December 1991

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The Magazine of the North American Data General Users Group

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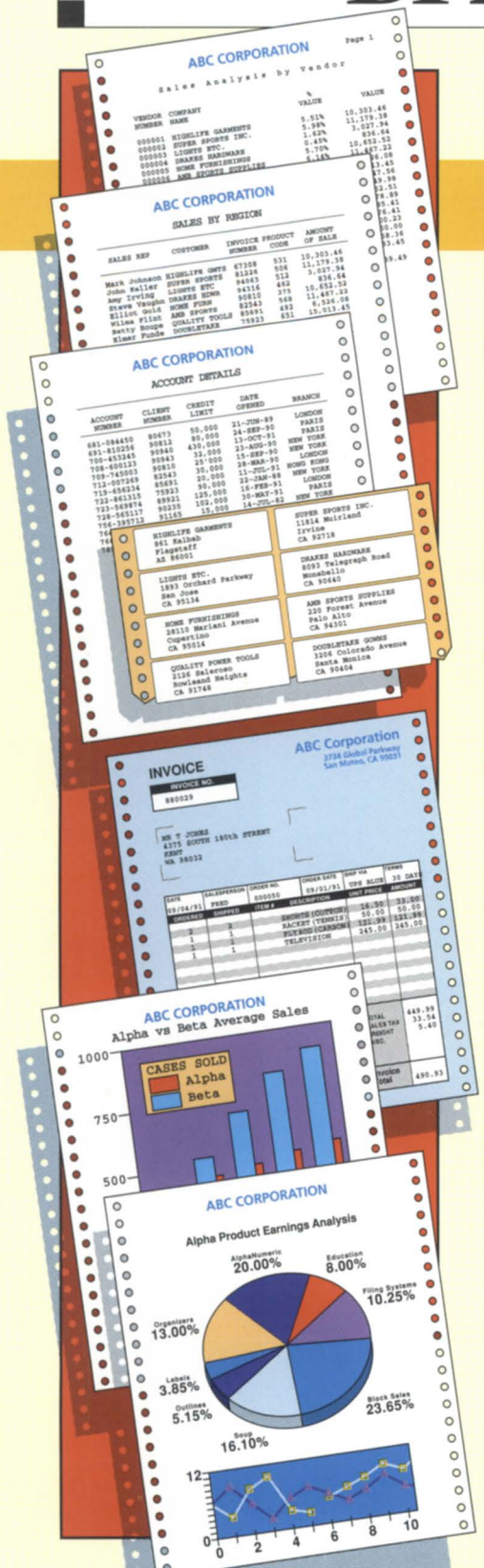

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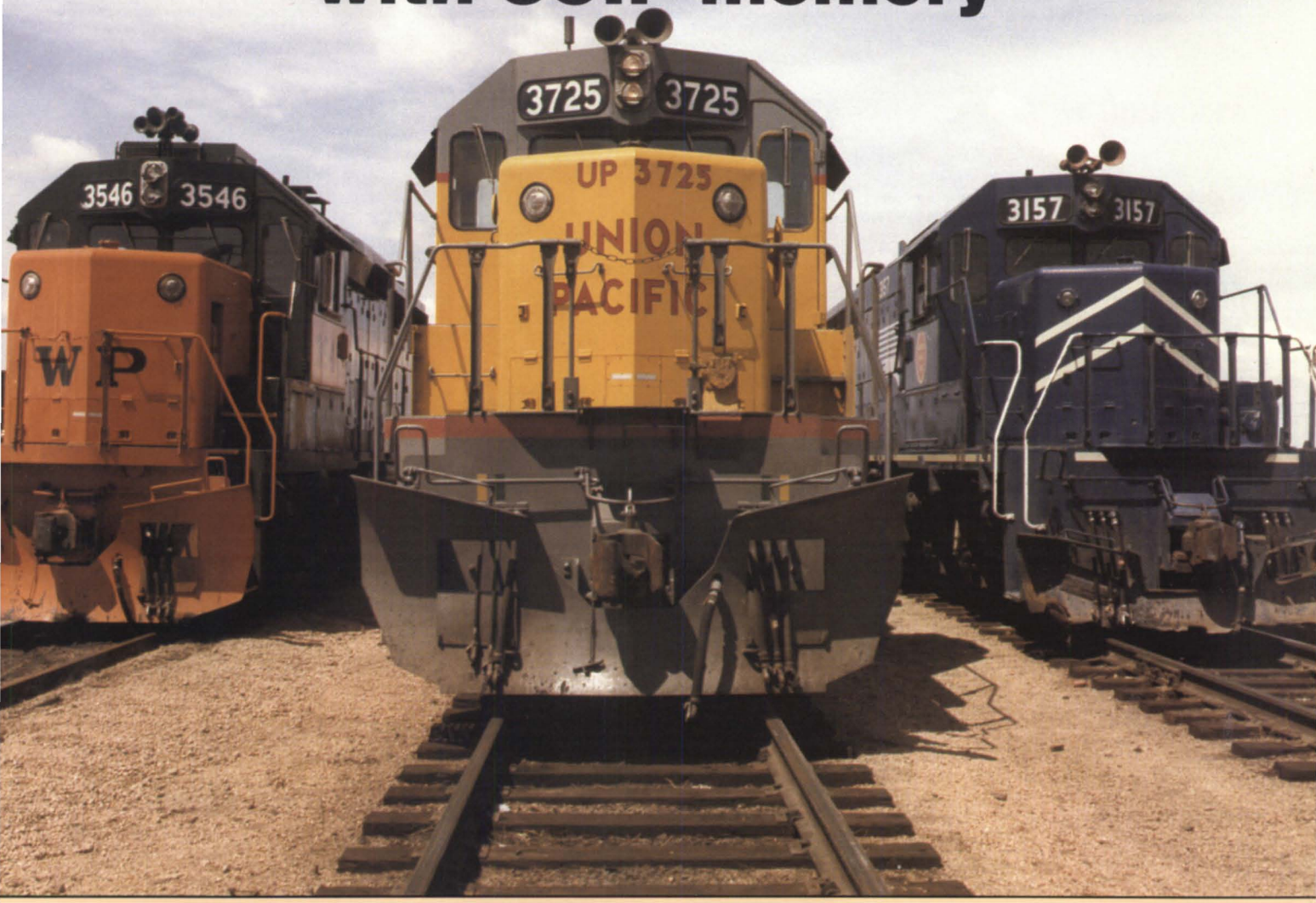

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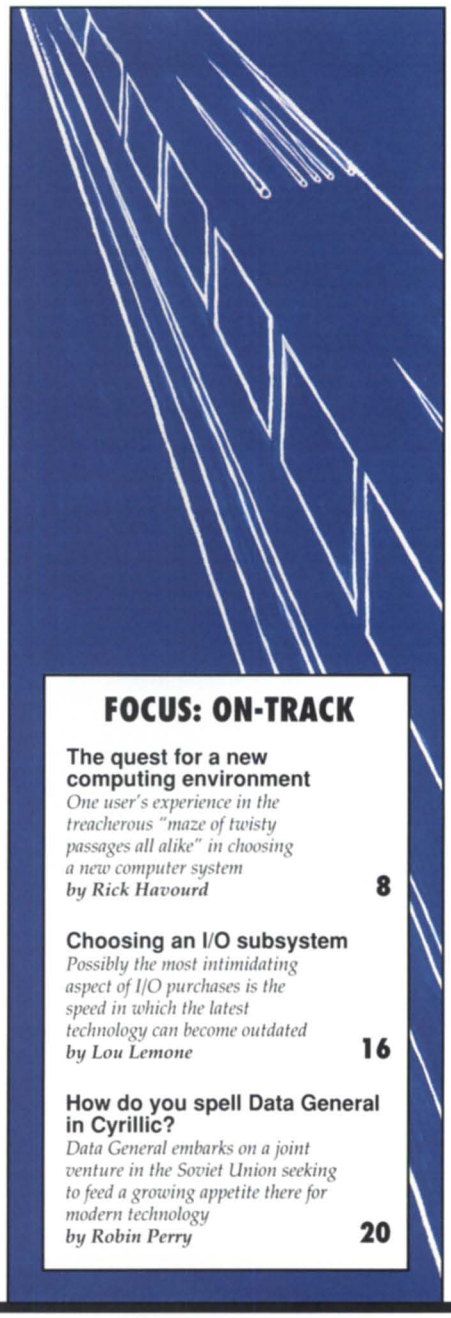

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Volume 7, Issue 12.

NORTH AMERICAN DATA GENERAL USERS GROUP

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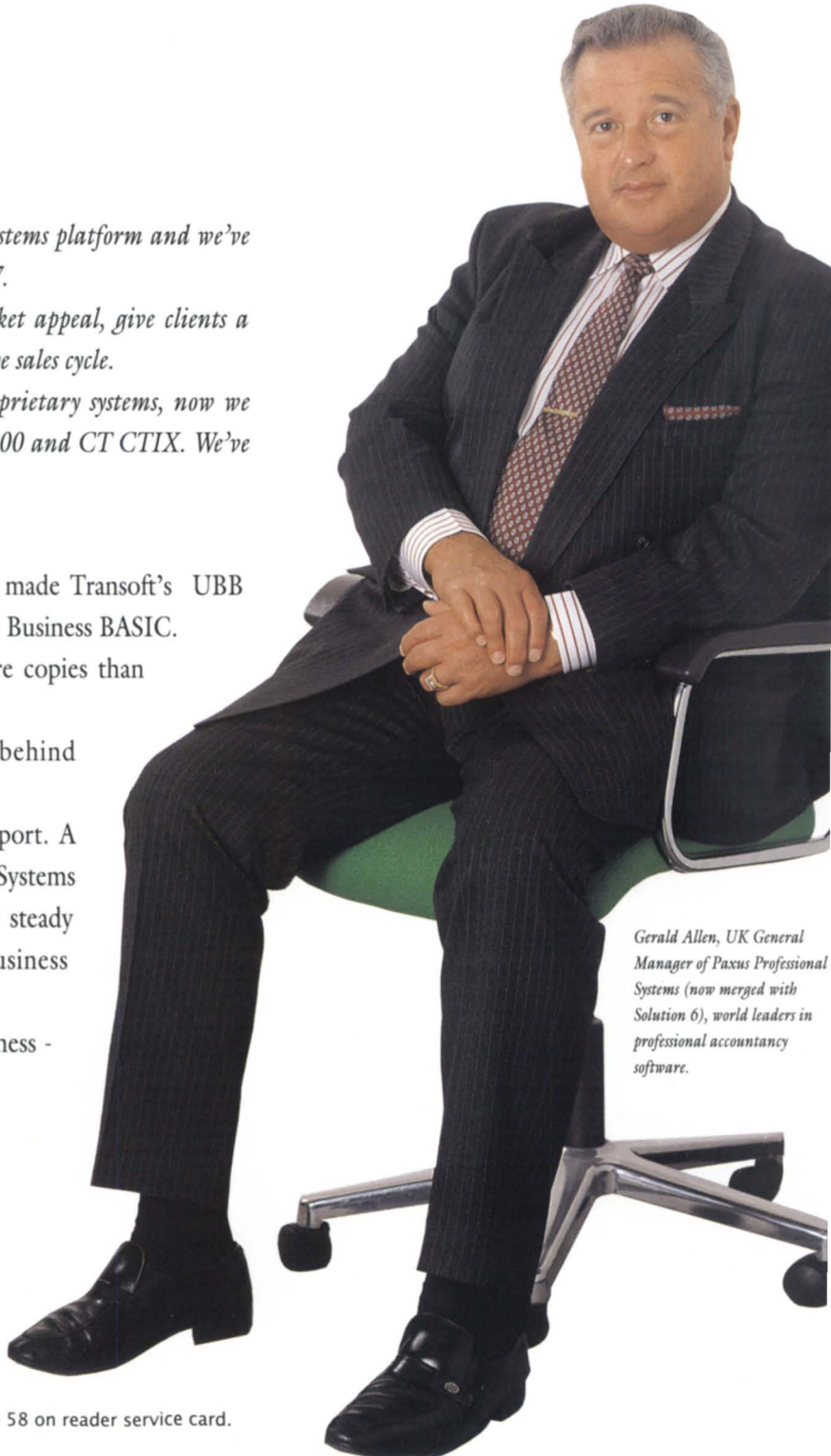

Gerald Allen, UK General Manager of Paxus Professional Systems (now merged with Solution 6), world leaders in professional accountancy software.

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Frank Perry

What a year!

This is my last message as president of our group. It is my farewell to the 1990-1991 NADGUG year—a year full of unanticipated challenges, along with unprecedented opportunities to guide NADGUG into the future.

As we gather here in Denver for the 1991 NADGUG conference, NADGUG takes its first steps into the new decade. NADGUG leaders are filled with fresh ideas and procedures, and very enthusiastic about the future.

Please don't let all this flowery language turn you away, as I really want to be in touch with you about what is happening. Those of you who attend the conference will have the opportunity to hear me or one of the other officers explain the past year in detail. For those who don't, I will summarize.

Following the general trend of every organization that is associated with the computer industry, NADGUG has had to reduce its expenses in the past year. We've worked hard to cut expenses without affecting the quality of services provided to NADGUG members. We've revised the NADGUG budget as adopted last spring, and will present the new budget for membership approval at the conference. One of the changes is that we've contracted for association management services with Danieli & O'Keefe Associates of Sudbury, Massachusetts, the firm that has been handling our conference and exhibit floor.

Another item of note is our annual membership survey. You should receive your survey soon, if you have not received it already. Results of the survey and Data General's responses to your concerns will be published in a future issue of *Focus*.

In looking back over my term as president, I have to say that it was much more than I expected. I have tried to do my best in representing the Data General Users Group. All of your officers put in many hours (and weeks) on NADGUG. Together, we have taken steps to ensure NADGUG's success, and to encourage growth in membership and benefits.

For the future, I would like to introduce all of you to your incoming slate of officers. Dennis Doyle, our current vice president, will automatically succeed me as president. Most of you know Dennis as a slightly irreverent but very capable consultant from Oregon (and several other places). Dennis has worked very hard this year and is responsible for one of our major coups—NADGUG's participation in setting priorities to clean up Data General's backlog of STRs.

Jan Grossman, of Minneapolis, has been doing double duty for the last year and a half, combining her position as conference chairperson with the duties of treasurer. Jan has shown remarkable energy and talent for organization that have been invaluable. Jan is our recommended candidate for vice president.

Tim Boyer, of Ohio, is our secretary, having been elected last year for a two-year term. Most of you know Tim from his column in *Focus*. Tim has been very helpful, with his dry wit, with keeping us all in a state of reality.

The new candidate, for a two-year term as treasurer, is Steve Pounds of Charlotte, North Carolina. In addition to being a CPA, Steve is a protege of former NADGUG President Don Clark—that alone is high recommendation.

I cannot forget the last member of the Board of Directors, immediate past President Lee Jones of Houston. Lee has done yeoman service over the past years, including calling me from Lawn, Texas (population 3), for a conference call. I will miss Lee's sage advice and calm approach.

All of these thoughts combine to summarize an exhilarating, hectic year. Thanks to all of you for the opportunity, and I hope that my best was good enough.

God bless you all! Δ

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The Magazine of the North American Data General Users Group

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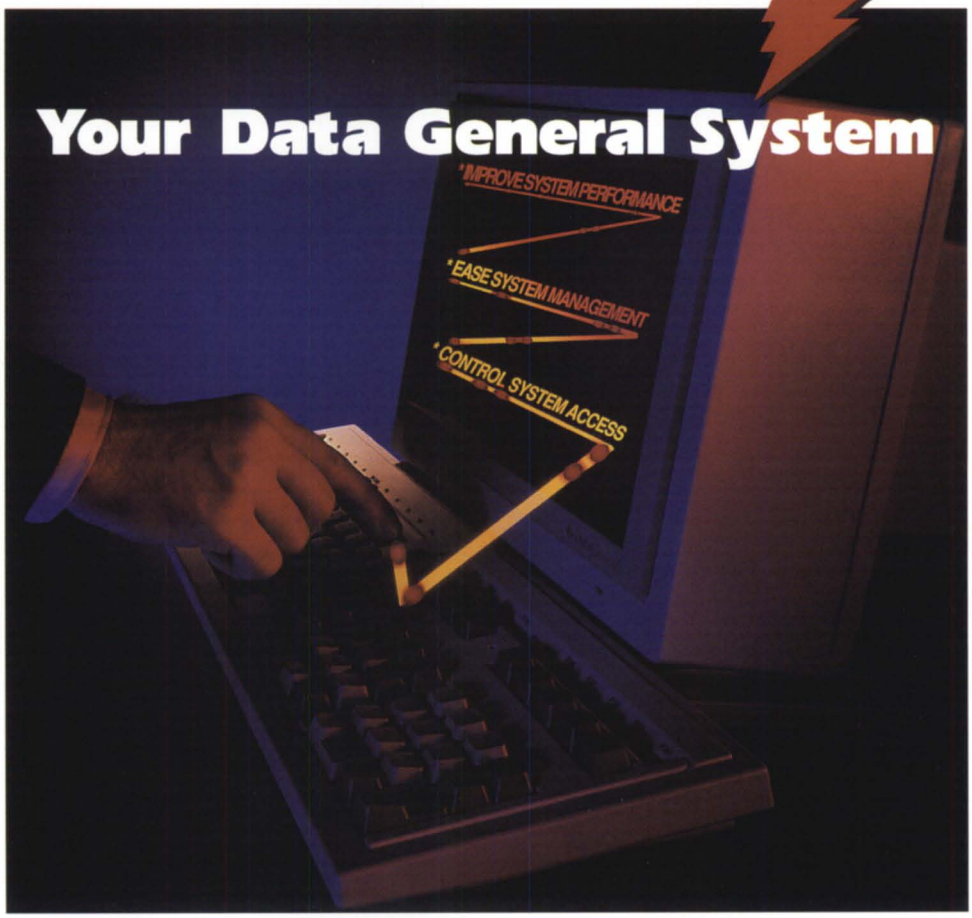

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Who's on track?

by Brad Friedlander
Special to Focus

The railroads helped put Denver on-track for its future as a major city in the west. NADGUG's 1991 conference in Denver puts you on-track for the future of your information systems.

This year's conference is important to your success in the 1990s. You'll see more developments in the computer industry in the next year or two than in the past decade. Conference 1991 finds Data General, computer technology, and NADGUG on-track for your future.

Data General is on-track

Data General seems ready to regain its stature in the computer industry. The success of the Aviion family provides a strong open systems solution as an alternative to proprietary systems. The growing role and capabilities of Eclipse MV and Aviion computers as servers in computing networks illustrates Data General's commitment to the direction of computer technology. This year's conference examines the newest capabilities that Data General and the conference's many other exhibitors have to offer, and explores significant directions for the future.

Computer technology is on-track

The art and "black magic" of software development in the 80s is giving way to solid software engineering approaches. CASE and object-oriented technologies are real tools for better productivity. Technology is taking a holistic view of computing networks instead of the piecemeal approach of the past. Distributed data bases and cooperative processing tools are leading to the emergence of the network operating system. The idle processing power of desktop computers can now be harnessed to solve business problems.

NADGUG is on-track

Conference 1991 again features "United for the 90s"—concurrent meetings including Data General, third-party suppliers, and NADGUG. The joint affair gives DG users more opportunities than ever to meet with Data General officials, and to see the solutions created by third-party vendors.

NADGUG has moved ahead to reach its goal of an independent user community developing a good working relationship with Data General Corporation. Conference 1991 gives you the largest exhibit that we have ever had. Take advantage of the ample opportunities to meet with NADGUG special interest groups (SIGs), and to help chart NADGUG's course through the 90s.

Consider it an investment!

NADGUG Conference 91 represents the best investment that you can make in the future of your business or organization. Make it work for you. Welcome to the Mile-High City. Δ

Brad Friedlander is a member of Arthur D. Little's Information and Telecommunications Section, a past president of NADGUG, and chair of the NADGUG bylaws committee.

Look who's talking!

If you're not in Denver at NADGUG 91, well, there's always next year. But missing this year's event means that you pass up the chance to hear the following special guest speakers:

Ronald L. Skates, Data General's president and chief executive officer, welcomes attendees and updates them on recent events. He addresses the company's financial results and discusses DG's strategic positioning to lead in the information technology market of the 90s.

Joel Schwartz, vice president of the Eclipse Business Unit, provides an update on progress of the Eclipse MV family of systems, and assesses future directions. DG recently announced the latest members of its fifth generation of MV systems, the Eclipse MV All-Star family.

Stephen Paul Baxter, vice president of corporate marketing, presents a "Report Card" on DG's open systems, discussing also the company's advertising and public relations programs and their effects on Data General's increasing visibility in the market.

J. Thomas West, senior vice president of advanced systems development, focuses on technology—outlining product strategies and technological trends, demonstrating how DG prepares to meet the challenges ahead, and showing how Data General applies the latest technology in ongoing product development programs.

Keynote speaker **Alan Parisse** presents "Prospering Through the Cycles," a discussion on the inevitability of cycles in business, careers, and life—and shows what can be done to deal with them.

A 20-year business professional, Parisse is respected for his insights into marketing, sales, and presentation development. He is author of *The Great Salesperson* and co-author of *Power Marketing: The 101 Best Strategies for Financial Professionals.* Δ

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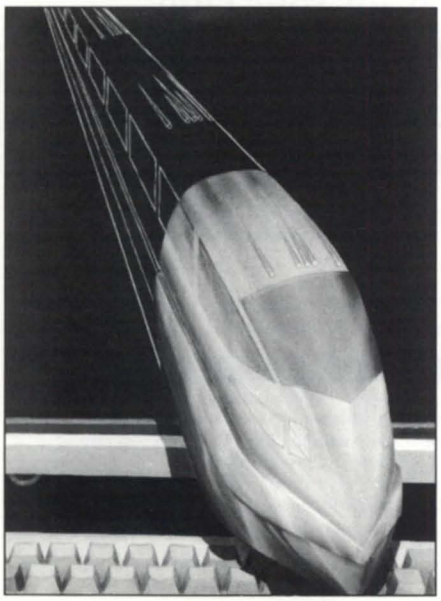
The quest for a new computing environment

by Rick Havourd
Special to Focus

SYNOPSIS

Know well your software and hardware requirements, for they will guide and sustain you through the treacherous "maze of twisty passages all alike" in choosing a new computer system. The author recounts the considerations that led his company into the realm of Unix and Avilon.



We knew that it wouldn't last forever—our Public School Administration package was originally developed in the late 70s on a DEC PDP-11/35 and has evolved over the years to remain relatively competitive with similar products on the market. During that same period, we have witnessed the introduction of Digital Equipment Corporation's VAX, which ushered in the era of 32-bit virtual memory computing (and yes, for those of you who have been running Data General equipment just as long, the Eclipse). We've seen PCs take over the desktop; we've chuckled with everyone while Apple Macintosh struggled for respect as a real computer. And most recently, we've seen the advent of RISC machines.

It wasn't too difficult to take a back seat while all of this was going on. The VAX was slow and lumbering. The Eclipse had a book written about it. PCs were running spreadsheets on 16-bit CPUs with 640K memory and floppy disks. The Macintosh was so god-awful slow that its stratospheric price tag didn't justify waiting as the "happy disk" slowly transformed into a windowed desktop.

The most curious of all the advances has to be Unix (and its bastard child, the RISC CPU). Personally, Unix has to be the most user-hostile operating system ever foisted upon an unsuspecting public. Let's be serious about this folks. Any OS whose commands were named by rolling a coffee cup across the keyboard shouldn't receive the fanfare we've given it. And how about RISC . . . reduced instruction set computing? Of course, it's going to be fast. It has fewer instructions than my 6502A (circa 1977) and a hundred times the memory. I'm sure the engineer who thought this one up also has a Chevette with a turbo-charged engine in his backyard that he uses to compete in truck pulls!

Anyway, it became time for us to choose a new computer system as the heir to our current products. We came up with a list of requirements that the software/hardware environment must satisfy.

Application development

We required the following for application development software: A multi-user relational data base system consisting of a 4GL with integrated SQL. A suitable method for distributing the data base across a network with multiple server or remote server capability. Support for character-based terminals and windowed terminals (preferably X terminals). Multi-platform portability. Affordable for systems with as few as 5 users and as many as 100.

Offerings from Ingres, Informix, Unify, and Progress were considered. In the end, we chose Progress from Progress Software Corporation. It has all of the features that we *require*. I say require because there are some items missing, such as complete windows support and a screen-oriented report generator, that aren't necessary but do help to provide for a complete system. We stuck with our "required" list on the premise that there would be a fair amount of customizing on our part regardless of which product we selected. Spending an extra $15,000 on bells and whistles that weren't relevant or would be scrapped in favor of our own "look and feel" didn't seem prudent.

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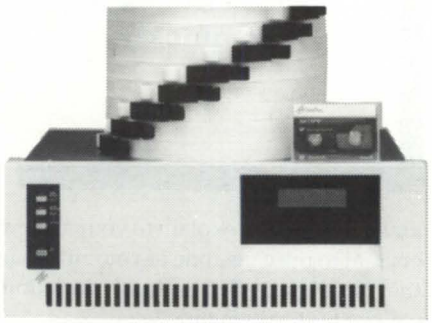

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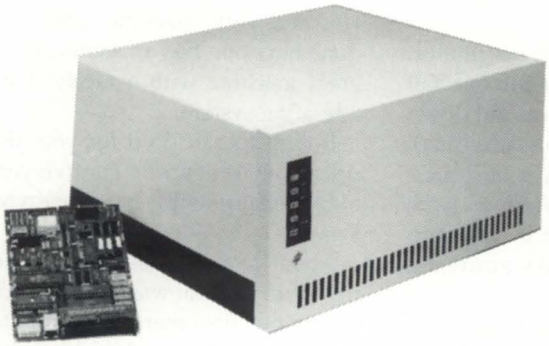

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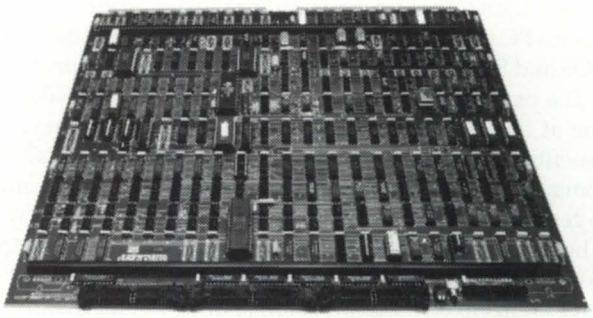

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and training services. This meant that whatever operating system and hardware we chose, our customers would also use. Being in the educational arena, most of our customers were demanding either Unix or MS-DOS. MS-DOS is an acceptable product for managing personal computers, but it just was not designed with the robustness of a commercial grade multi-user, multi-tasking operating system. I'm by no means a "propeller head," but by the same token, I'm not a "bonehead" either. We chose Unix.

Hardware

Short of the fact that we wanted an architecture with intrinsic virtual memory support, the hardware "iron" was our last consideration. Our application development system is available on systems from Data General, Sun, DEC, Unisys, IBM, and a host of others, so our choice in hardware vendors was wide open.

One demand that we made was that the manufacturer must actively support workstations as well as servers within the same family. We had already determined that development within our office would be done on workstations even if the target application would be for character-based terminals. There are so few rewards in life that this was something we couldn't skimp on!

With a complete line of software already developed on DEC equipment, it seemed only natural that the first place we would look was Digital. It has a full product line consisting of the mature VAX/VMS series, a Unix system built around the MIPS R3000 processor, and (for a third time) a PC product to compete in the MS-DOS and SCO Unix camps. Great.

The problem was trying to find someone at Digital willing to talk about the benefits of developing on any one of that company's platforms. It was very difficult to get a clear sense of the direction Digital is heading, and I believe that same indecision makes it impossible for their sales force to effectively assist in customer decisions. We did some research into its RISC machines and, if you're curious, DEC's machines cost about as much as everyone else's. Clever arrangements of silicon can only demand so much, right? Now, look at the licensing fees! I decided to keep my house instead. Next . . . .

I should have said NeXT. That's right, we considered Steve Jobs' most recent brain-child. It is quite a slick little machine. Just one look at the packaging and immediately you know something new is happening. Just as much creativity went into the desktop design with built-in object oriented development environment. Sprinkle on just the right amount of mind-candy and add some borderline-useful software, and you have quite a nifty machine. Too bad that NeXT is suffering worse marketing problems than Data General. How do you explain to your customers that to purchase one of your machines they have to enroll in the local community college first! Allemande left . . . .

We didn't tell our sales rep right away. Like kissing on the first date, he never would have respected us for giving in so quickly

On we went to ring Hewlett Packard's doorbell. Talk about total rejection—nobody answered for days. In all honesty, we spoke to someone in HP's VAR relations department, but she was the wrong person. We're still waiting for the information packet and salesperson's call. I'll keep you posted.

Honeywell-Bull has a local distributor, so we called. They responded to our hail almost before the receiver was put down (must be working on commissions only). Our concerns climaxed when our questions about TCP/IP and X Windows were met with blank stares—but it was comforting to know that as a VAR we can lease automobiles through them!

Data General. DG. Tom West and Edson deCastro. *The Soul of a New Machine*. That's right, we finally gave the guys in Westboro a jingle. They directed us to our local sales office, right in the middle of sunny Detroit! Actually, it's quite a ways from Detroit, but I figure that images of the "Motor City" and smoking guns would attract your attention. A couple of days later we were sitting in our conference room with a DG sales rep and his trusty SE sidekick talking about everything from marketing channels and sales margins to DG/UX and its "elegantly designed kernel and file system." They didn't leave until all bases had been covered and we were satisfied. Personal attention still means a lot to us—we love the idea of working with a company that is as hungry as we are.

After months of searching, inspecting, and rejecting, we narrowed our field to two: Data General and Digital Equipment. The benefits of going with DEC were twofold: 1) our history and identification as a DEC shop, and 2) DEC's image as a leader in technological advancement. When we considered DEC's negative points, they outnumbered the benefits. Digital is touting open systems only after taking a severe beating in the ongoing battle for the desktop; the political winds in Maynard tend to shift rapidly and we were tired of sitting in the cold. And finally, the cost of owning DEC equipment far outstrips everyone except, maybe, IBM.

That brings us to Data General, which, in all actuality, is very similar to DEC (if for no other reason than most of the people at DG worked for DEC at one time and vice-versa). Both companies have a cash cow proprietary system, both are fighting the MIPS war in the open systems arena, and both offer PCs so that their respective sales forces can submit bids on every level. When it comes to projecting a clear image, I would have to say that DG wins hands down.

Data General's message is clear: if you have an Eclipse, keep it. We will support you and your machine forever. If you don't have one, buy an Aviion. It is truly a great machine with a nicely integrated operating system.

If that doesn't do it for you, then the price of an Aviion will. The five-year cost-of-ownership simply blows everyone else away.

About five minutes later, we decided that Data General was the best choice for us and our customers. We didn't tell our sales rep right away. Like kissing on the first date, he never would have respected us for giving in so quickly.

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Innocently, we commented to our sales

No pretty pictures  . No fancy promises  . No big prices  .

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rep, "DG seems to be what we're looking for, but this whole Aviion thing has us at a bit of a loss." A week later, a demonstration unit appeared on our doorstep. Nobody thought it odd that we had a number of Aviion-compatible programs ready to load onto the machine as soon as it arrived. For the next month, we put an AV 310 with 12 MB memory, 19-inch color monitor, and a 332 MB disk through its paces.

While playing with our new toy, we also had to go into the ring with DG sales. This proved to be the typical "quote a price, balk at a price" merry-go-round. Along the way we learned a new term: NRE (non-revenue equipment), or better put, "scratch and dent," with truly exciting discounts. Now we're getting somewhere. What do I care if someone else pounded the keys (or, truthfully, scrubbed the pizza-box with steel wool) before I did. It's not like sleeping in someone's dirty bed sheets, right?

Our initial configuration is a network of three workstations.

(2) AV 310C, 12 MB memory, 332 MB disk, 19-inch color monitor;
(1) AV 200, 12 MB, 19-inch monochrome;
(boat-load) Coax cable.

Buying the equipment and actually having it delivered are two *entirely* different things. As I said, we already had one AV 310 safe in our clutches, but it was close to 10 weeks before all the machines had arrived. *Impetuous youth!* Here I am complaining about 10 weeks for the delivery of a complete system when I used to wait 10 months for a single disk drive!

Hardware support contracts

FE, CSR, FRU, CRU. Field Engineer, Customer Support Representative, Field Replaceable Unit, Customer Replaceable Unit. What am I getting at? This is primarily targeted at anyone using a workstation. If you have the ability to empty a dishwasher, you can put those same skills to good use and save yourself a bundle in service contracts. It's an option referred to as On-Site Select, and it may be just what you need. Basically, when something goes wrong with your machine, you are the first line of defense. You diagnose the problem, maybe even do a little investigative work to identify the major component that has failed (disk drive, monitor, memory, CPU). Then, when you're absolutely sure it's not your fault (maybe neglecting that the keyboard came unplugged), you place a call to Atlanta Support. They'll open a service incident and, most likely, ship a replacement part for overnight delivery. When the part arrives the next morning you just pop it in and *viola*! You're cured.

We've had both service options: On Call & On-Site Select. With our level of experience, I prefer the latter. Besides, with On Call Support the FE would arrive long before we opened in the morning. Then for the next hour or so, we'd be subjected to third-party guilt (worse than grandma ever inflicted) while the persistently cheerful FE commented on how nice our lobby looked . . . from the outside . . . in the freezing rain.

Setting up a new system

If you have ever installed software on an Aviion, you know that further discussion couldn't shed any more insight. If you haven't, then unpack your copy of *Installing and Managing the DG/UX System* and follow the directions. It's really that simple. I would, however, like to make a few comments about things we discovered during our install.

Regarding the predilection to divide your disk into a number of smaller logical disk units (LDUs); following the manual, you will have at least four LDUs: *root*, *usr*, *swap*, and *usr_opt_X11*. Turn the page and you'll be creating yet more: *accounts*, *mail*, *news*, *dump*, and so on. The ability to do this is great and, in time, you may need this feature. Before that time comes, I bet you'll run out of room in your most active partitions, even though gobs of storage are free in some other LDU. Even using DG/UX 5.4, with its ability to change the size of LDU with *sysadm*, means you're going to have to spend precious time playing the partition balancing act. We use the LDUs *swap* with 75000 blocks, *root* at 50000 blocks, and *usr* weighing in at 1186807 blocks. I want to manage my machine, not be managed by it.

I'm sure that this will come as a surprise, but when we purchased our machines, cost was a major concern. Sacrifices had to be made. We gave up memory and disk space for dinner and a place to live. In all fairness to our sales rep and SE, you really do need a 600 MB drive if you plan to have a semi-autonomous system with a bit of legroom for future expansion. The disks included with our systems were 332 MB each. With two of these drives and three workstations, we ran out of space very quickly. (Yep, a diskless workstation on a workstation server... sue me.) Thanks to the world of SCSI and free market economies, we were able to trade up to two brand new 600 MB Fujitsu drives (two-year warranty) at about the cost of one DG (read: Micropolos) 332 MB drive! Now, with 1.2 GB available we have ample room for our needs.

We took our 4.3x distribution tapes and completely reloaded our systems. I strongly recommend doing so yourself. This little bonding experience will quell a number of fears the first day something goes wrong

With disk space to boot (that was a pun, by the way), we went spelunking into the "maze of twisty passages all alike" affectionately called Unix. During our travels, we couldn't help but notice that there were periods when you would suffer through 15-20 seconds of frantic disk access, meanwhile everything pretty much froze as another tidbit of your process was swapped in from disk. After two weeks of

this, the time came to experiment a little. We brought the other machines down and began pulling memory boards and placing them in one of our machines to test for insufficient memory. At the end of the day we discovered two things:

sar -r 1 1 This command gives you the number of free memory pages and number of blocks available in the paging file. On the average, we were sitting with 50 free memory pages and 45,000 free swap blocks.

You will be much happier with a 20 MB machine. Our sales rep tried to get us to 16 MB initially, but as I told you, my kids need shoes for school. At 20 MB main memory, response is a bit snappier and paging occurs at far fewer intervals.

While we're talking about memory configurations, let me ask, "Doesn't this rapidly increasing use of memory and disk storage concern anyone?" Case in point: our typical customer has approximately 75 terminals and printers scattered over 10 buildings and 3 square miles. During a typical day, there will be 30-50 interactive users on the system running menu-driven applications, word processing, and the occasional spreadsheet. Data bases contain complete student records for 10,000 children; personnel and payroll information for 1,000 employees; and finance data spanning the past 24-36 months. All of this activity occurs on a DEC PDP-11/84 with 4 MB memory and a single 450 MB disk drive. Now, pick *any* hardware vendor today and configure a single-user Unix workstation. You wind up with a 20 MIPS processor, 20 MB memory, and a 600 MB disk! The really sick thing is that this configuration doesn't even turn heads at a cocktail party—people just accept it.

Back to work . . . Two of our systems came preloaded. It made life very easy while we were getting started. The problem is, we are still technically oriented (i.e., none of our VCRs have the clock flashing 12:00 AM). We maintain a high sense of intellectual pride. To have some unknown, a stranger, deliver a system that will be yours, sitting on your desktop, keeping you warm and happily radiated with a built-in 19-inch tanning lamp, yet not know exactly how life was breathed into it would be a crime. So, we took our 4.3x distribution tapes and completely reloaded our systems. I strongly recommend doing so yourself. This little bonding experience will quell a number of fears the first day something goes wrong. You built it, it's yours, you can figure it out!

Setting up your network

I hope you took my advice and reinstalled your system from the ground up. In front of you is a clean slate. In our office we stress elegance, the individual, and a bent toward the sadistic. Take the design of your network. If you're like most of us, the scope of your network is contained within one building and you aren't concerned with the Internet one bit. Great. Here's an easy way to set up your Internet addresses: Number each node sequentially from 1. Then prepend "1.0.0." to the node number and you have a valid Internet address that will serve just fine. Hence, our network consists of nodes: 1.0.0.1, 1.0.0.2, and 1.0.0.3 with 127.0.0.0 as the "localhost." This brings us to naming your nodes. I think you should strive for a coherent motif that is both functional and entertaining. We had the hardest time choosing between "bacterial scourges in history" and "presidential assassins." After heated debate and ballot fixing, *oswald*, *jwbooth*, and *hinckley* won over *anthrax*, *typhoid*, and *syphilis*. You should have fun with this. Beware! There are far too many networks dedicated to the middle earth characters *bilbo*, *frodo*, and *gandalf*.

Framemaker just arrived, so rush the ending

My hat really goes off to the people at Data General. The manuals covering installation and network management leave you with very few questions about setting up your system. We were a traditional DEC shop and liked our old operating system, but (with jaded attitude in hand) we jumped ship and have become devout DG fans. I guess I should have called this article "How I learned to stop loathing Unix and love the Aviion." That's all I have for this time. If I'm ever invited back, maybe we can talk about some of the issues in tailoring a DG/UX workstation to your own needs. Δ

Rick Havourd is a partner with Micro Sage Software Systems, based in Grand Blanc, Michigan. He may be reached at 313/695-5160.

INTEGRATING YOUR DG MINI

Linking your mini to your PCs isn't all that difficult.

And building a micro-mini LAN may be simpler than you think.

If you have a Data General minicomputer and a growing number of PCs, integration can make your life easier. But how far do you go? And how much do you spend?

Whether you're just getting started or have already installed a PC network, Rational Data Systems can help sort out the answers. We've been working on this problem since 1984 – long enough to become the acknowledged industry expert. We helped integrate Texaco, WordPerfect and a few hundred others.

There's a natural progression from isolated workstations to full-scale integration. As you grow, further integration helps keep your costs down.

Stage one: programs for around $100

The first step is to stop buying terminals. A program like PopTerm/410 turns a PC into a terminal at a keystroke for as little as $65 per desktop. It works over a direct connection, modem or LAN, and it's the most painless first step to integration. Other RDS offerings have more bells and whistles. They offer a simple upgrade path when your needs get more complex.

Stage two: file and print services

When your workload outgrows your mini, there's no reason to buy a larger one. You stave off the purchase by turning the one you have into a departmental processor, which manages the workload and offloads some processing to your PCs.

PC/Remote provides this next step. For an additional $400 or so per workstation, the PC can now use MS-DOS programs to process the mini's data and the mini can back up whatever your PC does – all over inexpensive async connections.

Stage three: the integrated LAN

Again, you're feeling the squeeze. It's time for the LAN, and probably time to supplement your mini with a high-end 80386 or 80486-based Novell NetWare file server. Our PC/VS is the high-performance package that pulls it all together. If your mini has the capacity, PC/VS can do it all, but if you've already got a Novell LAN, it's that much easier. PC/VS and NetWare make terrific partners.

Stage four: distributed processing

A completely integrated PC workstation can thread its way happily through everything you've got, including a vast array of DG, DOS and UNIX software. Now it's time for truly distributed applications. For CEO users, PC/Mail is already here. And later this year, we'll deliver the AOS/VS version of Portable NetWare. Even Data General looks to RDS for integration solutions.

There's a bible on the subject.

We wrote it. It's called *Report on PC Integration*, and the 1991 edition is just out. Read its 116 pages, and you'll really understand the opportunities and priorities involved in getting the most return from your DG mini. Most of the press run is already spoken for, but there are a few copies left. Get right back to us, and we'll send you one.

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Choosing an I/O subsystem

SYNOPSIS

Possibly the most intimidating aspect of I/O subsystem purchases is the speed in which the latest technology can become outdated. The secret for the consumer is to choose a subsystem that is well-designed and architected for the future.

by Lou Lemone
Special to Focus

When choosing an I/O subsystem, consider the many issues involved with computer operation. Knowing how the subsystem fits into the computer system as a whole is essential. When selecting a well-designed storage system, review a number of criteria—from the type of peripheral bus supported, to the system's ability to satisfy the needs of your high-level applications. A checklist of considerations should include performance, expandability, device flexibility, and available features.

Selecting a peripheral bus

One of the first decisions users face is selecting a peripheral bus. The bus you choose determines the boundaries to which your subsystem is confined. In the past, SMD, ESDI, and proprietary busses offered features that made them attractive choices. However, the limitations of these peripheral busses have become somewhat obvious. SMD and ESDI, limited by disk-only support, have reached their maximum performance levels. Proprietary busses lack a solid growth path; instead of taking immediate advantage of new technologies, users must wait until their vendor develops an equivalent proprietary version. An alternative is SCSI-2.

The SCSI-2 bus offers a standardized interface with unsurpassed levels of performance and flexibility, as well as a broad range of peripheral device support. The bus is widely accepted in the marketplace, and was conceived with an eye toward future development. As many as seven device formatters can be attached to a single SCSI-2 bus. Intelligent SCSI-2 co-processors provide a powerful controller-to-SCSI-2 bus interface. NCR's 53C7X0 family, the most intelligent co-processor currently available, simplifies advanced design implementation.

Hundreds of SCSI-compatible disk drives are available, ranging from low-capacity/low-performance units to multi-gigabyte caching devices with fast actuators and 5400 rpm spindles. Newer disk options include optical, ultra-fast RAM, and disk array devices. In addition to the disk support, SCSI-2 boasts the widest range of tape devices of any peripheral bus. Tape formats that are supported include 9-track, IBM 3480 compatible, 8mm, DAT (4mm), and QIC. Many of these devices provide performance enhancers such as data compression, caching, and stackers.

Performance

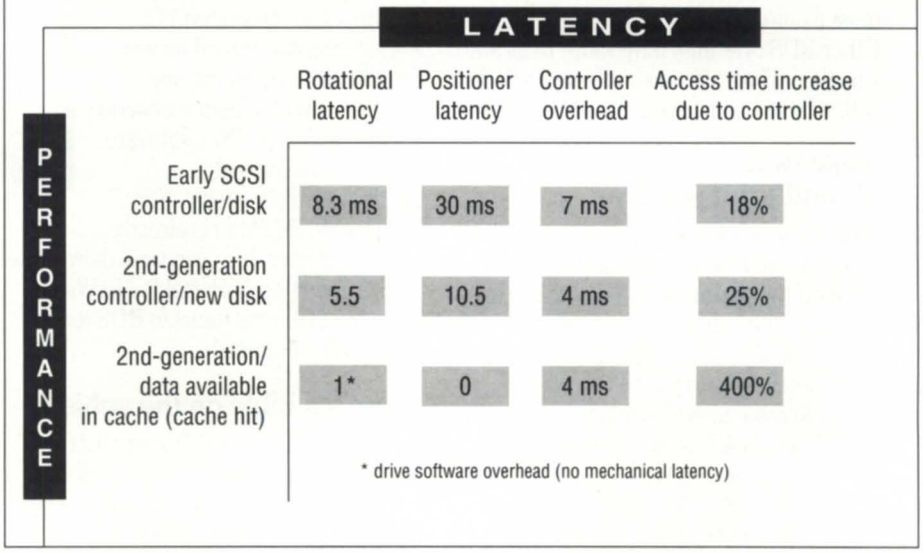
Overall MV system performance is affected by many factors, including CPU, main memory, secondary storage, and tuning. CPU performance and memory capacity have advanced to levels that typically result in users being I/O-bound. For those who have recently upgraded to the new MV/9X00 and MV/30000 series processors, waiting for your I/O system to deliver becomes a disappointing side effect. A properly chosen subsystem eliminates this problem.

I/O subsystem performance can be separated into two components: controller overhead and peripheral access time. In the past, peripheral access time was the dominant component. Disks had relatively slow rotational rates and positioning times. Without caches, disks always suffered mechanical access delays and tape drives were plagued by start/stop requirements. Early intelligent controller designers could rationalize controller overhead levels because they were such a small fraction of the total subsystem performance.

This is no longer the case. Virtually all SCSI disk and tape devices on the market today have some level of data caching. Disks perform efficient look-ahead read caching, while tape drives cache both read and write data. Caching decreases peripheral access time by removing mechanical latencies. Some disk devices separate the cache into segments, which increases the probability of cache hits even in a multi-user environment. The use of file system optimization utilities, such as disk defragmentors, also increases the likelihood of cache hits.

Figure 1 demonstrates the expanding role controller latency plays in subsystem performance. Long latency times hide high controller overhead, resulting in less con-

Figure 1: Latency vs. performance



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troller-induced effect on access times. The figure illustrates the increased impact of the controller on access times as mechanical latency disappears. Second generation controllers refer to utilizing state-of-the-art design architectures, and components such as the NCR 53C7 X 0, 25 MHz processors, and bi-directional FIFO buffers.

As device technologies advance, a greater percentage of I/O requests benefit from caches and their ability to hide mechanical latencies from the user. The controller overhead numbers in the chart do not include additional overhead, which has traditionally been overlapped with drive latencies.

Mirroring: more than a hedge

DG's VS operating systems fully integrate support for *mirroring*, a storage protection method. Also known as RAID 1, mirroring results in two disk drives containing identical copies of file system data. Should one of the disks become unable to access data, the controller automatically accesses the other.

The process of making one disk identical to another is called "synchronizing the mirror." Synchronizing involves reading all data off one disk and writing to the other. Once synchronized, normal read response times are improved by allowing disks to share tasks equally. Write operations, which result in near simultaneous writes to each disk in the mirror, take approximately the same amount of time to complete as non-mirrored writes,while doubling the work the controller must perform.

When subsystem designers initially implemented mirroring, their goal was to protect users from disk errors. They did not consider the other more frequent or time-consuming problems that customers experience—power, operating system, data base, or application failures. Far more likely to corrupt vital data, these problems could be mitigated with mirroring.

Customers use mirroring to obtain consistent, "perfect" copies of their data base, while their system is "live." In this scenario, the data base is shut down briefly, which allows the mirror to be split, and then returned to service. This process takes only minutes. The copy is left idle, ready to be called into immediate service. If a failure occurs, the system is brought up with the data base copy. Logged transactions are applied to bring the data up-to-date while applications remain available, eliminating hours or days of data base verification or recovery from tape media.

In addition to shortening downtime, an idle copy may be used to smooth tape backup operations. Day-, week-, or month-end processing can also be performed on the data base copy, with virtually no impact on the user community.

While the benefits of mirroring are clear, not all mirroring systems are equal. It is important to choose a subsystem with an efficient mirroring implementation. The demands mirroring imposes may be detrimental to overall subsystem performance. For example, a drive rotating at 5400 rpm (90 revolutions per second) may require the controller to process as many as 180 SCSI requests per second. Typically, the synchronization process trans-

fers 16 KB per request, yielding data throughput peaks at approximately 3 MB per second. This is a significant portion of the bandwidth available on a single SCSI bus.

The DGMS-SC1, dual-SCSI bus controller, from my company Hiperstor, configures the mirrored disks on separate SCSI busses, reducing the performance impact due to bus congestion. Additionally, systems are protected against SCSI channel failures.

Details

The ability to support multiple device types is a critical controller feature. Choosing a disk-only or tape-only controller is inappropriate in many environments. Locking a user into a single device type limits upgrade possibilities, and may prove to be more costly in the long run.

A dual-bus controller provides the ability to support both single-ended and differential devices on the same controller board. Supporting a mix of disk, tape, single-ended, and differential devices provides considerable flexibility. Mixing devices, coupled with support of older, somewhat non-standard devices such as DG's QIC and CSS, allows users to carry over their current device investments while incorporating the newest technologies. For users with a limited number of BMC–capable I/O slots, individually configured dual busses are more than a convenience, they may be a necessity.

Other more complex issues are difficult to examine. Did the designers scrimp on the cabling? Many have, resulting in errors when faster, synchronous devices are attached. Is the data path efficient? Successful bus implementations allow data to flow smoothly without bottlenecks. Aiding flow to and from the SCSI bus and MV memory takes full advantage of available SCSI bandwidth.

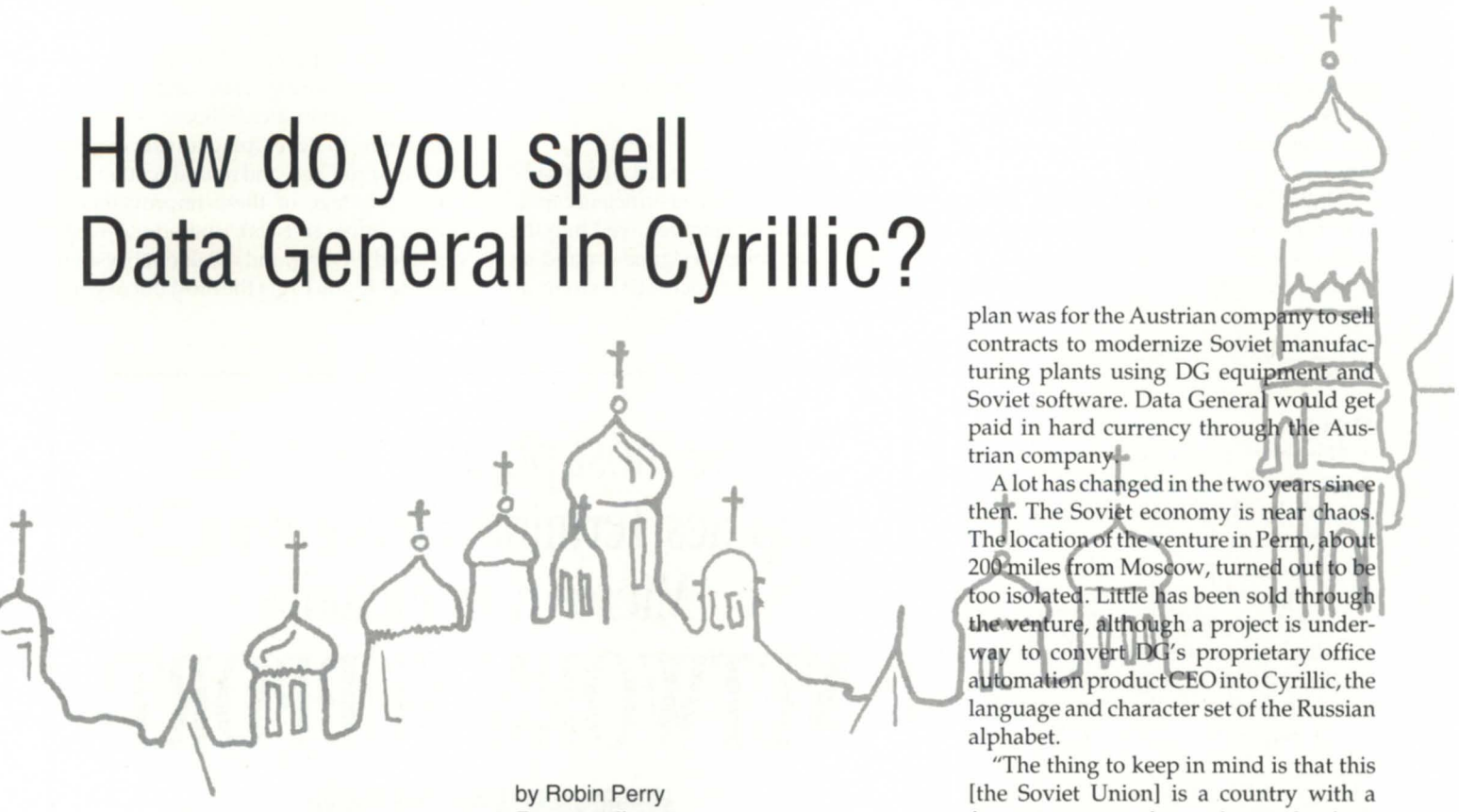
There are many other features that might be best placed in the "attention to details" catagory. Many are simple things that are often overlooked until they are needed. The ability to determine controller configuration information, without removing the controller or loading a diagnostic, for example, would probably save thousands of service hours in the field.

Room to grow

The controller is the heart of any subsystem. Be sure that it has sufficient capacity to continue serving you well into the future. A controller designed around an advanced microprocessor, such as Motorola's 68030, has reserves of power that could be harnessed to quickly perform chores normally associated with host-level backup utilities. Choose a vendor committed to developing advancements for their products, and a product that can take advantage of these improvements with a simple software upgrade. A well-designed, flexible, and reliable subsystem will enable you to get the most out of your MV computer. Δ

Lou Lemone is the vice president of engineering for Hiperstor, a wholly owned subsidiary of Clearpoint Research Corp., 800/253-2778, in Hopkinton, Massachusetts.

How do you spell Data General in Cyrillic?



by Robin Perry
Focus staff

SYNOPSIS

With an eye toward the long-term potential, Data General embarks on a joint venture in the Soviet Union seeking to feed a growing appetite there for modern technology and Western-style business relationships.

Not long ago, Data General turned down an order for several million dollars worth of PCs. Strange behavior, one might think, for a company that is striving for recovery in a troubled, competitive industry. But there was a catch.

The potential customer was based in the Soviet Union. Because Soviet rubles are not interchangeable with Western currency, the proposed form of payment to Data General was timber. "It was a complicated, convoluted transaction," says Peter Gyenes, Data General vice president of International Operations. "Even if we were willing to get paid in lumber, the whole thing would have taken two years of fantastic work just to get the transaction done . . . not to mention what we would have done once we received the lumber."

The incident illustrates how difficult it is for Data General and other U.S. organizations to do business in the Soviet Union.

Data General took the lead with computer companies attempting to do business in the Soviet Union when it formed a joint venture in late 1989 called Perekat. The joint venture was made up of a Soviet software company, an Austrian manufacturing company, and Data General. The plan was for the Austrian company to sell contracts to modernize Soviet manufacturing plants using DG equipment and Soviet software. Data General would get paid in hard currency through the Austrian company.

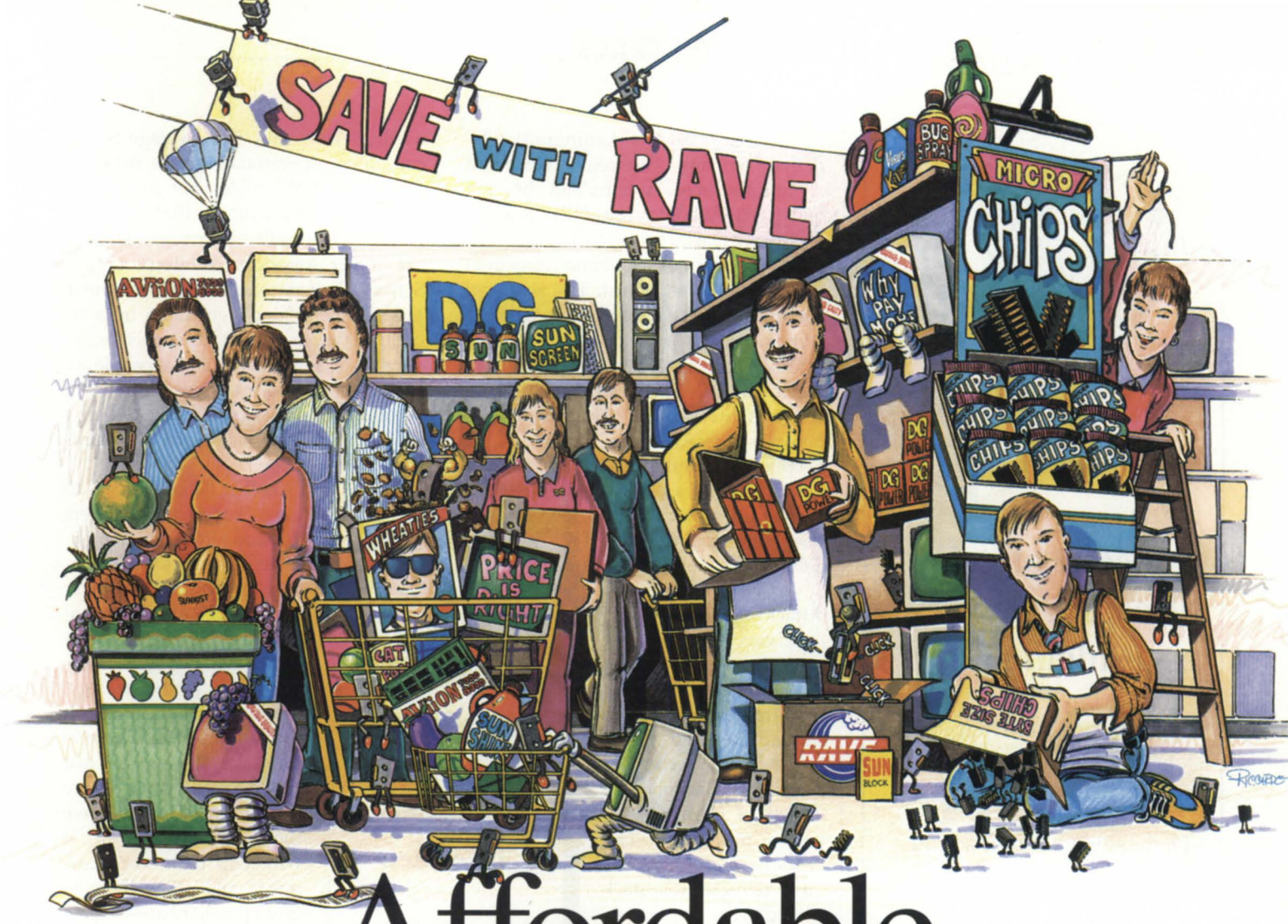
A lot has changed in the two years since then. The Soviet economy is near chaos. The location of the venture in Perm, about 200 miles from Moscow, turned out to be too isolated. Little has been sold through the venture, although a project is underway to convert DG's proprietary office automation product CEO into Cyrillic, the language and character set of the Russian alphabet.

"The thing to keep in mind is that this [the Soviet Union] is a country with a fantastic appetite for modern technology and for Western-style relationships," says Gyenes. "They just have a lot of ground to cover before they can achieve what they want to achieve."

Gyenes believes the failed coup of August is a signal that change inside the Soviet Union will occur even faster than before. "They still have enormous, complex economic problems. They still don't have any money. They still don't think like we do in terms of the business," says Gyenes. However, because "this coup happened and failed, I think there's more likelihood that there will be real business opportunities sooner."

With an eye toward long-term potential, Data General has formed another alliance that it hopes will give its products greater exposure in the Soviet Union. Intelligent Resources International (IRI), a Maryland systems integration and software development firm, is seeking distribution channels in the Soviet Union for Data General equipment—sort of a Soviet-style VAR (value-added reseller). Already with several joint ventures in the USSR, IRI connects Soviet software developers with American clients.

IRI's strategy is to work with recognized technology leaders within the Soviet Union—for instance, Lentel, the St.



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Petersburg (formerly Leningrad) telephone company. "We told them about Aviion and open systems and they got quite excited about it," says IRI President Georges Selvais. That led to the formation of a consortium of telephone companies in Leningrad, Kiev, Minsk, Tashkent, and Vilnius that will develop software for the Aviion.

Other participants in the consortium are a Swedish-Soviet joint venture, in which IRI owns equity. "The joint venture becomes the VAR for the telephone solution. We've literally created a vertical market integrator for the telephone industry," says Selvais.

The idea is to link Aviions to Soviet mainframes via a high-speed interface

Attacking the heart

Selvais describes the typical Soviet computer center: There are two mainframes—one working and one being "cannibalized" for parts. The Soviet ES mainframes are copies of IBM 360/370 series machines. The working mainframe has 10 to 40 removable stack disk drives. The Soviet-made disk drives are of poor quality and hold a maximum of 200 MB per drive. It has an IBM-copy telecommunications front-end with a top speed of 2400 baud. The high-speed printers are about half as fast as those made in the U.S. or Japan, but are of good quality.

The idea is to link Aviions to Soviet mainframes via a custom-built, high-speed interface. The proprietary Soviet printers also will require a custom interface to connect with the Aviion server. Soviet terminals will be connected to the Aviion. The final stage is the development of hypercard for data base inquiry, and a simple point and click menu in Russian and Ukrainian languages. Selvais reports that most Soviet managers do not know how to type. This combination of products, he says, will "attack the heart of Soviet computers."

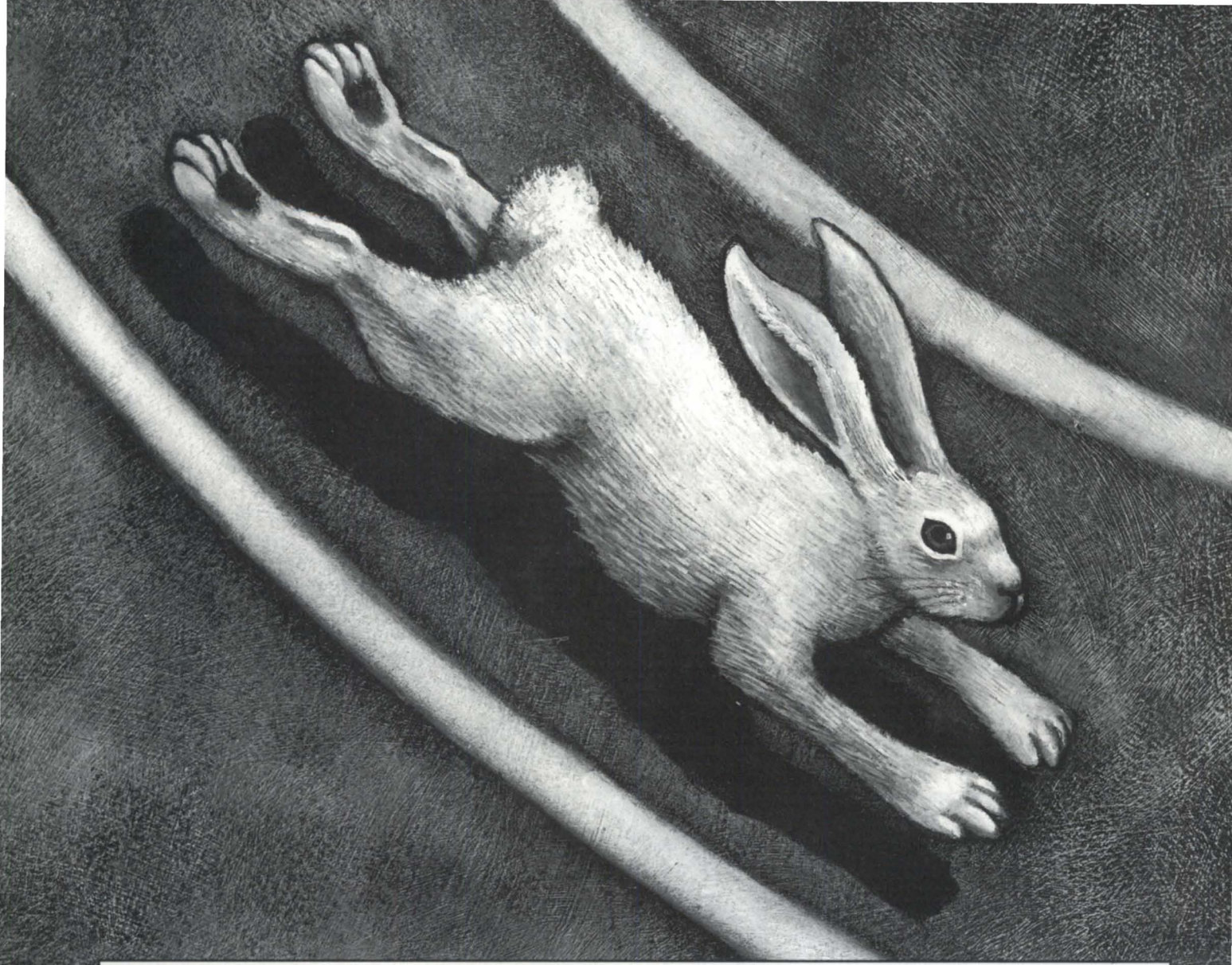
Software for the solution described above is being developed at the University of Simpheropol in the Crimea. The cost for software development in the Soviet Union is minuscule by Western standards, Selvais says. The average Soviet computer programmer makes between 1,000 and 2,000 rubles per month, or roughly $28—even though the Soviet programmer is usually better educated than his or her American counterpart, says Selvais. Soviets who become computer programmers "don't get there by accident. They were eager and aggressive and entrepreneurial in mind. Those people are highly motivated," he says. Some lack practical experience because they haven't had much exposure to hardware.

Another IRI objective is to have Soviet programmers develop software for American customers, says Selvais. "We can quote prices lower than India and other countries, and have access to better-quality people." That's a key part of the strategy, Selvais says, explaining, "If we had to sell hardware in the Soviet Union and just that, we would always have difficulties. If we can have them develop software, it will help them earn currency, and allow them to buy more hardware."

Back in the U.S.

Data General recently received a 15-member entourage from the Ukraine, representing various manufacturing centers. The group brought samples of electronic components, floppy disks, and related items that had been manufactured in the Ukraine, in the hopes that Data General would license them the technology to manufacture DG parts. DG's Gyenes said, "We looked at the output of some of the things they brought, and (pause) it is impossible for us to say 'Here's something for you to manufacture for us.' Their definition of quality and our definition of quality are about 35 years separated."

Although the Soviet Union has a long way to go to catch up with the U.S., Gyenes believes the ground will be covered in a few years—at least in terms of making the market more available to Western-style business practices. "Our strategy is to listen to everybody, because one day all these problems will be solved and we want to be in position." Δ



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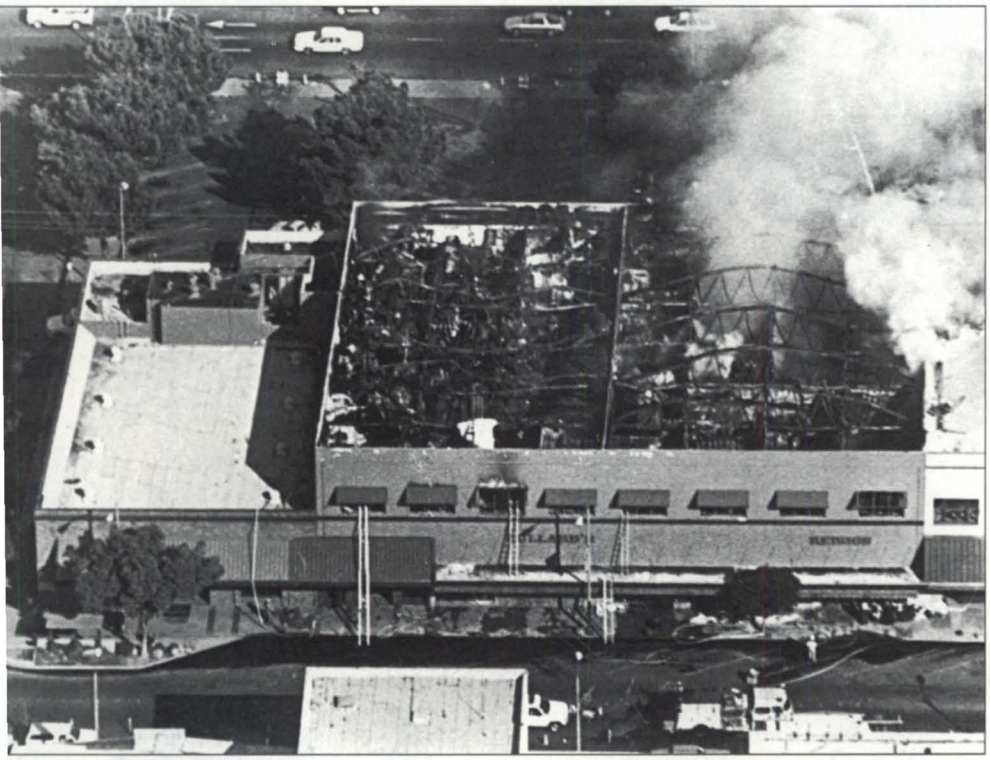
Banking on the future

SYNOPSIS

How do you continue with computer operations when there's nothing left of your business but a smoking hole?

Fire ignites on your building's roof not long after midnight, casting an evil glow in the sky. Firefighters arrive quickly but the roof collapses, blocking access. It will be several hours before they tame the blaze. By morning the entire structure is destroyed, your computer and business sections now a ghastly mass of charred, water-soaked wreckage.

by Doug Johnson
Focus staff



Bank of the Sierra's downtown Porterville (California) location lies in ruins following an October 2 fire.

For any computer-dependent business this would be a DP manager's worst nightmare. For the Bank of the Sierra in Porterville, California (pop. 45,000), this was nightmarish reality on the morning of October 2.

When everything's gone, even the little things become difficult. "Trying to operate without even having your telephone book, your list of telephone numbers, and all those essentials that were lost because they were in your desk, was really tough," observes Margie Mathis, Bank of the Sierra's director of marketing.

"They got the fire under control within four or five hours," Mathis recalls, "but then for two days after that it continued to pop out and re-ignite and smolder." There were no deaths or injuries. In that sense there was cause for relief. As for property and equipment, however, it was a grim scenario. Not too long ago the bank had completed a nine-month, $500,000 renovation project. That work was destroyed in minutes. But perhaps the most critical loss was the death of Bank of the Sierra's heart: its Data General MV/9500 computer system.

Employees could get replacements for the simple nuisances, like lost notepads and paper clips, but this was an *entire bank* that had been destroyed. What about accounting and record-keeping, and all the other everyday tasks so vital to the func-

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tioning of a financial institution?

It did not close. An alternate computer system was up and running by that evening, with the bank open for business the very next day. How was it possible? Put simply, says Mathis, "We had a disaster plan in place."

In makeshift headquarters across the street from its burned-out home, Bank of the Sierra clerks process checks, enter data, run reports, and carry out other tasks on computer terminals, just about as they would have done before the fire. Customers wouldn't notice anything different, aside maybe from wondering how this bank could burn down yesterday and be open today.

Far out of their line of sight, hundreds of miles to the east of Porterville in the Denver suburb of Englewood, Colorado, an MV/20000 maintained by Data Assurance Corporation for this very eventuality is running Bank of the Sierra's computer operations over a telephone-line hookup. Reports that the bank needs in the course of the day are printed out at this remote "hot site," and then shipped overnight back to California.

A disaster plan

"The requirement from the bank was to get back in operation, of course, as quickly as possible," says George Trayer, Data Assurance's senior vice president. "The role we play is to have computers ready to run, to back up our customers for all their essential data processing requirements." A majority of Data Assurance's clients are financial institutions. Sometimes the situation is just a power outage, or a crashed disk. Bank of the Sierra was the disaster recovery company's sixth live recovery of 1991. In any case, the client bank keeps going, with outside help, and in Trayer's words, "they can operate from our computers essentially in a mode that's transparent to their customers."

Notified first thing that morning on the day of the fire, Trayer says, "by noon that day we [Data Assurance] had shipped to California the necessary multiplexors and modems required to connect the main bank and its three branches to us and to our computers." This was a tandem effort with Bank of the Sierra's item-processing backup service contractor, Bank Up (of San Ramon, California).

According to Bank Up president John Barrett, "When the disaster happened, we flew the people from the bank to our place in San Ramon, where we did the capture and sort operations. Then we got the work over to Data Assurance, so they could run the update." Bank Up runs sort patterns on a Unisys system, producing output formatted for the bank's Data General equipment. During its normal business operations, the bank processes some 25,000 checks and deposit slips per day. The process is called "proof and capture." Amounts are manually encoded on a check, which is then run through a sorter that registers amount numbers onto a computer tape, and also takes a picture of the check on microfilm.

By that evening on the day of the fire, says Trayer of Data Assurance, "we had received tapes from the bank, had them loaded and operational." Also assisting in

data recovery has been Software Alliance of Beaverton, Oregon.

A "smoking hole"

"This is really the worst case that we can think of," says Trayer. "That's really the first time we've ever experienced a recovery for what we refer to as a smoking hole, where there was nothing left there." Data Assurance, in business since 1986, maintains a total of three hot sites in Colorado, Michigan, and New Jersey. Bank Up has been in operation since 1989. The two companies agreed to work together in July 1991.

"What we essentially provide is akin to insurance," says Trayer.

In the fire's aftermath at Bank of the Sierra, Mathis tells of heavy lifting equipment fishing out of the rubble a set of filing cabinets that fell three floors when part of the building collapsed. A trove of customer notes, deeds, car titles, documents, securities, and other valuable items were discovered intact. For the near future, Bank of the Sierra has rented office space at several locations around Porterville. Mathis notes that customers wanting to apply for mortgage refinancing had found the newly established locations "without us having had time to put out any publicity yet."

On site in Porterville resurrecting Bank of the Sierra's computer operations has been Gary Farnam, head of Bank Up's Southern California operations. "He went down there and worked with them," says Barrett. "They told him when he left that, without him being there, they would have had a great deal of difficulty in making this all happen."

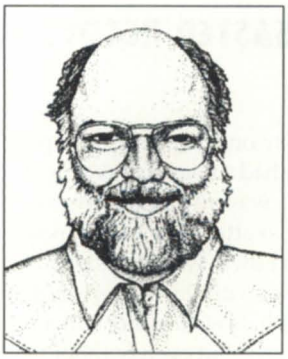
What might have been

A what-might-have-been irony emerges from Bank of the Sierra's disaster and recovery. The bank signed its contract with Bank Up and Data Assurance on September 10, just 22 days before the fire struck. Where would Bank of the Sierra have been without disaster recovery? "In a world of hurt," says Trayer.

Bank Up was formed as a company in part because executives Barrett and Farnam, both 30-year veterans of financial data processing, believed that most bank computer systems were already too burdened to handle another bank's workload in an emergency, an agreement called "reciprocal use."

In Bank of the Sierra's case, Barrett says, the amount of computer time needed would have been prohibitive. "There's just no way they could have gone to a reciprocal."

According to Ron Helart, DAC's vice president of recovery services, "They would have had to rely [and wait] on somebody to go out and purchase a system, get it configured, and delivered to operate. Or rely on some other company that may have had some excess capacity." Instead, there was an organized procedure in place to attack the problem. The only real unknown was a system test. "Unfortunately, with this customer, they were so new [that] we had not run a test yet," says Helart. "But even without that, we were still able to get them up and online within hours." Δ



Brian Johnson

Servers: Part III

SYNOPSIS

This month, BJ describes methods for synchronizing access to the shared data used by a complex server and its customers.

:NADGUG:DENVER

Some of you are reading this issue in Denver at NADGUG's Conference '91. If so, please note that the official conference agenda somehow omitted listing the meeting time for the SLEAZE SIG.

Traditionally, the SIG assembles on Tuesday night at 9 p.m. in the bar at the main conference hotel. I see no need to break with tradition, so we will be assembling between 20:30 and 21:00 in the bar at the Marriott hotel. Departure is 21:00.000 (i.e., sharp).

Because some of the sites we will be visiting are located outside the downtown area, attendees with rental cars should have them handy. In the past, we've had a minor problem with appropriate dress for the tour. Denver still thinks of itself as a cow town, so business attire is definitely out. I recommend cowboy or biker (Harley, not Schwinn) duds.

:SERVERS:PART_III

Just to refresh your memory, Part I dealt with the design issues for a "simple" global server and Part II began the description of a "complex" global server.

A "simple" global server involves isolated stimulus/response transactions between the customer(s) and the server. Simple global servers usually don't need to be notified of customer terminations, which makes them much simpler to code. CONTROL @EXEC SPOOLSTATUS is an example of an isolated transaction.

A "complex" global server involves an ongoing relationship between the server and its customer(s), and usually involves some sort of data being shared between them. Complex servers need to know when their customer(s) terminate so that they can clean up any messes left behind in the shared data base (typically locks left set).

Last month I showed the C source code for a skeleton complex server, including the code to establish the server as an Official AOS/VS Server (?SERVE), receive customer and son obituary IPC messages (?IREC), and acknowledge disconnections (?DCON).

This month I'm going to describe some methods for synchronizing access to the shared data used by a complex server and its customers, with a view toward making the impact on the system as low as possible.

:LOCKS

Anytime data is shared by two or more asynchronous entities, it must be protected against simultaneous access during updates. That's basic. How this is accomplished is another story.

Every DG operating system since Day 0 has provided system calls to set and release locks. Unfortunately, these system calls often involve thousands of instructions, making them relatively expensive when the operation to be protected involves only a handful of instructions, or when it occurs frequently.

Alternatively, later DG computers (the 16 bit Eclipse and the 32 bit MV) included several atomic (i.e., indivisible) memory reference instructions that can be used in a straightforward manner to implement locks efficiently, usually in just two or three memory cycles.

Which method you choose to implement your lock strategy can have a significant effect on the performance of your customer process. Recently, I ran into a

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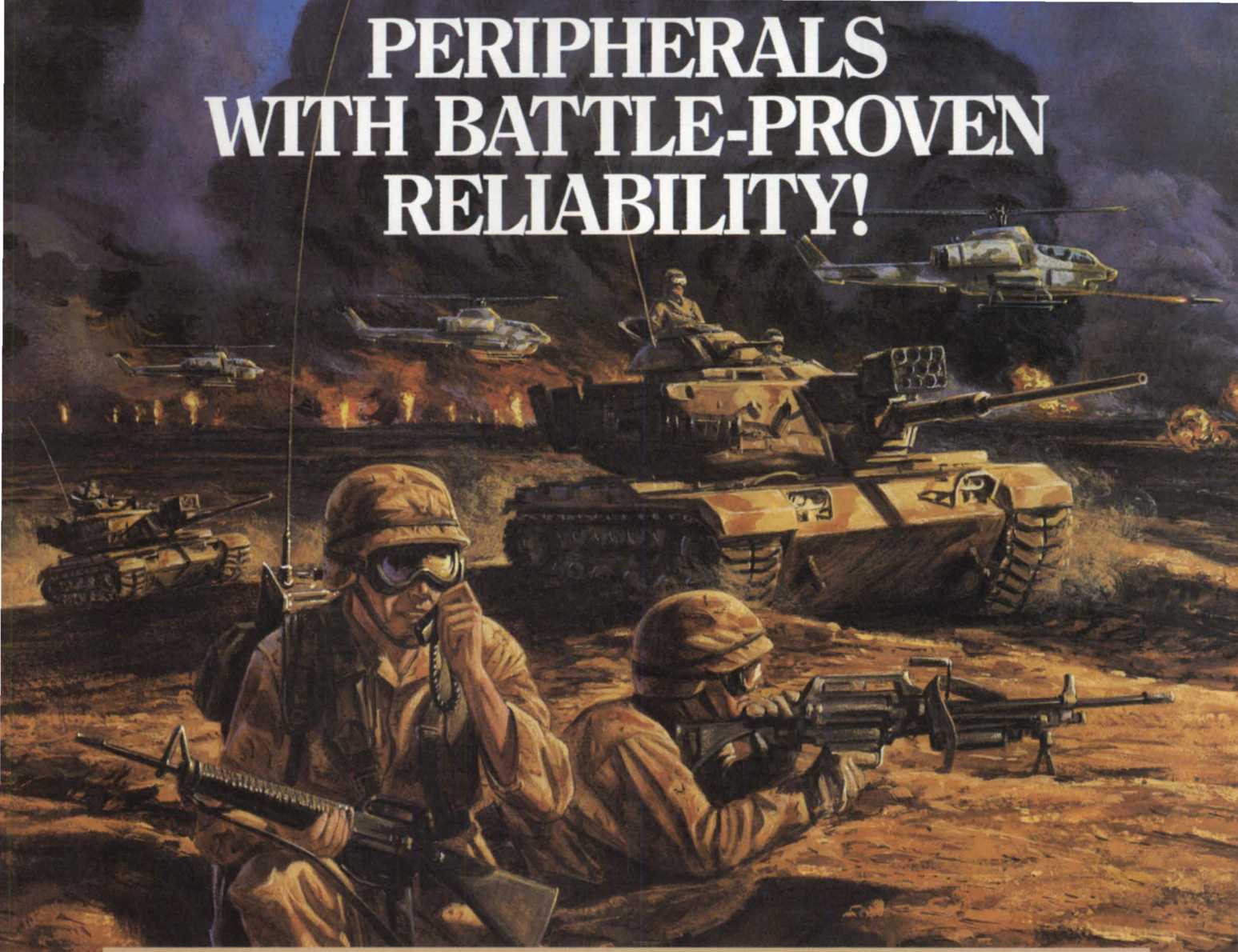

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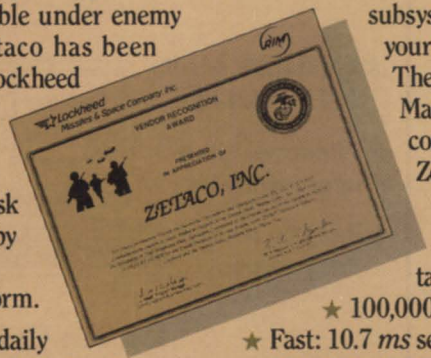

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Figure 1: SCF.H

```
/* Complex server Shared Common File (SCF) layout. */

#include <stddef.h>             /* offsetof() */
#include <dgqueue.h>            /* Queue functions */

typedef  unsigned int Uint;

#define  MAXLOCKS           512         /* Max no. of locked records */

/* Define the SCF layout. */
typedef struct scf {

    /* Define the SCF lock stuff. */
    int             scf_lock;           /* Bit 0 set indicates SCF locked */
                                        /* Bits 1->15 unused */
                                        /* Bits 16->31 = owner's PID */
    Uint            scf_locks;          /* Total no. of SCF lock requests */
    Uint            scf_spins;          /* Total no. of SCF lock spins */

    /* Define the descriptor queues: free, lock(ed), wait(ing). */
    _QUEUE          freeq;              /* Free descriptors */
    _QUEUE          lockq;              /* Lock descriptors */
    _QUEUE          waitq;              /* Wait descriptors */

    /* Record locking statistics. */
    Uint            record_locks;       /* Total no. of record lock requests */
    Uint            record_waits;       /* Total no. of requests which waited */

    /* Define the record descriptor pool. */
        struct desc {
                _ELE        elem;       /* Queue element */
                int         recno;      /* Record no. */
                short       pid;        /* Owner's PID */
                short       uid;        /* Owner's UID */
        } descriptors[MAXLOCKS];
} SCF;

/* Define the word offset of desc.recno for use with qsearch(). */
#define  RECNO_OFFSET     ( offsetof(struct desc,recno) / sizeof(short) )

/* Define the layout of a record lock request packet. */
typedef struct {
        int         recno;
        short       pid;
        short       uid;
} RLRPKT;

/* Define the function prototypes. */
extern void attach_scf(void);
extern int lock_record(RLRPKT*);
extern int unlock_record(RLRPKT*);

/* Define the SCF ptr (will be set by attach_scf()). */
SCF *scfp;

/* End of scf.h */
```

situation where an inappropriate strategy was adopted by a third-party software vendor with the result that the software spent 20 percent of its CPU time simply managing locks. That's ridiculous.

Let's survey the various lock facilities available under AOS/VS and find out when they are appropriate to use.

:EXCLUSIVE_OPEN

If the shared data that you're trying to access is associated with a file, then the cheapest locking method by far is simply to open the file exclusively. Unfortunately, this precludes access by any other process until you close the file. That eliminates this technique for all but the most brute-force cases (e.g., protecting a file or data base against any access during a complete batch run).

:?FLOCK/?FUNLOCK

Relatively late in the life of AOS/VS, DG added two system calls to provide a feature-rich lock associated with files and records within files.

?FLOCK/?FUNLOCK allow multiple tasks and processes to lock any "object" associated with a particular file, where the object can be anything (a bit, byte, block, element, record, field within a record, or even the whole file).

Two kinds of locks are allowed: exclusive and shared. An exclusive lock guarantees that only a single lock holder has control of the lock once the lock is set. A shared lock allows multiple simultaneous shared lockers, presumably for read-only access to the shared data, with the guarantee that it won't get updated while they're looking at it.

The nice thing about using ?FLOCK/?FUNLOCK is that the system automatically takes care of cleaning up after processes that terminate (ab)normally while holding locks, eliminating the need for the user to provide a complex global server for required cleanup.

The only disadvantage of ?FLOCK/?FUNLOCK is its cost: about 2 ms for an uncontended ?FLOCK/?FUNLOCK pair under AOS/VS 7.69 on an MV/4000. If you'll only be holding the lock for a few microseconds while you update the associated data, these calls impose an exorbitant amount of overhead.

:INSTRUCTION_SET:WSZBO

The MV instruction set includes several nice atomic test-and-set instructions that are well suited to the purpose of implementing cheap locks involving multiple processes.

The simplest instruction is the WSZBO (SZBO for 16 bit programs). This instruction tests a bit for zero. If it is zero, then it sets it to one and skips the instruction that follows. If the bit is already set to one, no action is taken and execution continues with the instruction following the WSZBO. This is textbook semaphore behavior at its simplest. This instruction is so handy that C provides a tiny five-instruction library function ($asm bitszbo()) to get at it. In other languages you need a small assembly language subroutine to get at it.

In terms of speed, WSZBO is tough to beat: 2.3 microseconds if the bit is changed,

Figure 2: LOCKS.C

```
/* SCF record lock management functions. */

#include <stdio.h>
#include <stdlib.h>             /* exit() */

#include "sys_ersys.h"          /* ERPRH */
#include "sys_resched.h"
#include "sys_signl.h"
#include "sys_wdelay.h"
#include "sys_wtsig.h"

#include "scf.h"

/* no_swap = mess(pattern,&swap_value,&lockword,mask); */
extern int mess(int,int*,int*,int);

#define         LOCAL       static
#define         BIT0        (1<<31)

/* Lock the .SCF file using a spin scheme. */
/* Pending while holding the lock is not advised. */
LOCAL void lock_scf(int pid) {
        int             attempts,ier,swap_word;

        attempts = 0;
        swap_word = BIT0 | pid;
        /* If scf_lock is zero then store 1B0 + pid. */
        while (mess(0,&swap_word,&scfp->scf_lock,~0)) {
                scfp->scf_spins++;              /* Gather statistics */
                if (ier = sys_resched()) exit(ier);
                if (attempts++ > 1000) {
                        fprintf(stderr,"SCF lock deadlock!\n");
                        exit(EXIT_FAILURE);
                }
                if (attempts % 100 == 0)
                        if (ier = sys_wdelay(500)) exit(ier);
                swap_word = BIT0 | pid;     /* mess() trashed it */
        }
        scfp->scf_locks++;                  /* Gather statistics */
}

/* Unlock the .SCF file. */
LOCAL void unlock_scf(int pid) {
        int             swap_word,test_word;

        /* Clear the lock only if it's me who's holding it. */
        test_word = BIT0 | pid;
        swap_word = 0;
        if (mess(test_word,&swap_word,&scfp->scf_lock,~0)) {
                fprintf(stderr,"Not your lock\n");
                exit(EXIT_FAILURE);
        }
}

/* Lock a record no. using a pend scheme. */
/* Returns 0 if successful, else error code. */
int lock_record(RLRPKT *pktp) {
        _ELE        *elemptr;
        struct desc *descptr;
        int         ier,recno;

        /* Sieze control of the SCF. */
        lock_scf(pktp->pid);

        /* Allocate a free descriptor and fill in the blanks. */
        if ( (elemptr = remove_head(&scfp->freeq)) == NULL) {
                fprintf(stderr,"Too many locks\n");
                exit(EXIT_FAILURE);
        }
        descptr = (struct desc *) elemptr;
        descptr->recno = pktp->recno;
        descptr->pid  = pktp->pid;
        descptr->uid  = pktp->uid;

        /* Search the queue of locked record descriptors */
        /* to see if the record no. is already locked. */
        recno = pktp->recno;    /* So next line is < 72 cols */
        elemptr = qsearch(&scfp- >lockq,WFSE,RECNO_OFFSET,recno,QNULL);
        if (elemptr == NULL) {
                /* Record is not locked: lock it by adding the des- */
                /* criptor to the locked record descriptor queue. */
                elemptr = (_ELE *) descptr;
                insert_tail(&scfp->lockq,elemptr);
                scfp->record_locks++;       /* Gather statistics */
                unlock_scf(pktp->pid);      /* We're done with the SCF */
                return 0;                   /* Exit successfully */
        }

        /* Record is already locked: queue my */
        /* descriptor to the wait queue instead. */
        elemptr = (_ELE *) descptr;
        insert_tail(&scfp->waitq,elemptr);      /* Enque the descriptor */
        scfp->record_waits++;                   /* Gather statistics */
        unlock_scf(pktp->pid);                  /* We're done with the SCF */

        /* Wait for a wakeup call from the lock holder (or server). */
        if (ier = sys_wtsig()) exit(ier);

        /* The record is now locked. */
        return 0;
        }

/* Unlock a record and wakeup the oldest waiter for it, if any. */
int unlock_record(RLRPKT *pktp) {
        _ELE        *elemptr;
        struct desc *descptr;
        int         ier,recno;

        /* Seize control of the SCF. */
        lock_scf(pktp->pid);

        /* Locate the descriptor. Not finding it is an error. */
        recno = pktp->recno;    /* So next line is < 72 cols */
        elemptr = qsearch(&scfp->lockq,WFSE,RECNO_OFFSET,recno,QNULL);
        if (elemptr == NULL) {
                unlock_scf(pktp->pid);
                fprintf(stderr,"Record is not locked\n");
                return -1;
        }

        /* Free the descriptor. */
        remove_element(&scfp->lockq,elemptr);
        insert_tail  (&scfp->freeq,elemptr);

        /* Look for the oldest waiter for this record no., if any. */
        elemptr = qsearch(&scfp->waitq,WFSE,RECNO_OFFSET,recno,QNULL);
        if (elemptr == NULL) {
                /* No waiter: unlock the SCF and return success. */
                unlock_scf(pktp->pid);
                return 0;
        }

        /* Found a waiter: move his descriptor from */
        /* the wait queue to the lock queue. */
        remove_element(&scfp->waitq,elemptr);
        insert_tail  (&scfp->lockq,elemptr);

        /* Wakeup the waiter. Ignore error if he died. */
        descptr = (struct desc *) elemptr;
        ier = sys_signl(descptr->pid,descptr->uid);
        if (ier && ier != ERPRH) exit(ier);

        /* We're done mucking with the SCF. */
        unlock_scf(pktp->pid);

        /* That's All Folks! */
        return 0;
}
```

2.2 if it isn't (MV/4000 times).

Clearing the bit to release the lock involves either a simple WBTZ instruction, which takes an additional 1.8 microseconds, or a sexier WMESS instruction, which takes 2.2 microseconds. The WMESS instruction advantage is that in a single atomic operation it can both verify that the unlocker is in fact the current lock holder, and clear the lock if it is.

Either way you unlock, that's roughly 500 times cheaper than the ?FLOCK/?FUNLOCK pair for the case of an uncontested lock. What a deal.

The comparison is a bit unfair, because ?FLOCK/?FUNLOCK allows both exclusive and shared locks, but a WSZBO-based function to provide the same facilities is still pretty simple, and adds only a few more instructions.

:DESIGN_EXERCISE

OK, let's try designing a low-overhead locking scheme for our skeleton complex global server and its customers to use.

We'll use an application that most of you can relate to—simple record locking (flat file or data base, it makes no difference). The scheme works as follows:

- Any process wishing to access the data base must begin by establishing a connection to the global server (using ?PNAME or ?ILKUP to locate the server's PID and ?CON to connect to it).
- Request access to the shared file/data base by sending an IPC request to the server (using ?IS.R) requesting either read-only or read-write permission. The global server responds by issuing a protected shared open (?SOPPF) to allow the customer to access the file/data base using shared page I/O.
- Open the record lock Shared Common File that contains the data base of locked records and read it into shared memory.
- The customer uses two functions, lock_record() and unlock_record(), to manage record locks. Both functions are passed a packet that includes the locker's PID, Unique task ID, and record number involved.
- Whenever a customer process terminates (by suicide, murder, or a fatal disease), the global server checks to see if the customer had any locks active (the locker's PID is stored along with the record number) and issues unlock_record() calls to release them.

The C .H file that describes the layout of the Shared Common File (SCF) is shown in Figure 1(page 30). The C lock_record() and unlock_record() functions are shown in Figure 2.

The complete set of source files, including those functions not shown in the figures, is available on the :SYSMGR BBS as item SMLOGS:SML9112X.

When reading the source code, note that BJ Inc. uses strict ANSI C include files and per-call include files for sys_xxx() functions, instead of the 10,000+ lines of include files normally used by DG C to access sys_xxx() functions. If I get a chance, I'll try to update the code to show both sets of includes with #ifdef DGC to allow you

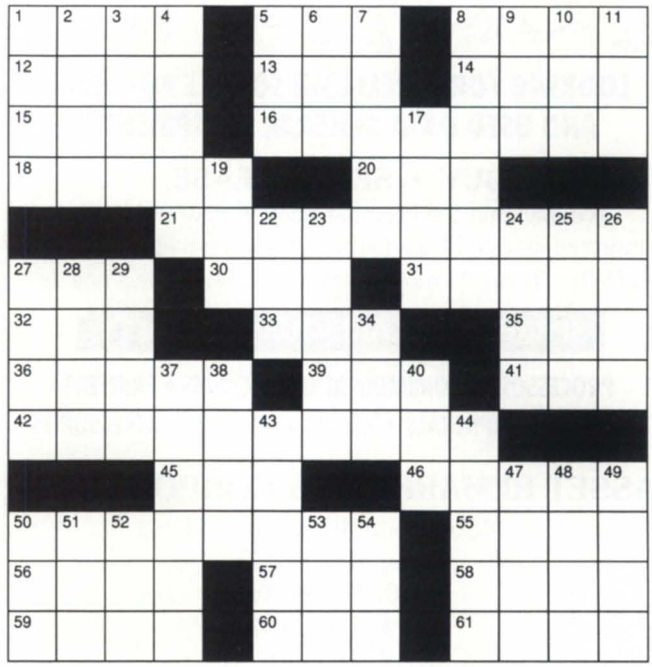
Continued on page 51

across

1 American National Standards Institute (abbr)
5 Break ___
8 Largest continent
12 Require
13 Cheer
14 Release
15 Fee
16 Most precipitous
18 Imply
20 ___ Tai
21 Let down
27 ___ switch
30 Baseball implement
31 Bother
32 End of line (abbr)
33 Parent/educator group
35 Apex
36 Bog
39 "___ a Wonderful Life"
41 DG ___ (portable)
42 NADGUG 92 location
45 Conquest
46 Northerners
50 88K manufacturer
55 ____ time
56 Dock
57 ___ code
58 ____ General
59 Happy
60 Military officer
61 Stalk

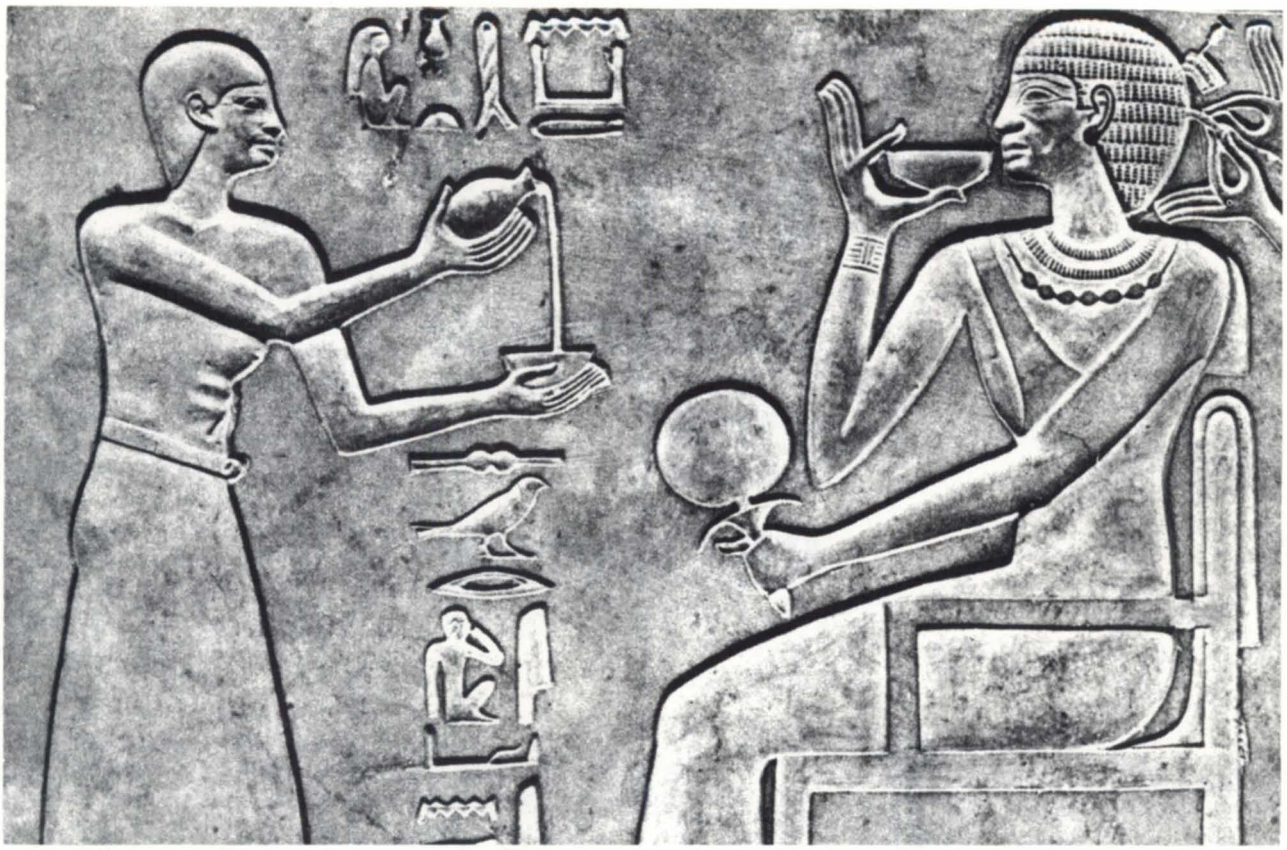
down

1 Against
2 Kind of light
3 To thine own ____
4 Made inactive
5 Computer mistake message
6 Systems Application Architecture (abbr)
7 Bonzo
8 DG Risc machine
9 View
10 Opposite of *outs*
11 American Telephone and Telegraph
17 Nat. Auto Parts Assoc. (abbr)
19 Adam's ___
22 Tree fluid
23 Loft
24 ____ the Woods
25 Midday
26 Printer command
27 ____top
28 Hawkeye state
29 ____ Perfect spreadsheet
34 PC graphics board maker
37 Microsoft word processor
38 Two of a kind
40 Pig's home
43 Haughty ones
44 Lawns
47 Not messy
48 Actress Hepburn to friends
49 Grand ____
50 Fuel efficiency monitor
51 Olive is one
52 Iced ___
53 Dawdle
54 Finesse



Solution on page 42

HISTORICALLY SPEAKING



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FILE PROTECTION AND RECOVERY

by Steve Kyes
Special to Focus

SYNOPSIS

Have you taken the proper steps to guarantee data base integrity and effective recovery from system failures? This article will bring you up to speed quickly with Infos II and AOS/VS[II] offerings in this area.

Because AOS/VS is a virtual, demand-paged system, modified Infos pages are left in memory while application users update Infos files. Abnormal system shutdowns—such as an emergency shutdown (ESD), no shutdown at all due to power failure, or various other malfunctions—can result in corrupted Infos files. This may be prevented if data bases are properly administered.

Although Infos revision 6.0 implements a new buffer manager and eliminates user ring 4 ?SPAGEing, file integrity and the possibility of data base corruption remain important issues for the Infos II user.

How does corruption occur? Application additions (writes), deletions, and rewrites to data bases can cause dynamic changes to internal B-tree and other file pointers. They can cause the data base to grow as well. When a system failure occurs, these newly modified or created pages may not be flushed to the Infos data bases on the disk. Infos could be in the middle of changing a series of disk block internal structures when a failure occurs. So the physical file changes in memory are inconsistent, even if the pages are written to disk. This is the case when ESD is run after a system failure. Even though all modified Infos file buffers are flushed to the disk, these buffers may not be (and are most probably not) logically consistent to begin with. Proper file protection, backup, and recovery procedures must be implemented so the user can recover quickly, with as little data loss as possible.

Infos II users should review user manuals for detailed information about data protection and recovery features offered and supported by Infos II. Refer to the AOS/VS Infos II System User's Manual, 093-000299-01, for rev 5 and prior, or the new Infos II System User's Guide, 093-000299-02, for rev 6.0. These manuals describe in detail what is described only briefly in this article.

What follows is an introduction to file integrity issues and recovery options available with Infos II. Checkpointing is the backbone of all Infos file protection and recovery, and should be understood clearly by the user. It is noteworthy to mention that all of the following options, with the exception of Request Groups, can be implemented procedurally with no application changes required for the user.

Infos file modes

Infos offers many solutions to the data base integrity problem. The first is file modes. Every Infos file created is in standard, or "S," mode by default, until the data base administrator or the application designer selects a production application mode. Standard file mode should be used only for temporary, test, or "read-only" live data bases. These need no file integrity protection. Very few data bases are "read-only," so standard file mode is not appropriate for production data bases.

Infos offers many other file modes that keep data bases in a protected, read-only state while inquiries and updates are made against the data base. These other file modes (and there are several) implement "differential files." In differential file modes, application transactions are applied to the differential file, not the actual data base. The actual data base remains

"read-only" until a checkpoint occurs. If an application requests newly updated record information, Infos knows to read this from the current data base page in the differential file—not from the read-only data base that contains an outdated page. Infos file modes may be set on each data base using the Infos Ifile utility. For example, "Ifile customer_db DF" turns on differential file mode for the data base named customer_db.

Because Infos keeps the data base file in a "read-only" state during differential file mode, nothing short of physical disk damage can cause data base corruption. If all system data bases are kept in one of the differential file modes, running Iverify following a system failure is not required unless you suspect physical disk corruption. Run Iverify occasionally on all data bases, but it may be scheduled during off hours, prior to backups, and should not affect production schedules.

Checkpointing

A checkpoint is the means by which these temporary differential files are flushed to the real data base pages. The pages need to be updated by all the activity since the last open or checkpoint. A checkpoint can be explicit (the user executes an Infos checkpoint utility every "n" minutes), or it can be implicit (when the last application user closes the data base). Or it may be a combination of the two. The "Ifile customer_db DF" example given earlier supports both user-requested explicit, and last-close implicit checkpointing. Explicit checkpoints may be set up to execute from the batch queue with user-defined frequency.

The checkpoint process has multiple phases. As soon as it starts, all data base requests are suspended until the checkpoint process is complete. The first active phase gathers all modified pages in memory for the data base being checkpointed, and writes them to the Infos differential file volumes, called DVOLs. The second phase copies these modified Infos data base pages from the DVOLs to the actual data base that had been in read-only mode. As long as the first phase has completed, a checkpoint is considered in progress and can be restarted following a system failure. A cleanup phase reinitializes the differential volumes, restores the data base to read-only mode, and allows suspended Infos requests to be processed.

Checkpointing guarantees physical data base integrity. It is possible, however, to have a logically inconsistent data base, because a checkpoint can occur in the middle of a logical application transaction that makes several Infos requests. The next checkpoint will flush the remainder of that same logical transaction. An Infos II facility called Request Groups supports checkpointing on logical transaction boundaries, but this requires application code. Because a logical transaction can span multiple Infos data bases, there is also a concept of File Set Checkpointing. For details on Request Groups and File Sets, refer to Chapter 12 of the Infos II System User's Manual for rev 5 and prior, and Chapter 8 of the Infos II System User's Guide for rev 6.

Irecover

Even in differential file mode, a system failure can result in lost data base information. There are two possible DVOL states after a system failure. If a checkpoint was in progress, it should be restarted using the Infos Irecover utility. Either Ifile or Irecover, with no switches, may be used to determine if a checkpoint was in progress. "Irecover/restart customer_db" will restart the checkpoint. Completed Infos requests will not be lost.

If a checkpoint was *not* in progress at the time of a system failure, the DVOLs must be deleted. They have a data base structure of their own, and are probably corrupt. So would the Infos data base left in standard file mode. Irecover is used to delete the corrupted differential volumes, e.g., Irecover/delete customer_db. In this latter case, changes to the Infos data base since the last open or completed checkpoint have been lost. Fewer transactions are lost if explicit checkpoints are issued with greater frequency.

Request logging

Infos transaction logging is available in order to further reduce the window of vulnerability for losing transactions. There are two versions of this: immediate, where transactions are logged unbuffered; and buffered. In immediate (unbuffered) mode, a few transactions can be lost, depending on the buffer size selected. The trade-off is performance. Writing to a log tape or disk file unbuffered is not as efficient as buffering up several requests, and then writing to the log file.

With logging, you must still discard the differential volumes after a system failure, unless checkpointing was in progress. However, you can replay the log file against the Infos data base, and bring it as current as the log file's last transaction. Logging Infos requests, called Request Logging, requires use of the AOS/VS Common Logger. The logger has two pieces: a logging program Comlogvs, and an unlogging program Comunlogvs.

When recovering from a request log file, Irecover will be given log records by Comunlog, and check the date/time of the logged transaction against the last successful checkpoint date/time. Only transactions written to the log file after the date/time of the last successful data base checkpoint will be applied to the newly created differential volumes. Once the last

log record is written to the differential volumes, Irecover will automatically initiate a final checkpoint. This could be restarted after a system failure, as could the logging recovery procedure.

Summary

There are many levels of data base integrity protection offered by Infos:

- No protection, as offered by standard file mode
- Physical structure integrity with differential file mode, but transaction loss since the last checkpoint
- Logging with differential file mode, so only one to a few transactions are lost when a system failure occurs.

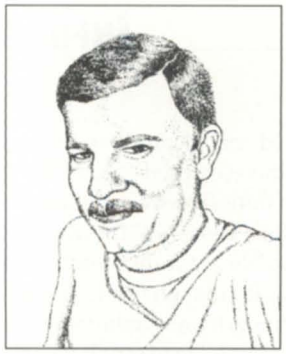
Some customers design their own applications for transaction logging that can be more efficient, in terms of performance and defining logical transaction boundaries, than the general purpose logging offered by the AOS/VS Common Logger.

In general, differential file mode does not affect performance much. But it will appear to pause the application when checkpoints are being issued. No new Infos requests may be applied to the differential volumes until the checkpoint is complete and differential volumes reinitialized. With transaction logging, however, checkpoints may be executed infrequently. You can let the differential file grow, and just replay more requests off the log file should it be necessary to run recovery procedures. You are increasing uptime throughput, but trading for a little more downtime to replay more transactions after a system failure. Infos II rev 6 has enhanced checkpoint performance, offering users more flexibility in scheduling checkpoint frequency.

As with any software, there are tradeoffs to consider. Except for custom application logging and Request Groups, all of the other options mentioned may be tested using Infos utilities and procedural changes (such as logging), which are all independent of the customer application code. Basic differential file mode affects performance a little. Adding full transaction logging requires additional resources. Every application has different requirements and performance characteristics. The greater the modifications to a data base as a percentage of total requests, the more log records must be written and replayed during recovery.

One thing is certain: something other than the default standard file mode must be implemented for all production data bases, except those opened "read-only." The strategy in Infos II recovery is simple: recover the data bases on the disk as quickly as possible. At a minimum, this requires file modes that guarantee physical data base integrity and eliminate the need to run Iverify and load tape backups, except when physical disk integrity is an issue. Δ

Steve Kyes, a Data General employee for 15 years, is a systems engineering consultant within DG's Technical Services group. He is based in Irvine, California.



Tim Boyer

Re-possessed

SYNOPSIS

The latest Screen Demon, abundantly populated with a teeming horde of improvements and new features, is a truly devilish upgrade. And it's not just for Cobol anymore, but for any AOS/VS 32-bit language. Invite it to inhabit your system's soul.

I just received version 3.0 of Screen Demon. It hasn't been very long since I reviewed Screen Demon ("Yes they do Windows," *Focus*, September 1989, pg. 42), but revision 3 has enough added to it that I can do a column on the new features alone. So that's what I'm going to do, with a minimum of re-review. Those of you who threw your September 1989 issue away are on your own.

Screen Demon is, of course, the program from Threshold, Inc., that adds windowing, pop-up menus, mail, and other goodies to ICobol and VS/Cobol programs. Except now, as one of their ads says, it's not just for Cobol anymore. All of the Screen Demon features can be added to any AOS/VS 32-bit language: C, B32, PL/1, and so on. In addition, a new version called C-THRU enables the features on ICobol and Microfocus Cobol on the Aviion platform. So if one of your concerns about starting to use Screen Demon was producing non-standard code, worry no more—this code can follow you anywhere.

Even into existing programs. I'm no longer running CLI32. Instead, I'm running SD_CLI32, which is the same thing with the Screen Demon routines linked in. Adding Screen Demon calls to existing programs couldn't be easier. All you need to do is type

```
SD_POSSESS :UTIL:SED.PR
```

and you create a file named SD_SED.PR that's about 2K larger, but has the Screen Demon routines bound in. Kinda nice to be running SED and popping up notepads, sending mail, printing off the screen, and so on. The only limitation is that it must be a 32-bit program, so I can't have a Screen Demon version of CRTEDIT.

Handy mail server, new calls

There's also a new global mail server. This lets you notify users who aren't currently running Screen Demon that they have mail. The program checks if someone is logged in under a non-Screen Demon process, and periodically sends them a notification. Handy for those of us who spend a lot of time in the CLI.

In addition, there are a few dozen new calls. Most of these are refinements of existing calls, such as SD_MESSAGE_ONLY, which sends a message without waiting for a keypress. Some of these are new and potentially useful, like SD_BITS_TO_DIGITS, which turns a numeric value into a string with its binary value. With this, I can easily check which bits are turned on in a word. And at least one of these routines is so indispensable that, had I known it was possible, I would have pestered Threshold long ago to include it.

SD_TEMPLATE_MATCH has already found its way into a dozen of my programs. Here's the problem: you're looking for a pattern match in an ICobol string. Say, for instance, HESSELBEIN TIRE. There are only three ways of doing it. One, you can look for the string itself, which will *never* work because someone will always type "HESSELBEIN TIRES CO." or spell it with one "S", or spell it "BIEN" or something like that. Next, you can check for part of the word, like "HES", and most of the time this will work, and that's what most of us do. Occasionally, it kicks out "HESTER TIRE", but thems the breaks. Finally, if it's critical, you set up some kind of ad hoc routine that breaks the word into individual characters and ignores dropped letters and transpositions, taking a couple of dozen lines and requiring a rewrite for each exception. Now there's a fourth way. The syntax is like so:

```
CALL "SD_TEMPLATE_MATCH" USING
        candidate string,
        template string,
        match flag.
```

and the important feature is that you can include the wildcards "*" and "+" to match single or multiple characters, respectively. So my pattern match is now

```
CALL "SD_TEMPLATE_MATCH" USING
        ORDER-SHIP-TO-NAME,
        "+HES+ELB+N+",
        MATCH-FLAG.

IF MATCH-FLAG = "Y" THEN . . . .
```

One statement replaces dozens, and the accuracy is greatly improved.

The only drawback is that, to quote the manual, "The first space, comma or unprintable character indicates the end of the string." Why the limitation? This means that I can't do a search for "HELLO THERE," either as the search string or the string to be searched.

Of course, I do anyway. In the template string, I just specify "HELLO * THERE." Then, I adjust the candidate string:

```
INSPECT CANDIDATE-STRING REPLACING ALL
   SPACE BY "|".
INSPECT CANDIDATE-STRING REPLACING ALL
   "," BY "~".
```

VENDOR INFORMATION

Screen Demon is available from Threshold, Inc., 118 N. Ross Street, Auburn, AL 36830. Their phone is 205/821-0075, fax 205/821-0122. The price runs from $950 to $1,550 depending on configuration. The upgrade is $95.

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I then do the search, and do a REPLACE going the other way. A bit tedious, but it works fine. This one statement is worth the whole upgrade to me.

A bigger, better manual

In addition to the new statements, there are some statements that have always been available—I just didn't know what they did. Now I know, because the 2.0 manual has more than doubled in size. There now is both a Programmer's Reference and a Development Guide designed to lead you through the intricacies of Screen Demon. It's no help, though, if you get an unreadable manual twice as big as before. Someone has put some effort into these revisions.

Take the SD_CREATE_WINDOW call, for example. It's always been available. Its function, as described by the old manual, is "the same as the corresponding SD_NEW WINDOW calls except that the initial view is set to the position and size of the box parameters, if any are specified."

Makes you want to run over to your terminal and program something, doesn't it?

In the new manual, I find out what this call does and why I want to use it. There's an entire page giving different reasons, but for me, the clincher is that with the SD_CREATE_WINDOW call you specify relative cursor positioning instead of absolute. In other words, you never have to figure where the box is on your screen—specifying LINE 4 will place your data 4 lines down from the top corner of the current window. So, in effect, decent documentation has added a whole new set of calls to Screen Demon. Finally, there are improvements to the existing utilities. The SPY utility allowed you to see exactly what each screen was doing. Now, not only can you watch, you can take over. That's right—while watching someone else's screen, typing "R" allows you to go in there and grab control.

I dunno. There have been occasions when I've used this, but usually I feel like one of those scientists in a 1950s horror flick. You know, the one who exclaims, "I shudder to think what could happen if this weapon falls into the wrong hands!" With the Remote Input feature, you literally become the other user, with all of the other user's privileges. Now, nobody would do this, but think what could happen if PID 2 were running a SD_POSSESSed version of CLI32. That means that anyone who could get access to SD_SPY could become OP. Whoops.

Still more goodies

Along with these improvements are a slew of other goodies: a CLI-32 type HISTORY feature that makes debugging *much* nicer, a screen saver included in the code, an on-screen clock that's practically infinitely configurable, an optional print redirector, and more. The TURBO feature has always been a problematical one for me, because when set to full, the screen won't redisplay until input is required. In other words, if you DISPLAY a line that says, "Warning! The computer room is on fire! Run for your life!" the line won't

A	N	S	I	■	E	S	C	■	A	S	I	A
N	E	E	D	■	R	A	H	■	V	E	N	T
T	O	L	L	■	R	A	I	N	I	E	S	T
I	N	F	E	R	■	■	M	A	I	■	■	■
■	■	■	D	I	S	A	P	P	O	I	N	T
D	I	P	■	B	A	T	■	A	N	N	O	Y
E	O	L	■	■	P	T	A	■	■	T	O	P
S	W	A	M	P	■	I	T	S	■	O	N	E
K	A	N	S	A	S	C	I	T	Y	■	■	■
■	■	■	W	I	N	■	■	Y	A	N	K	S
M	O	T	O	R	O	L	A	■	R	E	A	L
P	I	E	R	■	B	A	R	■	D	A	T	A
G	L	A	D	■	S	G	T	■	S	T	E	M

Answers to Puzzle on page 34

appear until the next ACCEPT, which may be too late. The current revision allows you to specify the number of seconds between screen refreshes, and the number of lines to buffer until a screen refresh, so I can finally take full advantage of TURBO mode.

One of the nicer additions is an emergency registration key code. Being an end-user, I'm no great fan of software locks, but I understand their economic necessity. I much prefer the method Data Bank Associates uses, because that company's lock file can be moved around and still function. Screen Demon's can't. This means that if you ever have a disk failure, loading from backup won't help, because the key code won't be valid. Fortunately, Screen Demon will still operate. Unfortunately, it pops up an "un-registered copy of Screen Demon" screen every few seconds, driving your users nuts.

Now there's an emergency code good for three days. And when you install it and forget about it until three days later, the code is good for another three days. If you forget again, you're on your own. This seems to be a good compromise.

The upgrade from 2 to 3 is not entirely painless. This is the first set of upgrade documents I've ever seen with specific instructions to beta users. Apparently, there were a lot of beta copies out there.

The major problem is updating SD_ICX_CONFIG.SR. This is the file that contains all of your Screen Demon parameters—which keys invoke Screen Demon, additional programs on the Screen Demon main menu, the logoff interval, and so on. If you haven't made *any* changes to these parameters, there's no problem. If you have, you must go through your old and new files line by line, making sure you replace all of the applicable customized keystrokes. Even the beta configuration file is different from the current release.

There needs to be some way of automating this process, some program that can read your current configuration file, recognize the custom modifications, and insert these into the current configuration file. If such a program were made available, the upgrade would be completely effortless. Maybe for 4.0, Threshold?

But that's nitpicking. With this many improvements, they have to leave *something* for next time. This truly is a major upgrade, with features that I didn't even know were possible in ICobol. If you're running ICobol, you need to be running Screen Demon. And now, even if you're not running ICobol, you need Screen Demon.

Odds and Ends Department

If you're reading this in Denver, look me up and give me some column suggestions. Surely, there must be some product that you'd like to see reviewed.

If you're not reading this in Denver, you should be. Δ

Tim Boyer is EDP Manager at Denman Tire Corporation. He may be reached at P.O. Box 951, Warren, OH 44482, 216/898-2711 or on the NADGUG bulletin board at 415/924-3652.

David Novy

Shedding light on optical disk storage

SYNOPSIS

Enormous capacity, and you can retrieve stuff quickly, too—optical disk technology offers staggering possibilities. But these systems are new, relatively unproven. If you consider one, treat it at first like a racehorse: put it through its paces, challenge it to perform. Then plan how to work this tool into your overall strategy for data storage, backup, and archiving.

At the Denver NADGUG conference this year you will find a strong emphasis on read/write optical disk storage technology. Two presentations on optical storage technology will be given on Thursday, November 21. I am sure that at least two vendors will demonstrate optical disk technology in the vendor area. Read/write optical disk technology promises users the ability to store tremendous amounts of data at reasonable cost, and with quick access times.

The task of bringing optical disk technology from concept to reality was very difficult. I have been using the Zetaco Netstor, and I am very pleased with its capabilities. Netstor went into full production only two months ago. It took 15 months to ensure that the machine would be reliable enough for production purposes. The machine's quality and the quality of support from Zetaco are excellent. However, using optical disk storage is different from anything that either I or Zetaco had ever done.

The first factors needing consideration were the potential amount of information that could be stored on a large-capacity optical disk system, and how to ensure that information's integrity. Theoretically, an optical disk system can store several years' worth of information. How do you ensure that this data will never be lost? This kind of storage capability and the need for integrity previously could be found only in large corporate data centers possessing large support staffs. Now this capability may be supplied by a support staff of just one or two, with an optical disk jukebox and a couple of Exabyte tape drivers. Until now, little thought had been directed to the technology and procedures required to give an optical disk storage system "corporate mainframe" reliability.

Another issue related to data integrity involves making sure that data input streams do not overload the system and

Testing a system

Some simple tests of the ability of an optical disk storage system to guarantee data integrity are as follows (Note: these tests are simple, but it can take several days to perform each test):

1) Load three platters full of static data. Run the Unix *find* command on the three platters and pipe the output to the Unix *xarg sum* commands. If you can do this three times, you can be assured that the data integrity of the data transfers from and to the optical disk storage media is excellent. The concept behind this test is that the *find* command transfers all data on the optical platters to the host computer, and the *sum* command runs a checksum on the data stream. If the checksum is the same for all three passes, then there was a 1 in 65,536 chance that a data error occurred while transferring more than 4 GB of data. The accuracy of 1 in 65,536 is because the *sum* command is accurate to 16 bits.

2) Check to see that the permissions and ownerships on all files used in the data transfer test described above do not change.

3) Try to overload the system with data input. See if it can deal with this overload without crashing.

4) Run three full backups of the three static platters to tape, and then do a checksum of the data on the tapes to make sure that all three backups are alike.

If the optical disk system you want to buy can pass these tests, you are dealing with a well-tested machine from a vendor who understands what is required to deliver a dependable product. Δ

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cause data stored on the optical disk to become corrupt. You must also ensure that data can be backed up properly.

It took Zetaco more than 18 months to bring the Netstor from practical concept to maturity. As far as I am concerned, the results were worth the wait. If you are in the market for an optical system, I know the Zetaco Netstor is one of the best because I have worked with Zetaco to ensure that its machine performed to specifications. If you are looking at another brand, make sure that the system has been thoroughly tested under high stress input and output conditions. (See "Testing a system," page 44.) My experience has taught me that you cannot assume that the vendor has tested the integrity of its system under high stress conditions. The market is too new. The stakes are too high.

Backup schemes

Once you are sure that you have a quality product, you need to know how to use it properly. One good way to use the system is for backing up critical data used by a workstation network. The two most widely used backup schemes are central file server and "over the network."

"Over the network" is used at sites where critical data is stored at each workstation and backed up to a central site. Central file server backup is used to back up a file server. In this scheme, critical data is stored centrally and distributed to the authorized users on demand. I prefer to use the central server backup scheme. My reasons for this preference involve security and backup performance.

A system in which critical data is stored at a central server site is more secure than a site where the users are allowed to store critical data at their workplaces. Also, if data is stored centrally, it is easier to maintain an audit trail of who used critical data and when.

As for performance, it is faster to back up a central file server, because you can transfer data faster from magnetic disk or optical disk to tape locally than you can over a network. If you can obtain data transfer rates in excess of 30,000 bytes per second from a workstation to a central backup system over a network, you are doing very well. This means that the backup of a single system can take a very long time. Attempting to back up several systems at once runs the risk of saturating the network or overrunning the backup server's data input capability.

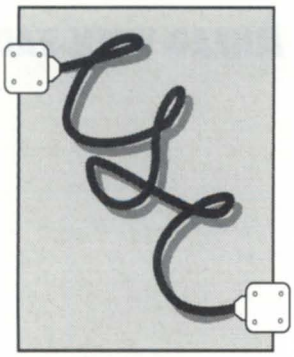
Another use of optical disk systems is for archive storage. I do not recommend using optical disks as the only method of archive storage. Instead, archive storage should be distributed over a mixture of magnetic, optical, and tape media. Tape media are not as reliable as optical media, but they are inexpensive. Whatever media you choose for archive purposes, I believe it prudent to have at least three copies of any archive information. My experience has shown me that if you do not keep three copies of any archive information, then you will lose some of it during the next five years.

The market

If you are considering optical storage technology, you should be aware that the performance and storage capacity of read/write optical disks will improve significantly over the next nine months. On the market by the end of the year will be 90 GB jukeboxes containing four drives. New drives will be available during the second quarter of 1992 that will increase the write capability of a read/write optical drive from about 250,000 bytes per second to about 750,000 bytes per second. These new drives should be direct replacements for drives currently available. The increase in write speed is the result of being able to do a write operation in one pass, instead of the three passes currently required for a write operation.

Finally, I want to mention how the Data General Aviion fits into the optical disk storage marketplace. Aviion, with its emphasis on commercial grade Unix and its RAID capability, is the best platform for coupling an optical disk jukebox to a computer network. The Aviion's RAID capability means that you can have magnetic media storage capability with an MTBF (mean time between failures) in excess of 1 million hours. The commercial capability of DG/UX allows it to be tailored to meet user demands. I think that once you have an opportunity to attend the DG/UX 5.4 presentations at the 1991 NADGUG conference, you will agree with me. Δ

David Novy is a technical computing specialist at 3M in St. Paul, Minnesota. He is past chairman of the AOS/VS special interest group and current chairman of NADGUG's SIG/UX.



Dial DASH

SYNOPSIS

A new 24-hour electronic service from DG's Customer Support Center offers e-mail, bulletin boards, and forums. Call in with questions, check the status of STRs, use the electronic search program, even place a service call.

by Tom Rizk
Special to Focus

In an effort to keep you informed of our ongoing as well as new services, I have worked with NADGUG to establish the CSC Forum in *Focus*. Through this column, we in the Customer Support Center will make you aware of how and why we do business remotely, as well as new service offerings we are delivering. I will have each member of my staff contribute articles on a monthly basis that explain the way calls are processed and how you can assist us in delivering the most efficient service in the business.

Additionally, we will answer questions of general interest submitted to our new electronic service offering, "DASH". DASH stands for Direct Access to Support Help, and is available 7 days a week 24 hours a day. This month's article describes DASH in detail and provides logon information. I look forward to communicating with you via the forum and hope that you will take advantage of DASH and the services of the Customer Support Center in Norcross, Georgia.

DASH was originally specified as a Unix user-only product that would provide a bulletin board service to our Unix users. The traditional Unix user community has used e-mail and bulletin board services.

The DASH bulletin board is available today to all of our customers. You can obtain access by dialing 800/DASH-CSC. You can review and submit articles in several bulletin boards and forums. Additionally, you may exchange e-mail with any other registered user. If you have a DG service contract, you may take advantage of an electronic search program, as well as place a service call electronically.

Additional services offered with a maintenance contract include ordering patches and replacement modules to fix problems you have reported, and checking the status of Software Trouble Reports (STRs). These services are also available to our Support Plus customers.

All you need to start using DASH are a terminal and a modem (2,400 bps). You will be prompted for information including username, password, address, and company name. Future plans include Compuserve and X.400 network access. Questions about DASH can be answered by calling 800/DG-HELPS. Δ

Tom Rizk, director of customer support, is a 17-year Data General veteran. He has been assigned various jobs during his tenure with DG, including regional service director, director FE administration, area services director, and for the last six years director of customer support in Norcross. Rizk is responsible for hardware and software services delivered from the CSC, as well as all on-site escalations. He may be reached at 800/DG-HELPS.

Kim Medlin

Putting RAD into practice

SYNOPSIS

When software application needs are so specific that no generalized package will do, it's time to get custom software. Cobol's too clumsy and costly? Move on to more efficient modern tools. Embrace 4GLs and RAD.

Now comes the good part. We're going to put RAD into practice. You will see firsthand how RAD tools can dramatically save time, effort, and money during the development process. In this article, I will identify an actual business problem that was solved using RAD tools. With the next few articles, we will follow the application through the complete development cycle: analysis, design, development, testing, and production. But first, let's make sure we're all on the same wavelength.

In previous articles, we identified the following "facts of life" regarding the Rapid Application Development (RAD) revolution:

- RAD is a reality because of the combination of fourth-generation languages (4GLs) and relational data base management systems (RDBMSs), coupled with recent advances in hardware speeds.
- In strict terms, 4GLs aren't languages at all. They are tools (written in 3GLs) designed to automate common functions of business/commercial software applications. For example, such functions include data-entry forms, menus, management reports, and business graphics.
- RAD can be employed effectively when the application's requirements "fit" the capabilities of the selected 4GL and RDBMS. It is imperative that you have a firm grasp of the 4GL's capabilities. It is important to understand that if a task isn't suited for a 4GL, it may well be faster to implement that task using a 3GL.
- Properly constructed 4GL applications are said to be "data driven." In many cases, 4GLs are able to reduce development time significantly because they assume the application data is normalized. This assumption allows 4GLs to implement easily such common functions as master-detail data relationships and interactive pick lists. (For a discussion of data normalization, see "Go Fourth and Multiply" in the November 1989 issue of *Focus*.)

The business situation to be solved

Enough with the preliminaries! Keep the above "golden rules" in mind as we discuss the following business application which was developed using RAD tools. This application will be used as an ongoing example in future articles to demonstrate various RAD techniques.

This story begins with a wealthy woman who lived in the southern Appalachian Mountains. Her name was Mrs. Big. She died a widow in the early 1980s after a long marriage to Mr. Big, a successful businessman (the names have been changed, of course). The story becomes interesting because there were no heirs to inherit the family fortune. To put her vast sums of money to good use, Mrs. Big had created a foundation to grant interest-free college loans to local graduating high school seniors. To qualify for loans, students had to meet only a few requirements:

- They must show academic promise
- They must have a financial need
- They must promise to work in their

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WITH COBOL

```
IDENTIFICATION DIVISION.
PROGRAM-ID. CALLDOG.
ENVIRONMENT DIVISION.
SELECT ANIMALS
   ORGANIZATION IS INDEXED
   ACCESS IS DYNAMIC
   KEY IS ANIMAL-TYPE
   ASSIGN TO BEASTS.
DATA DIVISION.
FD ANIMALS
   RECORD CONTAINS 16
   CHARACTERS
   DATA RECORD IS ANIMAL-REC.
01 ANIMAL-REC.
   03 ANIMAL-TYPE PIC X[8].
   03 ANIMAL-NAME PIC X[8].
PROCEDURE DIVISION
START.
   OPEN INPUT ANIMALS.
   MOVE 'DOG' TO ANIMAL-TYPE.
   READ ANIMALS INVALID KEY
   DISPLAY 'BAD ANIMAL'
      LINE 10 POS 1.
CALL-SPOT.
   DISPLAY 'HERE' LINE 10 POS 1.
   DISPLAY ANIMAL-NAME HIGH
      LINE 10 POS 16.
   CLOSE ANIMALS.
   STOP RUN.
```

WITH SYSTEM Z

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ZIP, a utility of System Z, allows you to develop queries, menus and reports with no programming knowledge. However, for the more experienced user, the source code generated by ZIP can be enhanced or modified for more complex applications.

Eliminate Machine Dependence

Programs developed with System Z are not dependent upon the hardware or operating system they were developed on. The executable code can be "copied" to other systems with no change or recompiling. For example, you might have a program developed under UNIX and then decide to install it on a DEC VAX under VMS or a PC under DOS. Graphics, function keys and other conventions previously accepted as "machine dependent " are portable.

Performance + Productivity + Portability

System Z cuts development time by 90 % without paying the price of slower response times and greater memory and disk requirements. Incredible as it seems, Z programs actually run **faster** than those developed with BASIC or COBOL and require only a fraction of the resources that third generation languages need.

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home counties for the first two years following college graduation.

Loan repayment would be forgiven if the student obtained a degree in medicine, nursing, or ministry.

Mrs. Big had selected an attorney to act as the foundation's trustee and administrator. All went well for the first few years of the program. Problems appeared when the volume of students became so large that it was difficult for the attorney and the foundation administrator to provide their services using manual procedures. All records were kept on ledger cards and in file folders. You can probably imagine how well a computerized application could solve the difficulties.

Application requirements

The basic requirements of the software application were fairly straightforward. Before graduating, high school seniors apply for the no-interest loans. Based on a set of selection criteria, students are admitted to the loan program. In return, the students sign a promissory note for the amount of the loan. Questionnaires are sent to existing participants to determine their financial requirements, if any, for the upcoming school year. If they require additional funding, their promissory note is updated.

During the school year, the foundation makes payments to colleges on the students' behalf. From the foundation's point of view, these payments are made at irregular intervals because each college maintains its own schedule for processing tuition. This results in significant administrative work for the foundation.

Upon graduating from college, the student agrees to a repayment plan and commences monthly payments. The foundation provides a receipt each time it receives a payment. At all times, the participant's current balance and amount in arrears, if applicable, are maintained. Participants who fall behind in payments receive a series of increasingly stern delinquency letters. If these letters do not convince them to become current on payments, the account is turned over to a collection agency.

RAD to the rescue!

The first approach the foundation took was to seek a packaged software solution. However, the requirements of the foundation as set forth by Mrs. Big were so specific that no generalized package could meet the need. It became apparent that custom software was the only available alternative. But what language should be used? Certainly a 3GL like Cobol could implement the system's functions. It wasn't a feasible alternative, however, because a Cobol application would be much too costly for the foundation's budget.

The only viable alternative was RAD. In fact, had it not been for RAD this business problem wouldn't have been solved with a computer at all. The nonautomated solution would have probably involved hiring more administrative personnel, and incurring a larger and continuing payroll expense. Compare that to the cost of the computer system, which would be recaptured in less than a year.

Happily for the foundation, RAD was not only technically sufficient, it was economically justifiable. In many cases, RAD is extremely easy to justify from a business viewpoint.

The technical solution

With the application requirements defined, we will focus our attention on the analysis phase. Once again, we have the opportunity to utilize a modern tool to make the process more efficient. My next column will describe how to use a CASE tool to quickly identify the processes and data required for this application. Specifically, we will generate data-flow diagrams and an entity relationship diagram. These two types of diagrams form the basic building blocks for all future application development. They also provide an effective means of communication between user and analyst. I will show you step-by-step the methods used to create these diagrams, and we will discuss the relative importance and significance of each.

Until next time, stay tuned for further adventures in rapid application development! Δ

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Continued from page 33

to compile using standard DG C.

:WALKTHROUGH

Let's take a little stroll through Figures 1 and 2 so you can see what's going on. *[Editor's note: Logistics would not allow us to place the complete figures adjacent to this description. You may wish to make copies of pages 30 and 32 to refer to when reading the following paragraphs.]*

The SCF data base itself is protected against multiple updaters by a "spin lock" using the high order bit of data item scf_lock. A spin lock derives its name from the fact that running into a lock that is already set is resolved by "spinning" in a loop that just keeps trying to get the lock until it either succeeds, or until some outrageous number of attempts have occurred (i.e., a deadlock). Because of the potentially large amount of CPU that can be wasted waiting for a lock to clear, spin locks are only advisable iff a) the lock is only held for a relatively short time (e.g., less than a millisecond), and b) all lockers agree to never do anything that might cause them to pend (e.g., I/O) while holding the lock.

The two functions that accomplish this are lock_scf() and unlock_scf(). Within the spin loop, a forced reschedule system call is done in order to (hopefully) pass control to the process that currently holds the lock in hopes that it will finish whatever it's doing and release the lock. To make the deadlock detector less sensitive to the speed of the particular system, a 500 millisecond delay is executed every 100 spins.

Once the SCF is locked, then the actual record locking is accomplished using the MV's non-atomic, but quite snappy, queue instructions. Luckily, the C libraries provide complete access to them. Other languages can manage the queues by coding up equivalent functions (since atomicity is not required), or by adding a handful of simple assembly language subroutines.

Locked records are kept track of using a "descriptor" that is either queued to a list of locked records (lockq), or to a queue of waiting requests (waitq) if the record is already locked by someone else (another task within the process, or another process). A third queue (freeq) is used to store descriptors not currently in use. The maximum number of simultaneous lock requests is determined by the total number of descriptors available (MAXLOCKS). Descriptors are always queued in FIFO order. This means that freeq provides a history of recent locking activity, lockq is in the same order as the locks were granted, and waitq is in order by who requested first.

The lock_record() function locks the SCF, allocates a descriptor for the new request from freeq, and then searches the queue of locked records to see if the record number is already locked. If not, the descriptor is queued to lockq, the SCF is unlocked, and the function returns normally. If the record is already locked then the descriptor is queued to waitq, the SCF is unlocked, and the ?WTSIG system call is used to pend until the record is unlocked.

The unlock_record() function locks the

SCF, locates the corresponding descriptor in lockq, deques it from lockq and enques it to freeq, and then checks waitq to see if anyone else is waiting for the same record number. If not, it unlocks the SCF and exits normally. If anyone's waiting then it deques the first matching descriptor from waitq (waiters enque in FIFO order) and enques it to lockq before unlocking the SCF and waking up the waiter via ?SIGNL. Finally, it exits normally.

If a customer should terminate while holding either the SCF lock or while holding a record lock, the global server cleans up the mess. From the obituary IPC message it gets the deceased's PID and checks it against the low order word of scf_lock for a match. If it matches, the server unconditionally clears scf_lock, releasing the lock to avoid a deadlock. Then the server attempts to lock the SCF normally (via lock_scf()). Once in control, the server searches lockq and waitq for any descriptors with matching PIDs. Descriptors in waitq are simply moved to freeq. Descriptors in lockq are moved to freeq and then the same waiter wakeup logic as described above is used to pass control of the record to the first waiter.

:FOOTNOTE:TASK_LOCKS

Task locks are useless for protecting data and code paths against intrusion by other processes. The only reason I'm taking the time to mention them here is so you don't mistake them for tools to be used in multi-process situations.

Probably the oldest way to protect a code path involves using the ?XMT/?REC system calls (AGENT calls, actually). A pair of these calls is slightly less than one-third the cost of a corresponding ?FLOCK/?FUNLOCK pair. Interesting, but irrelevant.

Protecting a task from being re-directed (e.g., via ?IDGOTO) by other tasks in the same ring is accomplished using ?TLOCK/?TUNLOCK. These system calls are primarily used by DG's language runtime libraries.

Disabling rescheduling for the ring (via ?DRSCH/?ERSCH) is a brute force technique for protecting against intrusion by other tasks.

Again, none of these facilities is appropriate for use when multiple processes are involved.

:WHEW!

This completes the survey of simple and complex server design issues. If you have any special requirements for your particular server, give me a call and I'll try to tell you in which direction to go. Δ

BJ is the president of B.J. Inc., a San Francisco based consultancy specializing in system auditing, system management, and performance analysis. :SYSMGR is a division of B.J. Inc. BJ can be reached at 109 Minna St., Suite 215, San Francisco, CA 94105, 415/550-1444 (voice) or 415/550-1072 (fax). The :SYSMGR bulletin board number is 415/391-6531 (300/1200/2400 with optional MNP class 5, CHAR/605X/CHARLEN=8/PARITY=NONE/AUTOBAUD) or 415/550-1454 (voice).

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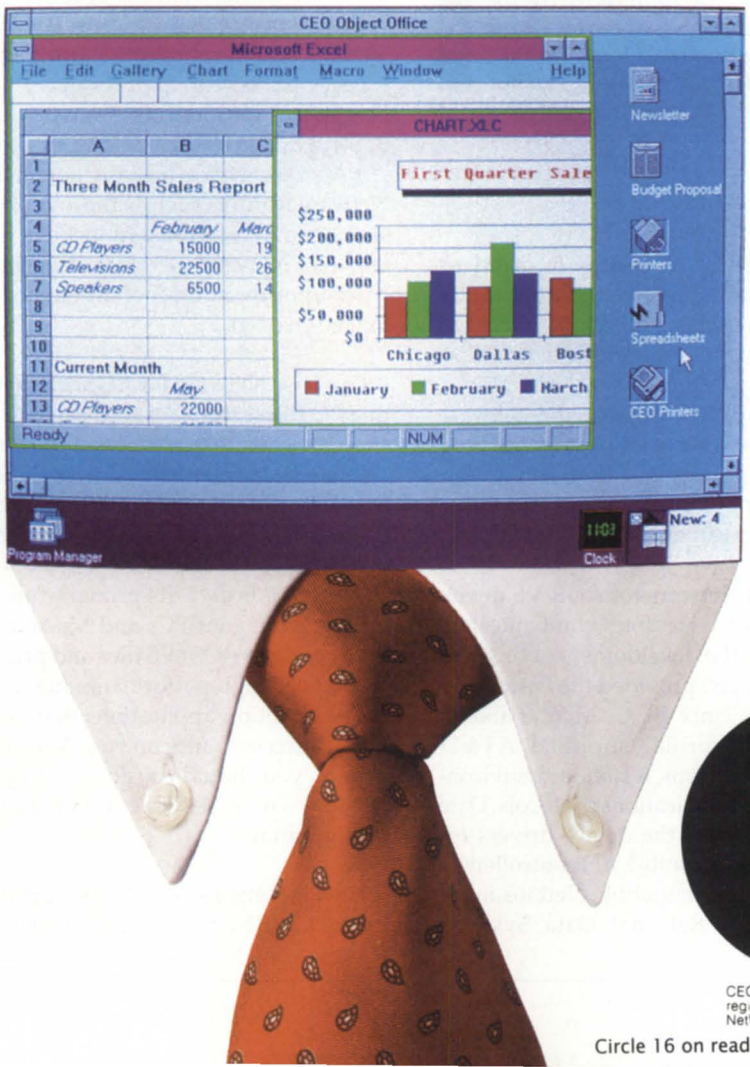

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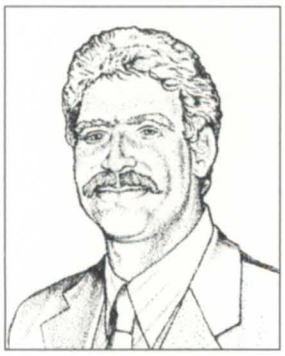

Doug Kaye

Netware for AOS/VS: Questions and answers

SYNOPSIS

Our columnist turns his attention to PC-integration products for MV family computers, specifically the new Netware for AOS/VS, and tackles it by consulting his diary of most-asked questions. Whos, Whats, Whens, Wheres, and Hows—dig in and satisfy your curiosity.

Most of my mail and phone calls for the past few months have been about Netware for AOS/VS. Yes, it's finally done, and by the time you read this it should have been shipping for a month of so. I've kept a diary of all the questions we've been asked, and this and next month's columns are a dump from the diary. This month we'll start with an overview of the product and its relationship to other PC-integration products for MV family computers.

1. **What is Netware for AOS/VS?** It is an implementation of Novell's Portable Netware. It allows an MV family computer to appear just like any other Netware server to MS/DOS, OS/2, and Macintosh clients on a local area network (LAN).

2. **Are other vendors offering Portable Netware?** Yes. Perhaps the greatest value of Netware is standardization. With a market share of more than 65 percent, Novell's Netware is clearly the standard to follow for the interconnection of PCs and larger systems. Portable Netware has been licensed by Hewlett-Packard, IBM, MIPS, Unisys, Altos/Acer, NCR, Prime, Wang, and others. Because the Netware protocols have been adopted by so many vendors, applications that run under Netware for AOS/VS can easily be ported to other hardware and software platforms.

3. **How was Netware for AOS/VS developed?** There were four companies involved with the development of this new product. Novell provided the basic code, written for Unix in C. Mentat (Santa Monica, California) supplied AT&T-compatible Streams, a standard environment for communications protocols. Data General supplied the device drivers for the various MV family LAN controllers as well as a PC*I-compatible Netbios interface module. Rational Data Systems "ported" the Novell source code, provided other AOS/VS-specific components, and put everything (including the documentation) together to create the final product.

4. **Who owns and supports the product?** The resulting product (Netware for AOS/VS) is jointly owned by RDS and Data General. Both companies are shipping the identical product and providing front-line support to their customers. As the primary implementor, Rational Data Systems provides second-tier support to Data General as well as direct to RDS licensees.

5. **How is Netware for AOS/VS delivered?** Netware for AOS/VS comes in two halves.

- *Netware Transports* include the AOS/VS LAN device drivers and standard Netware protocols including IPX, SPX, Netbios, and the application program interfaces (APIs) for these protocols. The license fees for Netware Transports will depend upon your MV family CPU type.
- *Netware Services* include the standard Netware features such as file and printer sharing, multi-user record locking, bindery, etc. Netware Services licensing is based upon the number of simultaneously logged-in users.

6. **Can I use Netware for AOS/VS instead of a PC file server?** Yes, you can, but you should be aware that Netware for AOS/VS may be substantially slower than native Netware 3.xx, which does not have the overhead of a general-purpose operating system. Netware for AOS/VS is a *connectivity product*. Its primary function is to provide your PCs and Macintoshes with access to AOS/VS files and printers. If you need high-performance file service for workstation applications that do not require access to files on your MV family system, you should consider adding one or more native Netware servers to your configuration.

7. **How is Netware for AOS/VS different from PC/VS?** PC/VS is the original PC-

to-MV, LAN-based integration product first shipped by RDS in 1985. PC/VS 5.00 and Netware Services both make use of (and require) Netware Transports. Earlier releases of PC/VS included a separate transport package.

8. **Can I run Netware and PC/VS at the same time?** Yes, PC/VS 5.00 and Netware for AOS/VS are designed to be used together. They both use the same Netware Transports and share a single LAN controller on your MV. On your PC workstations they likewise share a single LAN adapter and IPX protocol stack. MS-DOS users may use Netware, PC/VS, or both simultaneously.

9. **Can I use Netware and PC/VS with Xodiac?** Netware and PC/VS 5.00 are designed to share a single LAN controller (ILC, LLC, or ILAN). This must be a separate controller from that used by Xodiac. You may, however, use a single LAN. The data from one controller will not cause problems with the other controller, even on the same LAN. We are working with Data General to offer a future release of the Netware Transports that will allow all three products to share a single controller under AOS/VS II and XTS-II.

10. **How does CEO Object Office fit into the picture?** Object Office requires either the older PC*I transports, the PC*I Netbeui (IBM-specific token ring), or the Netware Transports. Neither Netware Services nor PC/VS are required for Object Office. Choosing the Netware Transports allows you to add Netware Services or PC/VS at a later time.

11. **What is the difference between Netware, PC*I, and Netbeui?** PC*I is based on the older Microsoft Networks program and uses Data General's proprietary implementation of the ISO protocol stack. It is a closed system. Netbeui is an implementation of IBM's proprietary protocol stack specific to token ring LANs. Its primary advantage is to those who want to use CEO Object Office in an otherwise pure IBM environment. The Netware Transports are fully compatible with all other versions of Netware.

12. **What are the speed differences between Netware, PC*I, and PC/VS?** There are benchmarks that can make any product look terrific and another very slow, but Figure 1 shows the overall picture.

Figure 1: Current relative performance

Product	O/S	Relative performance
PC/VS	AOS/VS Classic	Fastest
PC/VS	AOS/VS II	:
PC*I-II	AOS/VS II	:
Netware	AOS/VS Classic	:
Netware	AOS/VS II	:
PC*I	AOS/VS Classic	Slowest

PC/VS and Netware are slower under AOS/VS II because the operating system is, itself, somewhat slower than AOS/VS Classic. Because the PC*I-II transports were moved into the operating system under AOS/VS II (XTS-II), Data General achieved substantial performance improvements. If and when the Netware Transports are moved into the AOS/VS II kernel, the chart will most likely appear as in Figure 2.

Figure 2: Anticipated future relative performance

Product	O/S	Relative performance
PC/VS	AOS/VS II	Fastest
Netware	AOS/VS II	:
PC/VS	AOS/VS Classic	:
PC*I-II	AOS/VS II	:
Netware	AOS/VS Classic	:
PC*I	AOS/VS Classic	Slowest

13. **Can Netware and PC*I coexist on the same MV?** No, they cannot. In order to provide 100 percent compatibility between the Netware and PC*I interfaces to Netbios, portions of those interfaces have identical names and cannot therefore be run at the same time.

Next month I'll answer more detailed questions about the functionality and configuration of Netware for AOS/VS. Δ

Doug Kaye is president of Rational Data Systems, Inc., and may be reached at 1050 Northgate Dr., San Rafael, CA 94903; 800/743-3054.

1991 Focus Subject INDEX

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benefit from SNMP (simple network management protocol). Dr. Katherine Jones. Oct 91, pg. 20.

Why SNMP? Distributed, large, or multi-vendor TCP/IP networks can all benefit from centralized network management. Dr. Katherine Jones. Nov 91, pg. 28.

Nova

The last Nova. Data General's once-numerous Nova is fading away like an endangered species. Is there any such thing as a classic in the Computer Kingdom, something that will stand the test of time? Doug Johnson. Nov 91, pg. 30.

Recalled to life. Doug Johnson. Nov 91, pg. 30.

Office automation

Learning to share. Wordperfect's Office calendar saves you time and money by providing a scheduling technique free from paper and phone calls. Read on for a trick to get your users to try it. Kent Finkle. Jan 91, pg. 18.

Learning to PIM. If you use Wordperfect now, you already know how to do most of what those complicated and expensive "time-saving" programs take forever to teach you. See how easy it is to become an effective personal information manager. Kent Finkle. Mar 91, pg. 31.

Super macros. It's a bird, it's a plane . . . no, it's Wordperfect 5.0! Tackle those unwieldy big documents with this sleeker and more powerful than ever word processing tool. Kent Finkle. Sep 91, pg. 38.

MAID for CEO. People with huge, cluttered systems take heart, new utilities from Eagle Software will help you identify and recover unused blocks of data. James Ruby. Oct 91, pg. 30.

Product Review

Inside ICobol again. A revisit to ICobol reveals that a lot is happening. New products include C-Thru from Threshold and MV Windows from Digital Dynamics. Version 1.60 is in Beta testing. Version 1.70 will bring many language enhancements and the long-awaited STRING and UNSTRING verbs. Tim Boyer. Feb 91, pg. 37.

Emulation and access with Popterm. Popterm is a useful tool for bringing PCs into a DG environment. Here are some insights into its installation and features. Michael E. Marotta. Apr 91, pg. 33.

Taking wing with Pereline 3.0. Our reviewer expresses admiration for the soaring capabilities (and down-to-earth price) offered by the newest version of a DG terminal emulator that gets its name from a falcon. Kevin Danzig. May 91, pg. 34.

In the beginning . . . With its rich set of function key operations, impressive speed, and user-friendly attitude, Genisys is an excellent ICobol report writer—and much more. Tim Boyer. May 91, pg. 40.

Comparison shopping. Technological advances made in the years between the MV/20000 and the MV/30000 are impressive. This article answers the question "What do these advances mean for the user?" Gordon Haff. Jun 91, pg. 22.

Painless Windows. Why have the pain of two or three terminals on your desk when you can use Multiview Windows? The latest product from Digital Dynamics lets you run up to eight windows on a single MV screen. Tim Boyer. Sep 91, pg. 48.

MAID for CEO. People with huge, cluttered systems take heart, new utilities from Eagle Software will help you identify and recover unused blocks of data. James Ruby. Oct 91, pg. 30.

Hooked again. If you work with the CLI, there's always much more to learn than what you thought you knew already. What you need is an authoritative reference source that goes beyond the manuals. Tim Boyer. Nov 91, pg. 58.

Re-possessed. The latest Screen Demon, abundantly populated with a teeming horde of improvements and new features, is a truly devilish upgrade. Tim Boyer. Dec 91, pg. 40.

Rapid application development

Totally RAD. Feeling philosophical today? Try these on: RAD is rapid, but compared to what? And when is a language not really a language? Get hip with the

1991 Products and Services INDEX

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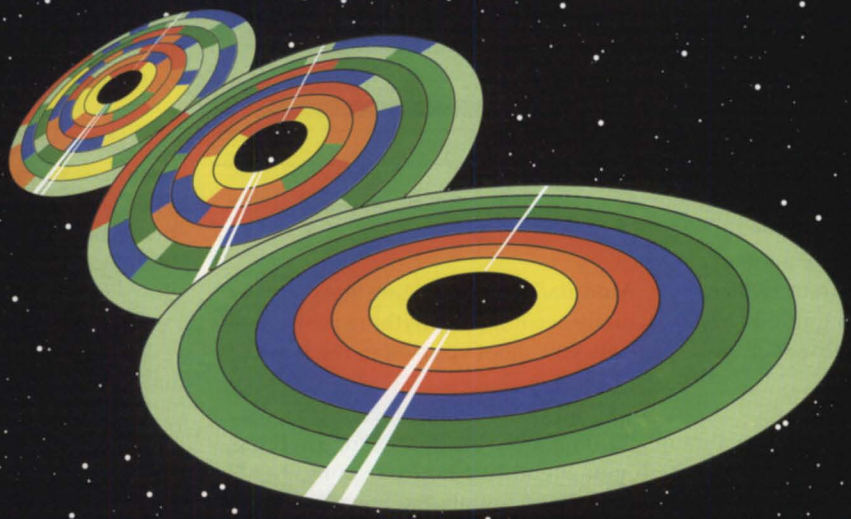

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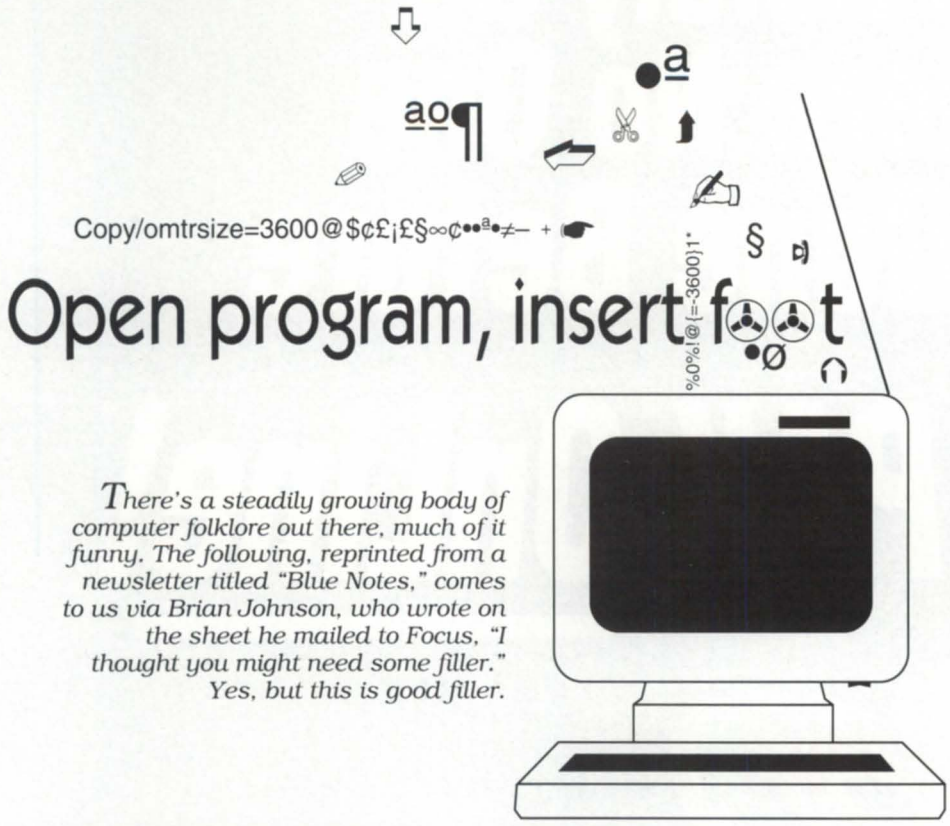


There's a steadily growing body of computer folklore out there, much of it funny. The following, reprinted from a newsletter titled "Blue Notes," comes to us via Brian Johnson, who wrote on the sheet he mailed to Focus, "I thought you might need some filler." Yes, but this is good filler.

The proliferation of modern programming languages, which seem to have stolen countless features from one another, sometimes makes it difficult to recall which language you're using. This guide is offered as a public service to help programmers in such dilemmas.

C: You shoot yourself in the foot.

Assembler: You crash the system and overwrite the root disk. The system administrator arrives and shoots you in the foot. After a moment of contemplation, he shoots *himself* in the foot, too, then hops around the room, rapidly shooting at everyone in sight.

C++: You accidentally create a dozen instances of yourself and shoot them all in the foot. Providing emergency medical care is impossible, since you can't tell which are bitwise copies and which are just pointing at others and saying, "That's me, over there."

Ada (and **Ironman** and **Tinman** and **Woodman** and **Strawman**): If you are dumb enough actually to use this language, the United States Department of Defense will kidnap you, stand you up in front of a firing squad, and tell them: "Shoot at his feet."

Modula/2: After realizing that you can't actually accomplish anything in this language, you shoot yourself in the head.

sh (and **csh** and **ksh** and **shell**): You can't remember the syntax for anything, so you spend five hours reading .MAN pages before giving up. You then shoot the computer in the foot and switch to C.

Smalltalk: You spend so much time playing with the graphics and windowing system that your boss shoots you in the foot, takes away your workstation, and makes you develop in Cobol on a character terminal.

APL: You hear a gunshot; you see a hole in your foot!—but you don't remember enough linear algebra to understand what the hell just happened to you.

Fortran: You shoot yourself in each toe, alternatively, until you run out of toes, then you read in the next foot and repeat. If you run out of bullets, you continue anyway because you have no exception-processing ability.

Algol: You shoot yourself in the foot with a musket. The musket is aesthetically fascinating, and the wound baffles the adolescent medic in the emergency room. The medic stabs himself in the foot with the bayonet and gives up.

Cobol: USING "A" COLT-45 OF HANDGUN, AIM, GUN-AT-LEG-FOOT. MOVE FINGER (INDEX) OF HAND OF ARM OF BODY TO TRIGGER OF HANDGUN, PERFORM SQUEEZE-TRIGGER THRU RETURN-HANDGUN-TO-HOLSTER VARYING BULLETS FROM MAGAZINE BY NUMBER-SHOT UNTIL BULLETS-ARE-GONE. NOTE CHECK TO SEE WHETHER SHOELACE NEEDS TO BE RETIED.

Basic: Shoot yourself in the foot with water-pistol. On big systems, continue until entire lower body is waterlogged.

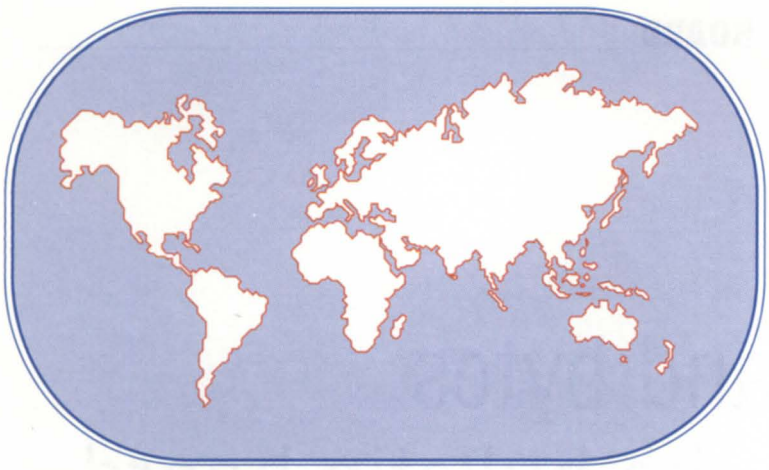
PL/I: You consume all available system resources, including all the offline bullets. The Data-Processing and Payroll Departments both double in size, each triples its budget, gets four new mainframes, and drops the original one on your foot.

Snobol: You grab your foot with your hand, then rewrite your hand to be a bullet. The act of shooting the original foot then changes your hand/bullet into yet another foot (a left foot).

lisp: You shoot yourself in the appendage which holds the gun with which you shoot yourself in the appendage which holds the gun with which you shoot yourself in the appendage which holds the gun with which you shoot yourself in the appendage which holds . . .

schema: You shoot yourself in the appendage which holds the gun with which you shoot yourself in the appendage which holds the gun with which you shoot yourself in the appendage which holds the gun with which you shoot yourself in the appendage which holds . . . but none of the other appendages is aware of this happening.

English: You put your foot in your mouth, then bite it off. Δ



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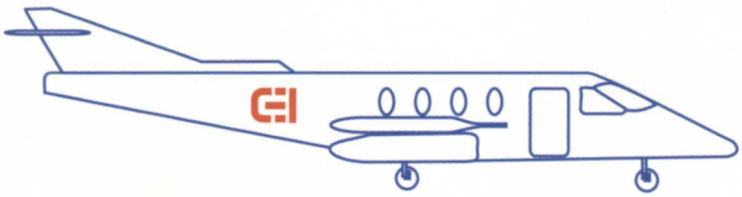

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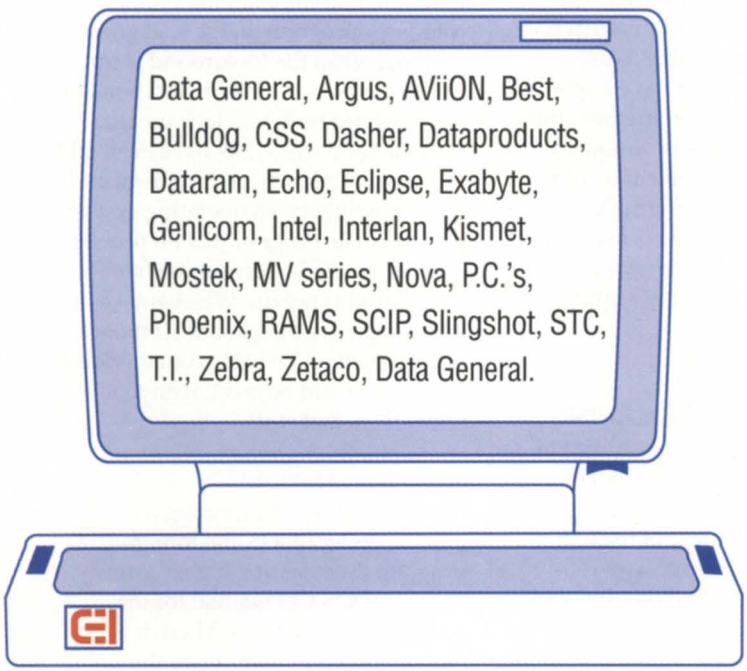

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Bits and bytes from the bulletin board

D200/400 terminal emulation . . . and snow

From: Jim Bageant

Does anyone know if any of the PC terminal emulators meet these requirements: 1) must be able to be memory resident (pop-up mode) under 100 K of PC memory; 2) must have Xmodem file transfer; and 3) must be able to use script files to log on, etc. I have Popterm, which fits the memory requirement but does not have script files or Xmodem (also has bad "snow" problem on old XT/CGA). I also have Softerm PC, which meets all requirements except the memory restrictions. Anybody know if Pereline or Rhintek meet my requirements?

From: Brian Johnson

Pereline does not operate as a TSR, but once started you can "push" out to DOS and Pereline will swap most of itself to expanded/extended memory, leaving only a 22 KB piece of itself in main memory. File transfers can continue while it's pushed out, but they aren't that reliable unless you've got a 50 MHz 386 and the famous 16550 UART chip installed. All of your other requirements (scripts, Xmodem) are met.

From: Doug Kaye

Popterm has a "big brother," PC/Remote. It includes very nice file transfer (actually, file redirection—even more convenient). The CGA snow can be fixed with the BIOS option to Popterm. A simple command-line option, I believe (no manuals handy at present).

Does anyone remember RDOS?

From: Brian Simi

We are currently having problems running a program on the background terminal when the foreground is up. Currently, we are using RDOS version 7.40. The program will lock up after running for a while. We have been told that it is not a hardware problem, and could possibly be an operating system problem. The program has no problem running on the background when the foreground is not up. When any key is hit on an active foreground, it unlocks the program in the background (weird). Any info would be great, if anybody remembers that stuff.

From: Terry Hubbard

By default when executing a foreground under RDOS, the foreground program executes at a higher priority. See the RDOS CLI manual for the command for switches. There is a switch, EXFG/E, that causes the foreground to run at a priority equal to the background. Δ

Do you have an answer, comment, or question? Call the NADGUG/RDS electronic bulletin board, available to all NADGUG members. The phone number is 415/499-7628. There are no fees for use other than the telephone charges.

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The latest products for DG systems

DG adds low-end Aviion servers

Westboro—Expanding the low end of its Aviion server family, Data General Corporation introduced the AV 4300 series, including the AV 4300 uniprocessor and AV 4320 dual-processor systems.

These 25 MHz RISC-based servers support from 16 to 128 MB of ECC (error checking and correction) memory, upgradable in 8 MB or 32 MB increments, and offer disk capacities ranging from 332 MB to 8.4 GB. A 525 MB backup cartridge tape unit is standard with each system.

The uniprocessor AV 4300 delivers 29 MIPS performance with a maximum user load of 159 on the industry standard AIM III benchmark test. The dual-processor AV 4320 delivers 58 MIPS with an AIM III user load of 261. Addition of a user-installable daughter board enables any AV 4300 to be upgraded to an AV 4320.

The new Aviion systems, running on DG/UX, fall between the AV 4100 and AV 4600 in price and performance. Prices for an AV 4300 system (including one 25 MHz CPU, 16 MB memory, 332 MB magnetic disk, and a 525 MB cartridge tape) start at $13,995.

Data General Corporation, 3400 Computer Drive, Westboro, MA 01580; 508/898-4288.

Circle 72 on reader service card.

DG's 1.4 GB disk drive, VME terminal controller

Westboro—Data General announced a full-height, 5.25-inch, 1.4 GB SCSI disk drive based on the industry standard 1650 MB (unformatted) head disk assembly. The 1.4 GB drive rotates at 3600 rpm, provides an average seek time of 15 ms, and has an average latency of 8.33 ms. The new drive is priced at $11,900.

Also announced by DG is a VME terminal controller (VTC) for the Aviion. The new VTC allows a variety of devices, including PCs, workstations, and X-terminals to connect to Aviion systems via the TCP/IP Telnet protocol and appear as directly connected asynchronous terminals. Designed especially to support large numbers of Aviion Termserver users, the VTC initially will be available for AV 5200 and higher systems. It is priced at $5,000.

Data General Corporation, 3400 Computer Drive, Westboro, MA 01580; 508/898-4288.

Circle 73 on reader service card.

Laser printer speed boosted

Westboro—Data General Corporation updated its low-end family of desktop laser printers, from 6 pages per minute to 9 pages per minute. The base model, #6640T, is priced at $1,499 and is equipped with 512 KB of memory, 14 internal fonts, and 24 symbol sets. The #6646T laser printer, priced at $2,054, includes a built-in, 35-font Adobe Postscript controller and 1.5 MB of memory. The third laser printer, model #6779T, priced at $1,999, has a built-in, 17-font Adobe Postscript controller and 1.5 MB of memory. Featuring a 10,000-page-per-month duty cycle, the new printers are intended for individuals and small workgroup applications.

The new printers provide 300 x 300 dpi text and graphics output in landscape and portrait modes, on various sizes of paper, envelopes, labels, and heavy stock. All three models fully emulate the HP Laserjet Series II, so they can work with both Data General applications and all major third-party software. The printers are supported by MV family and Aviion systems, as well as the Dasher Intelligent Workstations and other IBM-compatible PCs.

Data General Corporation, 3400 Computer Drive, Westboro, MA 01580; 508/898-4246.

Circle 74 on reader service card.

New Dasher in slimline style

Westboro—The Dasher II-386SX/16z personal computer is Data General Corporation's newest small-footprint solution to an MV family, Aviion, or PC local area network (LAN).

Handling tasks ranging from CEO Object Office to word processing, to spreadsheets and data base management, the 386SX/16z has been certified by Novell to be used as a client running Netware 3.11. A slimline design offers ease of upgrading memory and co-processor without tools.

Data General Corporation, 3400 Computer Drive, Westboro, MA 01580; 508/898-4087.

Circle 75 on reader service card.

Zetaco disk-tape controller upgrade

Minneapolis, MN—Zetaco, Inc., announced the addition to its SCZ-5 disk-tape controller of three software programs

Continued on page 72

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***Who to call for answers about* NADGUG *and* FOCUS**

NADGUG address:
c/o Danieli & O'Keefe Associates, Inc.
Chiswick Park
490 Boston Post Rd.
Sudbury, MA 01776
FAX: 508/443-4715

FOCUS Magazine address:
c/o Turnkey Publishing, Inc.
Livingston Building, Suite 250
3420 Executive Center Dr.
Austin, TX 78731
FAX: 512/343-7633

NADGUG

Membership, RIGs, SIGs
NADGUG staff **800/253-3902**
(Outside the U.S.) **508/443-3330**

Electronic bulletin board
(300 or 1200 baud modem)
Rational Data Systems **415/499-7628**

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512/345-5316

Editorial comments, article suggestions.....Robin Perry
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that ease system administration by providing on-line status information and functionality for the peripherals attached to the controller. The SCZ-5 multifunction controller is used in Data General MV series minicomputers to support SCSI disk and tape drives.

All three programs are included free with the SCZ-5 controller, which is supplied in Zetaco's SKM disk and tape subsystems. The operator must have the "change type" privilege to execute the monitor programs.

SCSI monitor program: Monitors the status of any device (usually magnetic disk and cartridge tape) on the SCSI bus, and shows exactly what the device is doing at the moment. There are 16 states reported by this program, some of which include read, write, erase, and rewind. For tape drives, the monitor program displays the current file number, record number and active SCSI command for all units configured on the controller. For disk drives, it shows the last block number accessed and active SCSI command.

Rewind/unload program: Provides the convenience of automatically ejecting a cartridge from the tape drive, either 8 mm or 4 mm DAT, after it's been rewound.

Tape formatter: The SCZ-5 controller supports the newest 8 mm and 4 mm DAT cartridge tape drive that can be formatted to either low or high densities. This program allows the operator to select a specific format (DDS, data compression) before actually doing the format.

Zetaco, Inc., 11400 Rupp Drive, Burnsville, MN 55337; 800/423-3020 or 612/890-5135.

Circle 82 on reader service card.

C & C brings NFS server to AOS/VS

Northboro, MA—Claflin & Clayton, Inc., announced the addition of NFS (network file system) server capability and SMTP (simple mail transfer protocol) for the company's AOS/VS TCP/IP product family. Adding these capabilities means that full system interoperability is available to all Data General AOS/VS Classic and AOS/VS II customers.

SMTP will be included as an upgrade to TCP/IP. C&C customers already running TCP/IP under AOS/VS Classic or AOS/VS II may purchase the NFS server separately. New customers may buy the entire interoperability package. Prices range from $140 to $8,345 depending upon system configuration.

Claflin & Clayton, Inc., 203 Southwest Cutoff, Northboro, MA 01532; 508/393-7979.

Circle 70 on reader service card.

PC trade-in program

Westboro—Data General's PC Business Unit announced what it bills as the "Rolls Royce" of all trade-in programs, available to the entire DG customer base, end-users, value-added resellers (VARs), and distributors. Until the end of the first quarter of fiscal year 1992 you may trade in any

existing 286- or 386-based product and receive as much as $600 toward the most recent and fastest components and peripherals. Also available are the latest software enhancements of MS-DOS 5.0, Microsoft Windows 3.0, Interactive Unix, Novell, and SCO Unix.

The trade-in program's features include a color monitor with each upgrade and a one-year warranty on all models; 2 MB system memory on SX/20, and 4 MB system memory on 25K; 1.44 MB, high-density floppy drive with each unit; and Class I discounts.

Data General Corporation, 4400 Computer Drive, Westboro, MA 01580; 508/366-8911.

Circle 76 on reader service card.

Datagen update

Summerville, SC—Newly released revision 2.5 of Datagen, from Productivity Systems Development Corporation, is intended for data processing shops that develop application software in Cobol.

Datagen supports multiple files, multiple screens, user-definable function keys, multiple paths to records, and user-activated field duplication. Datagen creates new files or imports file definitions of existing files.

Principle enhancements in the new release include:

- Handling alternate keys automatically
- Handling multiple files and multiple screens automatically
- Importing existing file definitions.

Datagen is priced at $8,500 per license, regardless of machine size. It includes a three-day training program at the user site or in Summerville. Productivity Systems Development Corporation releases a new revision annually.

Productivity Systems Development Corporation, P.O. Box 1931, Summerville, SC 29484-1931; 803/851-3742.

Circle 79 on reader service card.

PCBB enhanced

Lincolnshire, IL—Marc Alan Software's new release 1.1 of its Personal Computer Business Basic (PCBB) converts existing double and triple precision Data General

Business Basic applications and data to single or multi-user MS-DOS or PC-DOS environments. Binary compatibility allows data and index files to be moved and utilized without modification.

Enhancements include:

- Microsoft mouse support
- high-level optimization producing small run-time modules
- Pop-up windows, supporting up to 64 windows per screen for true full-color, PC-style, point-and-click applications
- KPREV index file support
- Support for terminal types 6 and 8.
- Comprehensive on-line Business Basic manual.

Marc Alan Software, Inc., 22096 North Pet Lane, Lincolnshire, Il 60069; 800/728-7387.

Circle 78 on reader service card.

Faster reports from UBB

London—UBB Embedded U/SQL, an add-on option to UBB, enables UBB developers to produce reports in minutes that might otherwise take days. Available now from Transoft Limited, Embedded U/SQL can generate SQL-type reports from existing ISAM files with just one line of code.

Embedded U/SQL obtains all file and data information from a data dictionary set up using Transoft's U/SQL standalone report generator. There's no need for the normal PRINT FILE USING statements, or for the expense and overhead of a relational data base—embedded U/SQL works directly on the user's existing ISAM files.

The new release is available under MS-DOS and a range of Unix platforms, including Data General's Aviion family. It may be ordered as an add-on to any supported copy of UBB. Prices depend on the number of UBB users, starting from $85 for a single-user copy on a PC.

Transoft Limited, Nash House, Datchet Road, Slough SL3 7LR, England; +44 753-692-332.

Circle 81 on reader service card.

Compress CEO documents with AIM

Germantown, MD—The Archive Interface Module (AIM) from Data Bank Associates provides for the use of Arc libraries in the Data General CEO environment. Documents may be flagged by the user for the on-line "archive" with an overnight update of the library. Individual users may extract compressed documents in a matter of seconds. AIM operates through the use of CEO Toolkit in order to ensure data base integrity.

AIM relieves CEO system managers from having to restore many documents from magnetic tape, thereby avoiding tape failure. AIM may also be used in CEO environments that do not currently enable "archiving." AIM maintains its own data base and sets the appropriate archive "flags" only when the CEO manager has enabled this attribute.

With three-tier pricing for low-end,

medium, and high-end systems, AIM ranges from $2,000 for the low-end MV/1000 to $6,000 for the MV/40000. DBA is offering a 30 percent introductory discount on AIM through the end of 1991 (a licensed copy of Arc is required). Arc licenses are available separately for $995 regardless of CPU size.

Data Bank Associates, Inc., 20010 Century Blvd., Suite 104, Germantown, MD 20874-1118; 301/540-5562.

Circle 71 on reader service card.

Unix backup and restore

Reston, VA—Systems Center's Unitech Software Division offers a new release of Backup.Unet software for automating backups and restores of multi-vendor Unix networks. Release 2.0 of Backup.Unet adds a graphical user interface (GUI), support for tape jukeboxes, and intelligent device selection for performing unattended backups.

The X-Windows-based GUI provides a common interface across heterogeneous Unix platforms. Using a mouse and pull-down menus. Backup.Unet also supports an ASCII menu interface and a command line interface.

Backup.Unet's jukebox support enables input-output commands to operate 8 mm tape jukeboxes. Backup.Unet's commands may be modified to work with a variety of other jukeboxes. Intelligent device selection allows an operator to configure and premount multiple tape devices so that Backup.Unet can automatically select the next available tape and complete backups in a "lights-out" unattended site.

Pricing—based on the computer class of the largest CPU in the LAN, and by the number of disk nodes—starts at $7,500 for a 10-node network.

Systems Center, Inc., 1800 Alexander Bell Drive, Reston, VA 22091; 703/264-8000.

Circle 80 on reader service card.

Cross-platform data protection

Salt Lake City, UT—MV Server for the Unix disk backup and recovery system (DBR) is now available from DMS Systems, Inc., offering flexibility to MV users downsizing to Unix platforms, including Data General's Aviion.

The DBR MV Server works on TCP/IP networks to allow Unix disks to be backed up to MV devices. The MV Server works in conjunction with DBR on Unix machines. This utility runs on AOS/VS II, and is offered as an alternative to available network file server or physical tape exchange methods.

The cost of the MV Server for DBR is $2,000 for all models. Current AOS/VS II DBR software subscription customers will automatically receive the MV Server as part of their next DBR upgrade.

DMS Systems, Inc., 1111 Brickyard Road, Salt Lake City, UT 84106; 801/484-3333. Δ

Circle 77 on reader service card.

Data Specific

Deck the Hall-Marks

Aviion servers and workstations will be offered by **Hall-Mark Electronics Corporation**, the nation's largest private distributor of electronic components and computer systems.

Hall-Mark will distribute Aviions through its nationwide network of 33 distribution centers, initially executing a cooperative advertising program targeted at Pick resellers.

Through its network, Hall-Mark provides VARs (value-added resellers) with local support, parts inventory, and financing. Hall-Mark's Dallas-based TECenter provides system and network integration, testing, product evaluation, a toll-free hotline, and other technical services for VARs.

"We are very excited about this new relationship because it positions us to better serve current Pick VARs as they begin to host their solutions on Unix. We feel that the price/performance offered by Data General's Aviion family makes it the ideal platform for Pick VARs making the change to Unix/RISC," said **Joe Semmer**, president and CEO of Hall-Mark.

Transoft to supply Genuine Parts

Transoft of England won a long-term contract to supply its 386 Unix Business Basic product to **Genuine Parts Company** of Atlanta. Genuine Parts will use UBB to convert some 5,000 TAMS (Total Automotive Management System) sites from proprietary DG Business Basic (BBASIC) systems to Unix. According to Transoft, the move will take several years to complete. Genuine Parts Company supplies 5,900 NAPA (National Auto Parts Association) stores throughout the U.S and western Canada—5,000 of these use the TAMS system.

Transoft was formed in 1986 and specializes in portability and productivity tools for BBASIC users. Genuine Parts Company is Data General's largest value-added reseller, by volume.

Eagle for Uncle Sam

Eagle Software, Inc., announced its GSA schedule contract award number GS00K92AGS5936, effective October 1, 1991 through September 30, 1992. Federal government agencies may purchase Eagle's products in the most practical and cost-effective method.

Eagle offers a variety of performance-enhancing utilities that run exclusively on DG's MV line of minicomputers. Federal government purchasing agents may call Dale Swindler, vice president of marketing and sales, 800/477-5432 or 913/823-7257.

Kansas City, here we come!

Can't get enough of **NADGUG**? Feel like you're missing out on something big? Mark your calendars now for October 12-15, 1992. That's the week of the NADGUG 92 conference, which takes place in Kansas City, MO.

System Z in Germany

Zortec, Inc., producer of System Z, a fourth-generation software development language that runs on Aviion computers, represented Tennessee at the international Systems 91 conference and exhibition in Munich, Germany, October 21-26. The huge technology show meets every two years and attracts more than 1,500 exhibitors. Zortec exhibited its product in the "Made in America" pavilion.

User notes

New officers for DGUI

The **Data General Users of Indiana** elected new officers for the 1992 year. They are **Theresa Lucas** of **Universal Distributors,** president; **Mark Langner**, **QIS Enterprises**, vice president; **Neil Buchanan**, **Wood-Mizer**, secretary; and **Jerry Waldon**, **Pictorial, Inc.**, treasurer.Δ

Wordperfect's freaky Friday

On October 25, a very strange thing happened to users of Wordperfect 5.0 on Data General MV computers. Starting in New Zealand, and happening around the world as the day began, Wordperfect 5.0 users with interim 5.0.1 and 5.0.2 updates were unable to print documents. When they attempted to print, the following message appeared: "Error: Document is too complex to print: 8; Held."

It was not a time bomb or computer virus designed by a disgruntled former employee and set to go off the Friday before Halloween. According to **Wordperfect Corp.**, the printing problem was caused by a bug in the Data General runtime library. On the date October 25, 1991, the Data General AOS/VS operating system returns an incorrect value for TIMES, the Unix system call that the Wordperfect formatter program (WPP50.PR) uses to return the CPU time used by a process.

Wordperfect developers were first notified of the problem around 5 p.m. on Thursday, October 24. **Rocky Snow**, manager of customer support for the Data General Division, was working when the call came from New Zealand. "I suspected that maybe he had a corrupted file in one of the temporary print directories that either the print server or the formatter uses," said Snow. He worked on the problem until around 10 p.m. that evening. The following morning, as domestic users were waking up to find they could not print documents, Developer **Chuck Swank** discovered the cause of the printing problem, and wrote a quick workaround that patched out the troublesome call. Swank's workaround was distributed to Data General, Wordperfect resellers, and regional managers who notified end users. Δ


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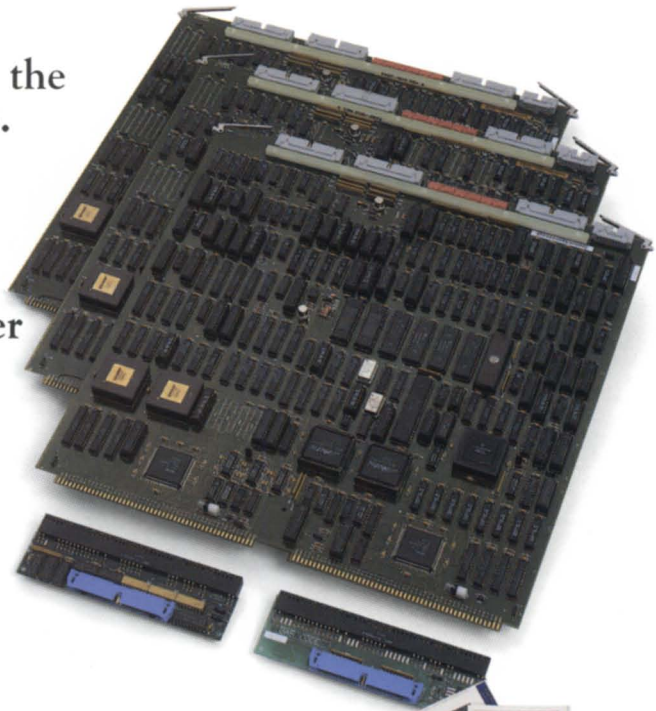

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