeting a specific application. For some applications, DEC may recommend products from more than 10 competing CMPs.

3. CMPs that offer products that compete with DEC's but are so superior that DEC has no choice but to bring them to the customer's attention. Companies that offer RDBMSs, for example, are entering the CMP program.

After companies qualify, DEC implements a system of metrics that measure various aspects of the relationships to determine if the relationships are profitable.

From the CMP side, some are ecstatic and others are disappointed with their profits. As the program underwent rapid expansion a few years ago, a vocal minority of third parties claimed that they weren't benefiting from it. But the complaints have quieted a bit, because DEC more carefully defined the relationships and the types of companies with which it could work.

## Companies Mentioned In This Article

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CIRCLE 544 ON READER CARD

Alliant Computer Systems Corp.  
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Littleton, MA 01460  
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CIRCLE 536 ON READER CARD

Apple Computer Inc.  
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Cupertino, CA 95014  
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CIRCLE 427 ON READER CARD

AT&T  
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New York, NY 10022  
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CIRCLE 537 ON READER CARD

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Andover, MA 01810  
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CIRCLE 558 ON READER CARD

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## ALL-IN-1 Phase II

Today, information systems departments are flooded with user demands to deliver custom-built solutions. At the same time, computer users are increasingly dependent on information technologies. As a result, end-user computing has started to split. From the desktop, users can satisfy their needs with PCs and workstations supporting such isolated tools as word processing and personal databases. From the computer center, information systems manage projects, connectivity and corporatewide data. The two worlds can be largely unrelated, and without the proper tools, each can remain unsatisfied.

From these often contrasting worlds comes the next generation of professional computing. The roles of users and the information systems department will shift. The information systems department is changing from user software developer to user software consultant. It will provide information to anyone who needs it. It will solve users' needs by introducing them to powerful but easy-to-use desktop tools. With these tools, users can develop their own specialized applications.

Digital's Business and Office Information Systems (BOIS) group is betting that its ALL-IN-1 office system — DEC's software flagship — will bridge the gap between desktop and information systems. In October 1989, DEC announced ALL-IN-1 Phase II (V2.4), the next generation of ALL-IN-1. ALL-IN-1 Phase II is built on DEC's Network Application Support (NAS) services and supports MS-DOS, OS/2, Macs, DECwindows workstations, DEC video terminals and IBM 3270 users.

The most noticeable enhancement to ALL-IN-1 is the ALL-IN-1 integrated office server. This implements a client/server architecture to

support PCs and DECwindows devices. This client/server system allows users to choose the desktop device best-suited to their needs. Prices for ALL-IN-1 V2.4 start at \$1,245 for a four-user license.

Also announced was ALL-IN-1 Desktop for MS-DOS. It works with PCSA and is priced at \$195 per user. Other client desktop platforms, including ALL-IN-1 Desktop for VMS DECwindows and Apple Macintosh Personal Computer Support, are scheduled for release in July 1990. DEC reported that OS/2 Standard Edition will be available within the next 12 months.

DEC intends to enhance the ALL-IN-1 office server to enable users of ALL-IN-1 desktop client devices to share files containing revisable compound documents. Other announcements include ALL-IN-1 Mail software supported by the ALL-IN-1 Mail Server. This mail server is the core software for all future ALL-IN-1 mail, including ALL-IN-1 clients and integrated ALL-IN-1. ALL-IN-1 Mail client software is available now for MS-DOS and VMS DECwindows.

More surprising than the list of enhancements to ALL-IN-1 is the list of vendors endorsing DEC's new Business Intelligence strategy. DEC claims that its Business Intelligence strategy, which includes NAS, is a key component of ALL-IN-1 Phase II. NAS is DEC's strategy for delivering a unified software environment in the 1990s. It will enable applications to share information and resources, regardless which systems run the applications.

DEC claims that its Business Intelligence applications address professionals' needs for accessing and analyzing information and sharing decisions with others. — *David W. Bynon, Workstations Editor*



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## Low-End Boost

Just two weeks after introducing its most powerful computer, the VAX 9000, DEC released a slew of new products to bolster its low end. On November 7 1989, DEC officials gathered at Boston's World Trade Center to announce more than 20 new products aimed at the desktop and peripheral services. The company noted price reductions as well.

The single message that shone through was that you now can run software on just about any standard operating system on a DEC computer. These computers will be linked through DEC's Network Application Support (NAS) networking environment.

At the top of the long list of new products are DECnet support for OS/2, further girding of DECwindows for PCs and workstations, enhanced PC integration software, additional VAX-based workstations and additions to the low end of DEC's printer lineup.

With DECnet for OS/2, you can run OS/2 Standard Edition-based PCs and servers as full peers on a DEC network. DECnet for OS/2 includes task-to-task communications, terminal emulation with multiple session support, disk and printer resource sharing, bidirectional transfer of ASCII and binary files between OS/2 network nodes and other network nodes and Netbios interface support. It also includes the OS/2 electronic mail utility, network management utilities and NDIS technology software support, licensed from 3Com for driver compatibility. Available now, DECnet for OS/2 costs \$300 per client.

John Rose, group manager of the Personal Computer Systems Group, said that DECnet for OS/2 is the first of many products to come for the OS/2 arena. In 1990, expect to see access to file, disk and resource sharing, LAN and WAN access, and DECwindows support in future versions of VMS Services for PCs.

### Open Windows

Workstation and PC users will be able to open more windows on their terminals this year. DECnet PCSA Client for DOS V3.0 includes the DECwindows Display Facility, which supports multiple X sessions on the PC screen. These windows can display results from any system running X applications anywhere on the DEC network. V3.0 server software will be added around February, said Rose.

X-compliant VMS V5.3 includes numerous enhancements to the DECwindows environment. It provides TCP/IP transport for transparent integration of applications on UNIX computers and extended international language features. New features let you more easily customize DECwindows sessions, desktop applications and new commands for FileView. Programming features have been extended with

new routines, attributes, arguments and datatype structures.

In addition to DECwindows enhancements, VMS V5.3 has been blessed with a new naming device, the VMS Distributed Name Service (DNS) Clerk. DNS stores names of resources such as files, disks, nodes, queues and mailboxes. With DNS, you can keep track of resources anywhere in a distributed system — part of DEC's effort to encourage the use of such distributed systems. The service makes it easier to avoid errors when moving resources in a network. Multiple users now can refer to a common resource by the same name and access a common set of files without knowing the files' physical locations.

DEC announced new services for ULTRIX users, as well. With little fanfare, the company released ULTRIX Worksystem Software (UWS) V2.2, which includes graphic subsystem software components for DEC workstations. UWS V2.2 is based on DECwindows and will support OSF/Motif and Adobe's Display PostScript.

DEC officials reiterated the company's strong integration message during the product announcement. "Everything today is linked by NAS guidelines. NAS is the glue that joins DEC hardware and software together, along with that of other vendors," said DEC spokesman Bob Price. Along these lines, the company released PCSA Software V.3. It provides VMS Services for PCs and the DECnet PCSA client for DOS. Used in any VAX, VMS Services for PCs offers such features as file and disk storage and resource sharing, including mail, printing and network access.

THE COMPANY ALSO ANNOUNCED two general-purpose, low-end workstations, the VAXstation 3100 Models 38 and 48. The Model 38, which starts at \$10,950 for a diskless system with 8 MB of RAM, accommodates up to three internal 3 1/2-inch storage devices and can run SoftPC, a DOS emulation tool.

The Model 48 is powerful enough to be a server, offers more storage capacity (including up to two 5 1/4-inch half-height storage devices in addition to the 3 1/2-inch drives), and runs Insignia Solution's SoftPC. The DECstation 212, another 80286-based PC, runs at 12 MHz. Prices start at \$1,440. DECstation 316 and 320 options have dropped in price from 19 to 39 percent.

In addition, DEC introduced the graphics-capable LA324 multiprinter, a \$1,995 heavy-duty printer that produces drafts at 300 cps and letter-quality hardcopy at 100 cps. The company also introduced a host of printer peripherals. —*Elaine L. Appleton, UNIX Editor.*

DEC's Channels Marketing Group now identifies several avenues beyond ISVs and CMPs sales forces through which potential customers are uncovered. These include industrial distributors and subsidiaries, which access a broader range of territory and small businesses than DEC can reasonably expect to reach. At the simplest level a toll-free number (800) DEC-ISVN provides information on the DEC product lines and ISV and CMP

product lines. (The term Systems Cooperative Marketing Program [SCMP] no longer exists at DEC. SCMPs bundled software into VAX turnkey systems and comarketed the solutions with DEC.)

Historically, the most important agreements for DEC have been with its OEMs, which were pivotal in finding and servicing its bread-and-butter scientific and engineering customers. It's been a love/hate relationship at times, but the majority of legal battles appear to have ended with the current legal description of an OEM.

The term OEM spans a wide variety of companies that buy VAXs from DEC and in some way must add value to them before they resell. An OEM is "a sales agreement for volume purchase and resale," says Lawrence. "[The OEM] must provide added value."

By far the most complex relationship to establish, define and maintain, an OEM agreement usually takes time to develop. OEM relationships may at once be the toughest and the friendliest and most profitable. ■





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**Philip E. Bourne, Ph.D.**

# File Management: UNIX Versus VMS

*Editor's note:  
We continue our  
introduction to  
UNIX for VMS*

*users by discussing the underlying principles that govern UNIX file management.*

If your desk is a sea of paper, then your VMS disk files may be in a similar state — a directory hierarchy with some subdirectories overflowing with files and others empty and never accessed. Most files of any use are found in subdirectories with such unimaginative names as [TEMP] or [SCRATCH].

Moving to UNIX doesn't prevent this natural tendency toward disorder. But because UNIX doesn't support multiple versions of a file, it takes longer to reach the same chaotic state. UNIX and VMS manage files similarly, but the command names and options differ. Figure 1 outlines the most commonly used UNIX file management commands and their VMS counterparts. To consider some of the underlying principles that govern UNIX file management, we need only a subset of the commands given in Figure 1.

## File Management Commands

UNIX has many file management commands. The modularity of UNIX and the ease with which commands have been added have led to commands that at first appear to have similar functions. For example, the TYPE command displays a VMS file. UNIX has such things as **cat** (display), **more** (display pausing after each screen), **head** (display the beginning of a file), **tail** (display the end of a file) and **pr** (display with headers, and so on, suitable for a printer).

This is confusing to the novice UNIX user. With use, the value of these commands becomes apparent. For example, a program can write a large file, but only

by viewing the end of it can you determine whether or not the application ran successfully. The command **tail** displays the end of that file in less time than it takes the VMS user either to display the whole file or edit the file and display the

last few lines.

Similarly, **head -1 \*.c >> index** enters the first line of all the C source files in a directory to the file index. This is useful if you reserve the first line of a program for its name and function, be-

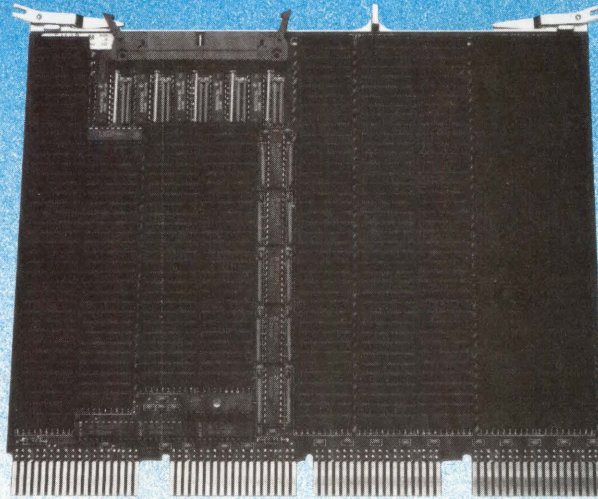
**F** I G U R E 1 .

UNIX	VMS	Purpose
ar	LIBRARY	archive files
awk	EDIT/TPU	pattern matching utility
cat	TYPE	catenate and print to terminal
cd	SET DEFAULT	change working directory
chgrp	SET FILE	change the group ownership
chmod	SET PROTECTION	change protection
cmp	DIFFERENCE	compare two files and report the first difference
cp	COPY	create a new copy
diff	DIFFERENCE	report all differences between two files
ex	EDIT	edit a file
find	DIRECTORY	locate a file
fsplit	-	split into functional parts
ftp	COPY	transfer to/from remote host
grep	SEARCH	find a string
head	EDIT/READ	output the first part of a file
lorder	LIBRARY	find ordering relationship
ln	ASSIGN	create a symbolic link
ls	DIRECTORY	list contents of a directory
merge	MERGE	merge files
mkdir	CREATE/DIR	make a directory
more	TYPE/PAGE	file perusal filter for CRT
mv	RENAME	move (or rename)
nroff	RUNOFF	text processing
od	DUMP	octal, decimal, hex, ASCII dump
pr	PRINT/HEAD	print file
pwd	SHOW DEFAULT	working directory name
ranlib*	LIBRARY	convert archives to random libraries
rcp	COPY	remote file copy
rm	DELETE	remove or delete
rmdir	DELETE	remove a directory file
sort	SORT	sort by key
tail	EDIT/READ	output the last part of a file
tar	BACKUP	tape archive
touch	CREATE	update file characteristics or create a null file
tr	EDIT	translate characters
troff	RUNOFF	text formatting and typesetting
uucp	-	remote file copy to neighboring host
uusend	-	remote file copy
vi	EDIT	edit a file
wc	-	count words
*BSD only		

*File management commands: UNIX versus VMS.*



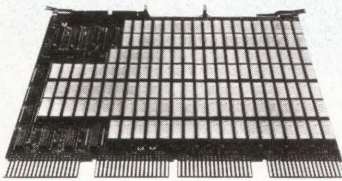
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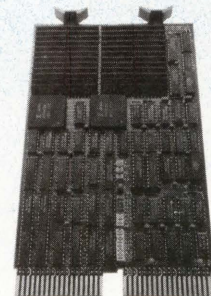
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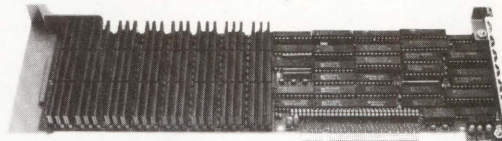
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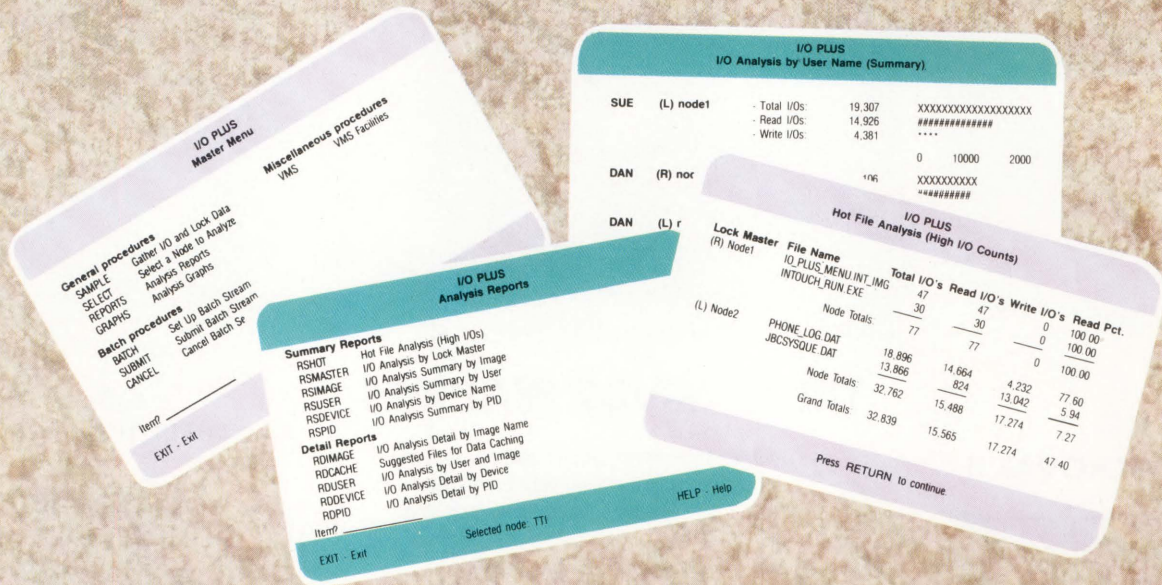
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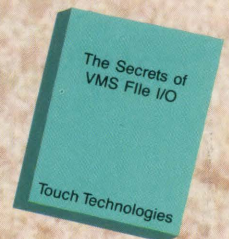
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## FIGURE 2.

### Command line options:

% more -c file1 file2	Refresh screen (default scroll)
% more -15 ../file1	Terminal window 15 lines (default 24)
% more -f widefile	Truncate long lines (default wrap)
% more +10 my_file	Begin display at line 10

### Options while paused during file display:

<space bar>	Scroll one screen
<return>	Scroll one line
i	Scroll i lines
t	Return to top of file
if	Skip i screens and print a screen
is	Skip i lines and print a screen full of lines
q or Q	Terminate file display
i/expr	Search for the ith occurrence of the expression
:f	Display the current file name and line number
.(dot)	Repeat the previous command
h	Help on the above

*The command more offers many options.*

cause you've created an index of all your C source code files.

What happens if you forget the names of these commands? While VMS has the command HELP HINTS, UNIX (more specifically ULTRIX and other BSD versions) has **man -k keyword**, which returns the header lines of all the **man** page entries containing a keyword.

UNIX file management commands offer many options. At first, the UNIX command **more** seems similar to the VMS command TYPE/PAGE, pausing after each screen is displayed. However, **more** is more powerful and complex, performing like an editor in read-only mode (see Figure 2).

What happens if you forget the letter(s) representing a command option? This can happen because of the number of options, and because the options aren't consistent. The VMS user forgetting the name and function of a qualifier can move through a hierarchical help scheme quickly, locating a qualifier name and function. The UNIX user invoking the **man** command is faced with a top-to-bottom view of the terse description found in the written documentation. This information often scrolls off the screen before it's absorbed. Fortunately,

the **man** page is piped through **more**, making the commands outlined in Figure 2 available to help interrogate any **man** page.

UNIX file management commands are often powerful but complex, in part because of the lack of consistency in command syntax. For example, the **find**

command has a unique syntax. Most commands have options of one or two letters, but **find** options are four letters, with order and placement critical. However, as Figure 3 illustrates, **find** is powerful and particularly useful to system

“

**UNIX is good at manipulating directory trees.**

”

managers. It can locate files and execute commands on those files.

The command **find / -name ourfile -print** is the simplest use of **find**. It locates all files on the system (from the root directory /) named ourfile and lists them. (UNIX print nearly always implies “print” to the screen.) The command **find /user1 -mtime +45 -print** locates all files from /user1 down the directory hierarchy, listing any files that haven't been modified for at least 45 days. The command **find /usr/fred -name '\*.f' -o (-mtime -3 -atime -6) -exec**

## FIGURE 3.

example: % find / -name ourfile -print

example: % find /user1 -mtime +45 -print

example: % find /usr/fred -name '\*.f' -o (-mtime -3 -atime -6) -exec rm {} \;

*The command find is powerful but complex.*

## FIGURE 4.

VMS	UNIX
example: \$ BACKUP [USER1...] [USER2.USER1...]	% cp -r /user1 /user2
example: \$ BACKUP [USER1.FRED...] [USER2.JOHN...]	example: % cd /user1/fred ; tar cf - .   (cd /user2/john ; tar xf -)

*Manipulating directory trees.*



**rm** { \; locates and deletes all files from /usr/fred down the directory hierarchy ending in .f that either have been modified within the last three days or accessed within the last six days.

## The Directory Tree

UNIX is good at manipulating directory trees. VMS users who want to delete a series of subdirectories containing files must repeat the delete command, because a directory pointer file will be deleted only if the subdirectory to which it points is devoid of files. The UNIX command **rm -r directory** deletes directory and all subdirectories and their associated files. This is powerful yet potentially devastating. Fortunately, **rmdir directory** only deletes directory if it's empty. This is good news for the UNIX novice and the faint of heart. Directory trees can be merged and grafted as shown in Figure 4.

There are no revelations for VMS users familiar with BACKUP. The UNIX user needs the commands **cp -r** and **tar** to achieve the functionality of BACKUP. In some circumstances, the UNIX user can invoke **rcp -r** (a remote version of copy) for copying to and from a remote host. The VMS user first must create a BACKUP saveset on a disk attached to the local node. The backup saveset then is copied to the remote node as a single file, and the directory hierarchy is reconstructed with further use of the BACKUP command. In the first example in Figure 4, the file /user1/fred/file.txt would become /user2/user1/fred/file.txt, and in the second example /user1/fred/file.txt would become /user2/john/file.txt, illustrating both the grafting and merging of directory trees.

## Shell-Specific Commands

UNIX file management is complicated by having shell-specific commands. Built-in features in the UNIX C shell are useful for moving among commonly used directories.

One feature is the shell variable **cdpath**. You can move from the current working directory to a directory defined

by **cdpath** without regard to the relative or absolute pathname required to get to that directory. A similar result, with one notable difference, can be achieved in VMS using the ASSIGN command (see

Figure 5).

VMS ASSIGN establishes a pointer to a specific directory, whereas **cdpath** establishes a pointer to the parent directory of any subdirectory that's frequently

FIGURE 5.	
VMS	UNIX
example: \$ ASSIGN DUA2:[USER.TEST] TEST \$ SHOW DEFAULT DUA3:[PROGRAMS.NEW] \$ SET DEFAULT TEST \$ SHOW DEFAULT DUA2:[USER.TEST]	% set cdpath = /user/test % pwd /programs/new % cd temp % pwd /user/test/temp
example: \$ ASSIGN DUA2:[USER.DOC] DOC \$ ASSIGN DUA2:[USER.COM] COM	% set cdpath = (/user/doc /user/com)

*Shell-specific file management with cdpath.*

FIGURE 6.	
example: % pwd /user2/programs/new	
example: % pushd /usr /usr /user2/programs/new	# Push /user2/programs/new onto the stack # and make /usr the current directory.
example: % dirs /usr /user2/programs/new	# Display the directory stack.
example: % pushd /etc /etc /usr /user2/programs/new	# Push /usr onto the stack and move to /etc
example: % pushd +1 /usr /user2/programs/new /etc	# Rotate the stack +1 times
example: % popd /user2/programs/new /etc	# Discard the current working directory and move # to the next entry on the stack
example: % pwd /user2/programs/new	
example: % cd /tmp	
example: % dirs /tmp /etc	

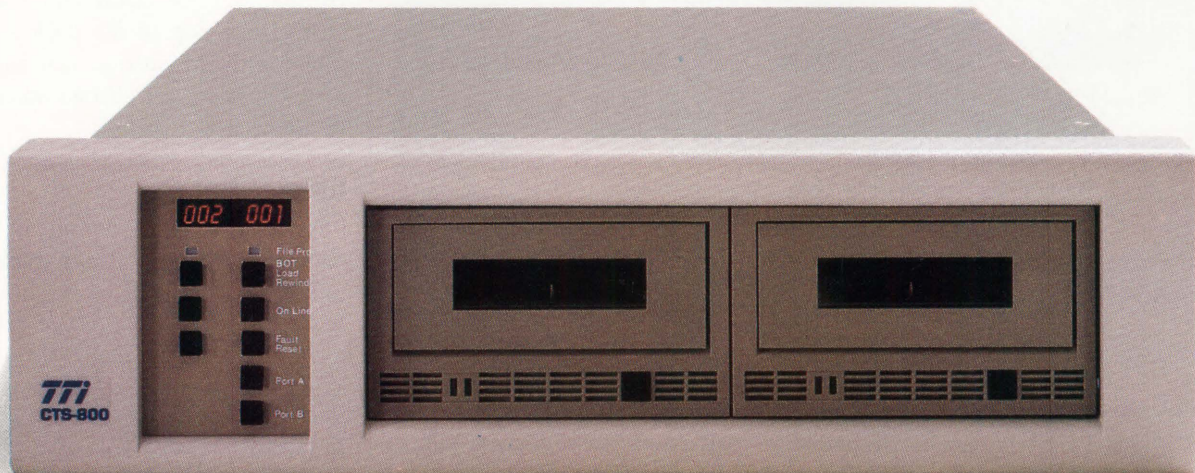
*The directory stack: shell-specific file management.*



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F

## FIGURE 7.

<pre>% pr -m file1 file2 Maine      Texas Montana   Montana Nebraska  Illinois Illinois  Alabama Iowa      Maine</pre>	
VMS	UNIX
<pre>example: \$ DIFFERENCE/PARALLEL/MATCH=1 FILE1. FILE2. [output not shown]</pre>	<pre>example: % diff file1 file2 1c1 &lt;Maine ---- &gt;Texas 3d2 Nebraska 5c4,5 &lt;Iowa ---- &gt;Alabama &gt;Maine</pre>

*diff: a command with complex output.*

F

## FIGURE 8.

<p>Line 1 Consists of three fields:</p> <ul style="list-style-type: none"> <li>(i) — The line number or range of line numbers in the first file prior to the change.</li> <li>(ii) — A character to describe the type of change, for example, a = append, c = change, d = delete.</li> <li>(iii) — The line or range of line numbers after the change.</li> </ul>
<p>Line 2 The line(s) from the first file if appropriate. The line(s) are identified by a "less than" (&lt;) symbol.</p>
<p>Line 3 A delimiter (----) between the items of the first and second file, if appropriate.</p>
<p>Line 4 The line(s) from the second file, if appropriate. The line(s) are identified by a "greater than" (&gt;) symbol.</p>

*The changes required to make file1 identical to file2 using ex editor commands.*

accessed. The first VMS command in Figure 5 establishes the symbol TEST for the directory specification DUA2: [USER.TEST], whereas the UNIX command `set cdpath = /user/test` establishes a pointer to all subdirectories of /user/test.

Changing the directory to temp makes /user/test/temp the current working directory. If /programs/new/temp existed, it would be the current working directory. The command `set cdpath`

`= (/user/doc /user/com)` illustrates that multiple directory arguments can be given to `cdpath` by enclosing them in parentheses and separating them with a blank.

Another feature of C shell-specific directory manipulation introduces the concept of a directory stack. A directory stack is a list of directory specifications retained by the C shell for the current terminal session only. Directory specifications can be placed on the stack and recalled as required. The current working directory is always at the top of the

directory stack. Figure 6 illustrates the use of a directory stack.

We begin in the directory /user2/programs/new. This directory is pushed on to the directory stack with `pushd /usr`, and /usr becomes the current working directory. The directory stack is displayed when the `pushd` command is used, and the same is true of other commands that manipulate the stack. The contents of the directory stack then are interrogated with the C shell command `dirs`. Further use of the `pushd` command (`pushd /etc`) deepens the stack, with /etc becoming the current working directory.

The command `pushd +1` then makes the first directory stack entry the last and the last directory stack entry the first, i.e., the stack is rotated +1 times. The top of the directory stack — the current working directory — is discarded, and the second entry on the stack becomes the current working directory with the `popd` command. The command `cd /tmp` changes the top of the stack to correspond with the current working directory, but it doesn't change other entries in the stack.

### Obtuse Output

Output of UNIX file management commands appears terse. For example, `ls` returns only a list of filenames. Unlike the analogous VMS DIRECTORY command, there's no indication of the directory being interrogated or the total number of files in that directory. Why be so terse? In the case of `ls`, there's a good reason. The output of `ls` constitutes a file list that can be used by other commands. For example, `vi 'ls *.c'` sequentially edits all C source files in a directory. This wouldn't be managed so easily if the file list contained extraneous information.

Output may not always be easily understood. UNIX has two commands for comparing file contents. The command `cmp` quickly checks if two files are identical, reporting only the first difference found. The command `diff` reports all differences, but in a format that isn't easily understood (see Figure 7).



The command **diff** reports each difference found with as many as four lines of information. The lines describe the

“

*Output may not always be easily understood.*

”

changes required to make file1 identical to file2 using the **ex** editor commands in Figure 8. Change Maine for Texas in file1. Line 1 will remain line 1. Delete line 3 (Nebraska) from file1 so that line 3 becomes line 2. Change line 5 in file1 from Iowa to two lines, Alabama, Maine, so that line 5 becomes lines 4 through 5. Simple!

INFORMATION REGARDING HINTS and kinks useful to VMS users grappling with UNIX can be sent 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 the author of UNIX for VMS Users, published by Digital Press.

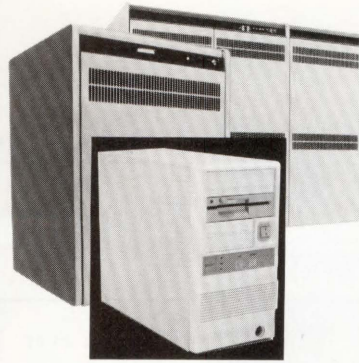
## Further Reading

Many books have tables of commonly used UNIX commands and options. *UNIX in a Nutshell, Berkeley Edition*, by Dale Dougherty, et al, is one large table and a useful reference. For system managers and others responsible for helping users cope with VMS and UNIX heterogeneity, a one-page cross-reference table pasted near each keyboard will win you many friends.

For more information about *UNIX in a Nutshell*, contact:

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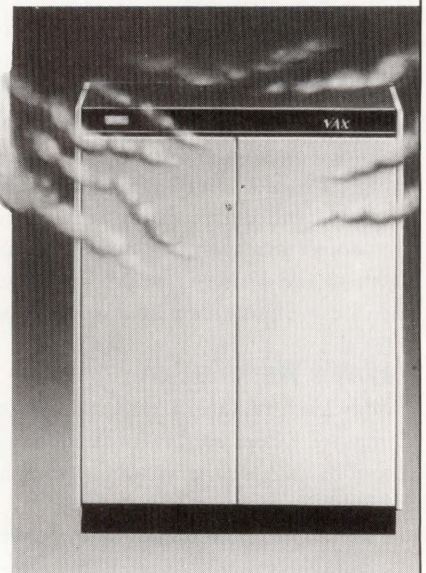
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## WORKSTATIONS

David W. Bynon

# High-End PCs As Low-End Workstations

Have you ever wondered what defines a workstation? Every

time I come to understand what a workstation is, someone changes the definition.

I first understood workstations to be big, powerful and expensive. Later I discovered that workstations do 3-D graphics for CAD/CAM applications. Then I heard that only engineers, draftsmen and designers could use them. Now, as if to add insult to injury, someone told me that PCs are workstations. Is this true? Are today's personal computers powerful enough to be workstations?

Today's workstations span a broad spectrum of price, performance, function and purpose. Expensive minicomputers are used primarily as midrange and high-end workstations.

Workstations costing less than \$15,000 account for about half of workstation sales. This is the low-end market segment, heavily contested by Apple's Macintosh, Intel 80386 PC-compatible systems and small RISC workstations.

The increase in low-end workstation sales is a result of the variety of software available for these graphics-based systems. Today, typical applications for workstations are desktop publishing, programming, computer-aided design, communications, office automation, data analysis, project management, network management and decision support. This being the case, we must redefine a workstation.

### Today's Workstation

Today's workstation is a specialized computer system used by professionals as a tool to increase the quantity and quality of their work.

Workstations are single-user computer systems with the following characteristics:

**1. High CPU performance** — At the low end, a workstation should have more than 1 mip processing power. However, a fast CPU isn't the only merit. A workstation needs exceptional floating-point math performance and precision. A floating-point co-processor is necessary.

**2. High-speed, high-resolution graphics** — All work done on a workstation involves graphics, if only for the graphical user interface. Three-dimensional graphics and color are application, not workstation, requirements. For adequate graphics support, a workstation's display resolution should be no less than 800 x 600 for monochrome displays and 1024 x 768 for color. For 3-D applications, the graphics processor should have a minimum of eight graphics planes. The display should be no less than 15 inches diagonal for use with a graphical user interface.

**3. Large quantities of physical memory** — Most workstations require a minimum of 4 MB of memory. To be effective, a workstation should be configured with enough memory to run the largest application without depleting the memory resource.

**4. A multitasking operating system with network support** — The benefit of a workstation is its ability to control many different activities. A multitasking environment is an important attribute of a workstation. And, because no workstation is an island, network support is essential.

**5. A graphical user interface** — A workstation should be easy to use and intuitive. Above all, the graphical user interface should make the workstation user more productive.

Thus, a properly configured PC or Macintosh can join the workstation ranks.

### The Long Road To PC Stardom

I've always thought of my PC-compatible 80386 system as just another fast PC system. Until recently, I never would have compared it to a VAXstation, Sun or Hewlett-Packard, Apollo Division system. I purchased the PC for not much more than desktop publishing. My only justification for the machine was the ludicrous price tag vendors command for desktop publishing software on a VAXstation.

After a careful audit of my PC's inwards, it was easy to see that it wasn't a workstation. It didn't have network hardware or software and it lacked a math co-processor. Also, the display was too small and had mediocre resolution, and MS-DOS was a single-task executive.

### Beefing Up

Upgrading the hardware was easy. An Intel 80387 math co-processor and a Digital Network Integration kit were available from a local DEC distributor. These items took less than five minutes to install with a screwdriver.



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The workstation monitor and video controller were harder to come by. The PC marketplace is full of display solutions, therefore I had to do some shopping. For price and performance reasons, I decided to get the NEC MultiSync 4-D monitor and the NEC MultiSync Graphics Engine board. NEC claims its MultiSync Graphics Engine board will run windows applications up to four times faster than normal VGA cards.

The software was more difficult. The first problem was deciding if I could afford to lose my investment in software. Micrografx Designer, Aldus PageMaker and clip art alone cost more than \$1,000.

Taking a careful look at the cost of SCO UNIX, I decided not to deep-six MS-DOS. To build a DEC-compatible UNIX workstation, I'd have to invest about \$4,000 in operating system and network software.

Once I eliminated UNIX, the road to workstation status was challenging. Although I purchased a multitasking MS-DOS operating system (Digital Research's Concurrent DOS 386), I couldn't find one that was compatible with DECnet-DOS and PCSA. Other networks are compatible with these multitaskers, but I already had purchased Digital's Network Integration kit.

I decided to use Microsoft's Windows/386, a multitasking version of Windows, as the operating environment. Unfortunately, I'd assumed that Windows/386 would be compatible with Digital's PCSA. The Network Integration kit came with Microsoft Windows V2.03.

To make use of the Network Integration kit hardware, I copied DEC's Window drivers (provided with PCSA V2.2) to a floppy disk. I used these drivers in place of the drivers provided by Microsoft in the Windows/386 kit.

When I started Windows/386, it recognized the PCSA virtual disks and services. I started PageMaker and Designer, and they ran OK. Next, I tried creating a DOS window by clicking on COMMAND.COM, and Windows/386 crashed. I tried other DOS applications with the same result. Operating within the strict Windows/386 environment,

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everything was fine. But starting a MS-DOS application was fatal.

Microsoft's technical support determined that the problem must be DEC's hardware or software. I could at least rule out that I was doing something wrong with Windows/386.

Although there could have been many reasons that Windows/386 was blowing up, it appeared to be a hardware or software interrupt conflict. I started troubleshooting by changing the DEPCA's interrupt vector. The results were the same. Next, I changed the DEPCA's base memory address. This didn't solve the problem either. Finally, I tried reconfiguring the system to use an old 3Com Ethernet card and a Logitech mouse. That worked! With another troubleshooting step, I determined that the DEC mouse was the culprit. The DEPCA worked fine with the Logitech mouse.

### The Hot Windows/386 Set Up

I went in search of a replacement mouse. The unit I finally chose was the new Microsoft Mouse, which has 400 dpi resolution. The DEC mouse, and most

others, have 300 dpi or less resolution — although there are optical mouse systems with very high resolution. The Microsoft Mouse is precise and felt good in my hand.

With the Microsoft Mouse in place, Windows/386 and PCSA run perfectly. I can start several tasks at once and freely jump between them. Unlike multitasking environments I've used in the past, namely VMS and UNIX, the job of task management belongs to the user.

For each Windows/386 task started, you must specify how the task will process — foreground, background or exclusive. Default processing is foreground, meaning that the task only gets CPU time when its window has input focus. When a task processes in the background, it receives CPU time despite the windows' disposition. You may think this is the ideal processing mode, but Windows/386 uses simple round-robin scheduling. Tasks don't get CPU time based on priority or individual need. Rather, tasks available for processing get an equal slice of the CPU's time.



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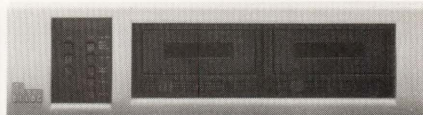
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CIRCLE 102 ON READER CARD

I found it interesting to run the DECnet File Access Listener (FAL) as a background task. By doing so, other network users can access the local hard disk or PCSA virtual disks set up for the PC. Without Windows/386, FAL would have to be run as an exclusive task.

For my workstation applications, the Windows/386 operating environment works very well. The limited multitasking capability of the product is adequate for most PC workstation applications. This is because MS-DOS applications don't create subtasks, and because few users try to operate more than one program at a time. Running applications side by side (for cutting and pasting information and for fast access) is Windows/386's greatest multitasking benefit.

The negative side of Microsoft Windows and Windows/386 is the lack of a menu for starting applications. To start an application, click on file names listed in the MS-DOS Executive window. When a directory has more than 10 files or when a program is in a directory other than the default, the MS-DOS Executive is ineffective.

While browsing through a local software store, I came across a cure for Windows' lackluster interface. It's a Windows/386 program from hDC called Windows Express.

Windows Express puts an icon menu between the user and Windows/386. The look and feel of this product is very Macintosh-like. Windows Express lets you label items and organize them into folders. With the Windows Express Editor, you can create folders, menus and icons.

Another useful program for Windows/386 is Crosstalk for Windows. Crosstalk for Windows is a version of the popular Crosstalk telecommunication program, specifically written for Windows/386.

Crosstalk for Windows supports nine file transfer protocols including KERMIT, CompuServe B, Xmodem and Zmodem. It also has a powerful script language (Crosstalk Mk.4 CASL language), emulates the VT102 and supports the Windows Dynamic Data Exchange (DDE). DDE support allows Crosstalk to inter-

act as client or server with other Windows applications. For example, Crosstalk for Windows supports CompuServe Information Services' VIDEX terminal protocol. With VIDEX, you can receive weather maps and stock pictures. When receiving the picture, Crosstalk for Windows opens a special window to display the graphics. The graphics can be cut and pasted into another window.

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Though the Network Integration kit gave me fits, it added valuable functionality. I no longer worry about limited disk space or how I will get word processing files from the VAX into PageMaker. Mail also is easy because PCSA V2.2 has a VMS mail-compatible program called PCMAIL. The PC workstation has become my favorite communication tool.

My only complaint about the PC workstation is MS-DOS. Once you've experienced a true multitasking operating system with demand-paged memory management, nothing else is good enough. Although UNIX and the X Window System are readily available, it's hard to justify the cost for a low-end PC workstation.

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## LET'S C NOW

Rex Jaeschke

# C++: The Saga Continues

*Editor's note: This month, C Editor Rex Jaeschke continues his introduction to C++. He revisits private functions and introduces the concept of function overloading, i.e.,*

*having multiple versions of the same function. Future columns will contain C and C++ sections.*

Anyone with access to an object of a given class has immediate access to the member functions of that class. This is possible because the class definition must be included in all code in which objects of that class are declared and member functions for that class are declared or defined.

Member functions can be made even more private by declaring them inside the private section of the class:

```
// Public versus private member functions
#include <stdio.h>

class circle {
    ...
    void secret(void); // private member function
public:
    ...
};

main()
{
    circle c;

    c.secret();           // error
}
```

We no longer can access the member function using the notation established earlier; the function has been hidden. How then can we access this function? A private member function can be called only by another member function:

```
// Calling a private member function
#include <stdio.h>

class circle {
    ...
    void secret(void); // private member function
public:
    void init(long, long, unsigned long);
    ...
};

main()
{
    circle c;

    c.init(5, 4, 10);
}

void circle::init(long xo, long yo, unsigned long rad)
```

```
{
    xorigin = xo;
    yorigin = yo;
    radius = rad;
    secret();
}

void circle::secret(void)
{
    printf("Inside function secret\n");
}

Inside function secret
```

Here, you call the public member function **init**, and **init** calls the private member function **secret**. This way, the designer of the class can rigidly define the interface between the program and class members.

You can argue that a well-disciplined programmer can get the same result by not doing silly or unreasonable things. The problem is that it's left to the programmer to make sure no rules are broken. In C++, this privacy and associated protection are forced on you after the class is designed. On a nontrivial project, the cost of this discipline is outweighed by the benefits of reduced debugging and maintenance.

A word of caution: C lends itself to abuse, and many C programmers take a cavalier approach to writing programs in C. That won't work with C++. If your C code is undisciplined and you intend to write C++ that way, there's no point in starting. If you're going to put all your members in the public section of a class, you may as well use structures. If you want to use C++, learn to play the game properly.

Many C programmers will say that C++ is wimpy. They'll complain, "All this strong checking is for those high-level languages and isn't in the spirit of C." They said the same thing about function prototypes, but prototypes are one of the biggest quality-assurance tools modern C has.

Whatever language you choose, you must have reasonable control of the design, debugging and maintenance effort needed. The checking tools in C++ are there to help you.

Don't think that I'm preaching C++. I'm a C convert, but I still have my doubts about C++. I want to explain C++ so that you can decide if it's for you and your projects. I'm not a language bigot. I believe in being informed about the pros and cons of a tool to make an informed judgment as to whether or not to use it. Even if I don't like a language, that doesn't mean I don't like parts of it.

### Private Global Data

Most languages support the notion of global variables (variables that can be accessed from anywhere in the program). C pro-





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vides this capability and allows a restricted global scope. By declaring an object **static** and outside a function definition, that object is accessible throughout that source file but to no others. C then has three levels of privacy for data: block, source file and program.

C++ lets the concepts of a global object and a class be combined by allowing members of a class to be shared via the keyword **static** (**static** is the only storage-class keyword permitted in data declarations in a class):

```
// static members
#include <stdio.h>

class circle {
    long xorigin;
    long yorigin;
    static unsigned long count; // static member
    unsigned long radius;
public:
    void set_count(unsigned long);
    void dump_addr(void);
    void print(char *);
};

main()
{
    static circle c1;
    static circle c2;
    static circle c3;

    c1.set_count(10) // set one count

    c1.print("c1"); // look at all count's
    c2.print("c2");
    c3.print("c3");

    c1.dump_addr(); // look at &members
    c2.dump_addr();
    c3.dump_addr();

    printf("\nsizeof(circle) = %lu\n",
           (unsigned long) sizeof(circle));
    printf("sizeof(long) = %lu\n",
           (unsigned long) sizeof(long));
}

void circle::set_count(unsigned long c)
{
    count = c;
}

void circle::dump_addr(void)
{
    printf("&xor = %p, &yor = %p, "
           "&count = %p, &rad = %p\n",
           &xorigin, &yorigin, &count, &radius);
}

void circle::print(char *name)
{
    printf("Object %s has contents:\n", name);
    printf("\txorigin = %ld\n", xorigin);
    printf("\tyorigin = %ld\n", yorigin);
    printf("\tcount = %lu\n", count);
    printf("\tradius = %lu\n", radius);
}

Object c1 has contents:
xorigin = 0
yorigin = 0
count = 10
radius = 0
```

```
Object c2 has contents:
xorigin = 0
yorigin = 0
count = 10
radius = 0
Object c3 has contents:
xorigin = 0
yorigin = 0
count = 10
radius = 0
&xor = 094A, &yor = 094E, &count = 09B0, &rad = 0952
&xor = 0956, &yor = 095A, &count = 09B0, &rad = 095E
&xor = 0962, &yor = 0966, &count = 09B0, &rad = 096A

sizeof(circle) = 12
sizeof(long) = 4
```

The static member **count** is declared, behaves and is accessed like a nonstatic member. But, it isn't stored as part of the class object. As evidenced by the output, the size of **c1**, **c2** and **c3** is 12 bytes, the sum of the sizes of the three nonstatic members.

Notice the hexadecimal addresses of the members. The **radius** member directly follows the **yorigin** member in memory. Therefore, although **count** is allocated space, it isn't part of any of the class objects. Look carefully at the address output, and you'll see that the address of the **count** member in each of the three class objects is the same. Only one **count** object was allocated, and the **count** members of each object of that class map into exactly the same object.

When we set **count** to be 10 for object **c1**, the **count** for **c2** and **c3** also "became" 10. **count** is like a global object, but one that only can be accessed by member functions of objects of that class:

```
// public static members
#include

class circle {
    long xorigin;
    long yorigin;
    unsigned long radius;
public:
    static unsigned long count; // static member
};

main()
{
    printf("count = %lu\n", circle::count);
    printf("sizeof(count) = %lu\n",
           (unsigned long) sizeof(circle::count));
    printf("&count = %p\n", &circle::count);
}

count = 0
sizeof(count) = 4
&count = 0900
```

You can declare a static member in the public section of a class. As such, that member can be accessed from outside a member function, as shown. To do so, qualify the member name by the class name and the scope resolution operator **::**.

In this example, no space is allocated for an object of class



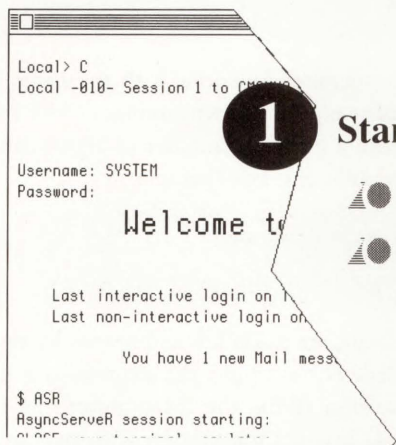
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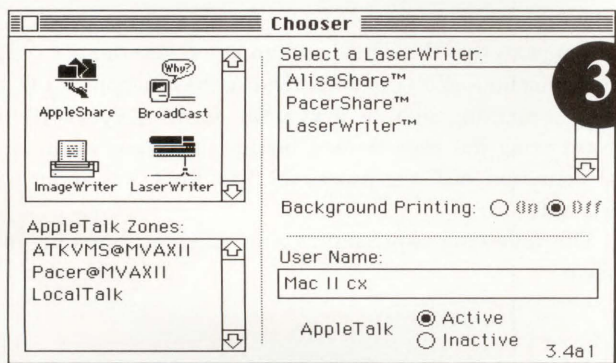
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**circle.** This isn't a problem, because we've seen that static members aren't stored as part of a class object — they're separate. Space is always allocated for static members, even if no objects of that class exist, as shown by the example above.

## Overloading Function Names

Overloading is a term often used with regard to programming languages. When something is overloaded, it takes on several possible meanings, depending on the context in which it occurs. For example, in the expression **a + b**, if **a** and **b** have type **int**, the plus is interpreted as "add two **ints**." However, if **a** and **b** have type **double**, the plus means "add two **doubles**." The plus operator is overloaded. C++ allows operators to be overloaded in other ways. For example, you could define addition for objects of type **circle**.

Some languages overload functions. For example, in FORTRAN, the square root function has the same name regardless of the arithmetic type of its argument. C, however, requires a unique version of each function type. For example, **sqrt** expects and returns a **double**, **sqrtf** expects and returns a **float** and **sqrtl** expects and returns a **long double**.

There are two distinct schools of thought. One says that each function with a different "purpose" should have its own unique name. The other says that there should be one generic function, and the compiler should work out what to do. C places the burden on the programmer, while C++ places it on the implementation.

I'll introduce overloaded functions by having several member functions with the same name but with slightly different purposes, as follows:

```
// overloaded member functions

#include <stdio.h>

class circle {
    long xorigin;
    long yorigin;
    unsigned long radius;
public:
    void init(long, long, unsigned long);
    void init(long, long);
    void init(unsigned long);
};

main()
{
    circle c;

    c.init(5, 4, 10);
    c.init(5, 4);
    c.init(10);
}

void circle::init(long xo, long yo, unsigned long rad)
{
    printf("init: 3 args\n");
    xorigin = xo;
    yorigin = yo;
    radius = rad;
}

void circle::init(long xo, long yo)
{
```

```
    printf("init: 2 args\n");
    xorigin = xo;
    yorigin = yo;
    radius = 1;           // default value
}

void circle::init(unsigned long rad)
{
    printf("init: 1 args\n");
    xorigin = 0;         // default value
    yorigin = 0;         // default value
    radius = rad;
}

init: 3 args
init: 2 args
init: 1 args
```

There are three member functions with the name **init**. All have the same return type, but their argument lists are different. Either they take a different number of arguments, or the argument types are different. For example:

```
void init(long, long, unsigned long);
void init(long, long);
void init(unsigned long);
```

The three functions are made less ambiguous by the way in which they're called. For example, the expression **c.init(5, 4, 10)** invokes the version taking the three arguments. The expression **c.init(5, 4)** invokes the version with two arguments, and **c.init(10)** invokes the version with one. The usual arithmetic promotion rules are applied so that **char** and **short** are promoted to **int**, and so forth, as you'd expect. Watch out in a few cases. Consider the following overloaded member function declarations:

```
void xyz(char);
void xyz(unsigned char);
void xyz(int);
void xyz(unsigned int);
```

It appears that the signed and unsigned versions are considered ambiguous. You can't differentiate the functions at call time using something such as **a.xyz(10)** versus **a.xyz(10U)**. I'm investigating this issue further, because it's vague in the original definition of C++, just as the first K&R was about some parts of C.

The following expressions cause different functions to be called:

```
a.xyz((char) 'A');
a.xyz('A');
```

The cast is needed in the first case to make sure the **char** argument version is chosen. There's no such thing as a **char** expression in C, unless you use an explicit cast. However, the type of the character constant **'A'** is **int**. Therefore, the **int** version is called.



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The definitions of the three versions are the same, except for the argument lists. Because these three functions have **extern** storage class, they must have distinct names behind the scenes. Otherwise, the compiler and linker wouldn't know which were which. Although that's true, it's an implementation issue about which the programmer needn't worry.

Zortech C++ used the unique function names `__circle_initFL_L_L__`, `__circle_initFL_L__` and `__circle_initFL__`. Each name is derived from the parent class and the user-specified function name as a prefix followed by letters that indicate the number and type of arguments.

Not only can member functions be overloaded, but so can regular functions not belonging to a class. For example:

```
// Overloading "regular" functions
#include <stdio.h>

overload abs;
double abs(double);
long abs(long);
int abs(int);

main()
{
    double d = abs(1.2);
    long l = abs(-50000L);
    int i = abs(-5);

    printf("d = %f, l = %ld, i = %d\n", d, l, i);
}

double abs(double arg)
{
    return (arg < 0 ? -arg : arg);
}

long abs(long arg)
{
    return (arg < 0 ? -arg : arg);
}

int abs(int arg)
{
    return (arg < 0 ? -arg : arg);
}

d = 1.200000, l = 50000, i = 5
```

To overload nonmember functions, the keyword **overload** is required, as shown. Its use must precede declarations and definitions of the overloaded functions. Again, the compiler generates unique external names. (Zortech C++ used the names `__abs`, `__absFL` and `__absFI`.) If the functions are defined in a separate source file, **overload** must be used so that those unique names are generated by the compiler.

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```

overload abs;

double abs(double arg) { /* ... */ }
long abs(long arg) { /* ... */ }
int abs(int arg) { /* ... */ }

```

As we've seen, it's sometimes necessary to cast an argument explicitly to ensure that the correct overloaded function version is chosen. If you don't, it can be hard to debug, because the compiler quietly chooses a function other than the one you intended. For example:

```

// More on function overloading

#include <stdio.h>

overload void display(int), display(char *);

main()
{
    /*1*/ display(10);
    /*2*/ display(0);
    /*3*/ display("some text");
    /*4*/ display((char *)0);
    /*5*/ display(NULL);
    /*6*/ display((char *)NULL);
}

void display(int i)
{
    printf("int = %d\n", i);
}

void display(char *p)
{
    printf("str = >%s<\n", p ? p : "NULL");
}

int = 10
int = 0
str = >some text<
str = >NULL<
int = 0
str = >NULL<

```

Note how the **overload** keyword can be used as part of a function declaration.

In this case, the problem is that zero isn't interpreted as the null pointer constant. Instead, it's seen as having type **int**, resulting in the **int** version being chosen. To call the pointer version, an explicit cast of zero to a pointer type is necessary.

You may find case 5 strange. Why did the **int** version get called when we clearly passed **NULL**? The problem is that **NULL** can be defined legitimately in many ways. ANSI C requires that **NULL** expand to a null pointer constant, and the three possible definitions of it are **0**, **0L** and **(void \*)0**. If either of the first two is used, the argument won't be recognized as a pointer expression. The only way to make sure this works in a portable manner is to use case 6, in which the cast is explicit. (This isn't an issue in C, because a prototype expecting a pointer will

implicitly cast an integer constant expression of value zero to the null pointer.)

## Using Default Argument Values

C++ lets a function be called with any leading part of the argument list, provided default values for the unspecified arguments are defined. For example:

```

// Specifying default argument values

#include <stdio.h>

class circle {
    long xorigin;
    long yorigin;
    unsigned long radius;
public:
    void init(long = 0, long = 0, unsigned long = 1);
    void print(char * = 0);
};

main()
{
    circle c;

    c.init(5, 4, 10);
    c.print("3-args");

    c.init(5, 4);
    c.print("2-args");

    c.init(5);
    c.print("1-arg");

    c.init();
    c.print();
}

void circle::init(long xo, long yo, unsigned long rad)
{
    printf("init: 3 args\n");
    xorigin = xo;
    yorigin = yo;
    radius = rad;
}

void circle::print(char *name)
{
    printf("Object %s has contents:\n",
        name == NULL ? "??": name);
    printf("\txorigin = %ld\n", xorigin);
    printf("\tyorigin = %ld\n", yorigin);
    printf("\tradius = %lu\n", radius);
}

init: 3 args
Object 3-args has contents:
    xorigin = 5
    yorigin = 4
    radius = 10
init: 3 args
Object 2-args has contents:
    xorigin = 5
    yorigin = 4
    radius = 1
init: 3 args
Object 1-arg has contents:
    xorigin = 5
    yorigin = 0
    radius = 1
init: 3 args
Object ?? has contents:
    xorigin = 0
    yorigin = 0
    radius = 1

```



The default values are specified using an initializerlike format, as follows:

```
void init(long = 0, long = 0, unsigned long = 1);  
void print(char * = 0);
```

In the case of **print**, you must put a space between the **\*** and **=**, or it will be interpreted incorrectly as the compound assignment operator **\*=**.

Because the member functions must be declared in the scope of every call to them, the compiler recognizes that fewer than the maximum number of arguments has been provided in the call and substitutes the default values from the function declaration. When calling the function, specify the leading part of the list. The following declaration is invalid, because the trailing arguments have no default, i.e., you can't call this function using **c.init( , 4, 10)**. For example:

```
void init(long = 0, long, unsigned long);
```

Default arguments also can be specified with nonmember functions. For example:

```
#include <stdio.h>  
  
void test(int = 4, long = 6);  
  
main()  
{  
    test(5, 4);  
    test(5);  
    test();  
}  
  
void test(int i, long l)  
{  
    printf("i = %d, l = %ld\n", i, l);  
}  
  
i = 5, l = 4  
i = 5, l = 6  
i = 4, l = 6
```

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](mailto: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) 957-1500.

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# Syntactical Dissonance

*Syntactical — of or in accordance with the rules of syntax.*

*Dissonance — opposing in opinion, temperament, etc.; incompatible; incongruous.*

Not all changes in the behavior of DCL are listed in the VMS Release Notes. From time to time, a potentially irksome change in behavior slips through without official notification.

I was working with my VAXstation 3100, learning the new and wondrous features of VMS V5.2, testing some previously written queue management command files and setting up a nightly backup procedure.

At first, everything appeared OK (see Figure 1). Then I decided to kill the DBACK job and replace it with a newer version:

```
$ del/entry=37 sys$batch
%DCL-W-CONFLICT, illegal combination of
command elements - check documentation
\CONFIRM
```

Huh? Another SHOW QUEUE command revealed DBACK was still in the queue, scheduled for execution at midnight. As for the nature of the error, the explanation was simple. Like many users, I have the following line in my LOGIN.COM file:

```
$ DEL*ETE:== DELETE/CONFIRM/LOG
```

A quick check proved I was correct:

```
$ SHOW SYMBOL DELETE
DEL*ETE == "DELETE/CONFIRM/LOG"
```

So, to kill the waiting batch job, all I had to do was:

```
$ DELETE:==DELETE
$ del/entry=37 sys$batch
```

I was rather peeved that a command that worked under previous versions of VMS with nary a burp would crash and burn so unexpectedly. However, being a good DCL camper, I followed the error message's advice and checked the documentation.

DELETE/ENTRY, DELETE/CHARACTERISTIC, DELETE/FORM and a few other variations have their own definitions to differentiate them from the plain vanilla DELETE file command. Only DELETE file has a /CONFIRM qualifier, though; DELETE/ENTRY accepts only a job number and a queue name. Previous versions of DCL were bright enough to ignore the qualifiers that weren't applicable to DELETE/ENTRY. DCL under V5.2 isn't.

I couldn't find anything in the *DCL Dictionary* that would warn of DELETE/ENTRY's new pickiness. A quick scan through the V5.2 Release Notes also was unrewarding.

If DEC has documented this change in behavior somewhere, I couldn't unearth it. If it's noted, I know that within a day after this magazine hits the streets, a lot of sharp-eyed readers will be directing me to the exact volume, page and line number, as well as providing CLD patches to restore the old DELETE/ENTRY I've come to know and love.

Of course, it could be an instance of "syntactical dissonance": a glitch or

change in behavior of the CLI.

In the meantime, I've resolved my problem with a simple:

```
$ DQ:== DELETE
```

DQ/ENTRY=nnn now works the way the old DEL/ENTRY did.

I discovered that using the previous DELETE symbol with /NOCONFIRM also works:

```
$ DELETE/NOCONFIRM/ENTRY=nnn
```

But that's too much typing.

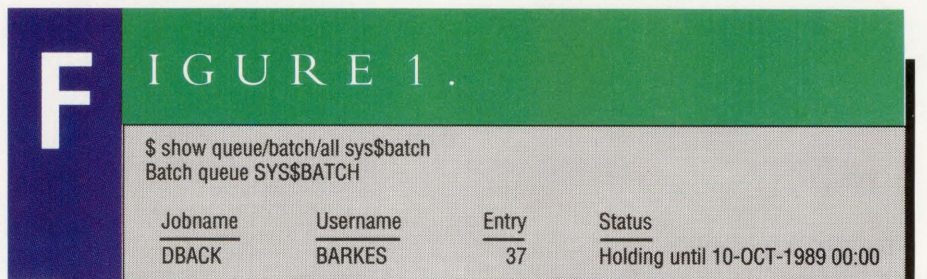
While we're on the subject, few things are more irritating than executing a command file that suddenly starts behaving unexpectedly because of conflicting symbol assignments.

Even DEC is guilty of this in a particularly nasty place: the SYSS\$SYSTEM: SHUTDOWN.COM procedure. I haven't checked recently, but I know that on V4.7 systems SHUTDOWN would come to a screeching halt and the console would display something like:

```
DELETE SYS$SYSROOT:
[SYSMGR]SHUTDOWN.TMP:1 ? [N]:
```

if the user running the procedure had DELETE/CONFIRM/LOG assigned to a DELETE symbol.

Fixing this type of problem is quite simple using the SET SYMBOL/SCOPE



*SHOW QUEUE command.*



# FIGURE 2.

```
$ @test 1 2 3 4 5 6 7 8
$ SET VERIFY
$ SET SYMBOL/SCOPE=(NOLOCAL,NOGLOBAL)
$ SHOW SYMBOL/GLOBAL/ALL
$ SHOW SYMBOL/LOCAL/ALL
P1 = "1"
P2 = "2"
P3 = "3"
P4 = "4"
P5 = "5"
P6 = "6"
P7 = "7"
P8 = "8"
$ EXIT
```

The "P" command procedure parameters aren't affected by SET SYMBOL.

command.

SET SYMBOL/SCOPE can make local and/or global symbols temporarily undefined at the current command level, eliminating the possibility of conflicts. If you add:

```
$ SET SYMBOL/SCOPE=(NOLOCAL,NOGLOBAL)
```

to the beginning of a command file, you can stop worrying about users with bizarre symbol assignments mucking up the procedure. Be careful, though, if your command file makes references to foreign commands. Those too will be undefined. The "P" command procedure parameters aren't affected by SET SYMBOL, and once the command procedure exits and returns to the previous command level,

all the symbols are "unmasked" and again available (see Figure 2).

DCL's F\$ENVIRONMENT(SYMBOL\_SCOPE) lexical function is a handy tool for checking the status of symbol scoping within an executing procedure.

Of course, SHUTDOWN.COM is a DEC-supplied procedure, and you're not supposed to touch it. I compromised and changed the DELETE to DELETE/NOCONFIRM/NOLOG.

### Other V5.2 Items

DEC has added other goodies to VMS V5.2, including an enhanced BACKUP utility and commands that return information on all nodes in a cluster.

The new BACKUP features improved save and copy operations, as well as faster

CRC checking for processors that emulate CRC in software (you might consider taking the /NOCRC off your BACKUP commands now). It also offers a CTRL-T command in BACKUP that displays, among other things, the last file scanned, the saveset volume and block number, and the size of the saveset blocks.

At the time of this writing, there were rumblings on DECUserve and the USENET info.vax conference about problems with BACKUP, third-party disk defragmentation software and RMS under V5.2. If you haven't done so already, hitch up with ARIS/BB or one of the other DEC-related electronic bulletin board systems to get the latest info.

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. Barks Consulting Services, 4107 Overlook St., Library, PA 15129.

The list also is available online from my SYSS\$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. Barks is an independent consultant in VAX systems software, management, tuning and training based in Library, Pennsylvania.

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# Freedom Of Choice

Many maintenance customers are frustrated to find themselves locked into one vendor. For example, if you want to use XYZ Corporation's remote expert/AI software, probably the only way to get it is to use XYZ's other maintenance offerings. If you want to use PDQ Inc. for corrective maintenance, you probably have to use PDQ's spares and repairs package, as well. Although you may love one vendor's service and response time, you may prefer another vendor's parts pricing and turnaround program. Often you're locked into a complete service package.

The San Francisco Maintenance Group (SFMG) is attempting to unlock that package. Its customers don't have to accept services they perceive as weak just to get other strong services. With SFMG, you can choose the services or products you want, in most cases without a contract.

## Maintenance Network

Formed by long-term participants in the maintenance industry, SFMG represents a consortium of select manufacturers, suppliers and vendors in the service business. The company doesn't represent any one firm exclusively. In each of SFMG's product/service lines, usually at least two or three available choices let you decide on the price/performance that meets your needs.

For instance, in repair, SFMG has a number of depots. Because there are no contracts, you're free to use your own depot, if you prefer, while availing yourself of SFMG's other services. Except for disaster recovery, offerings are on a time-and-materials basis.

According to Paul Files, president, SFMG is an independent marketing agent

engaged in supplying resources such as spares, diagnostics, training and backup support to self-maintainers and small TPMs who service DEC, Data General and IBM systems. It strives to make maintenance affordable for the local/district vendor or user taking on his first system. Mike Clark, a member of the board of directors at SFMG, reports that SFMG can put you in the MicroVAX service business, for example, for as little as \$500 initial cost plus a monthly fee starting at \$50. This includes a system-level diagnostics program that can be used on an unlimited number of machines and a full complement of spares for a standard MicroVAX configuration.

## Service Solution

The SFMG concept compares to the automobile service industry. Consider this scenario: Your car breaks down on an interstate, and you can't fix it. You call your automobile club, which dispatches a local service company that repairs your car. Or, it tows you to a nearby service station (depot) for repairs. The automobile club doesn't fix your car, but its network of local service firms responds to your need. Your call to the club sets that service network in motion.

SFMG does the same in the computer service industry with a somewhat more sophisticated approach. It acts as a consortium for a group of manufacturers and service providers — its network — that respond to a service request for a product, service or support.

"With the SFMG approach," states Files, "the customer benefits from competition among our vendors for their service dollar. The net effect is that the self-maintainer or user's TPM, using our maintenance group's services, can select from the best products, service and support available from all suppliers in the maintenance industry. Our aim is to en-

“  
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choose the services or  
products you want...**  
”

able our customers to make the most advantageous purchasing decision based on a thorough analysis of all options and alternatives in today's market.”

With the programs and support SFMG offers, in-house or small independent service organizations can pursue systems not previously maintained. And new service organizations can take on their first system.

Programs offered include spares, repairs, test equipment, diagnostics, training, backup support, disaster recovery and equipment brokering. All are offered on a nonexclusive basis, which means SFMG can locate the price/performance rating to meet individual needs.

SFMG has been in the planning stages for a number of years, says Files. The company was incorporated in October 1989 in California. Sales and services began January 1, 1990.

## From The Menu

Here's a rundown of some of SFMG's major offerings:

**Spare Parts** — The SFMG program, through agreements with major manufacturers and depots, supplies spares or has parts repaired within your time requirements. The spares program makes spare parts available at a monthly fee. It addresses the often staggering parts investment that prevents small servicers from



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creating an expanded service effort.

This is accomplished through SFMG's Risk Insurance Fee (RIF) program. With this plan, you pay a small monthly fee based on spares required. This ensures parts availability within a specified time frame. Under the RIF plan, you're allowed a certain number of usages per month. After that, you're charged additional usage fees. If you reach a point at which it's cost-justifiable, a second spares

set can be placed on the RIF program.

"The RIF program allows the servicer to have needed spares available for that first maintenance contract on a previously unserviced model and to control his investment in spares as the service business grows. The service firm, whether in-house or an outside vendor, only pays for what he needs as the customer base grows," states Files.

For example, a typical MicroVAX II

initial spares kit costs about \$7,000, a hefty investment for a user who wants to try self-maintenance. With the RIF program, you pay roughly \$50 per month for use of the same kit.

Also, SFMG provides a list of repair facilities that have been prequalified to handle the part. You select the best cost/turnaround time to meet your need.

**Self-Maintenance Programs** — If you want to become a self-maintainer, SFMG provides full-service backup on an as-needed basis. So, you can go it alone but not really be alone if you confront a problem that can't be handled in-house.

If backup troubleshooting help (either onsite or via remote diagnostics), test equipment or training are required, an SFMG RIF customer can get that support through the SFMG network. These service providers are linked with SFMG in your local area and service SFMG clients on a time-and-materials basis. You're given a choice of two or three prequalified service vendors who provide maintenance or support for specific equipment or systems.

**Diagnostics** — The SFMG customer can choose from a number of system-level, standalone and remote diagnostic programs. You can mix and match your purchase from several vendors, choosing programs from each and incorporating "foreign" peripherals diagnostics into the package to meet your site's configuration requirements.

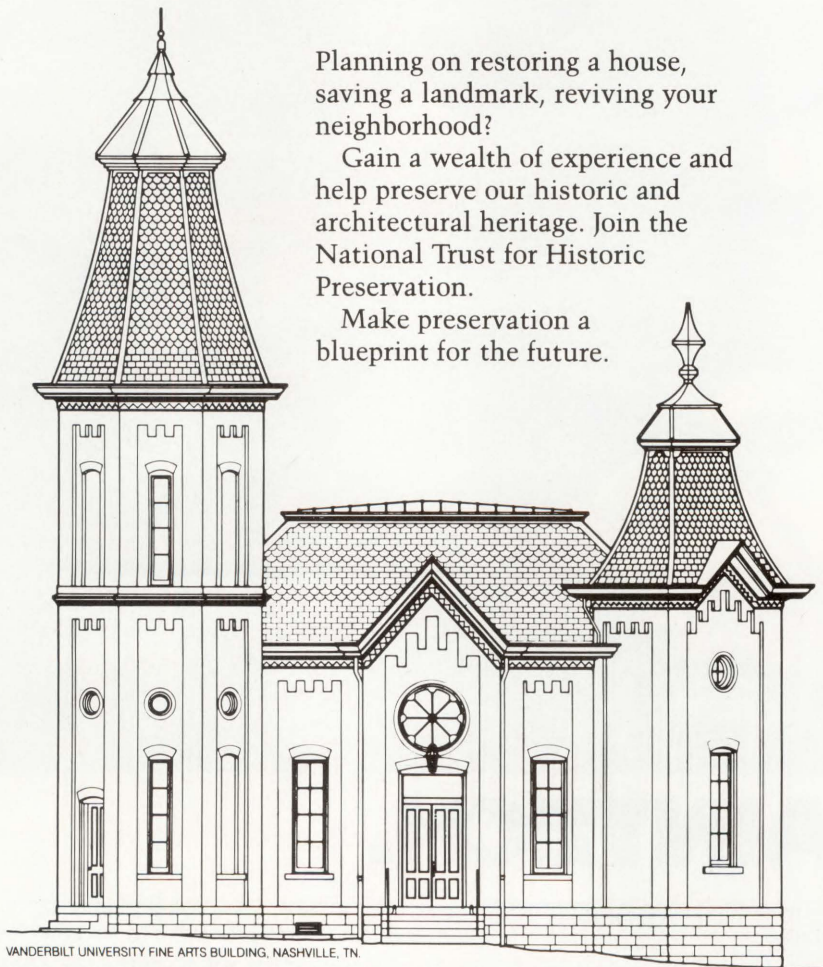
THE CONCEPT OF providing a network of services and products to the user on a nonexclusive, noncontract basis and responding to user's needs through one phone call is long overdue. In addition to removing the burden of shopping for service or equipment, SFMG customers benefit from competition among suppliers for their service dollar. ■

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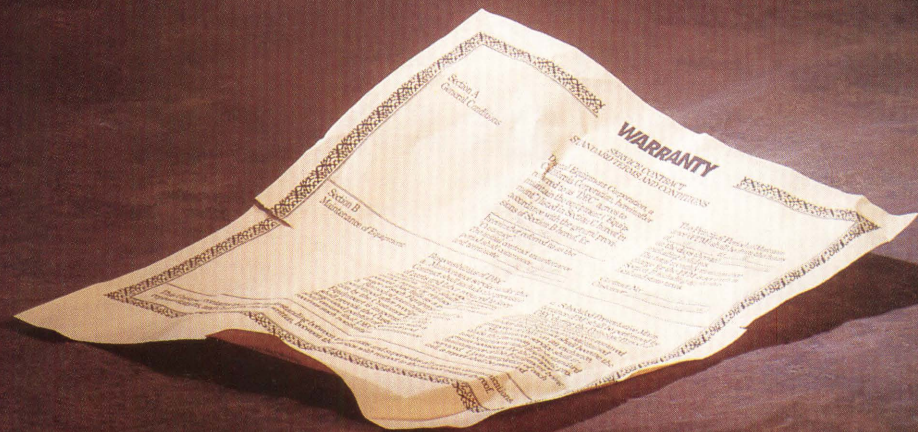
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# PRODUCTS

## Infotron Adds TCP/IP Support To Commix 32

Infotron Systems Corporation announced the addition of TCP/IP software support to its Commix 32 LAN terminal server, permitting communications with a variety of hosts via TCP/IP using the Telnet terminal protocol. The connection is made over an Ethernet cable.

Commix 32 lets a group of users interconnect PCs and access a DEC host via a single network connection. That same level of PC connectivity now is available to any host, workstation or PC that runs TCP/IP. Commix also features an X.25 gateway. The X.25 gateway lets you connect to X.25 hosts residing on a public data network or connected to another Commix 32 equipped with an X.25 gateway. It provides connectivity for X.25 packet network PAD/terminals to access LAN cable hosts via DEC LAT or TCP/IP-Telnet protocols.

The product is priced at \$7,790.

For more information, contact Ed DiMingo, Infotron Systems Corp., Cherry Hill Industrial Cntr., Cherry Hill, NJ 08003; (609) 424-9400.

Circle 402 on reader card

## Clary Offers Rack-Mount Online UPSs

Clary Corporation announced rack-mount configurations of online sine wave UPSs that feature 400-, 800- and 1,250-VA power ratings. The Onguard PC-1240, PC-2400 and PC-1.25k protect against power disturbances, including extended brownout protection to 84 VAC.

The rack-mount units eliminate daily power problems by continuously generating new AC power. These solid-state generators break down and filter utility power and provide clean AC power in perfect sine wave form. The PC-1240 provides five to 15 minutes of 400-VA online sine wave

backup for two typical IBM ATs or compatibles. The PC-2400 provides 12 to 24 minutes of 800-VA backup power for three LAN file servers. The PC-1.25K provides 12 to 24 minutes of 1,250-VA backup for super-micros and minis. The PC-1240 measures 3.5 x 19 x 15 inches; the PC-2400 and PC-1.25K measure 5.3 x 19 x 16 inches.

The PC-1240 costs \$1,290, the PC-1.25K costs \$1,690 and the PC-2400 costs \$2,490. For more information, contact Dina Deryan, Clary Corp., 320 W. Clary Ave., San Gabriel, CA 91776; (818) 287-6111.

Circle 446 on reader card

## Progress 4GL/RDBMS Supports DECnet, SPX/IPX

Progress Software Corporation announced support for DECnet and Novell's Sequenced Packet Exchange (SPX) and Internet Packet Exchange (IPX) network system protocols. DECnet and SPX/IPX are the latest in a series of network protocols supported by the

Progress 4GL/RDBMS, including Netbios, TCP/IP and OpeNET.

Progress includes built-in support for these network protocols as part of its basic product. A networked application can respond quickly to processing demands, even as the number of users increases, resulting in a cost-effective match of hardware resources to changing requirements.

Prices for a full application development copy on DEC hardware, including built-in support for DECnet, range from \$4,900 for the VAXstation 2000 to \$190,000 for the VAX 6000 Model 460. Prices on a LAN, including support for SPX/IPX, range from \$3,400 to \$9,000, depending on the number of nodes.

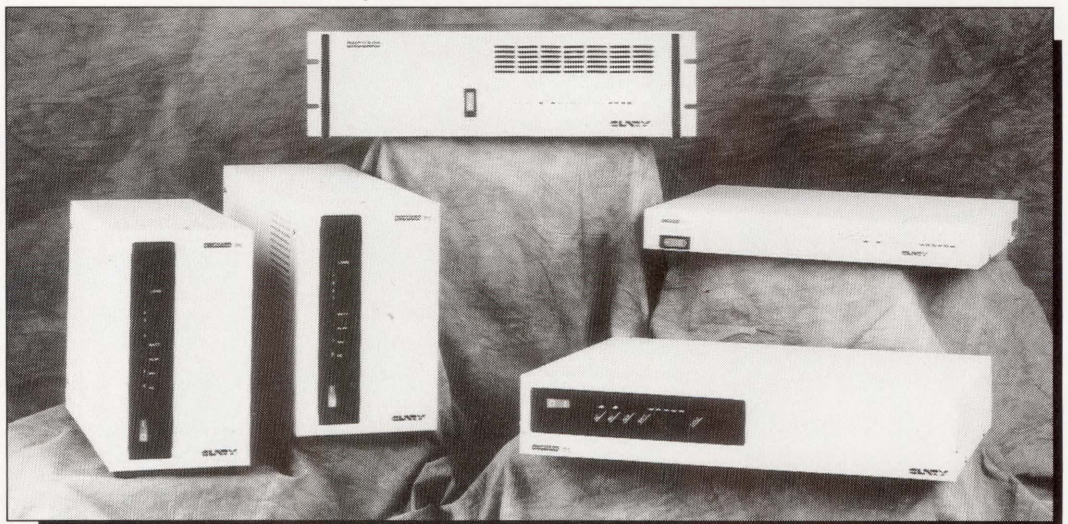
For more information, contact John H. Riccardone, Progress Software Corp., 5 Oak Park, Bedford, MA 01730; (617) 275-4500.

Circle 416 on reader card

## MAP Series Meets Mapping Requirements

Resources Planning Associates Inc. (RPA) announced the MAP Series V3.0. This software is used for creating, displaying, updating, analyzing and storing digital images and maps.

MAPEDT is for the editing, preparation and illustrative display of digital maps, charts,



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and so on. MAPOVL overlays multiple characteristics in color for analysis/presentation effectiveness. MAPDTM is for input, analysis and display of digital terrain models and other 3- and 4-D data. MAPROC processes remote sensing and other digital data to convert paper maps into digital maps. The series provides a package addressing all digital mapping requirements. Each program is fully compatible with CAPLIB, RPA's Computer Aided Planning Library. RPA products are available for PC (DOS) and VAX/VMS environments.

For more information, contact Marshall Taylor, Resources Planning Associates Inc., Cornell Business and Technology Park, Langmuir Bldg., Ste. 231, Ithaca, NY 14850; (607) 257-4305.

Circle 407 on reader card

### UDS Modem Complies With CCITT Standard

Universal Data Systems (UDS) announced a 9,600-bps V.32 modem that fully complies with the CCITT's V.42 error-correction standard. V.42 uses MNP 4 and LAP-M error-correcting protocols.

The FasTalk V.32/42 is completely error-correcting and supports full-duplex data transmission at 9,600 bps (V.32), 2,400 bps (V.22 bis) and 300/1,200 bps (Bell 212A). The modem automatically negotiates the proper speed and protocol with a remote modem and connects at the correct levels. The V.32/42 is AT command set compatible and supports MNP 5 data compression, which can increase its effective throughput up to 19,200 bps. It features a desktop enclosure with an LCD that monitors modem functions. Other features include automatic adaptive equalization, tone/pulse dialing, audible call progress detection and integral diagnostics.

The product costs \$1,045.

For more information, contact Bill Schlosser, Universal Data Systems, 5000 Bradford Dr., Huntsville, AL 35805; (205) 721-8000.

Circle 420 on reader card

### SmartStar Provides Interface To CDD/Plus

SmartStar Corporation announced capabilities for CDD/Plus users. Repository users now can take advantage of tools for automating the creation of CDD/Plus syntax, the import and export of CDD/Plus data and the migration of old CDD tables into the new CDD/Plus format. Star, a new component of the SmartStar application development environment, provides a menu-based interface to the CDD/

Plus environment for automating these tasks.

The new interface enables bidirectional processing between SmartStar and CDD/Plus through a Maclike interface. You can export data definitions from the SmartStar environment into CDD/Plus and can populate SmartStar applications with CDD/Plus data by specifying the appropriate table names. These operations are accomplished without any coding or syntax. You also can export CDD/Plus data definition syntax from SmartStar. The repository syntax for field definition protocols and table definition protocols is created automatically. This syntax can be edited by the user or placed directly into CDD/Plus.

For more information, contact David Baum, SmartStar Corp., 120 Cremona Dr., Goleta, CA 93116; (805) 685-8000.

Circle 417 on reader card

### Sorbus Markets SunGard Disaster Recovery Services

Sorbus and SunGard announced an exclusive marketing partnership under which Sorbus will market SunGard disaster recovery services.

Initially, Sorbus will market hot-site recovery services to IBM 4300 users and cold-site availability to IBM and DEC midrange users. In the future, the partnership will include service for a broader range of equipment according to customer needs. Hot-site services are supported at one of SunGuard's recovery centers to provide immediate access to fully equipped and functional computers and facilities. In a disaster, Sorbus customers can restore critical applications and conduct business using alternate data processing equipment and services. Cold sites are fully conditioned computer rooms that support the installation of additional or replacement equipment. They include raised flooring, HVAC and electrical capacity, fire protection and security systems.

For more information, contact Mary Keifer, Sorbus, 50 E. Swedesford Rd., Frazer, PA 19355; (215) 296-2987.

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### Oracle Supports Netframe, Integrates With /iTi

Oracle Corporation announced support for Netframe Systems' family of network mainframes, the NF100/300/400. Oracle Server for the Netframe computers will bring distributed database users the reliability, security and compute capacity of mainframes with the simplicity, flexibility and compatibility of PCs.



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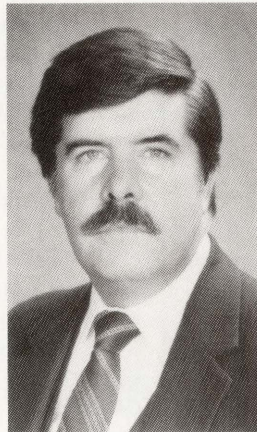
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CIRCLE 137 ON READER CARD



Oracle Server users can develop a new generation of mission-critical applications using Oracle's application development tools. Oracle Servers are available on Netware 386, OS/2, Banyan Vines and UNIX 386.

The company also announced the integration of Oracle V6.0 with Independence Technologies' /iTi Transaction Manager, a form of multithreaded, multiserver UNIX System RDBMS. It runs on Pyramid Technologies' MISserver line of high-performance servers. The integration of transaction monitor technology with Oracle provides high throughput for OLTP environments. The multiserver architecture of Oracle is extended with multi-threading, allowing each server to service multiple clients more efficiently by sharing common processing resources. While multiple database servers can concurrently execute in a multiprocessing computer, multithreading increases the number of users each server can handle.

For more information, contact Mark Rawlins, Oracle Corp., 20 Davis Dr., Belmont, CA 94002; (415) 637-7800.

**Circle 406 on reader card**

### Relational Accelerator Increases OLTP Performance

Charles River Data Systems announced the Relational Accelerator for VAX-based Oracle applications. This dedicated database engine has been designed for Oracle to increase the system performance of OLTP and decision support applications. It can execute TPI benchmark transactions at 25 tps.

The Relational Accelerator attaches through Ethernet and high-speed network software to VAX systems — including the MicroVAX, VAX 11/7xx and VAX 82xx/83xx — running Oracle V6.0. Application software continues to operate transparently on the VAX. The product provides a dedicated back-end processor, real-time system software that eliminates unnecessary overhead, a parallel disk I/O system to reduce disk seek time and optimized network software for high-speed data communications along a standard Ethernet network. The system software includes real-time features such as optimized scheduling and high-speed context switching, real/nonpaged memory space and fast synchronization capabilities.

For more information, contact Charles River Data Systems, 983 Concord St., Framingham, MA 01701; (508) 626-1000.

**Circle 411 on reader card**

### nu/TPU 2.0 Offers TPU On UNIX, DOS

a/Soft Development Inc. announced nu/TPU V2.0, a text editor that offers VMS V5.0 text processing utility (TPU) functionality on UNIX, ULTRIX and MS-DOS.

nu/TPU supports 31 UNIX platforms ranging from PCs to Crays. It offers a complete implementation of VMS V5.0 TPU with built-in EVE, EDT, WPS and VI interfaces in a window environment. It lets you recompile TPU source code and create an unlimited number of extensions, and it supports the use of Section, Command and Initialization files to customize the editing interfaces. A user profile utility lets you specify default configuration files for editing. This reduces the duplicating of section and command files across the system. The nu/TPU keyboard can be reconfigured, and the utility can be customized.

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UNIX-based systems cost from \$395 to \$5,000; MS-DOS systems cost \$325.

For more information, contact James R. Graf, a/Soft Development Inc., 1353 Salem St., N. Andover, MA 01845; (508) 683-4369.

Circle 409 on reader card

## XDOS Converts DOS Applications To UNIX

Eakins Associates Inc. announced an agreement to resell and integrate Hunter Systems' XDOS with its line of X visual Display Stations. Eakins resells Visual's family of X Display Stations, including the Model X-19 with a 19-inch monitor and the Model 640 XDS with a 14-inch monitor. Both are compatible with X clients, including DEC, HP, Sun, NCR and most UNIX-based computers.

The Visual X Display Stations offer a work-stationlike graphics display alternative to dumb terminals in UNIX environments. XDOS converts DOS applications into native UNIX applications. Available XDOS DOS applications include Lotus 1-2-3, WordPerfect, dBase III Plus, WordStar Professional and MultiMate Advantage II.

Pricing reflects a token checkout scheme

in which a token is assigned to each concurrent user. Prices for a single token configuration start at \$375.

For more information, contact Donald Krenn, Eakins Associates Inc., 67 E. Evelyn Ave., Mountain View, CA 94041; (415) 969-5109.

Circle 412 on reader card

## ACP 5250 Operates On DECsystem 5400

Advanced Computer Communications announced that it has enhanced its ACP 5250 Q-bus resident X.25 controller to operate in the ULTRIX-based RISC environment of the DECsystem 5400.

The ACP 5250 enhances the price/performance ratio of the DECsystem 5400 by providing a WAN interface that's directly integrated with the ULTRIX TCP/IP networking kernel. With the addition of the ACP 5250, remote applications and users can gain access to the DECsystem 5400 through commercial or private X.25 packet networks. Without a WAN connection, the DECsystem 5400 is accessible primarily in a LAN mode. The ACP 5250 is a Q-bus resident

X.25 communication controller card that operates in MicroVAX II, MicroVAX 3000/VAXserver 3000 series and the DECsystem 5400.

The product is priced at \$4,200 for Micro-VAX II configurations and \$4,400 for Micro-VAX 3000/VAXserver 3000 or DECsystem 5400 systems.

For more information, contact Bill Mason, Advanced Computer Communications, 720 Santa Barbara St., Santa Barbara, CA 93101; (805) 963-9431.

Circle 410 on reader card

## Epoch-1 Supports Diskless Workstations

Epoch Systems Inc. announced the Epoch-1 InfiniteStorage Server V3.0. This software introduces a set of administrative tools for managing hierarchical online storage, offers improved system performance and provides full support for PCs and diskless workstations.

V3.0 improves administrative control of the Epoch-1's optical disk level of storage hierarchy. A compact facility maximizes the effective capacity of each optical library unit to 30 GB. A quota mechanism lets you limit

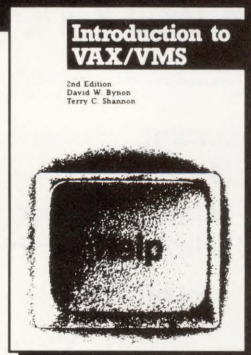
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how much virtual storage space (i.e., optical disk space) a workstation user can consume. A retrieval mechanism provides efficient access to logically related files that are physically stored on separate optical disks within a library unit. I/O throughput performance has been increased in the magnetic disk level of the storage hierarchy, the optical disk level of the storage hierarchy, the file system checker and the memory size of the system. For more information, contact Jay Woodruff, Epoch Systems Inc., 313 Boston Post Rd. W., Marlborough, MA 01752; (508) 481-3717.

Circle 413 on reader card

### Mobius Software Supports DOS 4.x

FEL Computing announced Mobius PC/VAX integration software V2.6. Mobius is a software concept that includes VT220 terminal emulation, file transfer, printer support, a virtual file system, task-to-task communication, a high-level task-description language and an advanced programmers interface.

Mobius features Ethernet support, automatic backup, PC control from the VAX and optional menu interfaces. Mobius is upwardly and downwardly compatible and supports DOS 2.0 through 4.x. It also supports such terminal emulators as VT240/241, ReGIS and Tektronix. They can be selected as part of setup and run along with Mobius. This gives PC users the integration of Mobius and the advanced graphics emulation of their choice. Mobius also supports terminal emulators from such companies as KEA Systems, Persoft and Walker Richer & Quinn.

A single-user system costs \$495 for standard connections and \$595 for Ethernet. For more information, contact Kathryn Merriam, FEL Computing, 10 Main St., Williamsville, VT 05362; (802) 348-7171.

Circle 401 on reader card

### Eurologic Announces Synchronous SCSI Support

Eurologic Systems announced that support for high-performance synchronous SCSI tape drives has been added to the range of CMD Technology SCSI host adapters for DEC systems.

The dual-wide CQD-220/TM (Q-bus) or quad-wide CDU-720/TM (UNIBUS) support up to seven synchronous or asynchronous SCSI tape or disk drives with transfer rates of 5 Mbps and full TMSCP/MSCP compatibility. This lets system designers/in-

tegrators combine high-capacity/performance Winchester with backup devices using a single module. Both models are available with differential drivers where long SCSI cables (up to 25 meters) are required. Versions of Q-bus units are available for the MicroVAX 3xxx series. The units are fully compatible with Q-bus and UNIBUS PDP and VAX systems and operating systems that use standard DU/MU drivers, including VMS, RSTS, RSX, RT-11, MUMPS, ULTRIX, TSX and UNIX.

You can mix any combination of seven synchronous or asynchronous Winchester, erasable optical, CD-ROM, Exabyte, DAT, 1/2-inch tape, 1/4-inch tape or 3480 tape on a single adapter with no software or firmware changes.

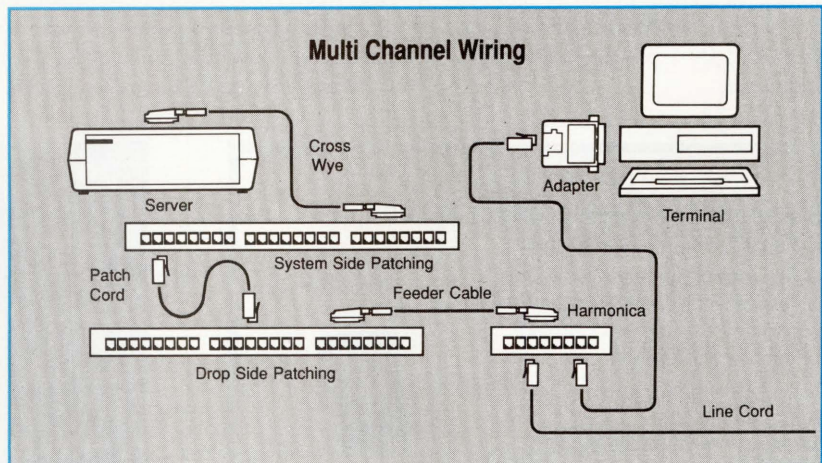
For more information, contact John Maybury, Eurologic Systems, Chamco House, Shankill, Co Dublin, Ireland; 0001 823688.

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Tech-Tip No.

7

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## Interface Links Focus With ALL-IN-1

Information Builders Inc. announced the Focus for ALL-IN-1 Interface. It combines the applications development, report generation and database access facilities of Focus with ALL-IN-1's productivity services, including word processing, e-mail and calendar and time management.

The interface seamlessly integrates ALL-IN-1 folders and VMS directories to let you access information beyond the ALL-IN-1 file cabinet. ALL-IN-1 applications can access data whether it resides in Rdb, RMS, DBMS, third-party databases, mainframes, PCs or LANs. Data can be incorporated directly into ALL-IN-1 reports, graphics and documents. The window-driven interface lets you access more than 30 relational and nonrelational sources of data without coding or leaving the ALL-IN-1 environment. Users automatically can describe files and generate reports and graphs through point-and-pick selections in pop-up menus. System designers automatically can generate screen forms and windows that meet ALL-IN-1 presentation and keyboard standards.

For more information, contact Linda Meister, Information Builders Inc., 1250 Broadway, New York, NY 10001; (212) 736-4433.

**Circle 404 on reader card**

## MEC Debuts Executive Express And Mass-11 Spreadsheet

Microsystems Engineering Corporation (MEC) announced Executive Express, a PC word processor for casual users. It's compatible with Mass-11, so files can be interchanged easily. It features a new user interface with pull-down menus and is available for the IBM PC and compatibles. Versions for the VAX and Mac will be available later this year.

Executive Express is priced at \$195.

The company also announced Mass-11 Spreadsheet, a spreadsheet and statistical analysis tool for the VAX. It offers live links to Mass-11, so you can merge data from the spreadsheet directly into your word processing documents. It also can import data from Access Technology's 20/20 and Ashton Tate's dBase III. It features a Lotuslike interface and can import Lotus data, graphs and macros.

Mass-11 Spreadsheet is priced from \$5,175

for a MicroVAX to \$20,700 for the VAX 8000 series.

For more information, contact Carol Karels, Microsystems Engineering Corp., 2400 W. Hassell Rd., Ste. 400, Hoffman Estates, IL 60195; (201) 592-6633.

**Circle 405 on reader card**

## GigaTrend Announces The Giga 1236 DAT Storage System

GigaTrend Inc. announced the Giga 1236, a standard QIC-02 plug-and-play 4mm DAT storage system for the IBM PS/2 and AT, Compaq 286 and 386 CPUs and compatibles.

It can store up to 1 GB of data on a cassette the size of a credit card. These industry-standard DAT cassettes have a storage capacity equivalent to 17 60-MB QIC 1/4-inch cartridges. The 5 1/4-inch form factor drive lets 1/4-inch tape drive users replace streaming drives with the Giga 1236 without replacing controller card and software. The 4mm DAT random access method of file recovery uses a high-speed filemark search feature operating at up to 200 times the drive's normal read/write speed. An automatic head-cleaning device is controlled by the firmware.

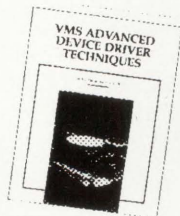
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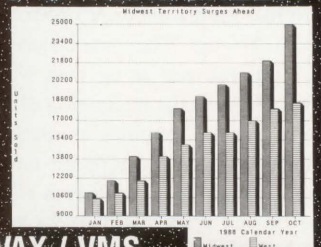
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For more information, contact Karina Lion, GigaTrend Inc., 2234 Rutherford Rd., Carlsbad, CA 92008; (619) 931-9122.

**Circle 414 on reader card**

### **Datability Line Card Replaces Modems**

Datability Software Systems Inc. announced the VCP/LC-8-2400B, a configuration of eight 2,400-bps Hayes-compatible modems compressed onto a single line card. Installed in Datability's Vista communications platform, it bridges incoming modem users directly onto networks via TCP/IP or LAT while providing network users with shared access to the modem resource.

Unlike traditional environments in which phone lines connect to modems that must be connected to terminal servers, this modem line card integrates eight modems directly within Vista. For DEC users, the integrated modems simplify access to remote systems by network users. System administrators can create LAN services with predefined telephone numbers that correspond to remote systems. When network users connect to these LAN services, transparent access is established through an available modem to the appropriate remote systems without the user entering a modem command.

The VCP/LC-8-2400B is priced at \$2,999.

For more information, contact Leslie Schinto, Datability Software Systems Inc., 322 8th Ave., 11th Fl., New York, NY 10001; (212) 807-7800.

**Circle 548 on reader card**

### **Able's Gateway Expands Wide Area Connections**

Able Computer announced a WAN gateway that directly interconnects Able's Easyway networks and provides access to a centralized or remote DEC host with no distance limitations.

Remotegate links to DEC hosts via Able's Ethernet/LAT, Q-bus or UNIBUS host servers. Access is provided to a variety of modems and statistical multiplexers and to Able's Ethernet products. It uses the CASE DCX-series ARQ protocol on its two independent 80-Kbps synchronous ports. These ports provide service for two remote sites or redundant service to one remote site. The ports use an error-recovery protocol to protect against

data loss and provide a redundant link for data transmission. Datalinks can be password-protected at the remote or local end. The remote site can maintain control over local resources while retaining access to the central site.

Remotegate costs \$5,500.

For more information, contact Dan Sullivan, Able Computer, 2567 S.E. Main St., Irvine, CA 92714; (714) 553-1188.

**Circle 456 on reader card**

### **KEA Systems Improves PowerStation Keyboard**

KEA Systems Ltd. announced a new model of the PowerStation keyboard, a VT200 layout keyboard that lets a PC act like a DEC workstation.

Used with KEA's terminal emulation software on a PC, it provides terminal operation identical to that provided by a DEC terminal. Used with VAX software converted to

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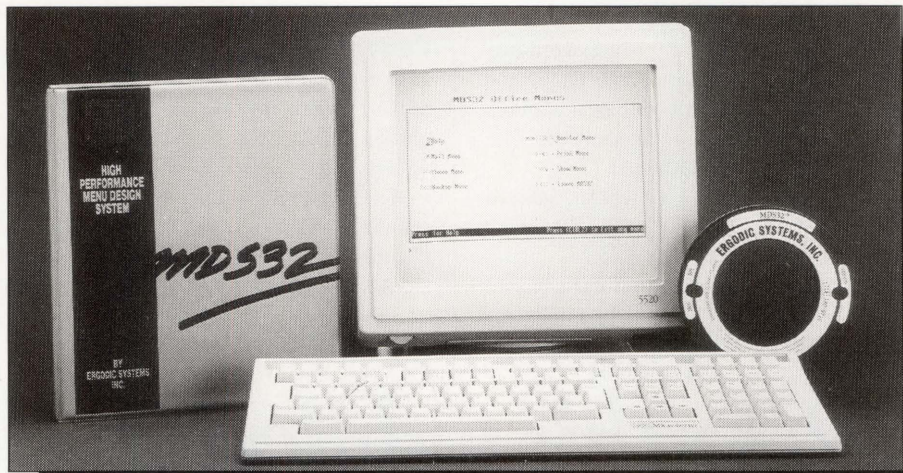
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*Ergodic Systems Inc.'s MDS32 VAX menu design system.*

run on a PC, the appearance and touch is the same as that of a DEC terminal connected to a VAX. The new keyboard features more configuration switches. It's sold separately for use with standalone PC applications or bundled with KEA's emulation software. It has eight option switches that set user configuration options such as key click, North American/European operation, and type of PC with which the keyboard will be run. A replacement ROM chip is no longer necessary. The keyboard runs with the IBM PC, AT and PS/2 and compatibles.

The standard model costs \$199; the gold model costs \$229.

For more information, contact KEA Systems Ltd., 2510 W. Broadway, Ste. 412, Vancouver, BC; V6K 4L9; (604) 732-7411.

**Circle 403 on reader card**

### **MasterTape II/HSC Supports HSC40/50/70**

American Digital Systems Inc. announced the MasterTape II/HSC 8mm tape backup system, which supports the HSC40/50/70. MasterTape II/HSC is available in configurations with one to four 8mm tape drives coupled to a SCSI-to-tape data channel protocol converter.

The basic product provides up to 2.3 GB of formatted storage. A fully configured system provides up to 9.2 GB of storage on an HSC data channel port and up to 36.8 GB per HSC tape data channel card. A tape data channel card can be shared between MasterTape II/HSC and installed DEC TA-series tape drives. As a companion to MasterDisk/SDI, MasterTape/II HSC supports any HSC disk system and is transparent to systems or applications software. In the event of failure,

DEC diagnostic programs can isolate the problem. The system is backed by a two-year warranty on all parts.

For more information, contact Kathy Ficaro, American Digital Systems Inc., 490 Boston Post Rd., Sudbury, MA 01776; (508) 443-7711.

**Circle 457 on reader card**

### **Timeline Enhances General Ledger**

Timeline Inc. announced the Timeline General Ledger & Financial Reporting System V4.2. It features a consolidation module, foreign currency conversion, expanded data storage and inquiry, reporting and budgeting capabilities.

Producing consolidated reports has been simplified with a menu function that lets you define the corporate hierarchy and percentages of ownership. The system automatically creates consolidations and eliminations of intercompany transactions. Intelligent integration with DIGICALC has been enhanced. For example, budget supercommands in DIGICALC can extract a budget for a department, company or project and put it into the general ledger summary file. Storage of general ledger budget data has been expanded from one year to three years of date and budget. The database of accounting information includes nonfinancial data for comparative analysis. Data such as budgeted statistical quantities, versions of the budget and budget variance limits are available.

For more information, contact Lawson Abinanti, Timeline Inc., 3055 112th Ave. N.E., Ste. 106, Bellevue, WA 98004; (206) 822-3140.

**Circle 464 on reader card**

### **Ergodic Enhances VAX Menu Design System**

Ergodic Systems Inc. announced a developers toolkit and run-time license for MDS32, its VAX/VMS menu design system. The option lets application developers build systems that use MDS32 for a dialog-based front end and as a back end for DCL and applications processing.

The developers toolkit consists of a menu environment, libraries and licensing that let developers incorporate MDS32 into their products. MDS32 scripts can be executed to interface directly to DCL and applications programs without programming. Hard-coded extensions can be called from within MDS32 scripts. Executable images can be linked against the MDS32 library, providing direct program access to the MDS32 application interface. The MDS32 architecture lets any combination of these methods be employed within an application.

The MDS32 run-time option is priced from \$2,000 for 50 installations to \$5,000 for unlimited installations.

For more information, contact Steve Duff, Ergodic Systems Inc., 23666-A Birtcher Rd., El Toro, CA 92630; (714) 380-9719.

**Circle 429 on reader card**

### **BBK-DR11 Bridges Parallel Processing To DEC Systems**

Paracom Inc. announced the BBK-DR11 board, which bridges parallel processing power to DEC systems using the DR11-W or DRV11-WA specification. System integrators can use a BBK-DR11 interface board to bridge a VAX to a parallel processing machine.

The bus bridge uses a T222 transputer chip with 32 KB 35 ns SRAM as an interface controller to make the resources of the parallel processing system useable to the host VAX. The BBK-DR11 lets the VAX perform compute-intensive applications. Applications that require automatic bootup can be accommodated with an optional 16 KB of EPROM. The board also acts as a DR11-compatible 16-bit parallel I/O port to standalone parallel processing systems. You can connect DR11-compatible peripheral devices to a parallel processing array.

The product costs \$2,345.

For more information, contact Randy Cochran, Paracom Inc., 245 W. Roosevelt Rd., Bldg. 9, Unit 60, W. Chicago, IL 60185; (312) 293-9500.

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Racal InterLan offers more proven, cost-effective ways of splicing DEC solutions into your LAN.



## Host Adapter Boards Provide SCSI Capabilities

Dilog announced two host adapter boards that provide single-ended SCSI capabilities for connecting multiple disk and tape drives to MicroVAX III systems.

The SQ3706A disk host adapter lets up to seven SCSI disk drives connect to a MicroVAX III. The SQ3703A tape host adapter lets you interface up to seven tape drives or tape emulation devices per system. Both are quad-sized boards that have their own bulk-head covers to maintain the integrity of the BA213 system enclosure. They support SCSI connect/disconnect, which allows overlapped seeks and maximizes SCSI bus throughput when more than one drive is attached to the host adapter. They configure themselves to match the synchronous SCSI bus throughput and support data rates of 4 Mbps in synchronous and 2 Mbps in asynchronous mode. The SQ3706A is transparent to the DU software driver and the SQ3703A is transparent to the MU software driver in VMS, ULTRIX and UNIX.

The products cost \$1,650 each. For more information, contact Julie Dutton, Dilog, 1555 S. Sinclair St., Anaheim, CA 92806; (714) 937-5700.

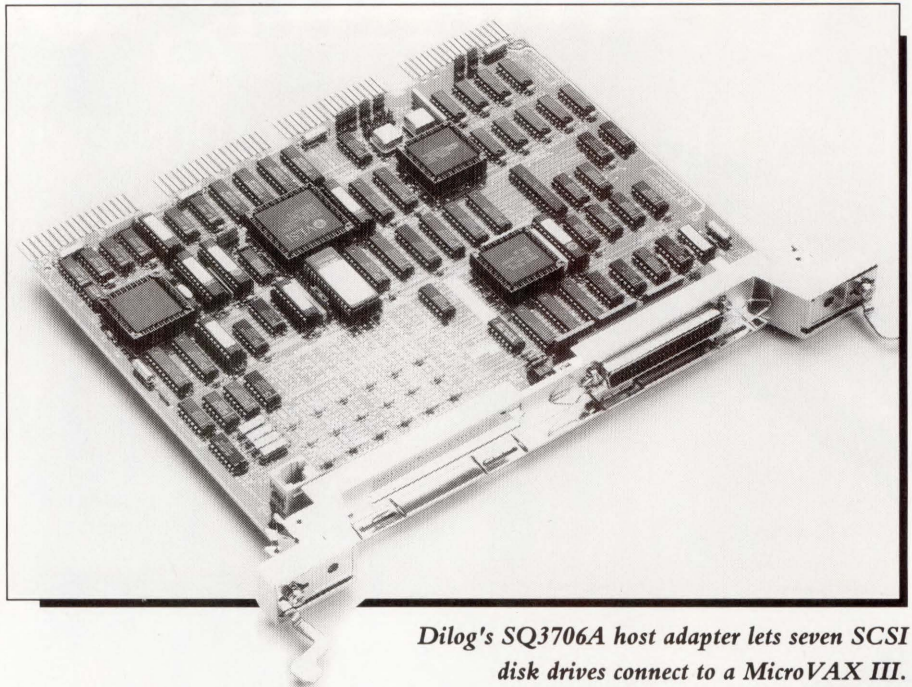
Circle 449 on reader card

## ConvexOS Delivers Supercomputer Power

Convex Computer Corporation announced Open Supercomputing, with hardware and software products that allow corporate-wide access to supercomputer power. It supports industry-standard interfaces and environments.

The ConvexOS operating system is compatible with the POSIX standard. Derived from Berkeley UNIX 4.2 and 4.3 BSD, it delivers supercomputer power to every user on the corporate network. Utilities from Berkeley UNIX 4.2 and 4.3 BSD provide an interactive user environment with command interpreters, text processing utilities and productivity tools. It provides the throughput of the symmetric parallel processors of the Convex C series. It supports protocols for integration of UNIX systems into a distributed computer environment to allow easy movement of data, programs and users from one system to another. It integrates into networks running VMS via the Convex COVUE product family.

ConvexOS costs from \$7,500 to \$37,500, depending on processor model. For more information, contact Donna Burke,



*Dilog's SQ3706A host adapter lets seven SCSI disk drives connect to a MicroVAX III.*

Convex Computer Corp., 3000 Waterview Pkwy., Richardson, TX 75083; (214) 497-4230.

Circle 448 on reader card

## Tartan Compilers Feature Optimization Technology

Tartan Laboratories announced the validation of four compilers: a VMS 68020 cross compiler, a VMS 1750A cross compiler and cross compilers from VAX/VMS and Sun workstations to the Intel 80960 processor. Tartan also announced the 68020 cross compiler, the VMS 68K, as a product. Each Tartan compiler is distributed as part of a compilation system that includes Tartan's source-level symbolic debugger, AdaScope, and highly flexible linker.

Tartan compilers allow development of embedded systems applications through optimization technology and a modular run-time system. They ensure that application code meets real-time response requirements and fits in limited onboard memory. Optimization technology uses target architecture features and provides Ada-specific optimizations. Four selectable optimization levels are provided. The run-time system excludes unnecessary modules to produce the smallest possible object code size, supports protected and reconfigurable applications, accelerates rendezvous times and is customizable to meet application needs.

For more information, contact Susan Englert,

Tartan Laboratories, 300 Oxford Dr., Monroeville, PA 15146; (412) 856-3600.

Circle 462 on reader card

## IBIS Model 2012 Provides 2 GB Of Storage Capacity

IBIS Systems Inc. announced the IBIS Model 2012, the latest in its line of parallel-transfer disk drives. It features 2 GB of storage capacity and a data transfer rate of 12 Mbps.

The IBIS Model 2012 uses an HDA with two 32 K bpi recording channels operating in parallel and features a track-to-track seek time of 1.9 ms. Spindle synchronization is built-in to let multiple drives operate in parallel. Two, three or four drives offer storage subsystem performance of 24, 36 or 48 Mbps while appearing as a single unit to the host. The product comes with the IBIS-1 interface; a 16-bit parallel data bus that offers a 12-Mbps data rate; and built-in controller functions, such as dual porting and daisy chaining, formatting capability, ECC generation and check, and error recovery features. It can be used with the IBIS-1 VME Controller and IBIS software drivers for UNIX environments such as Sun OS, AT&T System V and Berkeley 4.2 BSD.

The IBIS Model 2012 costs \$37,600. For more information, contact Dick Cavanaugh, IBIS Systems Inc., 5775 Lindero Canyon Rd., Westlake Village, CA 91362; (818) 706-2505.

Circle 450 on reader card



### **GatorMail-Q Links QuickMail And SMTP**

Cayman Systems Inc. announced GatorMail-Q, a software gateway between QuickMail and SMTP. The gateway lets QuickMail users exchange mail with electronic mail users of minis and workstations on Ethernet. It also can be used with GatorBox, Cayman's Local-Talk-to-Ethernet gateway, and other TCP/IP gateways.

The software features a transparent user interface that lets you send messages using familiar mail systems. When QuickMail users send messages to SMTP users, GatorMail-Q translates them into the SMTP mail format and delivers them to VAXs, Sun workstations and other Ethernet-based minis and workstations that support TCP/IP. When SMTP users send messages to Mac users, the messages are delivered to the QuickMail administrator running GatorMail-Q. GatorMail-Q translates them to QuickMail format and sends them to QuickMail for delivery to Mac and PC users. In networks that include Macs on LocalTalk and computers on Ethernet, GatorMail-Q uses the AppleTalk-to-TCP/IP routing built into GatorBox.

For more information, contact Carol McGarry, Cayman Systems Inc., 26 Landsdowne St., Cambridge, MA 02139; (617) 494-1999.

**Circle 428 on reader card**

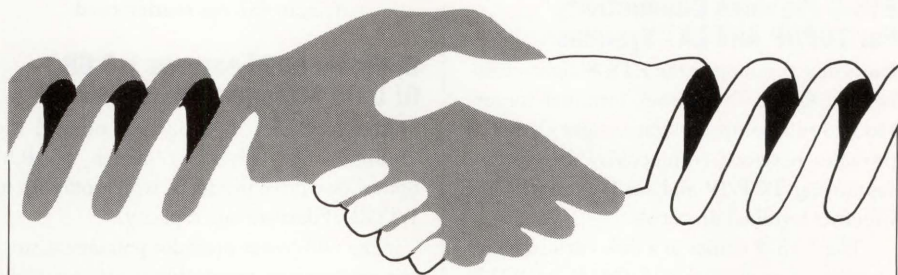
### **WordPerfect Displays Graphics On Nongraphics Terminals**

WordPerfect Corporation announced WordPerfect V5.0 for VAX/VMS. It features multiple fonts, leading, kerning, styles, enhanced laser printing capabilities and displayed text and graphics on nongraphics terminals.

WordPerfect V5.0 can retrieve all PC-supported graphics formats, as well as ReGIS, Tektronix and Sixel. Graphics images can be rotated, scaled and placed anywhere on the page. On VT220/320 text and VT240/330/340 graphics terminals it uses software character sets to display combinations of characters and attributes. You can see double underline, italics, super/subscript, shadow and strikeout in a variety of combinations. The graphics terminals display graphics onscreen in a bit-mapped composition. V5.0 supports more than 400 printers, including laser, PostScript, dot matrix, color, thermal and ink jet, and more than 1,000 characters. The compound file format is compatible between PC and VAX platforms and can be shared with WordPerfect users on Mac, ULTRIX,

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For more information, contact Kathryn Pond-Sargent, WordPerfect Corp., 1555 N. Technology Way, Orem, UT 84057; (801) 222-4435.

Circle 444 on reader card

### ETS-8 Provides Connectivity For TCP/IP And LAT Systems

Lantronix announced the ETS-8 eight-channel IEEE 802.3/Ethernet terminal server. Housed in a compact, light-weight chassis, it provides network connectivity for systems supporting TCP/IP and LAT over standard Ethernet terminal protocols.

The ETS-8 comes in a disk enclosure and consists of eight RS-423 (MMJ or RJ12) ports, an LED activity panel, an onboard microprocessor, memory and power supply. It measures 8 x 2.6 x 5.2 inches and comes standard with an AUI DB15 transceiver interface for connection to the Ethernet environment. The product lets you relocate workgroups and servers anywhere on the Ethernet network. It features gate array technology, making a cooling fan unnecessary. The company also announced the MAU-2,

a ThinWire transceiver that provides connection between ThickWire cabling and RG85 ThinWire coax cabling.

The basic ETS-8 unit costs \$1,695. The MAU costs \$175.

For more information, contact Brad Freeburg, Lantronix, 26072 Merit Cir., Ste. 113, Laguna Hills, CA 92653; (714) 367-0050.

Circle 458 on reader card

### Optimem 600 Features 1.3 GB Of Data Storage Capacity

Optimem Products Group announced the Optimem 600 Series 5 1/4-inch WORM optical disk drive products, which offer up to 1.3 GB of data storage capacity.

The 600 Series provides permanent storage on compact removable media for high-end PCs, workstations and minis. The series includes a subsystem available with one or two half-height drives and a controller; a standalone half-height drive; a standalone full-height drive with a controller; and optical media with storage capacity of 654 MB. All 600 Series drives use SCSI. They feature a 77 ms average access time and a 725 Kbps data transfer rate. The 5 1/4-inch drive is compatible with Optimem's family of 12-inch

optical drives.

Pricing for a Model 600 subsystem is \$3,295.

For more information, contact John Dean, Optimem Products Group, 297 N. Bernardo Ave., Mountain View, CA 94043; (415) 961-1800.

Circle 459 on reader card

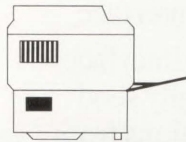
### Sigma Offers Memory Boards For MicroVAX II and III

Sigma Information Systems announced 8- and 16-MB memory boards for the MicroVAX III and an 8-MB memory board for the MicroVAX II.

The SM-16MB/MV3, SM-8MB/MV3 and SM-8MB/MV2 are designed around high-speed, high-density 1-megabit DRAM technology. They're hardware-, software- and diagnostic-compatible with their associated DEC CPUs. The SM-16MB/MV3 includes full error detection and correction. The SM-8MB/MV2 includes an online/offline switch that lets memory be removed from the system electrically but not physically.

The SM-16MB/MV3 costs \$6,750, the SM-8MB/MV3 costs \$3,685 and the SM-8MB/MV2 costs \$2,825.

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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.

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.

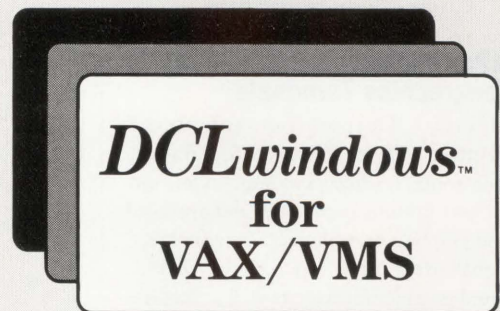
ScriptServer features full LAT support and compatibility with terminal emulation products, allowing sharing of printer resources by users from workstation, Mac or PC. The PCSA and SNA Gateway products from DEC are also supported.

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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### V:Access Provides Terminal Emulation

Golden Gate Communications Inc. announced V:Access, a PC LAN-oriented terminal emulation gateway. It lets IBM-compatible PCs on a Netbios PC LAN perform terminal emulation into a VAX.

In this hardware/software solution, the hardware is a PClike workstation that resides on the PC network as a normal 3Com or Token Ring (IBM PC LAN Program) node. The PC user executes a local terminal emulation program that brings up a dynamic menu displaying available V:Access servers. He then selects the server of choice and is connected to the VAX associated with that server. The terminal emulation software supports most terminal emulation programs. The program must support Interrupt 14. It includes an optional VT220 terminal emulator.

Prices start at \$11,900.

For more information, contact Julian Henkin, Golden Gate Communications Inc., 2140 Shattuck Ave., Ste. 2290, Berkeley, CA 94704; (415) 524-6166.

Circle 415 on reader card

### Telematics' PAG Lets Networks Communicate

Telematics International Inc. announced the Programmable Application Gateway (PAG), which lets networks supporting different addressing schemes communicate. The internet-work communications product is programmable and provides integrated access to public and private networks with or without the use of X.75 and inherent Data Network Identification Code (DNIC) restrictions.

PAG features DNIC insertion/extraction, zero suppression and address/facility/utility negotiation among networks. Configurable from the Telematics network management system, PAG applications include X.25/X.75 address mapping, customized security through call validation, logical channel number-based call routing, throughout class routing, and customized call establishment.

PAG costs from \$5,000 to \$10,000.

For more information, contact Miriam K. Frazer, Telematics Int'l Inc., 1201 Cypress Creek Rd., Fort Lauderdale, FL 33309; (305) 772-3070.

Circle 463 on reader card

### SI Integrates Disk Software With DEC-Compatible Subsystems

System Industries (SI) announced the integration of a full-featured disk optimization software package with its C Series and SI Performance Array disk subsystems. Smart Disk, an online performance enhancement and file defragmentation package, is included free with SI's VAX and VAXcluster plug-compatible subsystems.

An intelligent online disk defragmenter and optimizer, Smart Disk can improve disk access times by more than 30 percent. It consolidates fragmented files and creates contiguous free space for new files. It can be set up to run automatically at predetermined intervals and has no impact on users or applications. Through the VMS Distributed Lock Manager, Smart Disk ensures data integrity by never moving open files. In addition, a copy of each file exists on disk at all times, so recovery from system crashes and other interruptions is automatic and complete.

For more information, contact Brian Edwards, System Industries, P.O. Box 789, Milpitas, CA 95035; (408) 432-1212.

Circle 461 on reader card

### CTS-800 Series Offers 32 GB Of Storage Per HSC

Transitional Technology Inc. announced the CTS-800 Series of 8mm helical scan tape subsystems, which provides fast, high-capacity, unattended backup operations for VAXs.

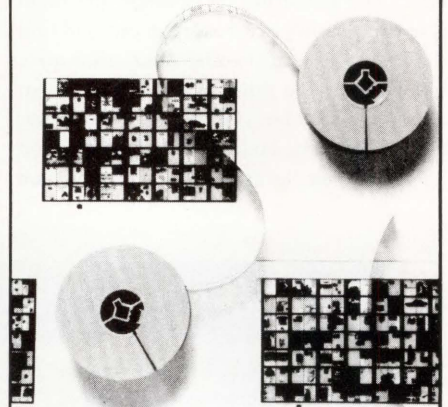
The CTS-800 Series supports up to 32 GB of storage capacity per HSC tape data channel. Each drive provides up to 2.2 GB capacity, and up to 16 drives are supported by each tape data channel board. The series offers a 15-MB-per-minute data transfer rate and supports copying and backup commands. It features 512 KB alternating buffer to ensure that a full record is available for transfer to the HSC. A SCSI interface allows direct connection to the STI on HSCs using TMSCP. The subsystem attaches to the HSC-5X-CA tape data channel on the HSC40/50/70. It's plug-compatible with TA-79 Series tape drives. Changes to systems or applications software aren't required.

Prices vary according to configuration. The CTS-820 costs \$24,000 and includes a master drive, slave drive, STI adapter, power supply enclosure and control panel.

For more information, contact Candace P. Diel, Transitional Technology Inc., 1411 N. Batavia, Ste. 203, Orange, CA 92667; (714) 744-1030.

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## APL\*Plus Provides Batch Capabilities

STSC Inc.'s APL\*Plus for VAX/VMS V2.0 provides batch capability to redirect terminal input and output and features enhanced printer support. It lets you debug non-APL subroutines from APL with the VMS DEBUG facility.

The batch facility lets you run APL programs in background while performing other tasks. The command file specifies the input script and an output file as arguments and runs the job while you go to other tasks. Workspace functions let you print APL and ASCII text. The workspace lets you select a printer font, format APL text, build a print file and submit a print request through VMS. You can print

APL character arrays, APL component files and APL native files. With the VMS DEBUG facility, you can debug non-APL programs from within APL\*Plus. You can step through the routine in source or machine language.

For more information, contact Ed Beemer, STSC Inc., 2115 E. Jefferson St., Rockville, MD 20852; (301) 984-5000.

**Circle 408 on reader card**

## Praxa Streamlines Sales Management

Unitronix Corporation announced Praxa Sales & Marketing Management System, a fully integrated sales management system.

Praxa Telemarketing and Sales Quotations are integrated with Order Entry & Invoicing,

Inventory Control, Sales Order Booking and Sales Analysis to form a system that handles distribution and sales. The system is an enhancement of the company's VAX- and MicroVAX-based Praxa Manufacturing Resource Planning (MRP II) and the Praxa Synchronized Manufacturing Systems. Telemarketing provides online sales and marketing summaries. Sales Quotations automatically generates and tracks sales quotes and produces proposals. Order Entry automatically posts to Accounts Receivable, allocates inventory, generates invoices and updates General Ledger.

For more information, contact Barbel French, Unitronix Corp., 1021 Centennial Ave., Piscataway, NJ 08854; (201) 981-1600.

**Circle 419 on reader card** ■

## DIGITAL PRODUCTS

■ DEC announced a trade-in/upgrade program for owners of VAX or Sun Microsystems workstations.

VAXstation 2000 owners can receive a \$2,000 trade-in toward a VAXstation 3100. Priced from \$7,950, it features a CMOS VAX CPU that offers more than three times the performance of the VAXstation 2000. Existing applications run without modification on the new machine.

Sun-3/50 owners can receive \$2,000 toward a VAXstation 3100 or DECstation 3100. Sun-3/60 owners can receive \$4,000 toward a VAXstation 3100 or DECstation 3100.

■ DEC's VAX DEC/MAP V3.0 products include software and hardware components and support IEEE 802.4 (token-bus) and IEEE 802.3 (Ethernet) technologies.

With DEC's industrial networking products, you can design and implement a seamless network that uses VAX DEC/MAP to communicate between VAX/VMS computers and control equipment such as programmable logic controllers on the shop floor while connecting to the DECnet/OSI network that supports plantwide applications such as shop floor control and MRPII. VAX DEC/MAP V3.0 products are based on the OSI model. The software implements layers three through seven. The hardware implements layers one and two.

Prices vary depending on configuration. MAP V2.1 users can migrate to VAX DEC/MAP V3.0 by retaining existing hardware and buying only software.

■ DEC announced a Q-bus adapter and a 32-MB memory module option for the VAXstation 3520/3540.

The DWFQA Q-bus adapter for the VAXstation 3520/3540 is a communications link between the system's internal M-bus and Q-bus. It connects three Q-bus option module slots and offers VAXstation 3520/3540 users a link to storage options and interface devices. The 32-MB memory module allows up to 128 MB of internal memory.

The Q-bus adapter costs \$4,000, the 32-MB module costs \$26,400.

■ DEC unveiled support programs to assist customers who provide

primary software application support to their users or maintain their own hardware.

A Node Service provides the right to use new versions of kernel software. It's available for software only or in combination with a hardware service agreement. It provides support for customers who centrally manage multiple systems, whether they're VAXs, MicroVAXs or DECsystems, and includes telephone access to DEC's Customer Support Centers (CSC). You can purchase a lower level of support for systems managed by your support group.

The Digital Assisted Services Program (DASP) offers products and services for self-maintenance customers. It provides direct and backup support, such as hardware diagnostics and documentation, including licenses, media and updates as well as manuals, printsets and microfiche; unlimited parts repair through DEC's Customer Returns Center; and remote diagnostic and hardware telephone advisory support 24 hours per day from CSCs.

■ DEC expanded its LAN Bridge family with the standards-based LAN Bridge 150 and 200. DEC also enhanced its Remote Bridge Management Software (RBMS) to support the LAN Bridge 150 and 200.

The products comply with 802.1, 802.2 and 802.3 standards for LAN technology. They implement an automatic configuration algorithm. This loop-detection algorithm simplifies the network manager's job in configuring LANs and provides an automatic backup capability to ensure network availability.

The LAN Bridge 150 uses the LAN Bridge 100 and IEEE 802.1 standard loop-detection implementations to provide autoconfiguration and autobackup capability, ensuring network availability. It automatically manages network bandwidth through traffic isolation.

The LAN Bridge 200 filters and forwards data at the maximum rates specified by IEEE 802.3/Ethernet. This ensures that the bridge provides maximum performance, even during peak traffic conditions. It simultaneously performs such functions as loop detection and RBMS command response.

*For more information, contact your local DEC sales office or call (800) DIGITAL.*



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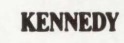
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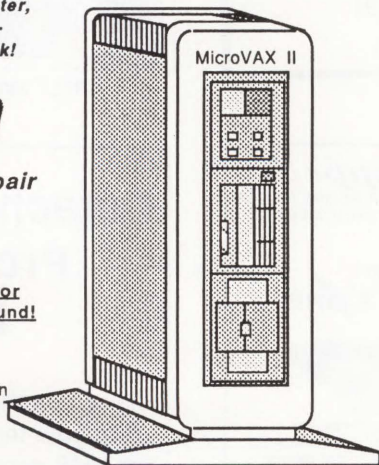
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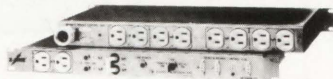
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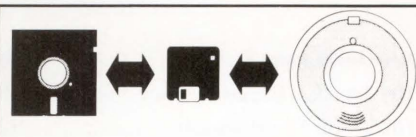
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# The Decline Of Civilization

Microcomputers are slowly turning Americans into time-wasting wimps. One sales pitch for the computer revolution says that computers increase productivity. A PC on every desk will improve work output and quality for every employee.

Do you ever wonder about this? Could the opposite be true? Perhaps computers, by their inherent time-consuming nature, are detrimental to productivity.

Why do we need computers? Computers are used for word processing, database management, accounting, spreadsheeting, telecommunications and stuff like that. No doubt, a couple of Crays will save time in calculating the path of a rocket to Saturn. But can observable time-saving attributes be connected to our beloved microcomputers?

Look at the ubiquitous spreadsheet. Is time really being saved in the office? In the past, departmental budgets were done by hand. Because this method was tedious, budgets were simple and therefore more easily understood. With a spreadsheet program, you go into time-consuming detail, play the what-if game and produce an unnecessarily complex report. If the office isn't standardized on a particular spreadsheet program, you transfer the data to another program and rearrange it until it's perfect.

Getting things just right is the computer's biggest bugaboo. Memos that once were handwritten now are printed repeatedly to make simple changes. The paperless office has turned into a bonanza for paper manufacturers. Computer users plow through boxes of paper. The worst offenders are time-consuming, user-friendly, high-resolution computers

such as the Apple Macintosh. With the Mac, you can draw on the screen and edit your drawing in fine detail in a mode called fat bits. This mode blows up a part of the picture and lets you do a pixel-by-pixel edit of the image. I know people who are *still* trying to get it just right with fat bits.

PC users with graphics programs are just as bad. They continually experiment with pie, bar and 3-D charts. Then they play with the colors until the whole thing is perfect. The irony is that the graphics are seldom perfect. Many computer users don't have an artistic eye. They used to send projects out to be done by experts. Now they waste hours doing it themselves.

## **Penny Wise**

Penny wise and dollar foolish may be the underlying theme of computer overuse, but the disadvantage of overuse is poor results. My favorite example of such a result is the form letter, that obviously is produced by a mail-merge program.

The mail-merge phenomenon began with what seemed like a good idea: finding a way to produce many seemingly personalized letters without taking time or effort to create them. This soon evolved into the mail-merge/word processing syndrome. A good mail-merge program can merge a mailing list into a word processed letter, and the result looks like a genuine personal letter.

Genuine personalized letters are usually short and to the point. Anything more verbose takes too long to produce. But because they only need to write a letter once, our intrepid computer users make it longer. Therefore, the recipient gets a form letter that's obviously mail-merged and just as insulting as one that's been copied with his name typed in.

A fancy feature of the mail-merge system lets you insert a recipient's name

throughout the text. No real personalized letter says things such as, "Dear Jim, How are you today, Jim? Jim, it's been a long time since we talked. I'll call you later, Jim. Until then, goodbye Jim."

There are similar examples of wasted effort in other software categories. The software-based recipe-filing system is a time-consuming joke. Aside from the fact that the copious amount of data in a real cookbook can't be put on a micro in any easy-to-use form, a cookbook is more portable and cheaper. I feel the same way about a computerized address list.

We're beginning to see a new type of counterproductive software genre: decision-making software. A computer can calculate alternatives nicely when it comes to a buy-versus-lease decision in which cash flow is involved.

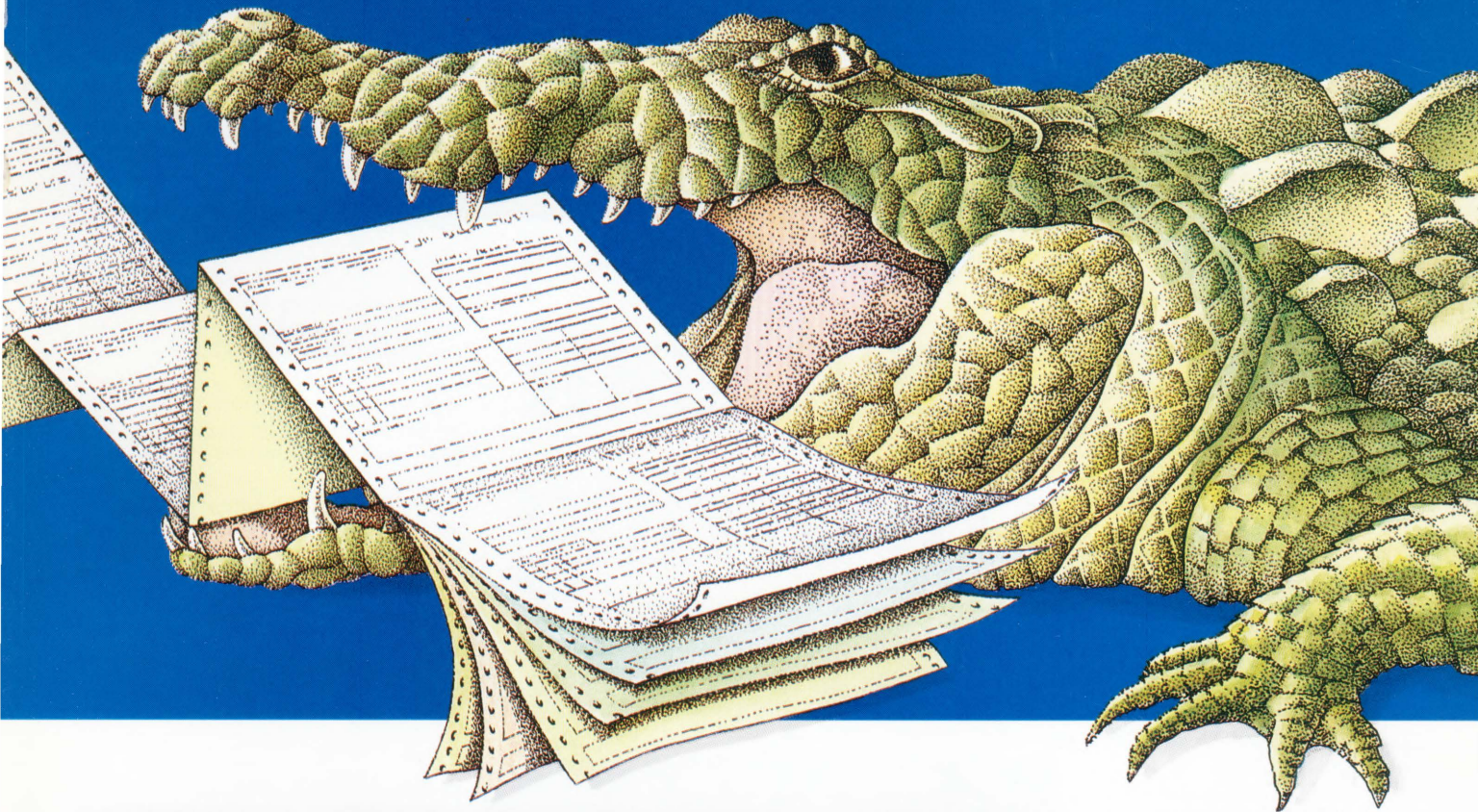
Now there's decision-making software that's used to decide what coffee should be bought for the office coffee pot. Some fanatic will waste hours of company time with this program. He'll surely turn into a spineless wimp from relying on a computer to make such an inane decision.

The way the computer is being used in American offices is about to turn the white collar worker into a time waster who can't do anything without some software's approval. He'll be afraid that nothing is acceptable unless it's just right. Decision-making prowess will disappear as office workers begin to fear that everything has to be overjustified with reams of computer-generated sanction.

If they don't already, blue collar workers soon will have computers at their disposal, and the same syndrome will attack them. The result may be the end of civilization as we know it.

Then again, I could be wrong. I have a program that will help me determine the accuracy of my thesis. Let's see. ...



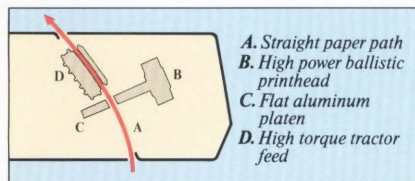


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