

January 1989

FOCUS

The Magazine of the North American Data General Users Group



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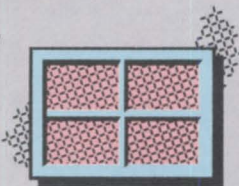
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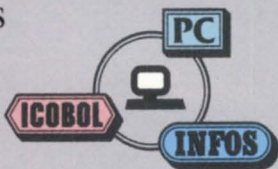
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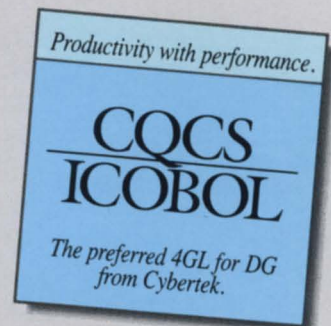
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Cover illustration by Bob Foster.

Focus, the Magazine of the North American Data General Users Group (ISSN 0883-8194) is the official monthly publication of the North American Data General Users Group (NADGUG) in cooperation with Turnkey Publishing. Editorial and business offices are located at Stillhouse Canyon Office Park, 4807 Spicewood Springs Road, Suite 3150, Austin, Texas 78759, phone 512/345-5316. NADGUG headquarters are located at NADGUG, c/o Data General Corporation, 3400 Computer Drive, MS C-228, Westborough, Massachusetts 01580.

Postmaster: Send address changes to Subscription Department, Turnkey Publishing, Stillhouse Canyon Office Park, 4807 Spicewood Springs Road, Suite 3150, Austin, Texas 78759.

Focus Magazine is distributed to members of the North American Data General Users Group. Membership fees are \$40 per person. A one-year subscription to Focus (12 issues) costs \$36. For all memberships outside North America, add \$50 to defray costs of mailing. For information on NADGUG membership, call 508/898-4067. Address all other correspondence to Focus Magazine, c/o Turnkey Publishing, Stillhouse Canyon Office Park, 4807 Spicewood Springs Road, Suite 3150, Austin, Texas 78759.

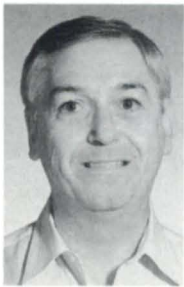
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Looking for solutions



By Donald W. Clark
NADGUG president

Compared with the greenhouse effect or international terrorism, the problem we're facing isn't very big at all. In fact, there probably isn't a soul outside the Data General community who could care less about the issues that have piled up around DG's introduction of AOS/VS II.

Still, the controversy we are facing now is the biggest problem we've had to deal with since I got involved with NADGUG. Maybe we've just been lucky, but DG and the users have been able to see pretty much eye-to-eye during the past five years or so. There have been small disagreements, of course, but nothing that we couldn't work out with a little give-and-take.

That's fortunate, because the relative peace and quiet has given us time to develop an attitude of trust and common purpose that will serve us well now that we have a harder set of problems to work through. NADGUG members have seen that DG is a reasonable company that is interested in working out solutions that are good for both parties. And we hope DG has seen that NADGUG is a responsible organization that reliably represents users' concerns—and likewise is interested in working out "win-win" solutions.

We do have a significant problem now, or rather a set of smaller issues that add up to something much bigger. Much of this month's *Focus* deals with various aspects of these issues, but let me summarize the situation briefly for you.

Many users were waiting eagerly for en-

hancements to AOS/VS that DG had said would come in revision 8. At the NADGUG conference, DG announced that there would not be a revision 8; instead, the enhancements would appear in a new product called AOS/VS II. The original AOS/VS would be rev-locked at 7.6—meaning that DG's future support for it would be limited to bug fixes and minor improvements. To get the expected enhancements, users would have to buy AOS/VS II, albeit at a hefty discount from the list price. And since AOS/VS II was a new product, sites that had paid for the Software Subscription Service on AOS/VS would not automatically get the new version.

Ironically, part of the problem stems from Data General listening to users and giving us what we asked for: a stable, reliable operating system that would be "frozen" at a particular level, but would continue to be supported. DG has done that with AOS/VS 7.6; rather than having to rev up to AOS/VS II, we now have the option of staying with AOS/VS indefinitely. But it seems that many users are having second thoughts about the desirability of that option.

If there were no monetary considerations, some users would opt to stay with AOS/VS because it is stable, and because it is a known quantity with respect to hardware requirements. However, some users who want to make the upgrade to AOS/VS II will not be able to do so because DG's decision to levy a separate charge for the new version makes it too expensive. Moreover, many of the people in this situation feel that they should be entitled to the upgrade because they have been paying for the Software Subscription Service.

The complexity of the issues makes this a very difficult problem. However, there does appear to be enough middle ground to give NADGUG and DG room to work toward an acceptable solution. The lines seem to be firmly drawn, but as NADGUG Treasurer Frank Perry puts it, "Reasonable people with good intentions can always reach some solution without hurting each other."

At this point, the best thing DG and the users can do is to keep talking. NADGUG's role should be to learn as much as possible about our members' concerns so we can represent them accurately to DG. I urge you to make your position known: talk to other users in your RIG or SIG, write to *Focus*, or contact one of the NADGUG officers. Tell us what are your concerns, and what you would consider an acceptable solution. With that information, we will be able to do our job for you. Δ

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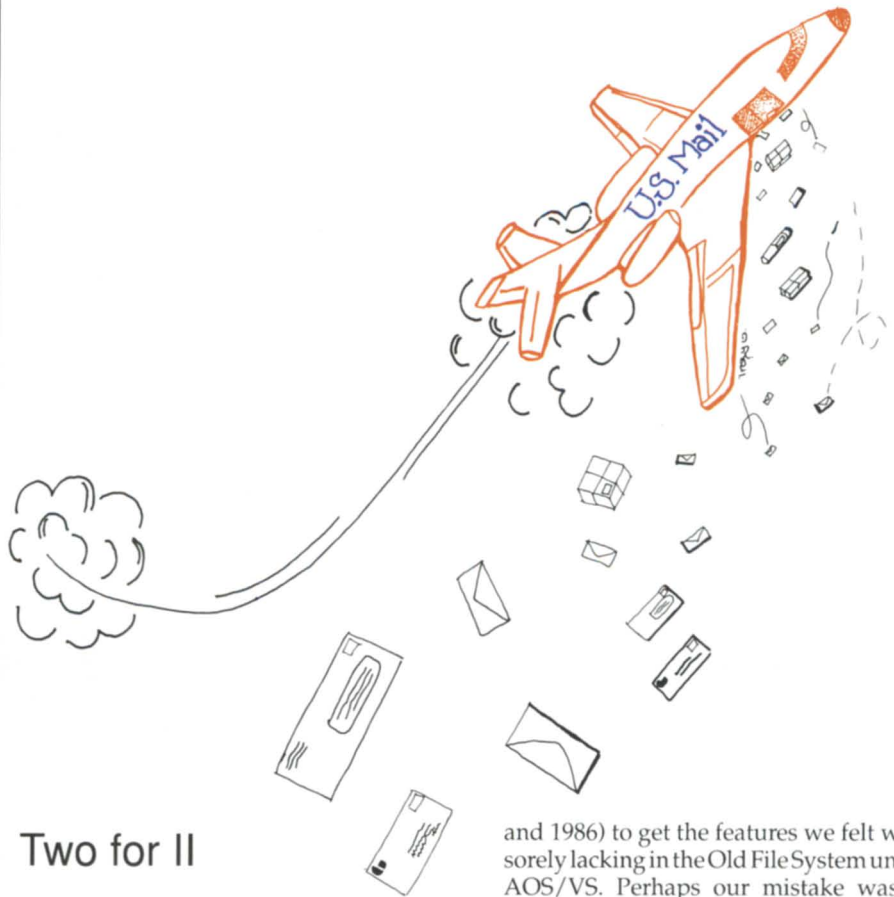
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LETTERS



Two for II

I want to add my two cents to the controversy concerning the changes in DG's policy for software support and AOS/VS II (previously known as AOS/VS rev 8).

I don't know any customer who wouldn't agree that DG has mishandled the customer relations aspect of AOS/VS II. I made a joke in the bar at Conference 88 that DG must have hired a new public relations firm: Haldeman, Erlichman & Deaver. A groan rose up from the assembled DG people. But apparently the message didn't take, so let me try to put it in simpler terms.

Rule #1: Don't screw your existing customers.

Rule #2: Don't do anything that will cause your existing customers even to *think* that you're screwing them.

Is DG violating Rule #1 by conspiring to screw us on the upgrade to VS II? Maybe I'm naive, but I don't think so. I suspect it's more a simple case of the worst marketing efforts since Ernestine the telephone operator. Unfortunately, the result is that DG ends up violating Rule #2.

There seems to be a lot of feeling that existing users are entitled to AOS/VS II in general, and the New File System in particular, because it resulted from our enhancement requests and our stated willingness to undergo a major upgrade effort and some monetary upgrade cost (as stated by attendees at conferences in both 1985

and 1986) to get the features we felt were sorely lacking in the Old File System under AOS/VS. Perhaps our mistake was in offering to pay some (presumably) nominal fee for the missing features, when all we were really trying to do was add emphasis to our plea for the sorely needed features.

When I look at the New File System, it seems to me that the changes we were demanding comprise only a tiny fraction of the effort. Most of the changes could have easily been done on the Old File System. After all, in my column this month I published a lousy two-word patch that creates a capability under AOS/VS that the New File System touts as a feature. It took me less than 15 minutes, start to finish. I'll even stick my neck out and bet my AOS/VS II license that I could develop a patch in less than a day that would exactly mimic AOS/VS II's Time Last Accessed suppression facility under AOS/VS, given access to the AOS/VS source listings. I'll sign whatever nondisclosure agreements are required, on the condition that DG publish and maintain the patch for AOS/VS.

So what's the point? Simple. If you think that DG developed the New File System simply to respond to our enhancement demands, you're sadly mistaken. Our enhancement requests were routinely answered with "To be considered in a future rev" until it came time to design the New File System. I seriously doubt if anyone ever sat down and analyzed how

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LETTERS

difficult it would be to implement TLA suppression under the Old File System: they just shot it down from their swivel chairs.

This may come as a news flash for some of you, but DG probably designed the New File System and the underlying New Disk Format for completely different reasons: to provide a common, extendable disk format as a basis for simplifying all future OS development (I expect that at some point even MV/UX will migrate to the New Disk Format). In short, the decision was a strategic one that had little, if anything, to do with our requests for TLA suppression for the last eight years. DG was and is simply trying to get more competitive in the marketplace, and control development costs, by adopting some sound software engineering principles (except for the cosmically dumb decision to put XTS in the kernel).

Software Marketing's mistake was in pitching the New File System as the solution to our RFEs, instead of addressing all the RFEs that could be easily addressed on the Old File System (most of them), and then announcing the New File System as exactly what it is: the New File System. Period.

But they still could have rescued themselves from the brink of the abyss by the simple expedient of announcing that the next update of AOS/VS beyond rev 7 would be AOS/VS II rev 0, and shipping it to existing users as part of the normal update service. What did they have to lose? Only a minuscule amount of upgrade revenue, hardly enough to generate a profitable quarter. What did they have to gain? The demise of AOS/VSI, along with its support costs and hassles, in 24 months or less.

Sure, some users would have stayed behind. Some users always stay behind. But they know why they're staying behind (usually dead-end configurations with no funds to upgrade), so they don't feel any more cheated than when a new rev raises the minimum configuration beyond what they've got.

So what about the new software support policy that makes SPSA a prerequisite for SSS? It has little to do with the AOS/VS versus AOS/VS II controversy, except for the incredibly bad timing of announcing them simultaneously. Unfortunately, now everybody links the two events.

The real shame about all the damage that's been done to the existing customer base so far is that it was so avoidable.

Regards.

B.J.
B.J. Inc.

User rebuttal

I applaud Michael E. Marotta's opinion article "Of Programmers and Users" (*Focus*, November 1988). Everyone is a user of somebody else's labor and accomplishments, and a reminder not to hold yourself above anyone else is always needed. I, however, draw the line when Mr. Marotta implies that the creators of products that programmers "use" are more *intelligent* than these same programmers. In one breath, he reminds us not to think ourselves better than the clients we produce products for, and in the next [breath], he places the producers of the products we "use" above us.

Good application analysts have a rare mix of technical and business knowledge, and I stress *business*. One of Marotta's "microkid wizards," the gurus that program in 75-bit binary strings, probably doesn't know the first thing about corporate taxes, fixed assets, depreciation schedules, or a general ledger, and probably doesn't care—just as I don't care about interrupt vectors, Schmitt hex triggers, or whether I can design a mask to photoengrave a silicon wafer. They were trained to do their job, and I was trained to do mine. I "use" their products so others can "use" mine.

Is the cave dweller who created the first hammer out of a rock more intelligent than the "users" of hammers today? I think not.

Donald Stewart
Controller, system manager, and user
Catlett-Johnson Corp.

Guardian Angel

[This letter is] regarding Brian Johnson's discussion of the System Manager's Panel at the NADGUG conference in the November issue of *Focus*.

He mentioned complaints about the lack of strong password controls within AOS/VS, and that DG has a product that addresses the problem. However, he failed to mention that Datalynx's Guardian solution to automatic password control was introduced at NADGUG and discussed in the meeting. Guardian automatically enforces limits on password life, generates easy-to-remember English passwords, and uses one screen to set 47 user privileges. We were pleased that so many system managers later viewed the product and have since chosen to adopt it.

John E. Husing
Marketing director, Datalynx

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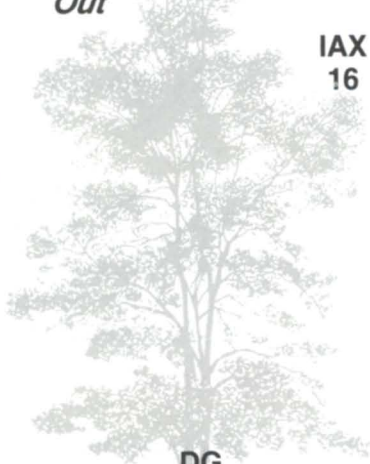
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EDITOR'S NOTE

A Choice

The controversy over Data General's decision to split AOS/VS into two versions—"classic" AOS/VS, which will be frozen indefinitely at rev 7.6X, and "new" AOS/VS II—is reminiscent in some ways of the consumer uproar following Coca-Cola's introduction of New Coke. Neither DG nor Coca-Cola anticipated the way consumers would react to decisions they were making for what seemed like very good reasons. Among DG users, the backlash has been so dramatic that it draws attention away from a choice that users will have to make very soon: to stay with AOS/VS or to move on to the new generation.

The controversy surrounding the choice has upstaged nearly every other topic at *Focus* this month. Most of the discussion among users has centered on the way DG introduced AOS/VS II. They had expected enhancements, such as the long-awaited option to suppress TLA during

back-up operations, to be included in AOS/VS revision 8. But DG announced last September that there wouldn't be a revision 8. Instead, the enhancements would be part of a separate product called AOS/VS II. Customers could stay with the original AOS/VS indefinitely, but future support would be limited to bug fixes and minor improvements. To get the new features of AOS/VS II, users would have to buy it as a separate product. Existing customers would be able to get a 70 percent discount on AOS/VS II by "trading in" their old AOS/VS licenses, but sites that had paid for Software Subscription Service on AOS/VS would not automatically get the new version.

Many users feel they should be entitled to the new enhancements, and that they shouldn't have to buy a new product to get them. DG's position is that it is offering users a choice. The controversy is important, but it shouldn't completely overshadow other aspects of the decision users are facing.

This month's *Focus* carries a series of articles covering some of the more technical aspects of the choice. Tom Gutnick reviews the new features of AOS/VS II (on page 15), and Brian Johnson gives you a preview of what to expect from the upgrade (on page 20). Jim Siegman adds a few thoughts of his own on page 57. As



you'll see when you read the articles, the technical aspects of the choice seem positively benign when compared to the furor stirred up by DG's announcement of the new policy.

Although "versioning" of DG software has become the focal point for a lot of controversy, we're not really dealing with a single issue. In fact, versioning is probably not even the *main* issue in most users' minds. It may come as a surprise, but money probably isn't the main issue, either.

To NADGUG members, the overwhelming issue is something more akin to pride. People who belong to NADGUG like to stay near the leading edge: they tend to represent larger sites, more systems, more applications, newer systems, more users, more knowledge, and bigger budgets than the average DG installation. They're the types of users who submit Software Trouble Reports and Requests For Enhancements—and they're likely to have been paying SSS or SPSSA fees in order to get the latest revisions and fixes from DG.

When you talk to NADGUG members, you realize that many of them have a proprietary feeling about AOS/VS. They stuck with it through its growing pains, and they feel that their STRs and RFEs were important feedback that helped DG

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develop AOS/VS into a mature product. More to the point, those who were paying for SSS or SPSA feel that they have already paid for the enhancements that will appear as part of the new AOS/VS II. They feel that they are entitled to receive the new version, and many of them are miffed by DG's decision to treat it as a new product. They tend to see it as a unilateral decision that amounts to changing the rules in the middle of the game.

DG's side of the story was stated in the interview with Frank Kenney that appeared in last month's *Focus*. Kenney, the marketing manager for DG's new Software Business Unit, put the issue in terms of a choice DG is offering its customers: the choice between two versions of AOS/VS, each fully supported and each offering its own benefits.

Kenney was correct in saying the choice is something users have been asking for. On several occasions users have told panels at NADGUG conferences that they liked the idea of DG freezing AOS/VS at a good revision level and continuing to support it with bug fixes and minor im-

provements. This would save them from having to install the newest revision of their operating system in order to get continued support in case a problem should develop later. It would also protect them from having to upgrade their hardware in order to accommodate a new revision that was hungrier for memory.

When the Data General Users Group in the UK and Northern Ireland got DG to offer continued support for rev 6.XX of AOS/VS, users were very pleased. By being flexible on its support policy, DG was giving users time to budget the funds and make arrangements for the hardware upgrades rev 7.XX would require.

DG's new versioning policy virtually institutionalizes that flexibility. Users who can't afford the additional hardware or don't need the new functionality will be able to stay with rev 7.6 indefinitely. Users should see this as an important development from DG.

Users had also been telling DG that certain enhancements to AOS/VS would be valuable enough that they would be willing to pay an additional fee to help defray the development costs. Even if they

said it more to emphasize a point than to indicate their desire to pay money to DG, users probably shouldn't have been quite so shocked when DG priced AOS/VS II as a separate product.

DG did foresee the financial impact the new policy would have on users, and made an attempt to soften the blow. DG is offering 70 percent discounts to existing customers who "trade in" their AOS/VS license, which will reduce the incremental cost of the upgrade to about two years' worth of software support fees. That is probably more than the users had in mind, but it's probably a reasonable place to start the discussions.

Which brings us to the main point: the people behind DG's new policies should have spent more time talking with users, so they could understand how users would react. If they had understood the users' point of view, they would have been able to frame the new policies in a way that would have been acceptable. The policies as announced may have been intended to give users something they had asked for, but users saw it as an attempt to take away something they already had.—G.F. Δ

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News from NADGUG and its affiliates



by Cathlene Gentry
RIG/SIG coordinator

Cybertek Software users will hold an organizational meeting for a special interest group January 12 and 13 in Denver, Colorado, at the Doubletree Hotel. The group will spend one day focusing on new product announcements and demonstrations, and one day organizing the SIG. Interested users are invited to attend. For more information, contact Ray Walther at 800/231-0803. In Texas, call 713/626-1919, or call a Cybertek representative at 800/451-1544.

■

The RIG/SIG Committee met in Phoenix with organizers of the Phoenix start-up RIG. The committee—consisting of RIG/SIG chair Charlene Kirian, Western chairperson Leryl Cash, Eastern chairperson Steve Kern, and myself—gave them suggestions for a successful group start-up. Later, we met as a committee to plan for upcoming RIG/SIG Committee activities.

First, we discussed the status of the ex-

isting regional and special interest groups and the start-up groups. Following the status reports, we drew up plans to implement two projects that had been left to the new committee by the preceding committee. These projects include a RIG/SIG workshop at the annual NADGUG conference and a speakers program for those start-up groups that don't yet qualify for speaker reimbursement from NADGUG.

The RIG/SIG Committee also will put into effect two new ideas: creating a NADGUG speakers bureau for the RIGs and SIGs, and addressing the unique needs of SIGs.

The speakers bureau would consist of NADGUG members who volunteer to speak at regional and special interest group meetings. Most NADGUG members have an area of expertise worth sharing with other members. If you would like to be listed with the speakers bureau, please contact one of the committee members.

The needs of special interest groups differ from the those of the regional interest groups. The committee plans to help the special interest groups by suggesting every SIG hold meetings in addition to the annual conference, and possibly organizing workshops for members.

The committee encourages comments or suggestions on any programs that could benefit the groups.

■

No. Cal. FUDGE held a "Vendor Night" at its November 9 meeting. Members had a chance to see what "the other guys" have to offer. Presentations were given from Data General, Peregrine Data Systems,

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Daterep, Grumman Systems Support, Dataram, Zetaco, and Rational Data Systems, among others. The next meeting is scheduled for January 11. Any questions should be directed to Charlie Crane, 415/598-8069, or Steve Tyler, 415/680-0501.



The Mid-Plains Data General Users Group (MPUG) changed its November 16 meeting from the usual dinnertime meeting to a luncheon, in order to see what time members prefer. A short business meeting started things off, followed by a guest speaker from the U.S. West Communications Speakers Bureau, who discussed "Technology Gets Easier."

MPUG's meetings are held the third Wednesday of each month. Anyone interested in more information can contact Chuck Paige at 402/593-2325, or Joyce Carter at 402/330-3683.



DG users in the Northwest corner of the United States and British Columbia

are forming a regional interest group in the area. The group's organizers are planning a meeting for late January or early February. All Data General users in British Columbia, Washington, or Oregon are invited. The group encourages members of the Willamette Valley Users Group to join them. If agreeable, the group will alternate meeting in both states.

A mailing announcing the first meeting will be sent to all DG users in the area. For more information, contact Scott Carr at 503/659-5880, Leryl Cash at 503/653-3282, or Don Hardwick at 206/453-3200.



Members of the San Diego Data General Users Group are recharging. Chris Thorpe and several other San Diego DG users are getting the group back on its feet. They've already met for several planning meetings, and will hold the first general meeting in February. The organizers invite all members of the San Diego group and any other DG users in the area to join them in February and reap the benefits of an active local users group. For more in-

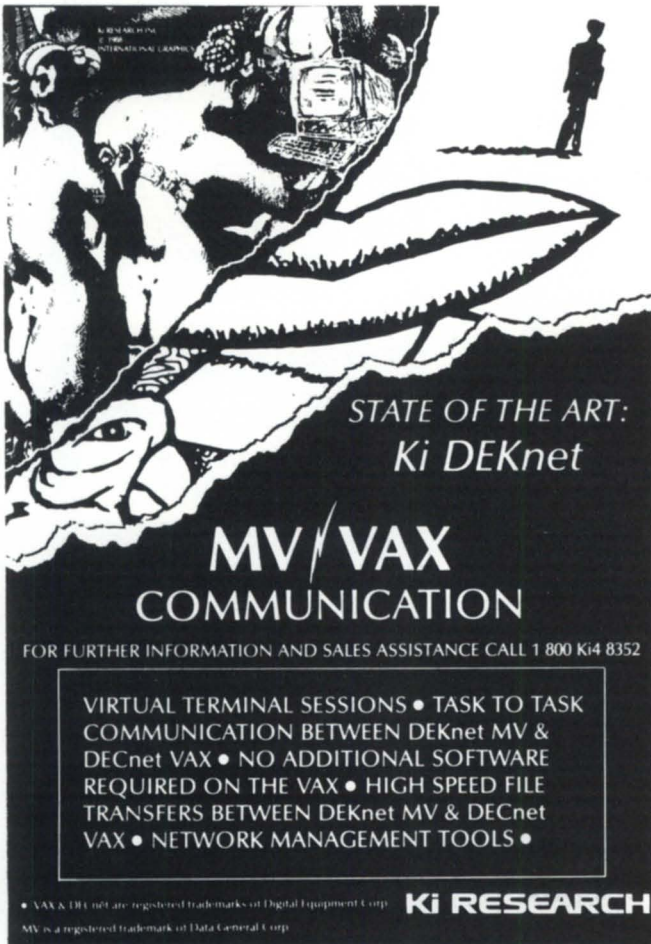
formation, contact Chris Thorpe of Delphi Data at 619/275-2892.



Bryan Scoggins, manager of Data General's Software Support Center, was the guest speaker at the Minnesota Data General Users Group meeting on November 15. Bryan touched on a few subjects including DG's new support policy for software, AOS/VS II and related products, and the Atlanta Support Center. More than 50 members attended the meeting. These members were so enthused by Bryan's presentation they initiated an impromptu question-and-answer session.

MADGUG meets again on January 17. The general topic will be disaster recovery. Specific subjects will be a discussion of the different techniques and sources for disaster recovery within the Twin Cities, and actual disasters members have experienced and how they recovered.

Contact Jan Grossman to find out more about the January meeting, or about the group itself. She can be reached at 612/333-5353. △



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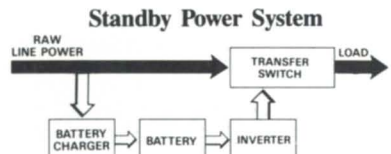
How to Protect Your DG[®] Computer And Make It Last Longer

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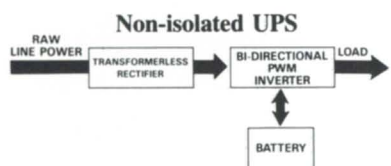
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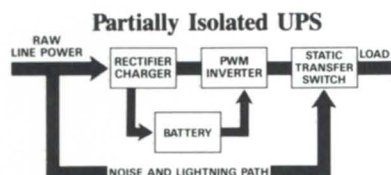
Shown below are three traditional UPS configurations. Each has its advantages and disadvantages.



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- Low cost
 - Inverter normally off
 - High efficiency
- Disadvantages:**
- No derived neutral
 - Break in transfer
 - Poor isolation
 - Poor brownout protection
 - Poor high line protection
 - Poor lightning protection



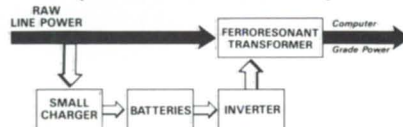
- Advantages:**
- Moderate cost
 - Brownout protection
 - High line protection
 - No break system
- Disadvantages:**
- No derived neutral
 - Poor isolation
 - Inverter on continuously
 - Poor lightning protection
 - Non-linear load



- Advantages:**
- Brownout protection
 - High line protection
 - Partial no-break system
 - Separately derived neutral
- Disadvantages:**
- Break in transfer to line
 - Poor isolation
 - Poor lightning protection
 - Non-linear load
 - Poor efficiency
 - Expensive

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AOS/VS II debuts

by Tom Gutnick
Special to Focus

At the 1987 NADGUG conference in Las Vegas, the hot news was AOS/VS revision 8. At Conference 88, attendees heard about AOS/VS II. No, it's not a Hollywood sequel, but close. Data General announced AOS/VS II early last October, and this successor to AOS/VS represents the state of the art in high-reliability, high-availability operating system software. This article may answer many of your questions.

Q. OK, if it's not a Hollywood sequel, what's going on?

A. AOS/VS rev 8.00 is now AOS/VS II rev 1.00; what would have been AOS/VS rev 8.10 will now be AOS/VS II rev 1.10. AOS/VS II includes new features that mark a new beginning, while continuing the evolution that started with 16-bit AOS.

Q. Will I get AOS/VS II automatically with my AOS/VS Software Subscription Service?

A. No. AOS/VS II is a new product with a different model number from AOS/VS. Upgrading an existing system from AOS/VS to AOS/VS II will require purchasing an upgrade license.

By making AOS/VS II a separate product, it's possible to give users some of the additional AOS/VS support they've been requesting for a long time. For example, at several of the past NADGUG conferences, users asked for a "frozen revision" of AOS/VS—a release that would still have bugs fixed and would be enhanced to support new mass-storage devices, but would

not undergo any major enhancements that might change the performance characteristics or resource requirements. In effect, this has been done.

With any new release of AOS/VS, users have six months to upgrade or take the chance of running an unsupported release. But when AOS/VS II rev 1.00 is released, it has no bearing on AOS/VS. Rev 7.6x of AOS/VS will continue to be supported—bugs will be fixed and new devices will be added. Instead of being forced to upgrade within six months, users can take their time, or even choose not to upgrade, without risking lack of support.

(Note that if you are buying a new MV processor, you can purchase a license for either AOS/VS or AOS/VS II at no difference in cost. For existing systems, upgrade licenses are significantly less expensive than a new license.)

Q. Regardless of what you call it, what's the big deal?

A. AOS/VS II represents one of Data General's larger software engineering projects. It incorporates features that will result in greater flexibility and availability for many sites. Although other new features will be mentioned later in this article, the most notable changes involve the New File System (NewFS).

The file system refers to the part of the operating system that manages files and directories on the disk. The old file system was designed for compatibility with 16-bit AOS, which means it inherited the AOS design goals of minimum disk space overhead, minimum number of in-memory data structures, and simplicity of logical data structures. But as much larger disk and memory configurations have become economically feasible in the past decade, and as AOS/VS has outgrown the need for AOS-compatibility, the file system goals have shifted to greater flexibil-

ity and higher availability.

Perhaps the most notable difference is that, thanks to a new disk format, Fixup will no longer be needed. (In fact, it no longer exists. Although there is a similar utility called the Disk Polisher, its use is optional.) Although the time to run Fixup was insignificant for a system with only one or two 96 MB disk drives, many sites have disk configurations of 1 GB or more!

Even though the ESD (Emergency Shut-Down) facility had eliminated much of the need for Fixup, until now occurrences such as power failures would still result in a time-consuming recovery procedure. But with NewFS, you can immediately reboot your system, with no need for operating system recovery.

The underlying design that allows for the elimination of Fixup has another bene-

fit. In previous revisions of AOS/VS, if the file system encountered a problem (such as inconsistent pointers in the directory entries), AOS/VS would panic—and ESD couldn't be run (to avoid disk damage). But with NewFS, file system problems—which should become even rarer than today—will be reported as errors to AOS/VS, but will not necessarily result in a panic. In addition, redundant pointers will allow the file system to fix many problems on the fly. (Also, bad block remapping will be done dynamically.)

Q. Is that all?

A. No, it gets better! The system manager gets many new options to use the disks even more effectively. For starters, you will now be able to create multiple LDUs (Logical Disk Units) on one Physical Disk Unit. In addition, each LDU can have its own default file element size. (If you've taken one of the AOS/VS performance seminars, you will realize that this extra control on element sizes is an extremely powerful capability.)

Q. What about other parameters, like hash-frame sizes?

A. Hash-frame size is one of the attributes of a directory under the old file system. Proper selection of the hash-frame size, based on the number of directory entries (and the lengths of the filenames), can benefit system performance. With NewFS, a completely new hashing algorithm has been introduced—an algorithm that actually eliminates the need for the hash-frame size attribute. (I'll spare you the details of the new hashing algorithm. But suffice it to say that the algorithm allows more than 10,000 files in a directory to be accessible with a single probe.) The result will be one less parameter for system managers to worry about and one more improvement in performance.

Q. What about disk mirroring?

A. Physical disk mirroring was introduced in AOS/VS rev 7.50, and is supported by Argus (354, 592, or 862 MB) and the recently announced RAMS (500 MB) disk controllers; two drives on the same controller can be maintained as mirror images. (See my article in the November 1987 issue of *Focus* to find out more about disk mirroring.) While this capability will still exist, logical disk mirroring will be added in AOS/VS II. This allows up to three LDUs, even on different models of disk drives, to be mirrored. Combine this feature with the ability to place multiple LDUs on one drive, and you've got a powerful facility; you could create a small- or medium-sized LDU for a critical data

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2-Profile expire:	12-Jul-89	25-Superuser:		26-Superprocess:	N
4-Initial Program:	CLI.PR	27-Use IPC:		28-Use console:	N
5-Initial IPC file:		29-Use batch:		30-Use virtual cons.:	N
6-Initial directory:		31-Use modem:		32-Change password:	Y
7-Default user priority:	2	33-Change priority:		34-Change type:	N
8-Max. queue priority:	0	35-Change username:		36-Access devices:	N
9-Unlimited son processes:	N	37-Create w/o block:		38-System Mgr priv.:	N
10-Max. son processes:	1	39-Access local device remotely:		40-Change address space type:	Y
11-Disk quota (blocks):	500	41-Change working set limit:		42-Comments:	N

BATCH

NON-BATCH

12-Log. addr. space:	-1	18-Log. addr. space:	-1
13-Min. working set:	-1	19-Min. working set:	-1
14-Max. working set:	-1	20-Max. working set:	-1
15-Def. user local.:	0	21-Def. user local.:	0
16-Use other local.:	N	22-Use other local.:	N
17-Other locality:		23-Other locality:	
Time of last logon:	18-Jul-88 08:39		
Last password change:	15-Jul-88 06:40		
Last profile change:	15-Jul-88 13:01		

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GUARDIAN'S profile editor window can limit a user's access to specific hours, and can assign a user to one of ten groups each of which can be granted or denied access.

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base, and mirror just that, without having to mirror all the other files on the physical disk.

Q. What about compatibility?

A. If you have been using DG systems for more than a couple years, you probably have already discovered that compatibility should be Data General's middle name. Although AOS/VS II incorporates changes visible to the system manager, applications programmers (and even most systems programmers) and end-users should find it virtually 100 percent compatible with AOS/VS rev 7.6x.

Q. Is AOS/VS II relatively easy to install?

A. If you're installing a new system from scratch, the process is similar to installing AOS/VS today. The only real difference is that one utility, called Disk Jockey or DJ, combines the functions of the old DFMTR, INSTL, and SYSBOOT. DJ is menu-driven, and includes a help facility.

It's a bit more involved if you're installing AOS/VS II on a system already running AOS/VS. Obviously, since the physical structures on the disk are different, a migration is required. (Old-timers may recall undergoing a similar process when upgrading from AOS rev 2.05 to rev 3.0 many years ago.) The basic process involves dumping all your files to tape, reformatting the disks, and then installing AOS/VS II and reloading all the files from tape. For sites with a spare disk drive, a Mover utility (running under either AOS/VS or AOS/VS II) will allow moving all the files from an old file system disk to a NewFS disk directly, eliminating the need for tape handling.

It's not an intimidating process. In addition to the Mover utility, Data General plans to provide several other tools to ease the migration process to AOS/VS II.

• **Migration manual.** This manual was shipped recently on the AOS/VS rev 7.62 update tape. (Look under directory :UTIL:NEWFS_MIGRATION.) It describes the entire migration process in detail, including case studies, along with guidelines and worksheets for planning your own migration. (You may be wondering where case studies come from before the software actually ships. Did you realize that Data General operates several hundred AOS/VS systems? The manual describes how some of these sites have installed AOS/VS II.)

• **Systems Engineering services.** Contact your local Systems Engineering office for information about services to help you plan and implement your migration. Equipment rentals—both disk drives and

6250-bpi tape drives—can also be arranged.

• **Seminar.** Data General's Educational Services has a new seminar, SM530, "AOS/VS New File System Conversion." This four-day seminar is offered at several locations; call 617/366-2900 for information about dates and cost.

• **Improved back-up tools.** An enhanced version of LOAD_II, which shipped with

AOS/VS rev 7.62, copes much better with unrecoverable tape errors. (But that's no excuse for using worn-out magnetic tapes. Remember that tapes are consumable items, not capital expenditures!) And DUMP3/LOAD3 (see below) will be even better.

Q. What's the catch?

A. If you have been in this business as

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long as I have, you know that there are always trade-offs. One of the goals in designing NewFS was to provide at least comparable performance, while improving reliability. Keep in mind that although CPU cycles are now measured in nano-seconds, disk accesses still take many milli-seconds. Anything that can save disk accesses by AOS/VS will help overall system performance. In designing NewFS,

the developers sought to minimize disk I/O whenever possible, at the expense of slightly increased memory requirements. The recommended minimum configuration for AOS/VS II calls for 4 MB of main memory. Although this presents a problem for the old MV/8000s and MV/4000s, even an MV/1400 DC comes with a minimum of 4 MB. (If 4 MB sounds like a lot, have you looked lately at how much

memory it takes to run OS/2 on even a single-user personal computer?)

Q. Doesn't AOS/VS II need more memory because it's written in C? Why wasn't it written in assembler?

A. The memory increases are primarily the result of keeping more file system information in memory, thereby reducing disk accesses. But it is true that most of the New File System code has been written in C. If it had all been written in assembly language, you would not see AOS/VS II until well into the next decade, and we would be debugging it into the next century. (Read *The Mythical Man-Month* by Frederick W. Brooks for an explanation of why you can't just throw more programmers on the project. This book is now considered a classic, with its many insights into software engineering.) In addition, by working mostly in a high-level language, it was possible to use complex, innovative algorithms (such as the one that eliminates the need for the hash-frame-size parameter for directories) without sacrificing reliability. And if you look at the code generated by the AOS/VS compilers, you will see that they generate very tight code indeed, so the trade-off in using C is reasonable. (Only the very best, the most talented, hot-shot assembly language programmers—a very small minority of the total—have even a hope of writing better code.)

Q. Will AOS/VS II support my existing hardware?

A. With a few exceptions, yes. Some of the old disk drives (5 or 10 MB top loaders, and the old fixed-head disks) won't be supported, nor will the 4017 plotter. And will anybody really lament the drop of support for the 4061 card reader?

The original Eclipse MV/8000 (model 9300) that used an IOP will no longer be supported—under AOS/VS II, terminals need to be attached to Intelligent Asynchronous Controllers (IACs) or their variants. (If you had been thinking about an upgrade, you now have one more good reason.) All other Eclipse MV processors are supported.

Q. What about improved back-up utilities?

A. As mentioned above, enhancements to LOAD_II make it much better able to cope with tape media problems. In addition, new back-up utilities are available for purchase: DUMP_3 and LOAD_3. Highlights include upward compatibility with existing DUMP format files, improved reliability, improved operator in-

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terface, and ease of use. Multivolume backups will be possible without using labeled tape (although I'm not sure why you'd want to do this), and it will be possible to do back-up and restore operations with a Xodiac network.

I like the idea that LOAD_3 can retrieve a file directly from the fifth reel of a multivolume tape set without having to read through the first four reels.

Q. Any improvements in communications?

A. XTS (Xodiac Transport Service, or X.25) and WSVTA (Workstation Virtual Terminal Agent) have both been embedded in the AOS/VS kernel, eliminating the need for much of the interprocess communication currently required. This change should result in greatly improved terminal-emulation performance for DG/PC*I networks.

Q. Anything else?

A. XLPT, EXEC's printer cooperative, has been rewritten in 32-bit code. (You may have noticed that EXEC was rewritten as a 32-bit process for rev 7.50.) This should result in better system performance in handling print jobs. Each XLPT process will manage up to 15 print devices. The "mapper" functionality introduced in rev 7.50 will also be enhanced. (And all of these changes were also included recently in AOS/VS rev 7.62.) In addition, terminal-server support will be added, which should help installations with large numbers of terminals.

Q. Should I be the "first on the block" to convert to AOS/VS II?

A. It depends. Here are a few reasons to consider installing AOS/VS II as soon as it becomes available:

1. The elimination of Fixup means that AOS/VS II can be rebooted immediately after a system failure.

2. PC*I performance will benefit from the kernel support for communications. If you are running a large PC*I configuration, AOS/VS II should help performance.

3. The current limit of 8 BMC disk controllers per system will be doubled to 8 controllers per IOC. If you're currently pushing the limit, go to AOS/VS II.

4. Much greater flexibility will be possible with disk mirroring. In addition to the currently available physical disk mirroring on an Argus controller, logical mirroring will allow up to three LDUs on any types of disk drives to be mirrored. If you need this flexibility, go to AOS/VS II.

If those issues don't affect you, then there's no rush to go to AOS/VS II. AOS/

VS will continue to be supported for the foreseeable future. On the other hand, you should note that AOS/VS II incorporates many internal changes that are not visible. These changes will provide a platform for additional significant new functionality in AOS/VS II rev 1.10 and beyond (such as support for the MV/40000 HA and Message-based Reliable Channel, support for VT100 terminals, and more). The best

is coming soon to a system near you! Δ

Tom Gutnick has been dabbling with Data General systems for more than a decade, and is currently the Systems Engineering consultant for Data General's mid-Atlantic region. He specializes in operating system performance and security issues. He can be reached at Data General, 7927 Jones Branch Dr., Suite 200, McLean, VA 22102; 703/827-9600.

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Election
year

It's not over yet. You
still have to decide
between AOS/VS and
AOS/VS II

:TO_II_OR_NOT_TO_II?

People keep asking me what I think of AOS/VS II. This month I'm going to tell you what I've been telling them. If you expect me to deliver a scathing diatribe against the AOS/VS II licensing and upgrade fee policy, then you're in for a disappointment. First of all, this column isn't the place for that kind of stuff, and second, I've already written a letter to the editor on the subject. (See page 20.)

This column concerns the technical aspects of AOS/VS II and the New File System. Specifically, I'm going to cover three topics: a brief review of the operational differences, an analysis of Disk Jockey's defaults, and a critique of the New Disk Format design.

:OPERATIONAL.DIF

One of the design goals of the New Disk Format (NDF) and the New File System (NFS) was to make the file system changes as invisible to application software as possible. DG succeeded admirably. In most cases, the changes are invisible even to quasi system software like XTS. The decision was clearly the right one, but DG's motives were probably less than altruistic: DG would have had to change a lot more code than you would.

As a result, your first Monday morning after the conversion is likely to be boring, but that's good. It'll give you time to contemplate how much disk garbage you can get rid of next month now that there's a true Time Last Accessed capability in the file system (DUMPing a file no longer updates its TLA).

Two kinds of people are likely to run into problems: ones like me who write software to take advantage of undocumented stuff (like :PERFMGR), and ones

who either play games with element sizes (me again, this time with Hazel) or who have undetected crocks in the file creation routines inside existing software.

This latter category usually involves old 16-bit programs ported from AOS to AOS/VS simply by relinking. If the program created a file with a specific element size that was not a multiple of 4 (like 1), and then tried to access the file using shared page I/O, it will fail with a "file element size not a multiple of 4" error message (or error code 351 octal/233 decimal). My spies tell me that this phenomena occurred a number of times to DG's own software while it was testing NFS. The reason for this problem is because NFS allows the creation of a file with any element size, even 1. For many of us, the disk space savings of this NFS feature will go a long way toward eliminating the wasted space involved in small files that have a length that isn't a multiple of 2 KB.

If you'd like to get a jump on researching the element-size problem and check it out under your existing AOS/VS system, take a look at the patch in Figure 1. It changes AOS/VS 7.6x to allow creating a file with any element size between 1 and 65,534, although defaulted element sizes will still come up with 4, or whatever you answered at VSGEN time. I'd advise installing the patch on a weekend and then checking out all your software. Chances are that you won't run into any problems.

Except for these few situations, NFS is effectively a replica of the Old File System (OFS) at the application level. On an anxiety meter scale from 1 to 10, NFS migration is about 0.5.

Good news so far, eh?

But what about your operating staff? Well, the news is pretty good here, too.

About the only thing you have to do is restrain them on how to run the new Spit Shine facility (DG calls it Disk Polisher) in Disk Jockey, instead of running Fixup. Speaking of cute names, I nominate Disk Jockey to the DG Cutesy Software Name Hall of Fame along with Jehovah and Hipboot. Disk Polisher doesn't make it.

DG has been flogging the fact that you're no longer forced to run a recovery program (Fixup) in order to reboot after a less-than-graceful system shutdown. In reality, Fixup is not a major concern where I work, and I suspect it isn't around your shop either. The advent of ESD and the stability of recent revs of AOS/VS (we don't reboot between routine maintenance visits by the FE) have eliminated the issue of Fixup time.

However, locating and IRECOVER/IV-ERIFYing all those pesky INFOS files that were open at the time the system went splat is a pain in the neck. I don't see that changing under the NFS, so even though you can now reboot instantly (poetic license) every time, you still have some work ahead of you before the users see banners on their tubes.

For similar reasons, I'm not overawed by DG's new assurance that no amount of disk damage under NFS can result in a system panic. The incremental annoyance caused by the panic doesn't seem to be such a big deal compared to how you feel when you notice that the disk with your main on-line data base has popped off-line due to the heads making an unscheduled landing without permission from the tower, or when a newly discovered bug in NFS ruins your favorite directory structure (like :PAGE or :MY_FAVORITE_DATABASES).

:MIGRATION

Except for the Bush versus Dukakis ads about Boston Harbor and prison furlough programs, not too many subjects have been more overblown than that of migrating to AOS/VS II. Granted, DG has to bend over backward to advise us to guard against file loss during the upgrade, mostly in order to avoid some ugly lawsuits. But come on guys, we have to reload disks from scratch often enough that doing it again as part of the upgrade isn't that big a deal. A few months back, I described how one local bozo FE (a third party, not DG) scribbled all over our four 335 MB Fujis during a preventive maintenance visit. We recovered from that in three or four hours. What's the difference between that and most of an NFS migration?

For the more paranoid and cash-heavy among you, DG is offering a Migration Service at a fee as part of the license upgrade fee. I don't know about you, but no stranger is going to come into our computer room and supervise the DUMPing and reLOADing of our precious files after getting me to sign a contract that says that if anything goes

Figure 1: Pretesting for AOS/VS II conversion problems

```

;Yet another one of BJ's unofficial patches for AOS/VS 7.60
;
;This patch changes the way that AOS/VS treats the file data
;element size specified in offset ?CDEL of the ?CREATE packet
;to match the way that AOS/VS II works. This allows checking
;for dormant software problems related to element-size creation
;prior to upgrading to AOS/VS II. Contact BJ Inc. for versions
;of this patch for other revs of AOS/VS.
;
;BECAUSE OF THE POTENTIAL PROBLEMS THAT THIS PATCH MIGHT EXPOSE
;IN BOTH YOUR SOFTWARE AND IN SOME DG PRODUCTS, THIS PATCH SHOULD
;ONLY BE USED BY EXPERIENCED AOS/VS SYSTEM MANAGERS, AND IT
;SHOULD ONLY BE USED UNDER CONTROLLED CONDITIONS (I.E., NOT
;DURING PRIME TIME).
;
;%AOSVS
CREATE.P+1342      [WMOV 0,3]    [WMOV 1 0]
^+1                [WSBI 1,0]   [WBR .+11]
;
;End of patch
    
```

wrong, DG's not liable. I want some guy on the staff to do it so that I know where he lives, what kind of car he drives, where his children go to school, and any other data I might need as part of a mas-

sive revenge plan in case he screws it up.

:TO_LDU_OR_NOT_TO_LDU?

Luckily for most of us, the defaults in Disk Jockey are very reasonable, with two

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exceptions. The first involves the number and configuration of LDUs, and the second involves the element size of the File Information Table (FIT) file. This latter item is easily solved by resorting to the formula published in the Disk Jockey documentation, although for the life of me I can't figure out why the question isn't worded "What is the average number of files in a directory on this LDU?" instead

of having to specify the FIT file element size. Seems a bit user-hostile. Clearly, just having menus does not user-friendly make.

As for LDUs, one of the major selling points of NFS is its increased flexibility in specifying how Logical Disk Units (LDUs) are organized within and across Physical Disk Units (PDUs).

Under AOS/VS, LDUs could be built

from one or more PDUs. Under AOS/VS II, the major change in NFS is that a single PDU can now contain multiple LDUs (except for the bootable system LDU, which still must be a single PDU). Looking at it another way, you could say an LDU no longer needs to encompass entire disk units.

Historically, multi-PDU LDUs have been shunned by most system managers, except for a small number of systems with several drives that are so small that they are unusable as a single LDU per PDU (e.g., a couple of the old 10 MB pizza ovens, or the 20 MB Peppermint Patties, which aren't supported under NFS anyway). The ability of file management/data base software such as INFOS to create indexes and data bases with multiple volumes also obviated the need for multi-PDU LDUs. The kiss of death for most multi-PDU LDUs occurred as soon as system managers discovered that losing any one of the PDUs due to something like a head crash resulted in loss of the entire LDU. For most systems, the risk simply wasn't worth the benefit, and multi-PDU LDUs faded into obscurity. These problems still exist under NFS, so multi-PDU LDUs are still a bad idea for most systems. Moral: If you believe that buying multiple lottery tickets will increase your chance of winning, stick with multidisk LDUs.

The real reason for the New Disk Format allowing multiple LDUs within a PDU is to make the new software mirroring scheme more usable. By definition, mirroring has to work on whole disk units (either physical or logical). Under AOS/VS, this facility was limited to PDUs, and only those PDUs with controllers that had the capability to do some or all of the image synchronization work in the controller itself. With the addition of software mirroring, NFS is now capable of mirroring LDUs and PDUs. In the case of PDUs, most of the work is still done in the controller (as evidenced by the blinding speed at which the new CSS drives resynchronize). In the case of LDUs, the work is either done in the disk controller, if you have the right controller, or it's done by NFS in software at a much slower speed, and with a much higher impact on the processor. Be that as it may, the increased functionality of the new Software Mirroring facility surely makes the cost worthwhile for some applications.

How important are the new LDU facilities to the average AOS/VS system manager who isn't interested in mirroring? Not very. In fact, it's actually inadvisable to take advantage of some of these options in some situations.



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So what's the risk for non-mirrored systems? You might avail yourself of the option of creating multiple LDUs on a PDU simply because it appears to suit the organization of your files better than a single LDU per PDU. Before you do this, you need to understand the potential benefits—and the potential costs.

What are the benefits? I only came up with two: (1) a separate LDU for your favorite overfilled directory might allow a more appropriate choice of FIT element size (more about this shortly), and (2) LDUs can result in one less level of path-name depth than subdirectories with the same name. Let me give you an example.

Suppose you had two 300 MB LDUs named UDD and DATABASES. Under AOS/VS, this would require two separate PDUs, probably using 354 MB disk units. If you initialized the LDUs in the root, as would normally be the case, they would appear as :UDD and :DATABASES. Suddenly your boss announces that the two 354 MB disks are being replaced with a 602 MB disk. Do you call the new LDU "DISKA" and move the UDD and DATABASES contents to the new disk as :DISKA:UDD and :DISKA:DATABASES, or do you create two LDUs on the new disk and end up with :UDD and :DATABASES instead? On the face of it, the latter option would seem to be better, because it eliminates an extra level of directory access when resolving pathnames on the new disk, and allows an extra level of depth under UDD (perhaps of interest) and DATABASES (probably not of interest). Well, the answer is that it probably doesn't make much difference performance-wise which way you do it. Given the information so far, I'd probably create two LDUs in the PDU, just to be safe.

What about the disadvantages? The extra space overhead caused by creating two LDUs is tiny, so that's not a major issue. The real disadvantage of two LDUs compared to two subdirectories is that the LDU sizes are fixed once they are created. The size of the two LDUs can only be changed by DUMPing off all their files, deleting the LDUs, and re-creating them with different sizes. Fat chance, unless the LDUs were allocated adjacent to each other, or you were stupid enough to leave extra space for a bigger LDU when you first formatted the disk. In contrast, two subdirectories can each grow, as long as the combined size doesn't exceed the LDU size. This effectively argues *against* the multi-LDU PDU, and *for* the single-LDU PDU with subdirectories approach, except in the case where one or both of the subdirectories are relatively static in size.

The net-net is that until you have more specific information, single-LDU PDUs are the way to go (i.e., just like you're probably using right now). The status of multi-LDU PDUs remains unchanged: they are generally inadvisable for the same old reasons.


:LDU_OPTIONS

When creating an LDU, NFS now offers

some new options. A couple of them appear to be only marginally useful, and a couple are potentially very useful.

Under AOS and AOS/VS, the ACL that you specified when you formatted the LDU was only used when the LDU was not used as a system disk. Now the ACL applies even if the LDU is the system LDU. The only difference is that users will be able to list what's in the root if you

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include +,RE in the system LDU ACL. On my system, I don't want users snooping in the root, so this feature doesn't appeal to me. Allowing users to list the contents of the root is certainly preferable to allowing them write access to the root. On the other hand, this new feature might be useful in obscure circumstances, but I suspect most of us will still opt for a root ACL of +,E. I wouldn't even put OP,WARE on the root;

I don't want OP casually deleting things in the root without first taking the extra step of turning superuser on.

Another marginally useful option is the ability to set the hash-frame size of the LDU root directory. (The way directories are handled has been completely redesigned, and the proper term is now File Information Table, FIT, size, but it's still the same idea.) This is handy for those of

you with cluttered root directories, or cluttered and grafted LDU root directories. I prefer to keep my root directories as uncluttered as possible, since they take part in most full pathname accesses (all for the system root!).

In place of setting the hash-frame size of each and every directory depending on the number of files it contains, NFS instead requires you to specify a single FIT file element size that is used for every directory in the LDU. The recommended answer is

$$((\text{average files per directory}) + 1) / 3$$

A utility is provided to analyze the average number of files per directory on your existing file structure prior to migrating to NFS.

On the face of it, there appears to be a potential problem specifying an optimum FIT element size for LDUs that have directories with a wide range of file counts. To assess the actual risk requires an in-depth knowledge of how NFS organizes and manages directories—clearly beyond the scope of this column (look for a detailed analysis in a future column). However, having studied the new directory design, I can assure you that it degrades much more gracefully than OFS directories did as directory file counts exceed your initial estimate. As a result, my preliminary advice is to set the FIT element size using the average directory file count, and don't worry too much at this point about what's going to happen with your larger directories. They will probably perform at least as well, if not better, than they would have under OFS.

The final and most significant LDU option has to do with one of the all-time favorite OFS topics: file data element sizes. Under OFS, the data element size for a file was specified at file creation time, subject to the constraint placed on the element size by the default data element size specified at VSGEN time. Under NFS, the data element size is still specified at file creation time, but with a few new wrinkles. First of all, there is no default element size set now at VSGEN time. Instead, you specify the primary and secondary file data element sizes as part of creating an LDU (both default to 4). You also get to specify the number of primary elements allocated before NFS switches to the secondary element size (defaults to 1). Finally, you get to pick the element size of the Random Index Blocks (RIBs) used to locate the actual file data elements (defaults to 1).

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Picking the defaults results in an element-size strategy identical to what AOS/VS used, with the exception that only 124 element pointers fit into an index block now, rather than the 128 that fit into it before. The discrepancy is because of a 128-bit ID tag that was added to the index. The worst that might result from this change is that what used to be a full, single-level index file will now become a two-level index file, albeit with only three index blocks. This shouldn't be much of a problem, even taking the extra cache activity into account.

Unfortunately, I still haven't had enough operational experience with NFS to be able to relate any actual performance data on the effects of changing the element-size options. That will surely come during the next few months. However, even if I had the data, there is no way I would recommend that you do anything other than select the defaults for all of these things the first time around. Any upgrade is risky enough without introducing additional potential problems unnecessarily. *Take the defaults!*

:NET_NET

On balance, NFS is slick, albeit a bit oversold with a heavier-than-necessary dose of anxiety generation. Maybe I'd be more in awe of NFS if my favorite RFE had shown up: Rename using pathnames (across directories!). That sure would save a lot of wasted disk traffic on our systems.

By and large, the default values supplied by Disk Jockey for LDU parameters are quite reasonable, and carry little risk of producing poor performance, with one possible exception: the FIT element size. That exception is easily handled using an estimated average directory file count to plug into the published formula. There doesn't even currently appear to be much of a downside risk if your guess is off by as much as 50 percent, so don't worry about this for now. After all, whatever you choose will probably be better than the 27 levels of overflow blocks currently on your main user application directory.

B.J. 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. B.J. can be reached at 109 Minna St., Suite 215, San Francisco, CA 94105; 415/550-1444, telex 296544. The :SYSMGR bulletin board number is 415/391-6531 (1200 baud) or 415/550-1454 (voice).

Clearly, it's going to be an NFS world within 18 to 24 months. The handwriting is on the wall for most of us, and it reads: "You better jump on DG's upgrade discount offers before they expire in June."

After all is said and done, NFS is certainly a major improvement on OFS in terms of its flexibility and features. However, the true test of the New Disk Format will come in the future as we see

how DG extends it to address the RFEs still left open, and how other DG operating systems mate with it.

:HAPPY_NEW_YEAR

I've been doing this column now for more than three years, and I have yet to use the words "paradigm" or "platform" in any of my columns. My New Year's resolution is to avoid using them again this year. Δ

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ICOBOL on UNIX



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Update on AOS/RT32 rev 5.00

Performance improvements and new features for DG's 32-bit real-time operating system

by Craig Presson
Special to Focus

After a period of relative quiet, Data General recently released revision 5.00 of AOS/RT32, so now is a good time to bring *Focus* readers up-to-date on its capabilities. I had the opportunity to present most of this material to the user community for the first time at NADGUG's Conference 88 in Philadelphia. For those who were there, some of this article will be quite familiar.

When I prepared my talk for the conference, I decided that I shouldn't assume my audience was familiar with previous revisions of the product, or even with what DG believes makes a good real-time operating system, so I began at the very beginning—always a good place to start.

Real-time is a term that describes systems that can respond to asynchronous external events within predictable time limits. In the context of an operating system, this means that response latency must be managed.

We recognize and measure two types of latency: interrupt latency and reschedule latency. The former is the time required to get from a hardware interrupt to the user's interrupt service routine; it is composed of hardware latency plus OS overhead. The latter is defined as the elapsed time from a signal that readies a new highest-priority task to the start of execution of that task's code. It is composed of scheduler overhead, plus the time it takes the previously running task to be preempted (if it was running with scheduling disabled), plus the time to finish any active interrupts.

Interrupt latency is assured within the OS by minimizing the use and the length of interrupt-disabled paths, both in the kernel routines and in the drivers that must disable interrupts, as well as by minimizing the length of the interrupt service routines. Reschedule latency is minimized by limiting the maximum length of a reschedule-disabled path in the kernel, task-management, and process-management code that must disable rescheduling.

System code is easily preempted, requiring only a scheduler to assure deterministic response. The system scheduling philosophy is simple: run the user's high-priority ready task. Of course, nothing is ever *that* simple, so when there are multiple tasks of the same priority, we use a round-robin, time-slice algorithm to allow them all to execute.

AOS/RT32 is system-call-compatible with revision 7 of AOS/VS. This means that system calls with the same name operate in the same way, using the same user parameters. With revision 5, for the first time, DG also introduced RT32-only system calls (which I'll describe later), thus making the AOS/RT32 system calls a "compatible-enhanced subset" of the AOS/VS calls. The differences between the two systems are in real-time performance, as described above, and in AOS/RT32's ability to run without disks, with the file system completely memory-resident, or situations where environment, cost, or time factors prohibit the use of disk storage.

Starting in 1980, the system was designed from the ground up for real-time and the MV architecture. The first four revisions were part of a phased-in implementation envisioned at the beginning; this fifth revision was brought out to catch up with AOS/VS functionality, to add the real-time extensions that customers had requested, and to increase the reliability and friendliness of the system. We added some 47 AOS/VS system calls that did not

exist in revision 4, and made existing calls work exactly like their AOS/VS counterparts in areas like the file system, terminal I/O, process management, and memory management.

We added a Virtual Timer Facility (VTF) to bring periodic tasking up to the state of the art and the capabilities of the hardware, and Fast User Device support (?FIDEF) to answer the need for extremely low interrupt latency for high-priority user devices. Reliability was increased throughout the system: parameter validation is consistent and correct, the internals have been "shaken out" very hard, and stress tests that would quickly break previous revisions now run for days and shut down cleanly.

Friendliness and ease of use were also addressed: the new system configuration utilities and the SYSINIT dialog look more like DG utilities than before; the fact that the OS no longer has to be told, via SYSTEM_DEFINE, what devices exist on the hardware, but finds them at boot time, makes life in a multi-CPU shop (such as my own lab) much easier. A minor but pleasant enhancement for the benefit of programmers is that SCREENEDIT is now supported on all terminal devices, not just IAC lines, and it works just like AOS/VS SCREENEDIT. We found and imitated all the strange and wonderful features, the cursor positioning, etc., and brought them home to the system console. A major, and still pleasant, enhancement is the presence of the user debugger (and FED) in AOS/RT32. Now single processes, as well as the entire system, may be debugged.

These enhancements will change the default for whether your program, developed on a time-sharing system and brought up in the real-time deployment environment, is going to work the first time from "no" to "yes."

Because of the auto-sizing functionality, system generation is vastly different under revision 5. SYSTEM_DEFINE and PROCESS_DEFINE are gone. FILE_DEFINE has been rewritten. A new utility, ECON-

FIG, allows users to specify changes in the boot-time defaults. You now get a starter system (AOSRT32.SYS) on the release tape, which can run right out of the box if the system root is to be a disk; it will read a file named :CONFIG to find out what has been specified for devices to ignore, operating parameters, and so forth. If you want to generate a memory-based system, you start with AOSRT32.SYS and run FILE_DEFINE, adding file definitions for the files the system needs (:RT\$CLI.PR, :RT\$CLI.OL, RT\$IACRS_5_00.PR, etc.) and the files the application will require, building them into a new system file. You get to choose the name of this file; I call mine MEMORY.SYS unless I have done Something Really Different in defining it—then I call it <mnemonic-for-Something-Really-Different>.SYS.

The way in which we replaced PROCESS_DEFINE is worth mentioning in some detail. We now bring up a temporary CLI process, PID 1, running directly under the system. This process has a pipe file as its INPUT file, and it receives an initial IPC message, the default text of which is "RT_UP." Thus, if there is an RT_UP.CLI in the root directory, that gets processed before we do anything else. This macro can be used to bring up your application, fix device characteristics, create files, send CONTROL messages—you name it. Processes that are started by PID 1 are special-cased by the system, since we expect PID 1 to go away before long; they are placed in the process hierarchy directly under the system (PID 0), not as children of the doomed PID 1. This is just as well, because the only command that comes down the pipe is a "BYE" written in by the system.

So the PID 1 CLI does the RT_UP processing, then it's terminated. When the TERM code in the system sees a PID 1 going away, it wants to reserve that special PID, so we don't use it again; it simply stuffs into the PIDTBL, in the place used by PID 1, a pointer to the process table belonging to the system (yes, internally, the OS looks like a process to itself).

From then on, for the life of this invocation of AOS/RT32, PID 1 is a synonym for the system, and calls like ?PSTAT, ?RUNT, etc., issued against PID 1 will return system information. When the system-initialization process is almost finished, it checks to see if the user asked, via ECONFIG option, for a CLI to be run on the system console. If so, it ?PROCs that CLI, with @CON0 as its INPUT, OUTPUT, and CONSOLE entries, and sends an initial message, which defaults to "PID2_UP" (but ECONFIG can change this name as

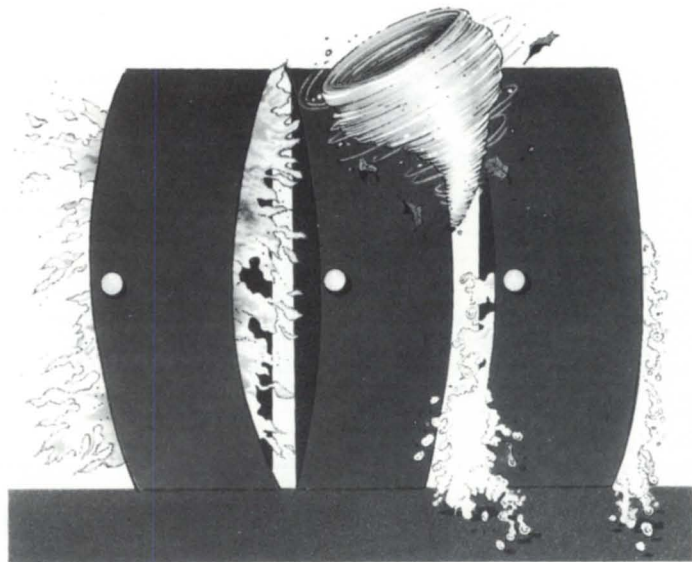
well). Note that this CLI may not in fact be PID 2, since RT_UP.CLI may have contained CLI PROCESS commands that brought up other processes ahead of it. Of course, all of this razzle-dazzle is available in a memory-resident system also, just by FILE_DEFINEing the necessary +_UP.CLI macros in the memory root.

That took about as long to describe as it does to do; now we are free to move on to

some of the new system functions.

VTF allows you to define multiple, prioritized time bases, each of which "ticks" at a rate defined in milliseconds by the physical clock, or by a multiple of "ticks" of a specific other Virtual Timer. In addition, there is an option by which the entire facility, system-wide, can be driven by interrupts from a specified user device defined via ?FIDEF. As a simple example,

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if timer 1 runs at the default RTC rate of 10 Hz (this rate can be as high as 1 KHz), and timer 2 is cascaded from 1 and runs at a rate of 5 (i.e., 5 ticks of time 1), then timer 2 will expire twice a second, or every 5 RTC ticks.

Timers can also be used to synchronize the start of other timers, including specifying a "skew" interval. As a result, practically any imaginable timing pattern that can

be realized in the hardware can be represented by Virtual Timers. Part of the definition of each VT is a selection of whether it will work by signalling a base-level task at each beat, or by running a (short, we hope) user procedure at interrupt level each time. Overrun and missed-signal handling is available. There are six VTF system calls, which are defined in a documentation change file on the release media.

Fast user-interrupt support (the ?FIDEF and ?FIXMT calls) was set up to look as much as possible like the existing ?IDEF facility, as you will be able to see from the documentation change file. This allows you to debug your application using ?IDEF, then change to ?FIDEF cheaply for final testing. It also gives you a decent shot at translating existing drivers if you want. This is the ultimate real-time feature. It allows you to map a block of user code and data into ring 0, and we hammer the interrupt vector table entry for the device to go directly to this remapped interrupt service routine (ISR), as if it were built into the system; after this, you get your interrupts (at least) as fast as we get ours. This is excellent for latency-critical applications, or for those who just want to take over the processor.

There are warnings on the label, of course. Once you're running in ring 0, the machine can't tell you from the OS, and if you have any nasty coding habits, they will show up in a bad light. In particular, you must have PC-relative code in your ISR, and not try to store any data away outside your defined data area. Things like stores into, or indirect jumps through, or page 0 locations, which all might have just been clever tricks before, will now get you to the "game over" screen real fast. Also, if you were in the habit of using a privileged instruction as an emergency exit from your program, your instruction is going to execute just fine, and you will fall into whatever code (or data) comes after (and it's never anything good).

We ran an extensive set of measurements of this facility compared to ?IDEF on various CPUs, and I, for one, was so pleased with the results that they ended up in the release notice. To summarize, a typical improvement was a factor of 2 in MAX latency and from 2 to 5 in MEAN. The distribution also got correspondingly steeper, meaning that ?FIDEF interrupt service is more deterministic than ?IDEF-ed service. All of this wasn't free, of course; our memory MEC went up to 2 MB from 512 KB.

The net result of all this is that your real-time applications can be marketed quicker, performed better, and maintained easier. △

Craig Presson is the software development project manager for AOS/RT32 at Data General. He has been with Data General for nine years. Craig is a member of NADGUG, IEEE, and the IEEE-CS Technical Committee on Real-time Systems.

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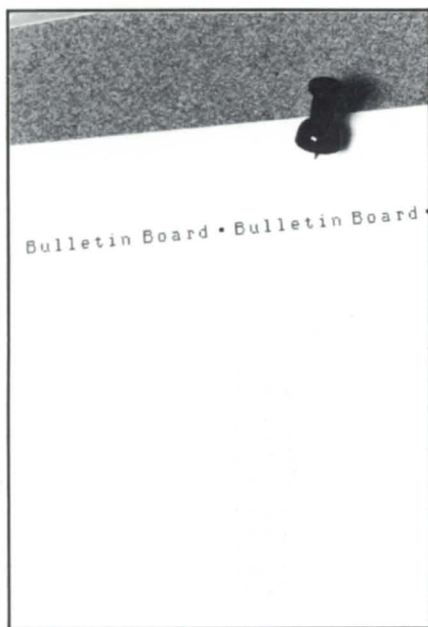
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Bits and bytes from the bulletin board



Stray PIDs

From: Bill Benedetto

I have an MV/8000 running AOS/VS 7.60 with about 12 MB of memory. I have seen a strange occurrence lately that I do not understand. I'm not really sure that it's anything more than a curiosity. What happens is that I may have 40 PIDs running, and they don't have continuous PIDs. That is, there may be 1 through 29, 31, 42, 60 through 62, and 70 through 74—all active (the numbers not mentioned are not PIDs). The problem I have is when I create a new process, I expect it to pick up a PID number that is not active. In this case, I would expect the next process to have PID = 30. This is not necessarily so. It may come in as PID 63. Why doesn't it get a lower PID, such as 30 (or 32 to 41, or 43 to 59, etc.)?

From: Michael Travis

Here are a couple of suggestions: (1) VS tries to reuse swap and page files by picking a PID that has ones of the right size around in :PAGE and :SWAP, generally from some earlier process that executed the same program. (2) Connection table problems can cause PIDs to get tied up. Typically, some server is failing to do a ?DCON when a customer dies. The customer PID then can't be reused until the server is terminated or the system rebooted. CEO had a habit of doing this for a while.

From: Bill Benedetto

OK, I understand the first part about VS trying to reuse :SWAP and :PAGE and wondered if that was a factor. I don't fully understand about connection tables, so I imagine what I will do for the time being is try taking the system down, cleaning out :SWAP and :PAGE, and then rebooting to see if we go back to a more orderly scheme. It doesn't seem to have affected anything, though. Thanks for the suggestions.

AOS/VS 7.62

From: Tim Boyer

Do *not* go to 7.62 if you want to print anything. I'm getting flaky errors all over the place. For instance, about every five times, when I do a CX BINARY @LPB CLEANUP_BINARY, I get "Error in cleanup file: :UTIL:FORMS:OP. Cooperative terminated." When I do ICOBOL/E=OUT.LS LOGON;QPRINT OUT.LS, I *always* get an "Inconsistent Tab Format. Cooperative Terminated." When I start the printer up again, (assuming that I don't get the clean-up file error), it prints fine. I'm using no special forms or tab formats, and all the clean-up file contains is a form feed. Caveat Emptor!

By the way, anyone hear anything more on VS II pricing? Why hasn't this board been melting with comments about that?

CLI macro help

From: Ted Barila

Does anybody remember reading an article about bullet-proofing CLI macros? I need information on special characters.

From: Mike Shumway

I have two articles that helped with our macros. First was a *Focus* article on page 6, March 1986. But the ideas there were solved by the READ/S switch. The other important article was the patch offered by Phil Horvitz in *DG Review*, July 1988, which prevented CTRL-C CTRL-A out of menus during logon. (That one drove the in-house hackers crazy.) As far as the brackets, etc., our in-house macro maniac still can't figure how to lock that one out.

Function keys

From: Ted Barila

Anybody know anything about programming function keys in the CLI?

From: Michael Travis

You can't. Sorry.

?PROC

From: Kim Geiger

I am trying to call CLI with an IPC message using ?PROC. I can't get it to work. Are there any known problems, or does it work differently than the documentation says?

From: Stan Gula

This is a well-known problem. There are some scantily documented flag bits to set in the user flag-word in the IPC header to make that work. The best reference for them is to browse PARU.32.SR. There are flag bits mentioned in the section of the *VS System Call* manual under ?GTMES and also in the ?IREC/?ISEND sections. This, together with information culled from PARU, will be what you need. I'm hedging because my MV is down, and I can't look up an example.

Anyway, the flag to look for is the one that indicated to GTMES that the message is in CLI format (all uppercase, arguments delimited by commas). Also, make sure the IPC message buffer is padded with nulls to an even byte boundary, because you pass the number of 16-bit words as the length, and I seem to recall CLI wants the null at the end.

From: Michael Travis

It's not documented worth a damn. Here's what works for me: (1) The initial IPC to be in "CLI format," meaning all uppercase, comma separated, one trailing 0 byte, or two if needed to fill out the last word. (2) Omit the "CLI" on the front. (3) Set word ?IUFL in the IPC header as follows:

(a) For the CLI to execute the initial IPC and terminate, set ?IUFL to 0.

(b) For the CLI to execute the initial IPC and then accept commands from @INPUT, set ?IUFL to 1B1 (10000 octal).

(c) To ignore the initial IPC and accept commands from @INPUT, set word ?IUFL to 1B0 (20000 octal, left bit on).

Of course, for cases (b) and (c) you must pass the CLI a file or console to be @INPUT. For example, Init IPC contains "TIME;DATE;PROMPT,DIR<0><0>". Word ?IUFL has 1B1. CLI ?PROCed by parent process with block and passing generic files, including @INPUT. CLI will type out the time and date, print its header, and accept commands.

If you need more info let me know. Now would anyone like to type in a tutorial on collecting and interpreting process-termination messages on port ?SPTM, a much messier and very ill-documented area?

Terminal emulation

From: Joe Carrico

Does anyone know of a good DG terminal emulator that runs on a Macintosh?

From: David Down

Versaterm is a good emulator for the Mac. It supports D200, VT100, and Tek 4014 emulation. It also supports Xmodem, Ymodem, and Kermit protocols in text, binary, and Macbinary modes. Runs in background under Multifinder. Has screen cut and paste, scroll back, and mouse cursor positioning. There are also many other options that you can customize.

From: Mark Weber

Yes, I just received Versaterm, and it looks good. Had Front End before, but it does not have Xmodem. Versaterm is doing a good job so far.

From: Focus editor

We use two of them here: Front End from Kaz Business Systems has very good emulation and is reasonably priced, but lacks a file-transfer protocol; Versaterm has a variety of file transfers but is poor in terms of function-key mapping.

By the way, using binary Xmodem protocol, we can move DG Wordperfect 4.2 files directly to Macintosh Wordperfect 1.01 with no problem, but it doesn't work well going the other direction. Anybody know why?

File conversion

From: Mark Chappell

I've downloaded MS-DOS files onto our MV. Does anyone know (1) of an easy way to convert the files (changing CR to LF) or (2) of a program to do this? Any help would be much appreciated.

From: David Down

You can use Sort/Merge to convert them. Note: If you use TEX to download, the "m" option converts the files as you receive them. Also gets rid of the ^Z at the end and null padding.

From: Kevin Danzig

I'm not sure anymore but x RDOS (dump/load)/c will also do a change. You can dump them all to a disk file with the switch and then load them without (I might be backward). We did it a couple of years ago.

From: Michael Meissner

Another possibility is SPEED. At its simplest is the loop: <<^M\$^J\$;>^D which changes all carriage returns (^M) into line feeds (^J) within the current buffer. If the file has form feeds in it, you have to cycle through the pages with an outer loop and the "r" command. You can cycle through a list of files by using the /i=cmdfile option, and () from the CLI. It ain't pretty, but it does the job, and furthermore, it's guaranteed to be on every AOS or AOS/VS (both new and classic) system. Note, that the "\$" above is really an escape character.

From: Focus editor

We do this using TEX on the DG for Xmodem and one of several PC terminal emulators. Using the "i" and "m" switches on TEX seems to take care of all the conversions for MS-DOS. In fact, we regularly use the MV/4000 as a middle step between Macintosh and PC for file transfers.

△



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


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Special to Focus

"We have never missed a conversion deadline," said John Ashburn, a conversion analyst for World Computer Corporation. That kind of success doesn't happen by accident. To achieve and maintain a superior level of customer satisfaction, World Computer has set a goal of doing everything right. They even talk freely about their mistakes.

Founded in 1973, World Computer Corporation of Auburn Hills, Michigan, serves credit unions. This vertical market is closely related to banking; however, there are some important differences. First and foremost, credit unions tend to be smaller than banks. While there are CUs with assets in excess of \$100 million and more than 25,000 members, these are the exceptions. Also note that while you may be a "depositor" to a bank, you are a "member" of a credit union. CUs are formed expressly to meet the needs of the people who put money in them. World Computer Corporation is a vendor to an intensely service-oriented industry.

Barbara Kasoff, vice president for Software Systems and Support said, "Credit unions are giving the other financial institutions a run for their money. We like them to come out first."

To meet that goal, World has defined the parameters for success. Of course, they are a Data General OEM. World buys CPUs around which systems are configured for its customers. At World, employees also know that people come first. World has a progressive and far-reaching understanding of what makes people tick.

Tom West's machines

World has approximately 300 clients, about 10 percent of whom make use of the service bureau. The others have systems

that run the gamut from the S/140 to the MV/20000. "We just upgraded our last RDOS customer," said Steve MacWilliams, Software Service director. "They signed up with World service because they wanted the technology of the MV series." World also runs a slew of AOS and AOS/VS machines from the S/140 and MV/4000 to the MV/10000 and MV/20000. In short, it has one of everything used by clients.

"We rack our own components," MacWilliams said. Indicating the expansive floor space for hardware configuration, he added that not everything has a Data General nameplate. "We have a mandate to shop along the price-performance curve. We get some of our peripherals from the same places DG does."

Anyone can make a disk drive, but only Data General can make a CPU. Kasoff and programmer Tom Gagne are totaling the service load of a typical MV installation for a major credit union. "You have 150 tellers, two or three batches running, the Automatic Teller Machines and Automatic Clearing House, general ledger, and CEO in use, and you have subsecond response," Kasoff said.

More than computers

"I am not a computer person, I am a people person," said Rick Moore, working the midnight shift in customer support. He will take a call every 10 minutes. "The computer operators are often part-time people, new people. They're there alone." His degree in computer science and 2½ years of experience with World give him the ability to describe to the user what should appear on the CRT. As he does this from memory, he fills out his log. The log will show whether or not he has met the corporate goal: total resolution of every client problem within four hours.

Supporting him is another programmer, Kyle Yee. Yee is tracking a corrupted file. An Automatic Teller Machine (ATM) has transmitted a nine-digit real number where the system expected an integer less than or equal to 32,727. He configures a World MV/10000 with the client's software and

wends his way through the data and the code.

In another corner, software support analyst Paul Ward is installing new drives on the MV/10000 used by the management. He has several reasons for being there at midnight when he is scheduled for a regular shift later that day. The staff can use the extra capacity. The drives are new products that need to be tested. He will learn more about the system by doing it.

This level of motivation is the result of accurate and precise planning by World's management team. To facilitate communication, the managers took the Myers-Briggs Type Indicator. The MBTI is a general measure of whether you are a thinking or feeling person, intuitive or situational, perceptive or judgmental, introverted or extroverted. The managers sport coffee cups with a four-by-four grid where they mark their type. This makes it easier to communicate, since you can tell at a glance where someone is coming from.

World has supported an ongoing effort of user surveys and employee opinion questionnaires. Dr. Zigmund S. Kryzak is the senior vice president in charge of organizational development. According to him, "What brings a team together is a dependable leader. By working together at the top, we are jockeying for a win-win situation."

Before this direction was identified, working in customer service was less than rewarding. "It was a burn-out job," said Kasoff. MacWilliams concurs, pointing out that what brought them to that state was good intentions overdone.

Less is more

MacWilliams said, "The company looked at the larger credit unions and saw an opportunity to help these people see where they were heading. We had a hand-picked team, the very best." Each of the special support people learned the full scope of credit union operations from share drafts (called "demand deposits" or savings and checking accounts in banking) to general ledger to IRAs to ATMs.

"We said, 'This is working out great,'

and there was a move to make this available to everybody. Our people were in a no-win situation. You had a lot of people trying to be experts in everything.

"It became apparent a year ago when we had a survey done by the users group. The results said that we needed to look at service as the primary product. If you were going to start a computer company from scratch so that service was the key, how would you do it?"

The MBTI is a general measure of whether you are a thinking or feeling person, intuitive or situational, perceptive or judgmental, introverted or extroverted. The managers sport coffee cups with a

four-by-four grid where they mark their type.



The solution was to define the areas of credit union services and in-house needs and get people to sign up to become knowledgeable about one area. Said MacWilliams, "We had to give our people the best opportunity to be successful." Kasoff believes that in following this path they have made customer support "the place to be."

If it spins, it breaks

Excellent client service means anticipating problems. World has begun offering "disk mirroring." The newest disk controllers now make it possible to rapidly write the same information to two drives without a significant loss of performance. The drives are configured to be twins, even to the point of having bad sectors on one drive being blocked off in the other, even if they are good. If a track or sector goes bad on one drive, rather than lose the

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data, it is read from the mirror drive. This is just one path to reliability.

One Saturday afternoon, system support engineer Larry Knowles spends four hours tearing out and reinstalling a series of seemingly identical drives to discover why 6 out of 20 have failed. He works carefully and methodically. He takes the time to ground himself. He is working on a tight schedule. He needs to have this

particular MV/20000 up and running and its files restored—or come Monday morning, 75 programmers are going to have a surprise.

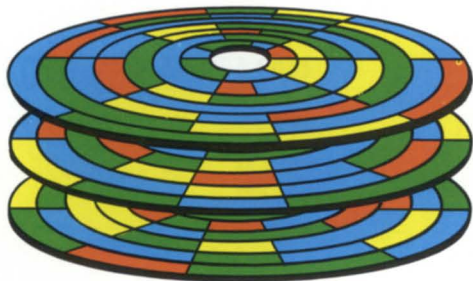
Larry Knowles started out as a field engineer. His ability to do the right thing made him a member of the home office team. As an FE, his concerns were somewhat different. Service in the field is always at the board or component level,

because in the field, there is no time for philosophical inquiries. Said Joe Power, the manager for Field Engineering in the Western District, "Every minute of down time is a catastrophe for a client."

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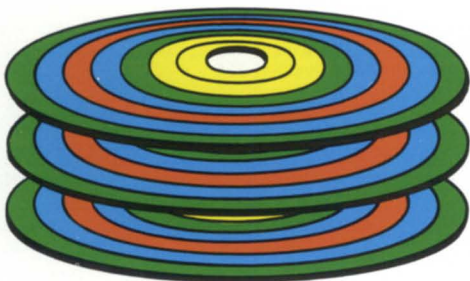
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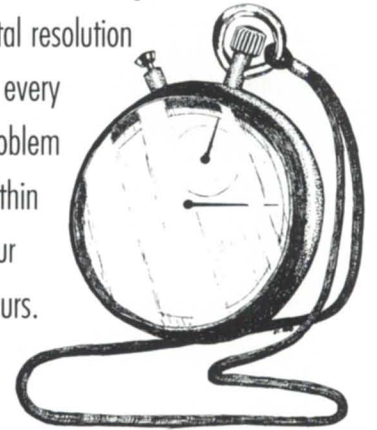
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Power's field engineers have a well-defined goal:

total resolution
of every
problem
within
four
hours.



Power's field engineers have a well-defined goal: total resolution of every problem within four hours.

Every trouble call that comes in is logged. The log can be run as a continuous process on CEO. At any time, any manager (up to the president, Donn Schulte) can see what problems came in and which ones were solved.

Said Kasoff, "After two hours, if the problem hasn't been fixed, the client gets a call from a manager to let them know that we know that they have an emergency." World's HQ is also at the disposal of the FE. Power wants his people to know that the combined might of the home office is behind them. "We want them to call us for every nontrivial problem. We want them to know that the expertise is here, the management and technical resources are here."

World maintains parts supplies with air freight couriers. They have contracts with ground-based delivery services as well. Their own parts people are on call 24 hours a day. If a client needs a part, the part can be packed and shipped on demand.

Don't bug me

While World clearly knows how to maintain hardware, without software the effort is one-sided. In line with its commitment to quality, World has organized a tiger team to test, document, and install software.

Circle 27 on reader service card.

Vicki Wood is the director of Quality Assurance, Documentation, and Training. She has been with World for seven years. Wood is responsible for six quality assurance analysts, three product research analysts, four technical writers, one librarian, and five trainers.

"We maintain a complete data base of our customers' optional programs, which allows us to send a unique release tape to each of our 270 credit unions.

"We also perform software acceptance testing attempting to emulate as many conditions as our clients have to offer. We run through the upgrade looking for error conditions. Most of our testers have credit union experience. They come up with those error conditions. They test the reports, documentation, and software.

"The data base and acceptance testing lend well to the quality of the past few software releases; however, a new and improved command line allows the credit unions to install a release by entering one simple four-digit command.

"Frankly, I'm very proud that Quality Assurance has been able to work well with our programmers. They do more than criticize and reject. They work as a team. QA used to be the last people to see software. Now QA is involved in a series of requirements meetings at the beginning of a project."

Ten clients are signed up to be beta test sites. These sites change, with the intention of maintaining a good mix of small, medium, and large installations. "Software is at a beta test site for two months. Typically, two sites get the first beta version. We come back with fixes for glitches and additions. The next eight come through Product Research for a beta test site for two months," according to Wood.

Kasoff explained, "We want new software releases to be a non-event."

Excellence found

A lot has been written about the "search for excellence." World Computer Corporation is a Data General OEM that has succeeded in that search. The team's ability is not so much in knowing what is right, but in being willing to identify problems and solutions. It does not look for quick fixes and instant solutions. Managers and line workers are willing to make the extra effort required and to follow through in detail.

Michael E. Marotta is a systems analyst with a decade of experience on Data General and other equipment. He specializes in creating user manuals.

World's employees take direction from their clients. They listen to their users. They do not argue them into submission with a barrage of techno-babble.

They use the right hardware. They shake out their software. They devote a substantial fraction of their resources to supporting their current clients. They pay their people according to the industry standards. There are many ways to measure

the effects that come with this kind of successful attitude. One measure, the easiest to perceive, is their three-story office building, designed to their specifications. It took 16 years to get there, one day at a time.

The course they charted can be taken by any company, surely any computer company, willing to do what is right simply because it is right. Δ

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Expert advice

Wise use of consultants is a smart move

by Steve Handlos and Liz Straus
Special to Focus

You just heard from the company president. The company is expanding into a new market, and it expects to close the contract three months sooner than projected. That new marketing and order-entry project has to be completed by the time the contract is closed—and the other projects on the agenda have to stay on schedule.

You thought you had plenty of time to complete this project, but now you're behind. How will you meet the new goal along with your other commitments?

The bottom line is that you have to get the job done in the most efficient way, managing the resources at your disposal for the results your company wants. This may be a delicate task, but it also offers the opportunity to build credibility and sell yourself to management.

Using consultants

The real reason to use a consultant is to help you do a better job. It's a two-way learning and training process. The consultant teaches you about a particular specialty, but also learns from you. As a team, you can improve your managerial ability and make yourself look better to the company.

The consultant has a vested interest in making you look good. The consultant wants you to get promoted, because the better you do, the more likely you will ask that person to return. If the consultant helps you develop into an employee with more responsibility, then you are in the position to delegate and refer more business in that direction. By helping each other, everyone benefits: you, your company, and the consultant.

A consultant should be viewed as a

resource to be used on a regular basis to solve the normal business problems you face. If you don't use the consultant regularly, you can't expect miracles in a crunch. A cultivated consultant needs to be part of your regular team. A good consultant will constantly be in touch with the market in order to find the additional resources you may need. Your consultant may already know that information.

A consultant shouldn't *replace* your staff, but rather be a part of it. You still need an in-house staff to handle the daily work load. The consultant gives you the flexibility to manage time constraints and personnel shortages, and exposes you to new ideas. This helps you to manage your budget by providing you with a flexible work force that has the expertise you need.

The consultant teaches you about a particular specialty, but also learns from you

Not being an employee frees the consultant to do things that you wouldn't dare to do. The consultant can speak respectfully to management in ways that challenge action. Employees tend to take their instructions from management. A consultant's opinion is viewed differently once credibility is established. This fact helps you to sell yourself and your ideas to management. If used properly, this can be a valuable tool.

Case studies

Pat, an MIS vice president of an up-and-coming insurance company, spoke recently at the NADGUG conference in Philadelphia. Her company grew so fast and the needs for good software were so critical, she had to use every means possible to get the software running. She used in-house programmers. She used software packages. She used consultants.

Her problem isn't unique. Because her company was small, her performance was critical to the company's success. Pat had to develop an entire department overnight—and under pressure. Management was aware that the bottleneck caused by

the lack of software was preventing the company's growth. The consultants that helped Pat reach her goals are just as important to her now as her employees. And likewise, they will probably continue to benefit by getting referrals and future opportunities to help Pat maintain her performance.

Another example is John, a technically oriented person who knows his field well and started his own company. While he was technically competent, he lacked an understanding of marketing and sales. Although others were able to find work in this particular niche, John had difficulty.

Someone recommended he find a consultant to explain marketing strategies for a newly formed company. John learned from the consultant what he was doing wrong, and how to correct it. John's company changed directions almost overnight, and is now successful.

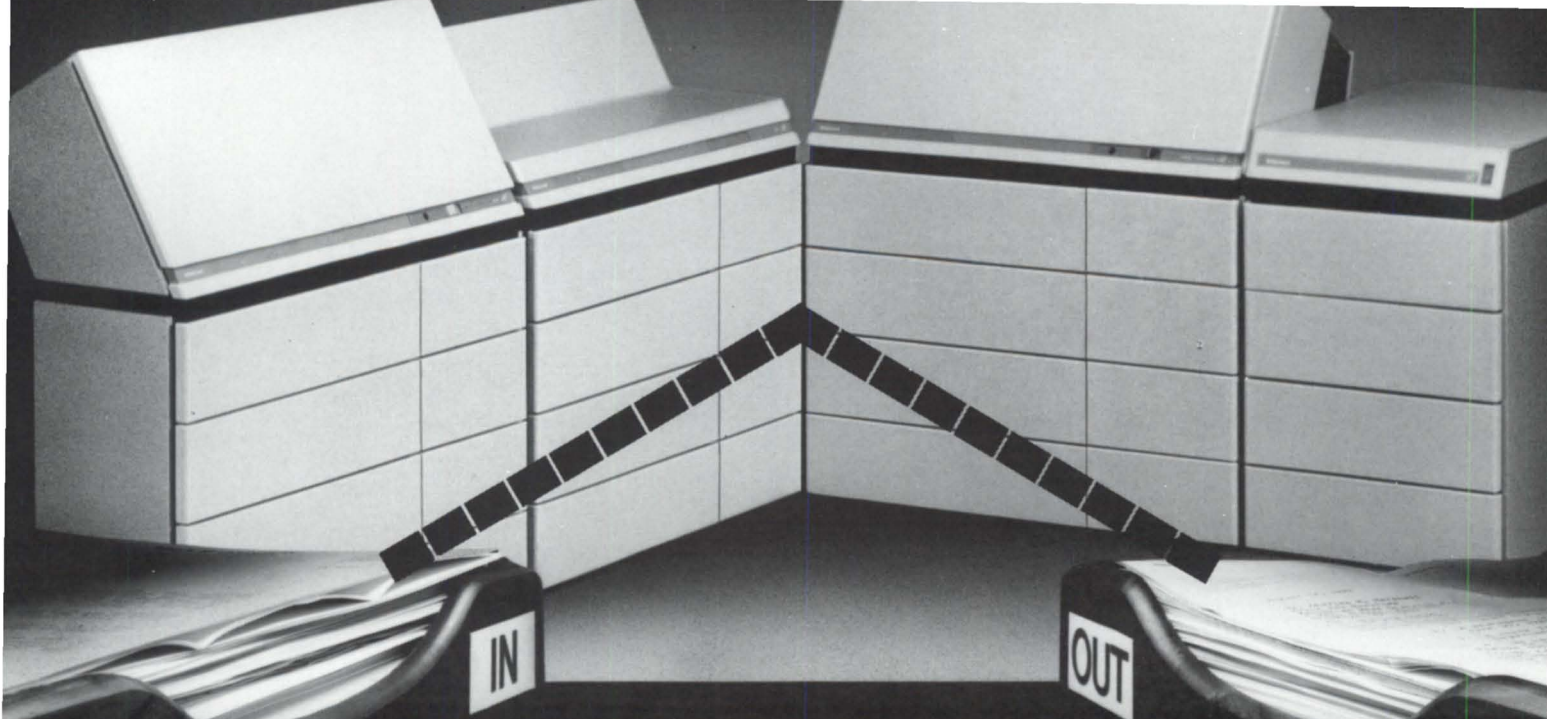
John learned a great deal from his consultant, but the consultant also benefited. They continue to work together, expanding the business into new markets. John's contacts have led to more opportunities for the consultant, and in some cases, the consultant works for John as a subcontractor.

Get organized first

To make effective use of consultants, you have to have the right attitude about yourself and your role in the company. Decide today that you want to be a factor in your company's success. Evaluate yourself, and address your weaknesses through a training program. Learn how to do things right. Analyze your objectives and your resources.

Then take another look at consultants. As you find some who can help you reach your objectives, make them a part of your staffing plan. Teach them what they need to know about your company and its operations—and learn from them. Be ready for all contingencies, so when your opportunity arrives, you can succeed. Δ

Steve Handlos established Productivity Systems Development Corp. and Data Safe Corp., with products that include contract programming, disaster recovery services, and training. He can be reached at 2138 Ashley Phosphate Rd., Suite 206, Charleston, SC 29418; 803/553-6649. Liz Straus is the president of Stewart and Assoc., a marketing consulting firm that offers management training for data processing people. She can be reached at P.O. Box 11944, Columbia, SC 29211; 803/771-4636.



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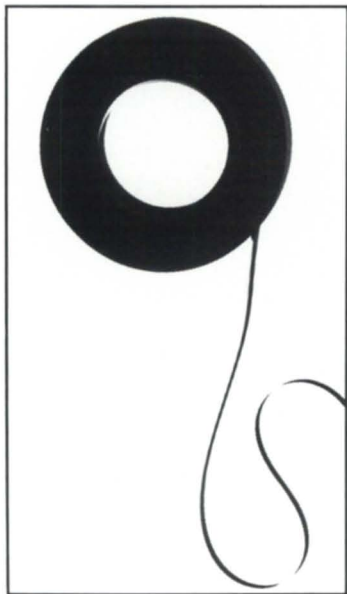
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People with AOS/VS rev 6 should send a 2,400-foot tape and specifically request a DUMP_II instead of the usual compressed version. The decompression program is rev 7-specific.

Please include a self-addressed envelope with sufficient return postage. In compliance with postal regulations, do not date the postage, because the tape will not be returned to you on that date. If you send it at the end of the month, please

have the postage read for the following month.

Big Brother

Automatic log-off program written in Fortran 77. Donated by the U.S. Forest Service. 181 blocks.

B.J.'s BBS contributions

This addition to the library consists of about 20 items, including various programs, documentation, and macros. Some of the more interesting items include the :SYSMGR benchmark suite, a continuous incremental backup, a clean-up file maintenance program, a program to find strings in files, and a type-backward program. 5,749 blocks.

CRTEDIT

This is the old RDOSScreen editor ported over to VS. 51 blocks.

DBCHECK

This program checks the open status of an INFOS file and examines the check-pointing status of a file. 230 blocks.

DUMpload

DUMpload is a Macintosh program to dump and load AOS/VS-compatible dumps on a Macintosh. 140 blocks.

ERP

A process-termination program developed by NASA and modified by Manville. In Fortran 77. 338 blocks.

FILEMNGR

With this new version, you can move, copy, delete, view, and perform several other options faster. This is distributed as shareware. If you try it and continue to use it, you are requested to pay a registration fee. From Kim Geiger. 459 blocks.

FTNCVT

This is a Fortran 5 to Fortran 77 translator. 287 blocks.

Games

Games is a collection from various places. Enjoy. 19,293 blocks.

Glossary

Glossary is a program from John Grant that builds a list of words used in a document and shows where they are used. 416 blocks.

IMSLUTIL

This is a collection of CLI macros, COBOL routines, and assembly routines callable from COBOL. By IMSL of Houston. 6,154 blocks.

JAG_UTIL

JAG_UTIL consists of several programs:

Filecount, Userspace, Scan, and Laminate. 1,501 blocks.

Kermit

Kermit is a file-transfer protocol developed at Columbia University. Uses 9,328 blocks.

Logout

Another auto log-out system. 246 blocks.

Look

Look is used to view text files. It allows you to move forward and backward in a file. This program was donated by Data General. 438 blocks.

Macbook

This is a collection of macros from the Colorado users group. 342 blocks.

MENUDIR

This is an initial user menu that can chain to other applications. It features a password-control system. From the Fed SIG. 492 blocks.

Misc Kerm

An expanded version of AOSKerm, this now includes other versions of Kermit including DG/One Kermit. 6,298 blocks.

QHelp

QHelp is a tree-structured help facility. 2,277 blocks.

SKLSCRN

This is the COBOL standard entry screen featured in George Burns' article that appeared in the April 1988 issue of *Focus*. 385 blocks.

Softrans

This is a file-transfer protocol written in Fortran 77. It's used to communicate with proprietary PC communications packages. 496 blocks.

SWITCHES

SWITCHES is the GET.SWITCHES routine from John Grant's column in *Focus*. 1,297 blocks.

TEX 2.25

TEX (Terminal Emulator with Xmodem) is a terminal-emulation program written by David Down. He has recently revised the TEX software to include a command language. TEX is being distributed as shareware. At the end of 30 days, either remove it from your system or send the author a \$45 fee. 495 blocks.

VT100KER

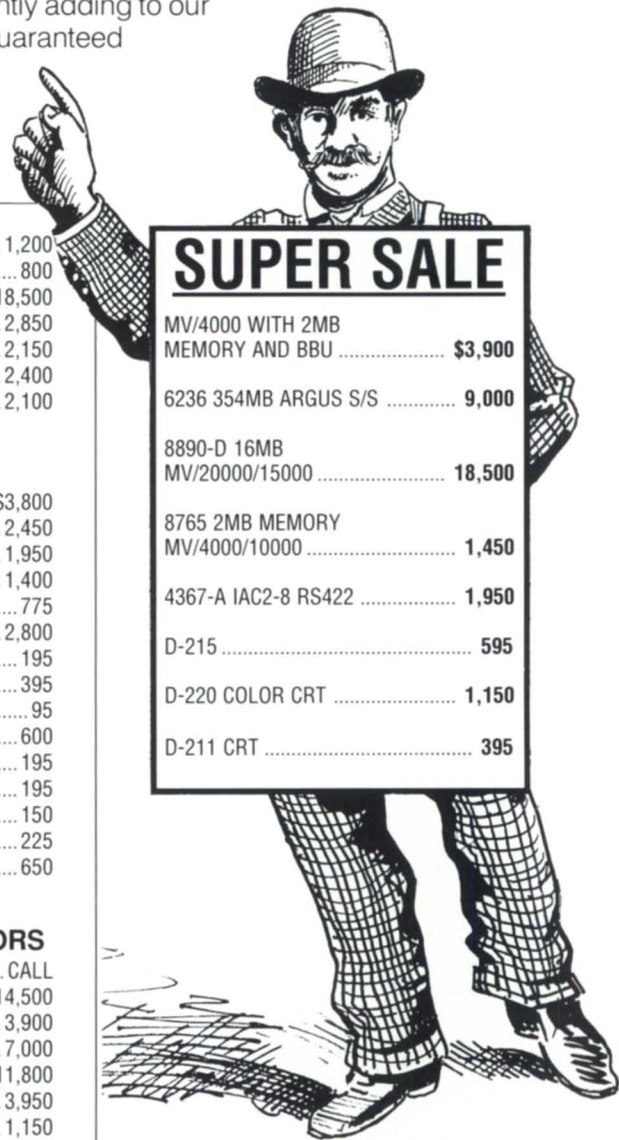
VT100KER is the VT100 emulator from John Grant. 1,135 blocks.

Xfer

Xfer is a tape-conversion utility. 653 blocks. Δ

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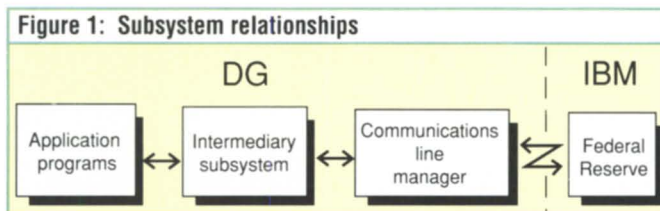
Communications you can bank on

Data communications involves more than data transfer to the Federal Reserve

by William P. Rawlins
Special to Focus

Success for a data-communications project depends on a solution that addresses the user's total information need, not just a special protocol or communications product.

Consider the case where data is transferred from one system to another, and the receiving system updates its data base with the data received. If a line failure occurs during transmission, the communications protocol can detect the failure and resend the data. But how are data base updates affected? Have any updates already taken place? If so, have duplicate updates been prevented? Can the system determine if no updates have occurred?



A major financial institution asked Data General's Software Products and Services Division (SPSD) to help automate the wire transfer of funds to and from other financial institutions through a Federal Reserve bank ("the Fed"). The Fed uses a binary synchronous (Bisync) protocol it developed to perform funds transfers on an IBM mainframe computer. Our customer uses an MV-class computer. Large sums of money were to be transferred electronically over dedicated lines to and from the Fed. (Security issues aren't addressed in this article.)

SPSD's software development effort included:

- A communications line manager pro-

gram to run on the MV and converse with the Federal Reserve's computer using the Fed's protocol.

- Application programs to record the entry of the funds to be transferred and received.
- An intermediary subsystem to run between the line manager program and application programs to ensure the smooth operation and integrity of the entire process.

This article deals mainly with the intermediary subsystem. Figure 1 provides an overview of the relationships among the three subsystems on the MV and the Federal Reserve computer.

SPSD designed the intermediary sub-

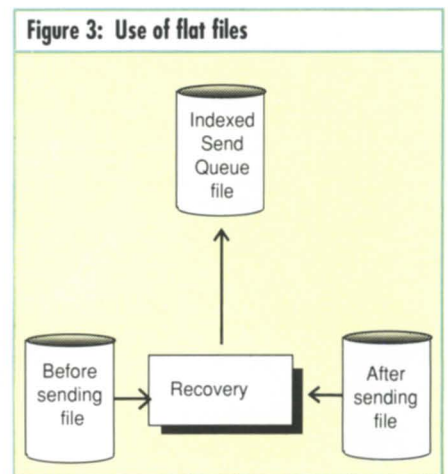
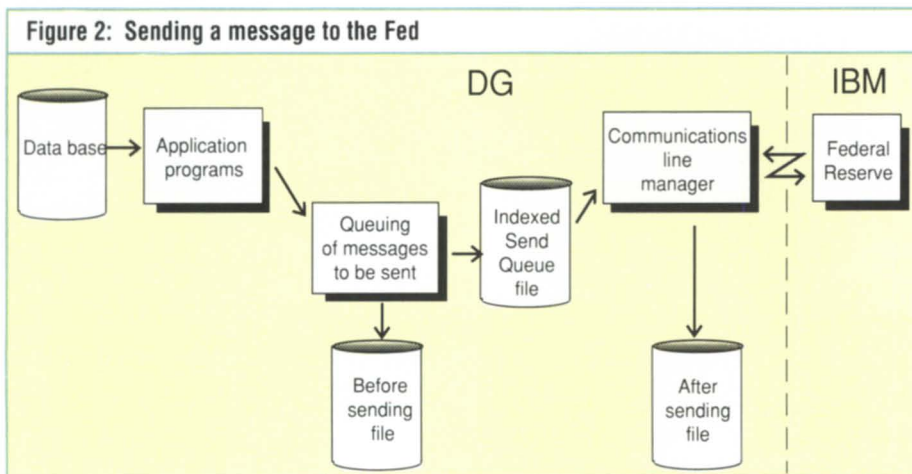
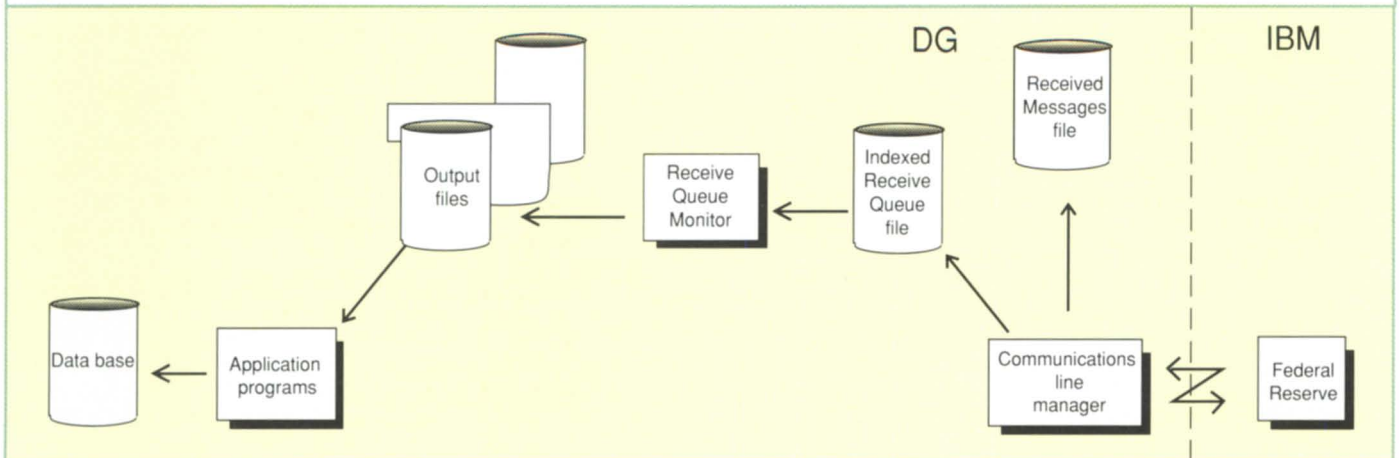


Figure 4: Receiving a message from the Fed



system to perform several functions.

- To queue funds messages to be transferred to the Fed. Since the Fed protocol was single-threaded and since multiple application programs could submit requests to transfer funds, the subsystem had to be able to queue funds transfer requests on a first-in/first-out (FIFO) basis. Each message had to be marked with a

unique identifier.

- To recover from a system failure. Recovery from a system failure was the most important goal of the subsystem. If a communications line failed or if a hardware or software failure occurred, the system had to be able to recover completely. The recovery process had to ensure that messages queued for transmis-

sion would still be sent, that messages already sent would not be resent, and that messages received, if complete, would be processed. The recovery process would also need to generate a list of partially received and erroneous messages to use later for issuing retransmission requests. In addition, the recovery process had to be easily started, so application users could

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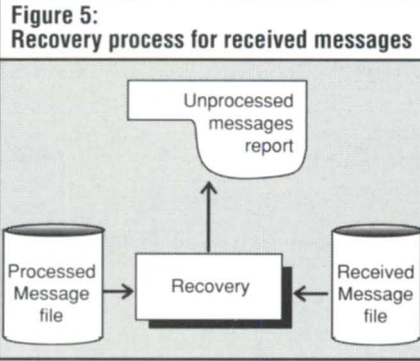
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resume work with little effort.

•To queue funds received from the Fed. Funds received from the Fed had to be recorded, printed, and stored in files on the MV.

Figure 2 details the process of sending a message to the Fed. A message sent is first submitted by the application program to a queuing subroutine, and a unique identifier is appended to it. Next, the message is written to a "before sending" flat file. Then the message is placed in a FIFO queue ("Send Queue file"), which is an indexed file keyed by date and time. The communications line manager program removes the oldest message from the queue and sends it to the Fed. The Fed acknowledges the receipt of the message and the communications line manager program writes the message's unique identifier to an "after sending" flat file. Records written to the flat files are flushed to disk immediately.

Figure 3 illustrates the use of the "before sending" and "after sending" flat files. In the event of any type of system failure (including corruption of the indexed Send Queue file), a recovery program compares the two flat files and rebuilds the Send



Queue file based on those messages that were queued for sending but were never sent.

Figure 4 details the process of receiving a message from the Fed. When the communications line manager program receives a message, it writes a unique identifier for the message to a "received messages" flat file. The message is then put into a queue ("Receive Queue file"), which is an indexed file. A program running in the batch stream, called the "Receive Queue Monitor," periodically checks the Receive Queue file for received messages.

The program processes a received message by writing it to one or more output files. (Application programs later scan the contents of the output files and update the MV data base. These programs have checks for duplicates, etc.) Then the program writes the unique identifier for the message to a "processed messages" flat file. As with the sending process, records written to the flat files are flushed to disk immediately.

The recovery process for received messages is slightly different from the process used for messages to be sent (see Figure 5). A recovery program compares the Received Messages file and the Processed Messages file and prints a report showing all messages received but not processed. This report is used to electronically request complete copies of any unprocessed messages from the Fed.

Figure 6 shows a flowchart of the entire intermediary subsystem. If the communications line is down, users can still queue messages to be sent. When the line is brought back up, the communications line manager dequeues the messages and sends them.

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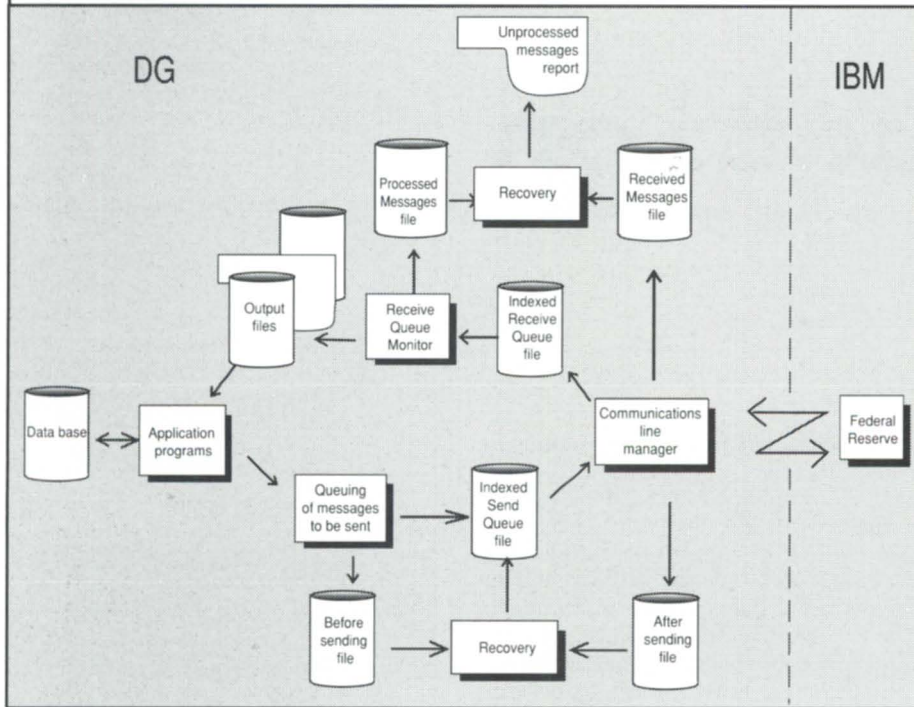
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Figure 6: Flowchart of intermediary subsystem



If there is a system failure, then any hardware or AOS/VS recovery, if required, is carried out first. The intermediary subsystem recovery is initiated by selecting options from a menu.

The intermediary subsystem, which is transparent to the user, ensures:

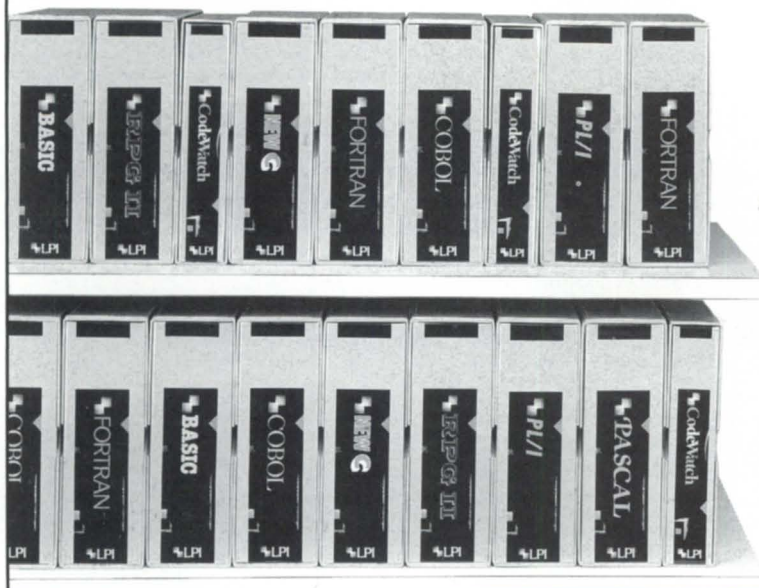
- outgoing messages are transferred
- incoming messages are received and processed
- messages aren't sent twice for the same transaction.

The intermediary subsystem provides users with a smooth-running operation and ensures the integrity of their data.

Currently millions of dollars flow through this wire transfer system every day. This system illustrates that data communications involves more than just data transfer . . . it requires solutions at all levels of an information system. Δ

William P. Rawlins is project manager for the Software Products and Services Division of Data General. He can be reached at 3617 Parkway Ln., Royal Peachtree Corners, Norcross, GA 30092; 404/448-6072.

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Construction work

Assembler may be a programmer's most productive tool

by Al Takach Hill
Special to Focus

Assembler programming productivity

Most programmers avoid assembler programming, because the time required to implement assembler programs of any reasonable size with conventional methods is almost always longer than what would be needed to implement a similar program in some higher level language. However, assembler productivity tools are now available, and they can make the successful implementation of a development or production environment comparatively easy. But why take the trouble to use assembler?

Advantages of assembler programming

Some programming models lend themselves to assembler. Others need code that imposes low overhead, although some sophisticated compilers can generate code that even the best assembler programmer might have a hard time beating. Access to user-defined devices almost certainly requires assembler. Some functions that can be implemented in higher level languages are more easily implemented in assembler. Some system resources are designed to be accessed by assembler. Timing considerations for some applications can only be answered by assembler. And assembler is a good way to beat DG's runtime license issue.

Reasons for its lack of appeal

Assembler has a large number of in-

structions that require the programmer to constantly refer to the instruction dictionary. The number of instructions will be reduced with the new RISC machines. The AOS/VS debugger seems difficult to the casual user, and is quite different than the more familiar source-level debugger. The number of system and task calls are large and confusing to the beginning assembler programmer. Knowledge of hardware architecture (specifically the stack, ring structure, and addressing) may even require additional college courses.

The assembler lacks the simple If-Then-Else and Do-While constructs that most higher-level-language programmers are familiar with, although these constructs can be implemented easily once the programmer understands the macro assembler. By implementing these two constructs, the programmer no longer has to bother with the maintenance of labels, and is free to improve the readability and maintainability of the program significantly. Lastly, there is the portability issue.

Need for productivity tools

Once programmers learn all of these components, they feel comfortable in assembler. A utility is needed that makes assembler somewhat easier to use for new as well as traditional purposes.

The assembler programmer on an AOS/VS system probably devotes a significant amount of time to looking up information in the *AOS/VS System Call Dictionary* and the *AOS/VS System Concepts* manuals. Depending on what is to be accomplished, this is mostly wasted time. Once the programmer decides on what call or calls to use, packets divert attention from the programming problem at hand. If the programmer had a consistent, documented, shorthand interface to a large number of system and task calls, a larger

Figure 1: AOS/VS coding

```

        .title      example1
;Using AOSVS coding
        .ent       start
        .nrel      0
word:0
chnl: 0
        .nrel      1
ofile: .txt      /file/
start:
        lda        1, =ofile*2
        lda        0, =?rtdy+?ofot
        ejsr       open
        Esta      0, chnl
loop:
        Eida      0,chnl
        lda        1,=word*2
        lda        2,=2
        ejsr       write
        Eisz      word
        jmp        loop
        Eida      0,chnl
        ejsr       close
        sub        0,0
        mov        0,1
        mov        0,2
        ?return
        jsr        error
error:
        sub        1,1
        lda        2,=?rfcfl?rfec!?rfer
        ?return
        jsr        error
open:
        save      ?iblt
        elef      2,1,3
        sta      0,?isti,2
        sta      1,?ifnp,2
        sub        0,0
        sta      0,?ich,2
        sta      0,?isto,2
        sta      0,?ires,2
        sta      0,?irlr,2
    
```

Figure 2: RDOS coding

```

        .title      example2
;Using RDOS coding
        .ent       start
        .nrel      0
word:0
        .nrel      1
ofile: .txt      /file/
start:
        SCT_VS
        lda        0,=ofile*2
        sub        0,0
        .system
        .open      0
        jsr        error
loop:
    
```

```

sta      0,?irnh,2
sta      0,?irnl,2
adc      0,0
sta      0,?ibad,2
sta      0,?ircl,2
sta      0,?imrs,2
sta      0,?idel,2
?open
jsr      error
lda      0,?ich,2
sta      0,?oac0,3
rtn

write:
save     ?iblt
elef     2,1,3
sta      0,?ich,2
sta      1,?ibad,2
lda      0,=(?icrf!?rtdy)
sta      0,?isti,2
lda      0,?oac2,3
sta      0,?ircl,2
sub      0,0
sta      0,?isto,2
sta      0,?ires,2
sta      0,?irlr,2
sta      0,?irnh,2
sta      0,?irnl,2
sta      0,?ifnp,2
sta      0,?imrs,2
sta      0,?idel,2
?write
jsr      error
rtn

close:
save     ?iblt
elef     2,1,3
sta      0,?ich,2
?close
jsr      error
rtn
.end     start

```

```

lda      0,=word*2
lda      1,=2
.systm:
.wrs     0
jsr      error
isz      word
jmp      loop
.systm
.rtn
jsr      error
error:
.systm
.ertn
jsr      error
.end     start

```

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amount of assembler code could be implemented more quickly. Calls that may not lend themselves to this type of shorthand can still be coded manually. The assembler program could be more easily maintained because of the decreased amount of code necessary to support the system and task calls. Code readability is improved by the removal of this extra code and the packets required for those types of calls.

This results in greater productivity. Environments that require assembler coding can benefit from this type of tool in a number of ways. The application can be coded, tested, and implemented more quickly. Test and debug routines can be easily developed and used. Programmer turnover is less of a problem, because the new programmer can worry about the problem at hand rather than about how and what information is being supplied to the packets of the system and task calls used. Even environments that use higher level languages can benefit by being able to produce an assembler subroutine or test program that may have been beyond their AOS/VS system programming experience.

MV and AOS/VS support tools

This type of tool was developed from the RDOS system- and task-call descriptions. Since RDOS (with few exceptions) passes all information to system and task calls via the ACs, packets are of no concern. Nearly every RDOS call can be directly mapped to an AOS/VS equivalent call. The remaining calls are managed by data structures within the utility.

It should not be thought of as programming in RDOS under AOS/VS. The programmer is simply allowed to use a different interface to AOS/VS system resources. No intermediate code is developed, as with a precompiler or interpreter. Performance is not a consideration, since in any large application, the programmer would eventually decide to compose subroutines to handle repetitive functions anyway.

The architecture of the MV hardware and AOS/VS allows this type of tool to be implemented. The programmer would code the call as described in the *RDOS System Reference* manual. The program is assembled and linked. When the program is executed, an initialization routine does a ring load of an inner-ring local server. When an RDOS call is encountered, a hardware call is made to the inner-ring server. The information contained in the ACs are used as arguments to a subroutine, and the equivalent AOS/VS call is

executed. When the call completes, control returns either to the error or to user program. All processing in the inner ring is 32 bits. The user program may be either 16 or 32 bits. The coding of the inner-ring server is such that all packets and temporaries are built on the wide stack. In a multitask environment, this means that all of the utility functions are reentrant and shared. The programmer must still worry about reentrancy in personal code, but now the problem is simplified, since only ACs are required to be used for any system or task call. The task scheduler will always save ACs on a per-task basis. The programmer doesn't have to worry about two or more tasks trying to use the same packet at the same time, since the program now would use no packets.

The length of the program is decreased and readability of the source code is improved. Figures 1 and 2 illustrate this.

These two figures perform exactly the same function and could be implemented in a variety of ways. This is to illustrate the amount of code that can go into an assembler program. It should be noted that the open, write, and close routines are reentrant, and can be used for a number of different files by a number of different tasks simultaneously. Figure 1 could be coded more simply, but would then be limited to a specific packet. Also note that both are coded for 16-bit assembler under AOS/VS and that both programs require the file to exist already on disk.

Don't forget RDOS

This utility can also be used to rehost RDOS assembler programs under AOS/VS. In fact, that was the reason for its development. I now find myself coding new assembler programs under AOS/VS with this utility, since I can deal directly with the problem at hand.

The RDOS operating system has seen its day. But the simplicity and power of the system and task calls that RDOS provided cannot be ignored. The approach of this utility can help those who need to program in assembler under AOS/VS until they develop the skill and confidence required to use the more powerful features of AOS/VS, while also allowing the last of the RDOS users a migration path toward better hardware and operating systems. By providing the same assembler interface to system resources under AOS/VS and AOS/RT32, what's left to keep RDOS alive? △

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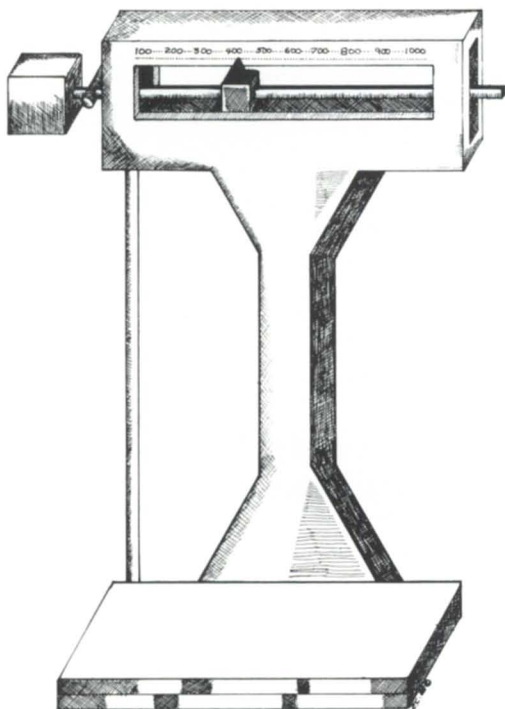
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Platform scale



LAN products for DG workstations weigh heavily in users' favor

We've come far enough along in this series of articles on PC workstations that it's time to address the LAN platforms available to Data General users. For all

practical purposes, there are two: Rational Data Systems' PC/VS and Data General's DG/PC*I. Both are illustrated in Figure 1.

PC/VS

PC/VS is a LAN software package that uses the Xerox Network Systems (XNS) protocols for the integration of IBM PC, XT, AT, PS/2, and PC-compatibles with MV-series computers. The following paragraphs summarize its features.

- **Virtual disks**—MS-DOS files are stored on the MV computer, where they can be backed up using proven AOS/VS system management tools (DUMP, LOAD, DUMP_II, LOAD_II, etc.)

- **Remote printing**—PC printer output may be redirected to AOS/VS files, printers, plotters, or queues—in text, binary, or special DG binary mode. Remote printing supports complete accounting and standard header and trailer pages.

- **File transfer**—PC/VS transfers files at up to 30 KB/second between AOS/VS and MS-DOS. File transfer includes on-the-fly conversion of text file formats, and CLI-style file-transfer options such as /RECENT, /CONFIRM, /DELETE, and /APPEND.

- **Mail notification**—The PC/VS Notifier alerts PC users to the arrival of messages, and supports Data General's CEO and Wordperfect's Office.

- **Remote CLI**—Users can issue CLI commands directly from their PCs. Many simple tasks can be performed this way without need for terminal logon.

- **Programmer's Toolkit**—The Toolkit provides access to PC/VS's XNS network and transport layers, allowing OEMs and sophisticated end-users to develop distributed PC-to-MV and PC-to-PC applications. The Programmer's Toolkit also includes utilities to access PC/VS from many programming languages.

- **Data conversion and back-up utilities**—A collection of utilities such as menu-driven programs for backup, recovery, and

print queue management are included with each update.

- **Date/time synchronization**—A PC's calendar and clock may be set automatically from the MV host clock and calendar.

- **Low overhead**—Only 13 KB of resident PC memory is required.

- **DOS 2.xx or 3.xx**—Whereas many PC LAN products are restricted to MS-DOS 3.10 and later, some users prefer the older revisions that require substantially less memory. This allows users to run memory-intensive applications that will not squeeze into the MS-DOS 3.10 environment.

- **Native mode**—Workstations may be directly connected to MV computer servers using Ethernet or Lattisnet.

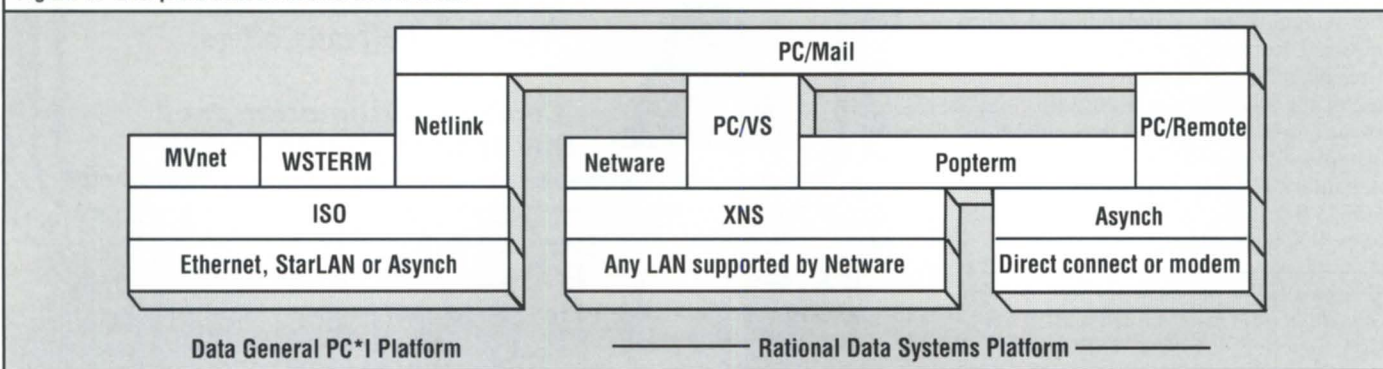
- **Novell-compatible mode**—Alternatively, PC/VS may be run on a PC workstation running Novell's Advanced Netware, using any cabling scheme supported by Netware. If the cabling used is other than Ethernet or Lattisnet, a Netware server will bridge between the selected LAN and the MV server. A short Ethernet connects to the Data General system.

- **Xodiac-compatible**—Since PC/VS uses standard AOS/VS system calls, it is inherently compatible with Data General's Zodiac wide area network technology. A user may, for example, access a virtual disk or printer on a remote MV system as easily as accessing local resources.

- **IBM PS/2-compatible**—PC/VS can be used on IBM's PS/2 model 60, 70, and 80 processors either with Novell Netware or via direct support for the 3Com 3C523 controller.

- **Choice of command or menu interface**—Those unfamiliar with computers may prefer PC/Menu, with its pull-down menus and pop-up windows. The VS.EXE utility is a standard command-line interface for use within .BAT macros and by those familiar with MS-DOS. Both PC/Menu and the VS.EXE utility provide access to all of the PC/VS facilities.

Figure 1: LAN platforms available to DG users



Standalone PC/VS

When used without Novell's Netware, PC/VS requires a local area network based on IEEE 802.3 Ethernet or RG-58 thinnet. The following hardware is required:

- **MV hardware**—An IEEE 802.3 controller and appropriate internal cable from the following list: (1) Micom-Interlan model NI4010A, (2) Data General model 4532 Intelligent LAN Controller (ILC), (3) Data General model 4562 L-Bus LAN Controller (LLC), or (4) DG model MV/4000 DC or MV/7800 DC processors with built-in IEEE 802.3 controller as part of the Multifunction I/O Controller (MIOC).

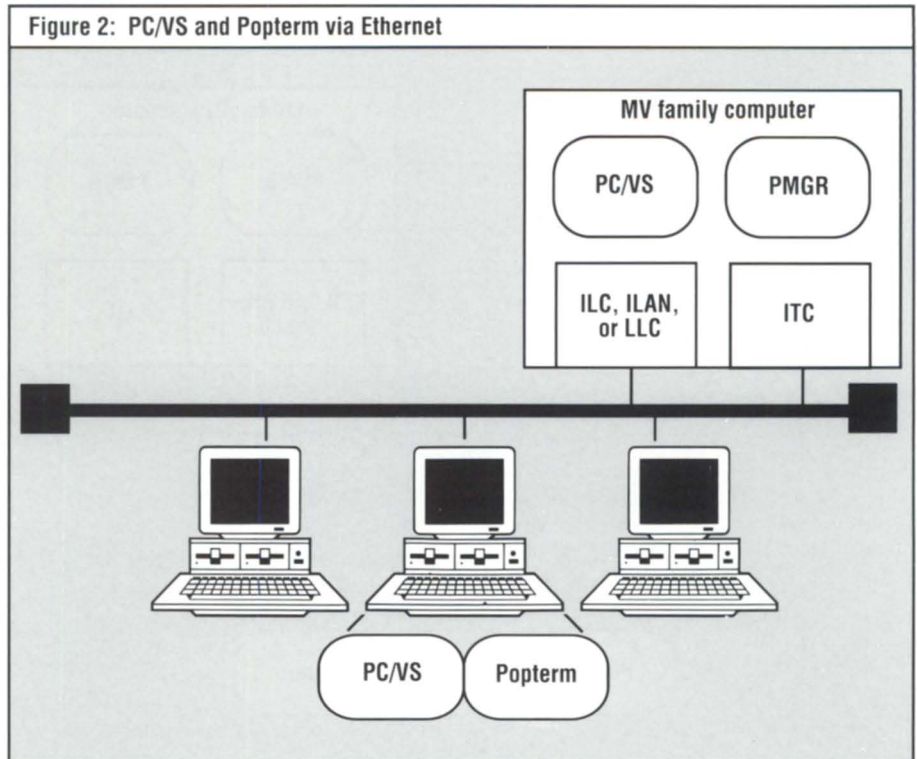
Although other products such as DG's Xodiac and DG/PC*I can share LAN cabling with PC/VS, a separate LAN controller is required for PC/VS.

- **PC workstation hardware**—Each PC requires a 3Com 3C501 controller. The 3Com 3C523 microchannel controller is supported for PS/2s and compatibles.

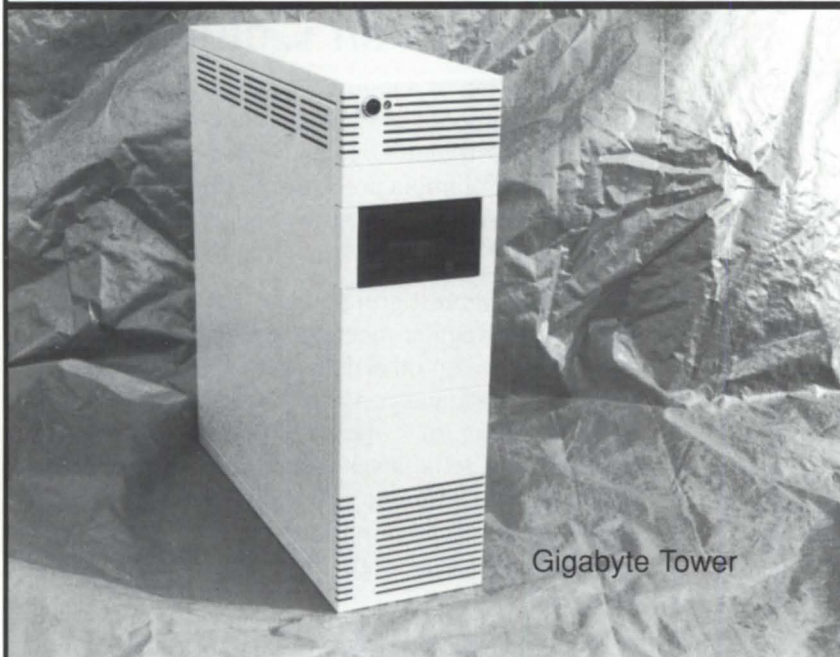
- **LAN cabling**—A network conforming to IEEE 802.3 (Ethernet) must be available, complete with appropriate repeaters, transceivers, and transceiver cables.

Figure 2 shows the standalone PC/VS

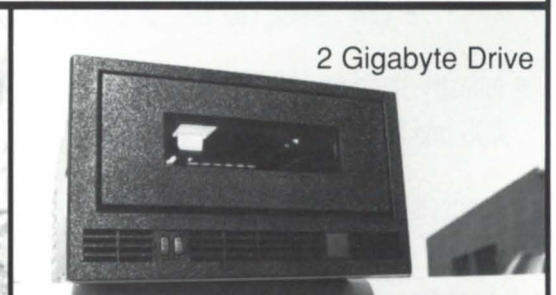
Figure 2: PC/VS and Popterm via Ethernet



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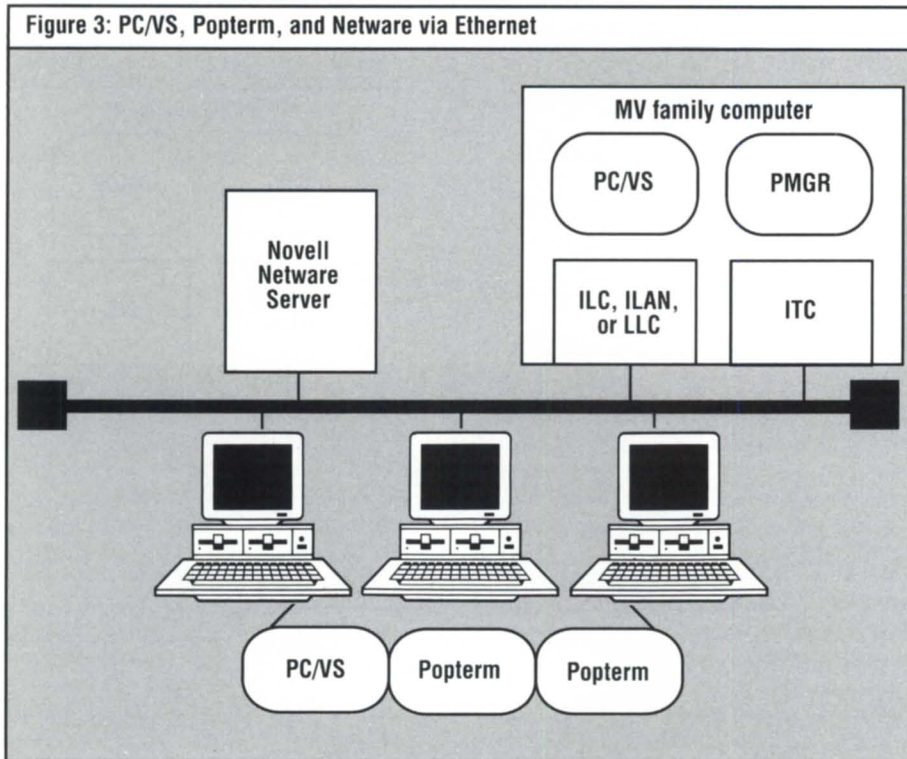
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Figure 3: PC/VS, Popterm, and Netware via Ethernet



environment (i.e., without Novell's Netware).

Novell Netware options

Alternatively, PC/VS may run on any PC workstation in conjunction with Novell's Advanced Netware 286 release 2.1 or later. Figure 3 shows how PC/VS can be configured in conjunction with a Novell Netware LAN using Ethernet.

Figure 4 shows how PC/VS can be configured in conjunction with Novell Netware using a LAN other than Ethernet. Notice that when a network such as Arcnet or Token Ring is used (i.e., one for which there is no Data General controller available), a short piece of Ethernet cable is used to connect the Novell server to the MV.

Data General's DG/PC*I

DG announced a family of PC-integration products in June 1987 that were shipped shortly thereafter. Collectively, they are known as DG/PC*I.

At the lowest layers, DG supports 10 mbps Ethernet and 1 mbps StarLAN. On the MV processors, a range of controllers for each wiring scheme is available. One

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Oregon, Washington, and British Columbia

The formation of a regional interest group in the northwest corner of the U.S. is in the works. Organizers in Portland, Oregon; Seattle, Washington; and British Columbia are working together to establish a users group that will benefit all DG users in the Northwest.

A regional interest group can be advantageous in many ways. Regular meetings enable members to make friends with other DG users who have similar interests and concerns. Newsletters keep communication lines open, and provide information on group activities and current news from the Data General community. Networking among group members can provide answers, and help solve problems that might otherwise cost big bucks to fix.

If you are in Oregon, Washington, or British Columbia, and you would like to help form this group, or would just like more information, contact Leryl Cash at **503/653-3282**, Scott Carr at **503/659-5880**, or Don Hardwick at **206/453-3200**.

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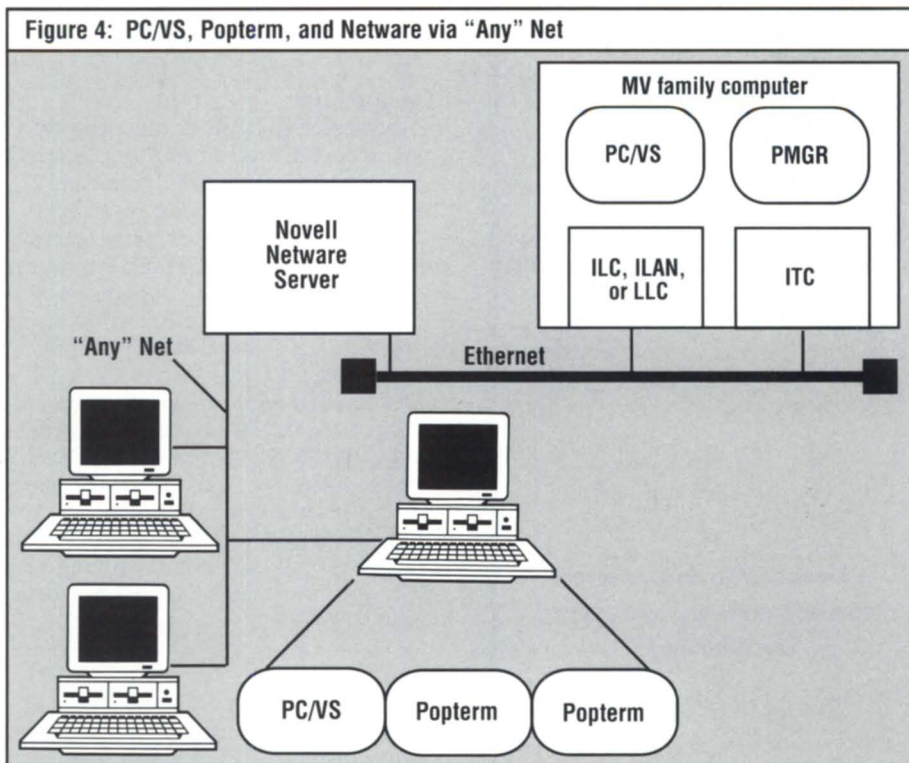
advantage of DG/PC*I is that DG's Xodiac (used for connecting multiple Data General minicomputers) and DG/PC*I can share controllers. If Xodiac and PC/VS are used on the same MV computer, each software product must use a separate controller, although the LAN may still be shared.

On the workstation, DG/PC*I supports certain controllers manufactured by Data General, 3Com, and Ungermann-Bass (now owned by Tandem Computers).

DG cautions its customers that DG/PC*I is only supported on IBM and DG workstations (and possibly a few others). Data General does not guarantee that DG/PC*I will operate on most clone PCs. At this time, DG/PC*I does not support the IBM microchannel-based PS/2 computers.

On top of the hardware, DG/PC*I utilizes the ISO IP and TP4 protocols. At the session layer, DG supports the IBM NETBIOS interface. On the workstation, this interface is accessed via software interrupt 5C (hex). Under AOS/VS, the interface is via a nicely implemented 5C emulator. From a programmer's perspective, the session-layer interface is quite

Figure 4: PC/VS, Popterm, and Netware via "Any" Net



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THE WORKSTATION

similar on both the minicomputer and the workstation.

The platform

Under AOS/VS, all of this software is part of the XTS (Xodiac Transport Service) software. Under MS-DOS, it is called WTS (the Workstation Transport Service).

Viewed together, the hardware and software up through the NETBIOS interface is referred to as the DG/PC*I platform. It is the data-communications facility upon which all Data General DG/PC*I applications are based.

The primary application software available for DG/PC*I is MVnet, which implements the MS-DOS 3.1 multiuser file and print extensions to MS-DOS. Like many other vendors (including DEC), Data General licensed the Microsoft Redirector (for the PC) and the accompanying MS-NET file server, which DG adapted to run under AOS/VS.

WSVTA

Along with transport code, Data General provides three terminal emulators that operate over DG/PC*I LANs, one each for D210, D400, and D460 emulations. These emulators are, in fact, the same as those available with CEO Connection, but rehoused to operate over the LAN.

The WSVTA emulators do not appear to AOS/VS as normal terminals, but rather as virtual terminals. The protocols used are similar to those of Xodiac's VTA (Virtual Terminal Agent), but are based on ISO instead of X.25. A special process (WSVTA) runs on the MV computer to handle virtual terminal I/O and to relay data among the AOS/VS Peripheral Manager (PMGR), the application, and the remote workstation.

Data General doesn't recommend the WSVTA emulators for heavy use, or for use by more than a few users at one time.

Standards

Data General's marketing strategy emphasizes industry standards. The buzzwords DOS 3.1, NETBIOS, ISO, Ethernet, and StarLAN sound impressive, but let's take a look at exactly what advantages they offer the user.

MS-DOS 3.1 compatibility is an important feature for some users. Most LAN-based multiuser applications make use of these extended system calls to control access to files by multiple users.

The use of NETBIOS as a standard is, however, of far less importance. NETBIOS is a communications interface protocol. MS-DOS file I/O requests are detected by the Microsoft Redirector and converted to

requests according to the Server Message Block (SMB) protocol. These SMB requests are then sent to the MVnet file server using the NETBIOS interface. SMB is never seen or used directly by the DG/PC*I customer. The NETBIOS interface is available for use as a raw communications protocol, but most LAN-based applications don't use it; they simply open, close, read, and write files using standard MS-DOS system calls.

In fact, with the adoption of LU6.2 as a second session-layer protocol for IBM's OS/2, NETBIOS may soon be reduced to a stepchild protocol. NETBIOS is limited to addressing a single, local LAN. It does not have LU6.2's ability to communicate in a multi-LAN or internetwork environment.

Use of the ISO protocols also sounds impressive, and it seems to imply that these protocols permit the products of one vendor to be used in conjunction with those of another. However, the fact that Data General has implemented NETBIOS on top of ISO does not mean DG/PC*I can be used to communicate with other vendors who use the same protocols. Each vendor uses a different technique for plugging one protocol into another. Although you can connect DG/PC*I to the same Ethernet cable as, for example, a 3Com network (both of which support NETBIOS and MS-DOS 3.1), the two will not be able to communicate.

The message here is that standards don't necessarily make for compatibility. Because of the way different vendors implement the standards, you will tend to be locked in with the vendor you choose initially. You will not, for example, be able to add a PC-based server to your DG/PC*I network. I call this "proprietary use of industry standards."

This restriction is to some extent true of RDS products as well. However, PC/VS is fully compatible with Novell's Advanced Network.

DG/PC*I's use of the ISO protocols requires a substantial amount of memory and CPU resources. In the PC, for example, the combination of WTS and the Redirector requires 120 KB.

Also, because DG/PC*I requires MS-DOS 3.10 or later, it cannot be used with MS-DOS 2.xx to help increase the memory available for application programs.

Apples to apples

Compared to other minicomputer-based, PC-integration products, DG/PC*I is pretty good. We've heard some horror stories regarding DEC's PC-integration products, and there have been multiple

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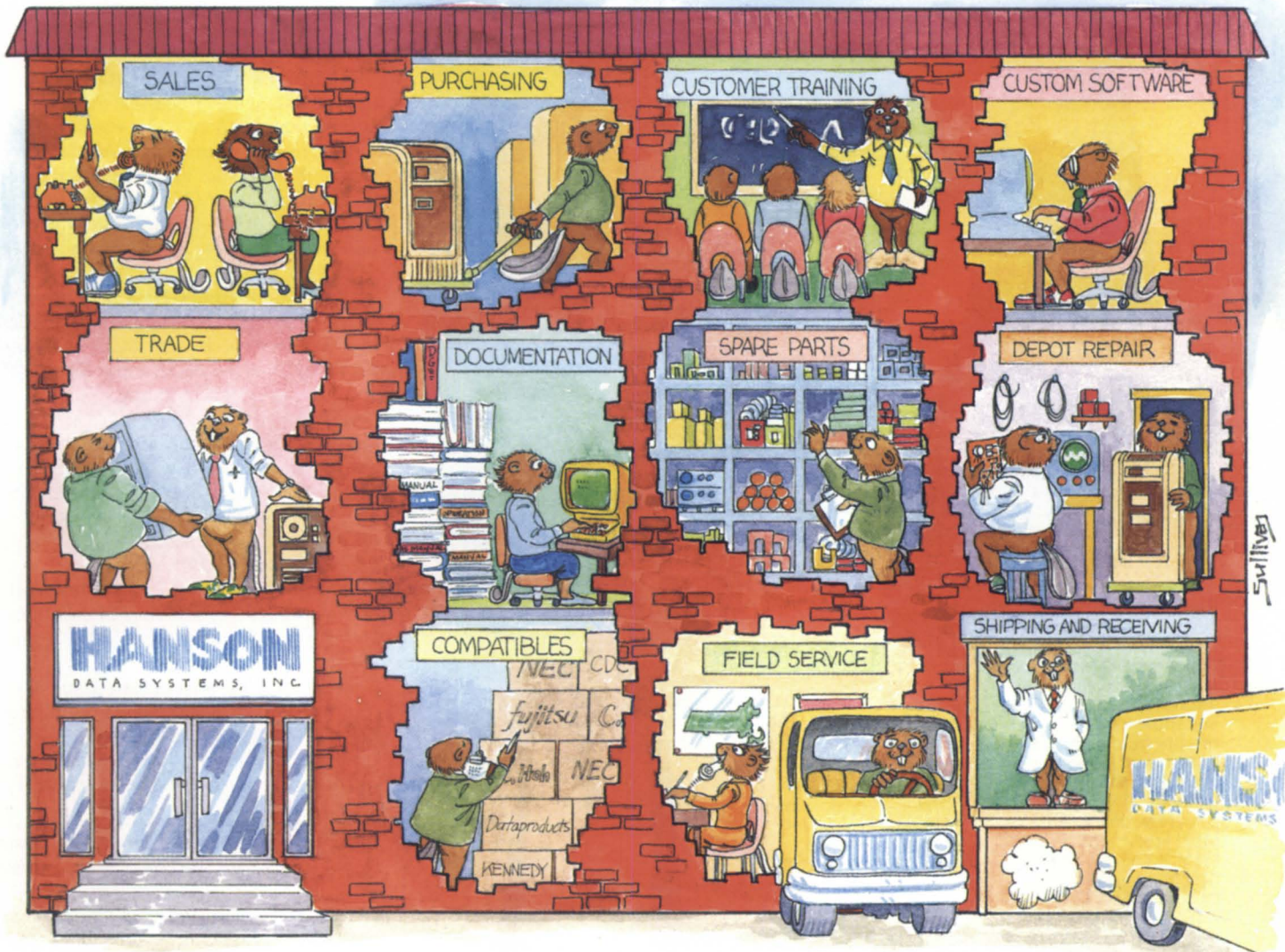
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attempts by DEC and others to properly integrate PCs. With the exception of a few minor details, Data General appears to have developed a strategy superior to most of its traditional competitors.

I can't speak for Data General, but if there is one basic philosophical difference between DG/PC*I and PC/VS, it is this: Rational Data Systems views the mini-computer as a system that provides ser-

vices to a collection of PCs and their users; Data General treats the workstations as more of an extension of your DG mini-computer.

Few end-users will tolerate learning both MS-DOS and AOS/VS. It is important to our philosophy that the PC remain a PC, and that it retains its MS-DOS flavor. Although AOS/VS is an excellent multiuser, time-sharing operating system, there is so

much more application software available under MS-DOS that we think MS-DOS should be the environment of choice for end-users. Whereas AOS/VS is appropriate for sophisticated users and system managers, there is relatively little application software available, and what is available can't take advantage of the PC's graphic display and interactive capabilities.

Netlink

As DG/PC*I neared completion, RDS (under contract to Data General) ported the application-layer features of PC/VS to the DG/PC*I platform. The resulting product is called Netlink, and is available both from DG (as an ISV Plus product) and directly from RDS.

Netlink software enhances the functionality and performance of DG/PC*I networks when used in place of, or in addition to, the MVnet file server.

Features

- **Improved management**—Netlink's unique surrogate processes support full system management on a per-user basis.

- **Improved accounting**—All resource utilization statistics are available according to individual AOS/VS usernames.

- **Virtual disks**—Netlink offers higher performance and less overhead than MVnet file service.

- **Remote printing**—Data may be redirected to files, printers, plotters, or queues in either text or binary mode. Remote printing supports header and trailer pages and full per-user accounting.

- **File transfer**—Netlink gives access to all AOS/VS files regardless of name; on-the-fly conversion of text files (AOS/VS text files can be converted to/from MS-DOS format), with CLI-style file-transfer options such as /RECENT, /CONFIRM, /DELETE, and /APPEND.

- **Mail notification**—The Netlink Notifiers alert PC users to arrival of messages, and support Data General's CEO and Wordperfect's Library.

- **Remote CLI**—Users can issue CLI commands from PCs, thereby minimizing the need for terminal emulation.

- **Date/time synchronization**—PCs may set their calendars and clocks from the MV host. △

Doug Kaye is a partner in Rational Data Systems. He can be reached at 5725 Paradise Dr., Corte Madera, CA 94925; 415/924-0840. This article is an excerpt from the "Rational Data Systems Report on PC Integration." For a free copy, contact Rational Data Systems at 150 S. Los Robles, Pasadena, CA 91101; 818/568-9991. Copyright © 1988 Rational Data Systems.

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If I had known this worked so well, I would have done it a lot sooner

Happy new year, everyone! I've been playing with COBOL again, and have some interesting findings to report. Recently I was working on some programs to deal with sequential fixed-length files, which was a little unusual for us, since most of our work involves on-line interactive systems. I have always known that specifying block sizes and using the RESERVE AREAS clause in COBOL would be more efficient than simply reading records, but I never knew how much difference it made.

Let's look at what is happening. If you declare a file sequential, but you don't say anything about reserving areas or declaring a block size, COBOL will open the sequential file so that it issues a system call for each read/write request. AOS/VS accesses the disk a page at a time (2,048 bytes). Since few files have a record length of exactly 2,048 bytes, the system must process the file so the data exchanged between the system and the application is the length of the record the application expects to work with. In many applications, you'll have multiple records in a single page of disk, and AOS/VS keeps track of the deblocking that is required.

Although the system can do this, it becomes quite inefficient if it has to do a lot of it for many users, since it slows down the amount of system calls that can be processed. COBOL is intelligent enough to do its own deblocking and buffering, and that can have a profound effect on your throughput and your CPU usage. The greatest single factor is to use the RESERVE AREAS clause to allocate some of the working set of your process to be used as sequential buffers for processing the file.

The test I ran involved processing a file of 10,244 records, 35 bytes each. These were in blocks of 700 bytes on the tape. I was using COBOL 3.41 under AOS/VS 7.57. In all tests, I declared the block size as 700 bytes in the FD statement of COBOL. The only difference between the runs is how much memory was allocated using the RESERVE AREAS clause and whether I was reading from tape or disk.

Figure 1 summarizes my findings. My two main hypotheses were supported by the data obtained. First, I expected that the buffering in COBOL would be more efficient than system buffering (as is documented), and second, I assumed disk-to-disk processing would be faster than tape-to-disk (which I would expect in most cases).

CODE-SET in the FD statement. I was surprised to find the output file on disk unusable because the EBCDIC-to-ASCII translation had not been performed. This restriction is mentioned in the manual, but everyone should be reminded of the potential problem before writing code. If you try to use both, the CODE-SET will be ignored. In this case it didn't matter, because the tape processing time went from 22 seconds to 43 seconds. That tape was a full month of data for the client, and we don't expect him to have a performance problem with our software, especially since he has an MV/10000 as opposed to our MV/4000.

AOS/VS II, part II

Although still not released as of this

Figure 1: Processing times

Seconds needed to process 10,244 records of 35 bytes with 20 records per block.		
AREAS reserved	process from tape	process from disk
not used	43	33
1 area	25	9
4 areas	22	9
16 areas	22	9

What I didn't expect was the degree to which it improved the performance. Just using one buffer nearly doubled the speed at which the tape was processed, and using multiple buffers came even closer. When processing from the disk, the data went through the program nearly four times as fast when using one or more buffers, as opposed to using no buffers at all in COBOL.

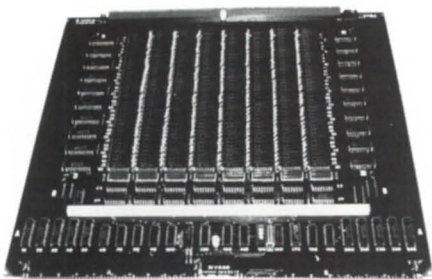
What's the price? A little extra memory. How much depends on the number of areas you reserve, but that can be limited to four, since reserving more than four areas seemed to have no effect on the smaller block and record size. And because the cost is only a couple pages of memory, I have no problems allocating up to four areas. That seems to be good enough to provide optimum performance with tape or disk input. Users tight on memory may want to limit themselves to only one area.

There is another catch. If you use the RESERVE AREAS option, you can't use the CODE-SET option. My tape file was written in EBCDIC, and I had specified

writing, AOS/VS II is well under way. DG is apparently going ahead with the plans announced in Philadelphia, and since then, I have had the opportunity to obtain more information and gain more insights about what's going on. When I wrote of AOS/VS II a couple months ago (and called it AOS/VS 2), my information only came from the week in Philadelphia at the conference and a number of short discussions with other users. With that information, I wrote a column based on the latest major development in the DG world and what the reaction of many users had been.

Now I have seen more of the picture. One of the major goals of DG development was to make AOS/VS and AOS/VS II 100 percent compatible at the system-call level. After months of testing, this appears to have been pulled off successfully. Why is this so important? There will be total compatibility between the two systems for all programs. In other words, no recompiles and, more importantly, no multiple versions of languages or utilities. The only notable exception to this is XTS and XTSII (the Ethernet drivers that Xodiac

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DISCOVERIES

depends on), which gave rise to the rumor about the two versions of Xodiac.

DG will continue to support and enhance AOS/VS to handle new hardware (including the MV/40000s) and to keep it system-call-compatible with AOS/VS II, at least for the near future. But AOS/VS won't get major upgrades to the underlying structure, and it will continue to be the system as we know it today.

AOS/VS II on the other hand will continue to undergo new developments and improvements in many areas. The disk system was rewritten under the assumption that it was all right to increase CPU cycles needed if it reduced the number of I/O requests accordingly. This means that the smaller systems (MV/4000, MV/7800, MV/1400, etc.) might be better to run AOS/VS. The slower systems can't access the disk any faster than the faster systems, since the disk rotates at the same speed on both. The faster systems, however, have more MIPS to burn and will benefit from a more-CPU-less-I/O trade-off. Although there are no tests or benchmarks that I am aware of, the implication is that AOS/VS might outperform AOS/VS II on the smaller CPUs.

There is one potential negative effect this compatibility will have on AOS/VS II. I see the potential for new features to be delayed, since the system calls are being kept identical for now. Ensuring this compatibility also means ensuring that nothing gets into AOS/VS II unless it also goes into AOS/VS. This could have the ill effect of slowing the development of certain features for AOS/VS that do not readily apply to AOS/VS II, and vice versa.

The only issue remaining is price. To date, I haven't found out what the pricing schedules are. I have found that using the proper model numbers really helps ordering a new copy, but upgrade ordering information (especially price) is more difficult to come by. The average Joe User has not yet picked up on that. Many still don't think that DG should spend time keeping two systems compatible when one would do. Only time will tell.

Flashback to old mail column

A couple months ago, a reader wrote in asking if DG would ever offer Oracle as a third-party solution, similar to what it did with DG/Blast and C/Script. I responded that the only reliable answer could come from DG or Oracle. I received some additional information on the subject, which readers may find interesting.

DG is a major OEM of Cognos' 4GL, Powerhouse, in Europe. Not only that, but DG also derives a lot of revenue from

prototyping and developing applications using Powerhouse. Many of DG's software engineers use Powerhouse as a development tool, and some of them are considered masters of the software package.

At this time, DG and Cognos do not have any agreements to market Powerhouse in the U.S. When asked if there were any negotiations along these lines, my source wouldn't say. I feel that there must have been some discussion along those lines, but nothing concrete has been resolved. So what I said about Oracle a few months ago still stands and also applies to Powerhouse. Whether or not DG chooses to offer it either as a product through an ISV or OEM program is still entirely up to DG and the companies involved.

Keeping that in mind, we can still speculate about what DG will do about 4GLs. Will they choose Powerhouse in the U.S. and support it worldwide? Will it go with Cybertek's CQCS, which it already uses in-house? Will it beef up marketing of Henco's INFO, which it already has in the price books? Will it sign on with Oracle so that all of DG's major 4GLs are represented somewhere? Will it pick one of the lesser known packages to have yet one more alternative when it comes to a 4GL solution? Will it take it one step further and promote multiple vendors? Or will DG become so overwhelmed with the decision that it does nothing? That last option doesn't seem likely—DG doesn't usually stand around and watch the world go by.

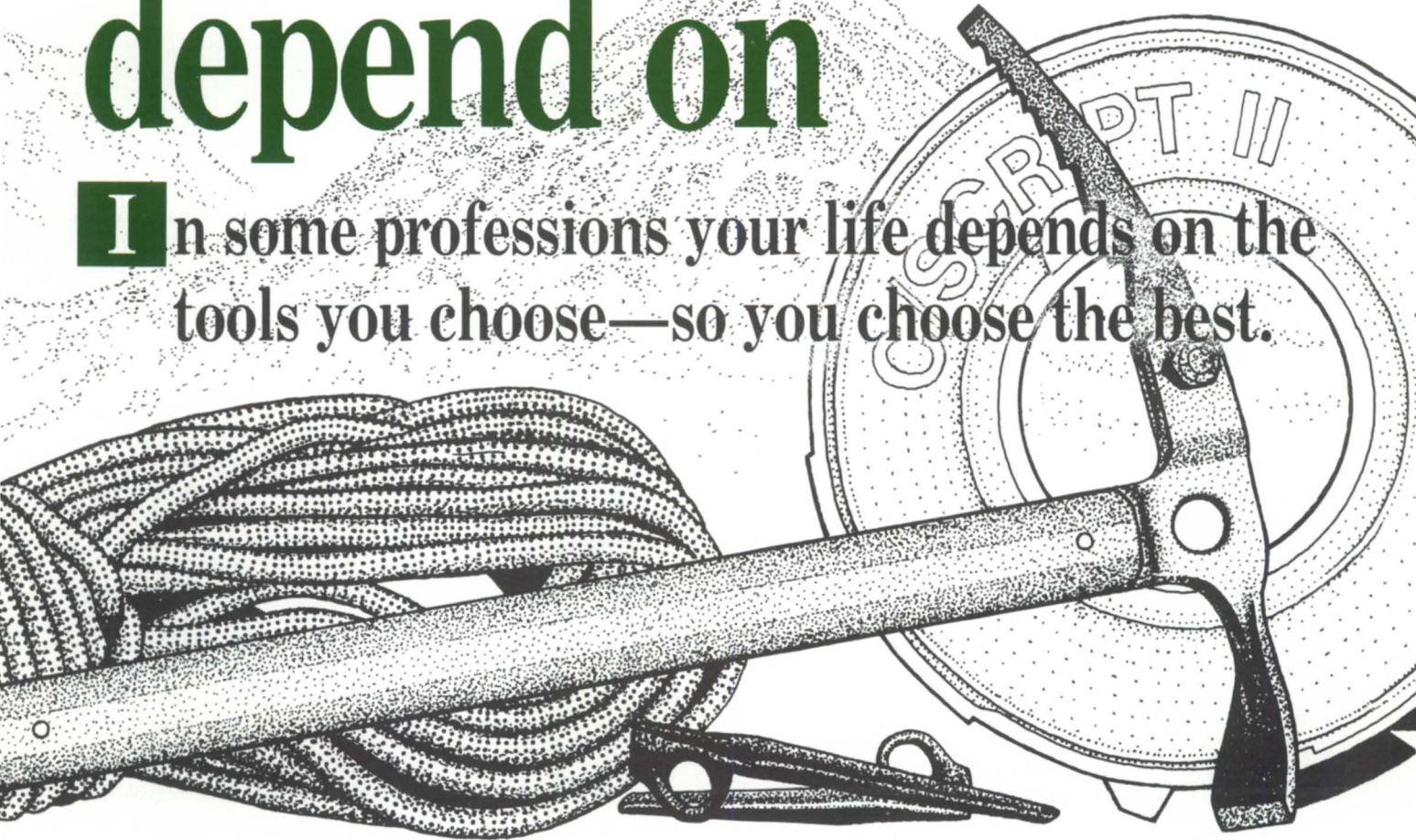
A plea

Our Cub Scout pack bought some timing equipment that interfaces with an IBM/PC or PC clone. Although a few of the parents have a machine that can be used, the scouts would like to get their own. If anyone has a PC or PC clone they no longer need, please consider donating it to our Cub Scouts. We don't need much—a monochrome monitor, two floppy drives, and 256 KB of memory is enough. A printer would be nice, but not essential. Anything else would be considered a bonus. If you have a system or know of such a system, please call me. If several systems surface, there are other packs in our council looking for systems, too. Δ

Jim Siegman is a contributing editor to Focus, chair of the NADGUG Audit Committee, and treasurer of the Chicago Area Data General Users Group. Send comments or questions to Datamark Corp., 3700 W. Devon, Suite E, Lincolnwood, IL 60659; 312/673-1700.

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ICOBOL grows up

ICOBOL maturity benefits users, receives healthy backing from DG

Having made it safely back from Philadelphia, I have to say that NADGUG's conferences are getting better every year. The exhibits were literally overflowing into the halls, a situation that should be alleviated by using a convention center next year in New Orleans.

I didn't get to spend nearly as much time on the exhibit floor as I usually do. I don't know if anyone else noticed, but there are more AOS/VS sessions than there ever were for RDOS, so I was busy hopping from one room to another. However, one product that I saw *must* be brought to the attention of ICOBOL users.

Screen Demon from Threshold is the slickest ICOBOL utility I've seen. It consists of a series of assembler routines linked into your ICX program to give you, among other things, windows, mail (send and receive), a notepad, a calculator, a hot-key push to and return from the CLI, screen printing to the system printer, and faster screen I-O. All on your dumb D200!

The only drawback as far as I was concerned was that it wouldn't work on the three 6053 terminals we still have. Well, they called yesterday and said they are sending the patches for the 6053. Now there is no reason not to get this product—they'll even send you a demo tape. Screen Demon works with ICOBOL 1.40 and 32-bit COBOL rev 3.20. For more information, contact Threshold at 205/821-0075.



And now, on to the ICOBOL Roundtable! In keeping with my columns of previous years, I'll talk about RDOS first, and then AOS/VS. Here are the RDOS upgrades for ICOBOL:

OK, now that *that's* out of the way. Yes, that's right. There was absolutely

no mention of RDOS this year either from the panelists or the audience. Apparently I got out just in time. So for you people running ICOBOL under RDOS: cherish it. Get to know it intimately, because it looks as if there will be no more upgrades to RDOS ICOBOL.

Of course, I also remember when there were going to be no more enhancements to ICOS, so take all of the above with a large grain of rock salt.

In AOS/VS, it's another story. According to the panelists, ICOBOL is now DG's #1 selling language, and it's putting resources into it accordingly. ICOBOL 1.50 was in beta test in September, and should ship in early 1989. It includes such goodies as:

- increased table space to 2 MB
- ACCEPT ID FROM ENVIRONMENT, something that's quickly becoming a necessity if you are making use of any of 1.40's features but still need transportability
- WRITE/REWRITE IMMEDIATE, flushing the blocks to disk
- increased user connects to 2,048
- PIDS to 32,767
- number of files to 211
- file locks to 100
- index size to 4 GB, the same as the XD size
- selectable file element size

It looks like ICOBOL is growing up! Revision 2.00, scheduled for sometime in 1989, is the one that has Paul Duck drooling. This will be the ICOBOL port to Unix on the 386 and 88000 engine. The revision will be completely compatible with VS ICOBOL 1.50, and will include hooks for DG/SQL and CEO support (through ICOBOL SMART).

So it looks like Data General's forgotten language is picking up a lot of supporters. In addition to DG, many of the third-party software suppliers are paying attention to ICOBOL.

Therefore, with everyone optimistic, it's up to me to inject some doom and gloom into the proceedings. Data General has taken ICOBOL well past any of my wish lists of a few years back. I was asked recently what more I would like to see put

into the language, and I couldn't think of anything. Now that we can call routines from other languages, I don't even have any gripes about the lack of mathematical functions.

What I *do* worry about are the ICOBOL utilities. The only new utility to be released in the past few years is Rebuild, which I've used once. The rest are the same old things that I've been using since ICOS. Personally, they're fine with me. Data General can give me a 4 GB index space, and I'm still going to break down the file into separate files once it hits about 5 MB. But someone, somewhere, is going to try to run with a 4 GB file. And sooner or later, that file is going to get corrupted.

At that point, they might as well shut down for a week, because that's how long it's going to take to ISAMVERIFY and Reorg that sucker! And if the file can't be fixed, it means rekeying all of the data, because ICOBOL lacks any kind of roll forward/rollback system, and none are in the works.

The bottom line is that if we're going to be able to work with files that big, we need Minisam utilities that will make it possible in real-time. For example, my next column was going to explain how to use Reorg to do the sorts that everyone does in ICOBOL. I gave up after I found out that Reorg takes twice as long as ICOBOL to sort the same data. Maybe DG should rewrite the utilities in ICOBOL.

Roll forward/rollback processing will become more of a necessity as user counts and files continue to get larger. Eventually, a DP manager in an ICOBOL shop is going to get lynched for telling 200 people that they've got to reenter everything that they've done since that morning. I've come close to getting strung up myself.

Another consequence of ICOBOL growing up is that it must begin to give us more information. I was running a program the other day that failed with a USE ERROR. Where I work, all I had to do was take a 10-minute jog around the place, look at each terminal, and kick off the offending party. But what would I have done if I ran a shop with a couple hundred terminals, possibly spread out around the country? Sure,

I could send out a message, but what if (as was the case here) the operator had stepped away from the terminal without bringing it down? Does the whole company wait for that person to come back? In conjunction with that, the ability to time out inputs would be most useful.

Another part of growing up is admitting that ICOBOL is an honest-to-gosh member of the AOS/VS pantheon. One of the gripes from the audience (actually, it was from me, but it's my column and I'll gripe if I want to) was the lack of standardization among ICOBOL utilities. Some of them (ISAMVERIFY, Reorg, CSSORT) use the old RDOS auditfile/A. Rebuild has been updated to use the AOS/VS /L=filename. COLLAPSE won't send output to anywhere but COLLAPSE.LG, and CREV won't send output anywhere.

The panel members commented that they weren't sure whether we wanted the utilities to conform to the operating system, or to be the same across all implementations of the language. Personally, I lean toward consistency with the operating system. If ICOBOL is going to be an AOS/VS language, then it (and its utilities) should start behaving in a manner consistent with other AOS/VS utilities. I could be a minority, though, since the only place I'm running ICOBOL is on an MV. The ICOBOL developers need to hear your opinions. Drop me a line, or leave a message on the bulletin board, and I'll pass it on.

As long as I'm making impossible requests, I'll make one more: with more people using the utilities, they have to be made easier to use. Wouldn't it be nice to ISAMVERIFY all of your files that changed today with one command line, e.g., ISAMVERIFY /L=VERIFY_RESULTS/AFTER/TLM=[!DATE]+.XD? As things stand now, it's not *impossible* to do. I use B.J.'s Build macro to build a list of files without extensions, then use SPEED to modify the file, because ISAMVERIFY wipes out the audit file each time, then use COPY to concatenate all of the output files. So it is possible, but not easy. And certainly not very friendly.

Something that I'd like to see changed is the terminator for ICOBOL inputs. In order to use AOS/VS efficiently, we split our files among as many directories as possible. Say, for instance, that I'd like to analyze a file that resides in :FILES:AR_FILES. I get into ANALYZE, type :FILES:AR_FILES:AROPEN FILE at the "Filename" prompt, and get back "File not found, already open, or read protected: FILES:AR." The underline is a termination character in ICOBOL, and ICOBOL

discards any input after it. This was fine in RDOS, where the underline wasn't a valid file character. However, it's a real pain in AOS/[VS] and MS-DOS. If there's a valid reason for ICOBOL terminating at the underline, I wish someone would tell me what it is. If not, get rid of this particular "feature."

Anyway, here's a synopsis of the issues raised at the roundtable, and the interest expressed in them:

SQL—low
 Backup/recovery—high
 Faster COLLAPSE—low/medium
 CEO integration—low
 Minisam Housekeeping utilities—medium/high
 Unix—low
 Batch impact on interactive performance—high
 Debugger—low

The ICOBOL SIG meeting was also a tremendous success—at least this year, the participants outnumbered the DG personnel. Basically, we're in the process of organizing the group, and we hope to schedule more ICOBOL sessions for the next conference. After all, we are the best-selling language. Anyway, please join up. For more information, contact Dennis Doyle at Software Alliance, 503/643-2446.

Odds and Ends Department

XLPT 7.62 terminates the cooperative when you QPRINT program listings with an "Inconsistent Tab format." An STR has been submitted.

ICINQUIRE still doesn't work correctly. In RDOS, I never used it, because no matter what the documentation said, I had to type in the .FD every time. I just tried it on the MV, and it didn't ask for the FD specifications. However, I aborted it after it had run for 51 minutes and used up 42 minutes of CPU! I don't think I'll be using ICINQUIRE a lot. I could have custom written the code in less time. What is this thing *doing*? There's nothing odd in the macro that invokes it, except signs that it was written by an old RDOS programmer (the temporary files are CLI.CM and FCLI.CM). I just tried it without specifying an .FD, and it took about 10 seconds. Obviously there's a bug somewhere. An STR has been submitted.

By the way, submitting an STR on the OIS board is slick and easy. I'll never mail one again. Δ

Tim Boyer is EDP manager at Denman Tire Corp. 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.

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Rummage sale or treasure trove?

Four short items from the macro bin

I didn't have time to write an in-depth article this month, so I rummaged around in my macro bin to find something that might be useful. None of the items I found require much description, and most are obvious—but they might give you some ideas to try out on your own system.

UP.CLI

Rather than having one giant UP:CLI macro that contains everything including the kitchen sink, I split my UP:CLI macro into several pieces that are called sequentially (see Figure 1). It's easier to maintain several small macros than one large macro, and each macro can be executed separately. The names contain a letter (as opposed to a number) as the fourth character, so FILESTATUS/SORTED will show them in the order they are invoked by UP:CLI:

```
UP_A.SYSLOG_REPORT.CLI
  (Runs REPORT on previous SYSLOG and starts new SYSLOG.)
UP_B.DISKS.CLI
  (INITIALIZES disks, i.e., @DPJ0.)
UP_C.QUEUE.CLI
  (Compresses or creates :QUEUE:Q.)
UP_D.SYSID.CLI
  (Sets SYSID.)
UP_E.TAPEDRIVES.CLI
  (Creates LNKs and sets ACLs.)
UP_F.EXEC.CLI
  (Starts EXEC.)
UP_G.BATCH.CLI
  (Sets up and starts BATCH queues.)
UP_H.PRINTERS.CLI
  (Sets up printers.)
UP_I.SETUP_DATE_STUFF.CLI
  (Queues recursive macros to change the name of the day at
  midnight each night, to remind users to back up every Friday,
  and to run Janitor every Friday at midnight.)
UP_J.WP.CLI
  (Starts Wordperfect server.)
UP_K.ENABLE_CONSOLES.CLI
  (Enables consoles.)
UP_L.LOCK_CLI.CLI
  (Starts LOCK_CLI.)
```

When I VSGENed the system, I specified UP:CLI as the up macro for automatic startup. The 5 second pause gives me a chance to stop at PID 2 in case I am testing something and don't want the system to come up.

Figure 1: UP.CLI macro

```
write [!asc,207]
write Automatic startup in 5 seconds: use ^C^A to cancel
pause 5

UP_A.SYSLOG_REPORT
UP_B.DISKS
UP_C.QUEUE
UP_D.SYSID
UP_E.TAPEDRIVES
UP_F.EXEC
UP_G.BATCH
UP_H.PRINTERS
UP_I.SETUP_DATE_STUFF
UP_J.WP
UP_K.ENABLE_CONSOLES
UP_L.LOCK_CLI
```

Figure 2: GO.CLI macro

```
push
prompt pop

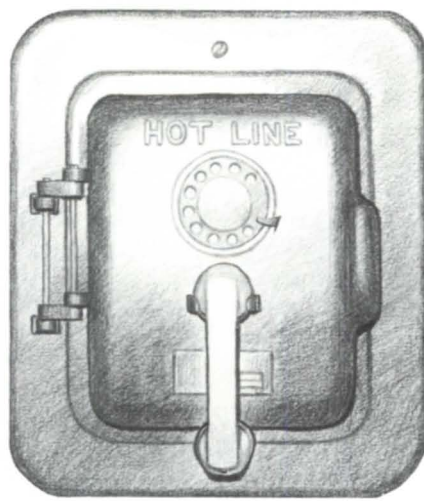
string &
[!eq, %1%, F5]:FORTRAN5&
[!else][!eq,%1%,F77]:FORTRAN77&
[!else][!eq,%1%, L]:LANG_RT&
[!else][!eq,%1%, M]:MACROS&
[!else][!eq,%1%, P]:PUBLIC&
[!else][!eq,%1%, G]:GAMES&
[!else]ERROR&
[!end][!end][!end][!end][!end][!end]

[!eq,[!string],ERROR]
  write %0% requires 1 of the following arguments:
  write,,,,,'F5' for :FORTRAN5
  write,,,,,'F77' for :FORTRAN77
  write,,,,,'L' for :LANG_RT
  write,,,,,'M' for :MACROS
  write,,,,,'P' for :PUBLIC
  write,,,,,'G' for :GAMES
  pop
[!else]
  superuser/1=ignore/2=ignore on
  defacl +,re
  directory [!string]
  string [!asc,211,211,211,224]Directory[!asc,240]&
    [!directory][!asc,225,240,250]POP[!asc,240]to&
    [!asc,240]return[!asc,251]
  prompt string
[!end]
```

GO.CLI

Each software product is in a separate directory, either in ":" or in ":UTIL." Although the macros that access the products all add the directory to the SEARCHLIST before running the product, sometimes users have a need to go into the directory to look at some of the files (documentation, update and release notices, example source files, etc.) The GO.CLI macro (see Figure 2) accepts a keyword that is then matched up with the actual directory name. GO.CLI then PUSHes and enters the directory.

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Figure 4: .PH.CLI macro

```

push
directory :udd:[!username]:TELEPHONE_BOOK.DIR
string [!asc,211,211,211,211,211,224]Directory:&
      [!asc,240]Phone[!asc,240]Numbers[!asc,225]
prompt string

```

CALL.CLI

This little macro keeps track of telephone numbers and addresses on my system. The CALL.CLI macro (see Figure 3) prints the contents of a file that match the argument supplied. The files are presumed to be in a directory called TELEPHONE_BOOK.DIR in the user's initial working directory. If the directory doesn't exist, the macro gives further instructions. The .PH.CLI macro (see Figure 4) PUSHes and goes into the TELEPHONE_BOOK.DIR directory from anywhere on the disk. A simple POP will return to the previous directory. I create a file with an address and phone number for each person or organization, and then create LNKs to the file with aliases. For example:

```

) CREATE/I FRED_SMITH
)) Telephone: (613) 123-4567
)) Address:100 Main St.
)) ...
))
) CREATE/LINK FRED fred_smith
) CREATE/LINK SMITH fred_smith
) CREATE/LINK FS fred_smith

```

Then the phone number can be displayed on the screen (or to a file if /L[=filename] is used) with either of:

```

) CALL FRED
) CALL SMITH
) CALL FS
) CALL FRED_SMITH

```

You'll notice when I CREATE the LNK entries, I use lowercase for the resolution filename. It makes the names stand out a little better with FILESTATUS/ASSORTMENT, because CREATE preserves the case of the resolution filename.

Forest and trees

The :UTIL directory supplied with AOS[VS] contains a zillion files. One way you can see the forest for the trees is to DUMP the unused files into another disk file (i.e., UNUSED.DMP) and then delete the files. You will still have them on disk if you need them, but your :UTIL directory will be considerably cleaner. Of course, if you know you'll never use them, you can simply back them up and delete them. The prime candidate for cleanup is the collection of +.ST files that is rarely used for patches. Δ

John A. Grant is a geophysicist with the Geological Survey of Canada, where he manages an MV/4000 for the Exploration Geophysics Subdivision. He may be contacted at 601 Booth St., Room 591, Ottawa, Ontario, K1A 0E8; 613/992-1082.

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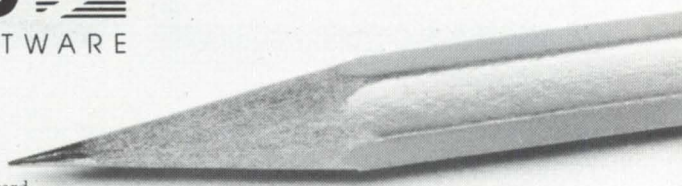
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VAR agreement brings sales software to DG/One



Westboro—Data General and Lowell Corporation, a Worcester-based software developer, have entered into a VAR agreement that will enable Lowell to offer Pro-

sell Sales Automation software on the DG/One model 2T portable laptop computer.

Prosell software automates administrative functions of a professional salesperson. Features include a customer and prospect data base; automatic letter writing; word processing; an electronic mail interface; and on-screen, presentation-quality graphics.

The portable system weighs 11 pounds, allowing salespeople access to customer and home office information.

The DG/One model 2T with Prosell software is available from Lowell Corporation for \$4,189. It includes a blue LCD screen, internal 20 MB hard disk, 768 KB memory, and carrying case. Δ

Circle 75 on reader service card.

Dataplex Switch expands LAN alternatives

Westboro—DG has introduced Dataplex Switch, a data switch system that connects

asynchronous devices, such as terminals, personal computers, and printers, with MV-series processors across standard twisted-pair telephone wiring.

The Dataplex Switch can give users access to multiple hosts without running multiple cables to their offices, and without installing an Ethernet terminal network. For example, a Dataplex Switch user can switch hosts by invoking an on-line menu and initiating a session on another host. This places the initial session on hold and initiates a call to the desired host.

Other Dataplex Switch features include:

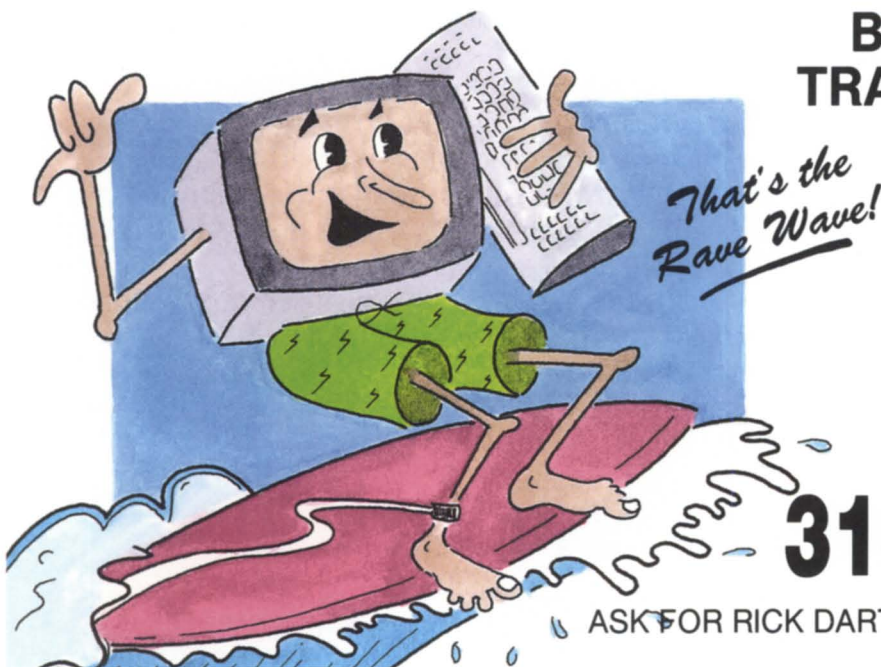
- a concentrated host interface that supports 60 sessions per board
- up to 408 nonblocking connections per switch
- distributed multiplexors that simplify wiring configuration
- remote diagnostics and system management.

Dataplex Switch has three major components: (1) the Processor Interface Module, a host controller board that plugs into an MV computer chassis and demultiplexes the asynchronous terminal connec-

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tions in order to communicate with the AOS/VS operating system; (2) Dataplex Switch Equipment Modules, which provide the distribution and connection switching between terminals and hosts; (3) a desktop component with a built-in switch interface for Dasher terminals.

Pricing ranges from \$13,528 for a 60-user system, to \$27,945 for a 180-user system. A 60-channel Processor Interface Module is priced at \$7,500. Dataplex Switch is available 90 days after receipt of order. Δ

Circle 76 on reader service card.

Teach Yourself Quiz ported to DG

Ottawa, Ont.—Teach Yourself Quiz, a computer-based training product from Cognos, is being shipped for DG's MV series of computers.

Teach Yourself Quiz teaches computer novices to produce professional reports with Quiz, the report writing component of Powerhouse, a 4GL programming language from Cognos.

With Quiz, users can access data in their own organization's data bases, perform calculations using the data, and report the results to either a terminal or a printer. Quiz is self-paced, with an on-line glossary and help features.

Cognos Inc., 3755 Riverside Dr., Ottawa, Ontario K1G 3Z4; 613/738-1440. Δ

Circle 77 on reader service card.

Instant Replay trains DG users

Cleveland, OH—Integrated Applications has developed a training device called Instant Replay that offers a new direction in training sales demonstrations. This device is a specialized tape recorder installed between a computer and a terminal.

Instant Replay allows a sales manager, software author, or training instructor to record both voice and screen action going to the terminal onto a standard audio cassette tape. Everything typed on the keyboard, displayed on the screen, and

spoken into the microphone is recorded on an audio cassette tape. When the tape is replayed, users can see and hear the previously recorded session. If a user missed what was shown, or didn't understand the explanation, the rewind button can be pressed to play the same session again at an individual's pace. Necessary equipment is a terminal, a pre-recorded training cassette, and Instant Replay. No instructor required.

Integrated Applications, Inc., 5405 Valley Belt Rd., Unit C, Cleveland, OH 44131; 216/398-9300. Δ

Circle 78 on reader service card.

Micro Focus COBOL/2 compatible with DG ICOBOL

Palo Alto, CA—Micro Focus COBOL/2 is a mainframe-level COBOL compiler for 32-bit CPUs. It can be used for migrating existing applications from other environments or for developing new business ap-



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plications. Micro Focus COBOL/2 provides 32-bit addressing capability that allows the programmer to compile and run mainframe-sized programs. Data files in COBOL/2 can extend up to 2,000 MB, hardware permitting. Programs can have up to 256 MB of data and up to 16 MB of procedure code for each of up to 50 segments. Also, a program may load up to 100 subprograms at any one time.

Micro Focus Inc., 2465 E. Bayshore Rd., Suite 400, Palo Alto, CA 94303; 800/872-6265. Δ

Circle 79 on reader service card.

Postscript laser printer has graphics

Westboro—Data General has an-

nounced a 12-page-per-minute (ppm) laser printer with PostScript graphics capabilities. The model 6480 features support for Adobe Systems PostScript Page Description Language and HP Laser Jet Plus emulation.

The printer can be integrated with DG's CEO Desktop Composer. DG also announced a PostScript upgrade kit, model 6481, which is available for models 6474, 6475, 6476, and 6477 laser printers.

The model 6480 printer features high-quality printing and paper-handling flexibility, with text and full-page graphics capabilities. It includes 4 MB of memory and is suited for high-volume mailings, spreadsheets, labels, reports, and presentations with graphics.

Options include a dual-bin paper feeder and an envelope feeder. model 6480 is recommended for 10,000-page-per-month duty cycle. Paper/envelope-handling capacities range from 250 to 750 sheets (with the optional two-bin feeder), and a maximum of 100 envelopes (with the optional envelope feeder).

Prices start at \$7,995 for model 6480 with PostScript interpreter. The model 6481 upgrade kit is \$4,995. The optional two-bin feeder is \$895, and the envelope feeder is \$995. Delivery is 30 days after receipt of order. Δ

Circle 80 on reader service card.

TLC Express links PCs to mainframes

Hopedale, MA—TLC Systems, Inc., has announced an electronic network that links remote PCs or DG/Ones with Data General's CEO system. TLC Express is a software platform consisting of remote electronic mail, application front-ends, file transfer, and minicomputer and mainframe interfaces.

TLC Express integrates PC applications with mainframe and mini applications using electronic mail as a conduit. It reduces the time and number of steps required in completing a transaction and transfers administrative costs out of the home office and into the field, company officials said.

TLC Express was originally developed for a large insurance company that needed to communicate with remote agents, customers, and client companies. The insurance company has more than 250 users of the software. TLC Express helps the insurance company book new businesses and respond quickly to agents and customers.

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ing application areas: insurance, travel, order entry, customer service, sales, and marketing.

TLC Systems, Inc., 5 Airport Dr., Hopedale, MA. 01747; 508/478-8211. Δ

Circle 81 on reader service card.

Multi-currency accounting system offered by DG VAR

Southampton, NY—National Investor Data Services (NIDS) has announced NIDSGlobal, an international securities portfolio management system. The system tracks tax lots of international securities in both native currency and U.S. dollars, and automatically calculates all capital and currency gains and losses.

Although designed for use by billion dollar investment managers, NIDSGlobal also suits small- and mid-range firms. NIDSGlobal supports automatic pricing, captures and stores foreign exchange rates, and generates a Net Asset Value for mutual funds (offering prices for load funds) daily. With a fully integrated portfolio and general ledger processing, files are updated with a single entry.

Subsequent releases scheduled for 1989 will provide portfolio management functions already included in the NIDSPort II product.

National Investor Data Services, 33 Flying Point Rd., Southampton, NY 11968; 516/283-1100. Δ

Circle 82 on reader service card.

Sensaphone alarms users of computer problems

Necedah, WI—Best Power Technology offers an alert system that automatically dials pre-set numbers in case of electrical power problems. This option is available with Best's Ferrups uninterruptible power systems (UPS).

The Sensaphone is an automated phone caller that dials up to four numbers in sequence when one of a number of alarm conditions occur. When answered, the Sensaphone gives an alarm message to the listener in English. The Sensaphone is useful to security-conscious users and users who have sensitive or remote and unattended operations protected by a

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Tony Deakin: 0937 73446

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Ferrups unit. The Sensaphone calls its pre-set numbers when any of the following conditions occur:

- Utility power fails for more than five minutes.
- Temperature exceeds the unit's pre-set limit.
- An audible alarm is sounded, such as a burglar or smoke alarm.
- Any one of a number of internal Ferrups alarm messages is triggered.
- Two other alarms of the user's choice occur, such as high water level in a basement, a door opening, or a photosensitive beam being broken.

The Sensaphone also receives incoming messages and will report monitored conditions to the caller. The Sensaphone's built-in microphone allows the caller to listen in on activity at the Ferrups location.

The Sensaphone has an independent battery backup that's good for 15 hours of normal operation. It plugs into the standard RS-232 port of Ferrups units of 1 KVA to 15 KVA. It also can be used with 250/500 VA Micro Ferrups units that have alarm contacts installed.

Best Power Technology, P.O. Box 280, Nece-

dah, WI 54646; 800/356-5794. In Wisconsin, call 608/565-7200. Δ

Circle 83 on reader service card.

Penta's Textmaster based on PCs

Baltimore, MD—Penta Systems International has introduced Penta Textmaster, a family of products based on personal computers and file servers. The product line uses standard hardware, utilizes standard workstations, and offers modular expansion opportunities. The entry-level system starts at \$35,000 and can support up to eight personal computer workstations. The price includes Penta's software for typography, text editing, and security.

Textmaster products include enhancements to Penta's basic software package, on-line diagnostics for customer support, expanded file server and disk drive options, and new upgrade and conversion opportunities.

Penta Textmaster software operates with the full line of Data General's 32-bit MV

superminicomputer file servers.

Penta Systems International, 309 E. Federal St., Baltimore, MD 21202; 301/685-7258. Δ

Circle 84 on reader service card.

SAS releases SAS/ Assist software

Cary, NC—Providing a menu-driven interface to many of the basic SAS System tools, SAS/ Assist software is free to users of the SAS System for personal computers.

SAS/ Assist software gives users access to basic tools for data analysis, report writing, and graphics. The task-oriented system allows users to accomplish basic SAS System tasks. The software comes packaged with sample SAS data sets and an on-line tutorial.

Future releases of the SAS System for mainframes and minicomputers will also include SAS/ Assist software.

SAS Institute Inc., SAS Circle, Box 8000, Cary, NC 27512-8000; 919/467-8000. Δ

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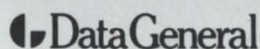
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NADGUG staff508/898-4067

Information on RIGs or SIGs

Cathlene Gentry512/345-5316

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Greg Farman or Robin Perry
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Sharon Dennis512/345-5316

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Let the North American Data General Users Group (NADGUG) connect you with other Data General users who have a similar special interest and who want to share information, ideas, problems, and solutions. No matter what the special interest is behind the group — equipment, systems or application software, major language, operating system, industry type — the reason is the same: to work together to exchange ideas on how to get the best performance out of your DG system.

Listed above are NADGUG's current special interest groups. If you are interested in making the connection with one of these groups, or if you have an interest that needs a group, please contact NADGUG's RIG/SIG coordinator, Cathlene Gentry, at 512/345-5316 for further information.

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Friends in high places? When President-elect George Bush named New Hampshire Governor John Sununu as chief of staff for the new administration, it triggered an old memory: Sununu was the subject of a June 1986 article in *Focus* because of his use of a DG/One. Sununu said of DG then, "They're a great New Hampshire firm and it's a great product." Yes, but will he remember that when he gets to Washington?

In one of the largest law firm mergers ever, the 453-lawyer firm of Fullbright & Jaworski combined with the 105 lawyers of Reavis & McGrath. The merged firm is the eighth largest in the U.S., with many prestigious clients—like Data General Corporation.

Data General has joined the Open Software Foundation (OSF), a member-sponsored research and development organization with the goal of establishing internationally accepted standards for open software. DG's participation in the organization furthers the company's pursuit of industry-standard products.

Rational Data Systems (RDS) announced an agreement with Mini Computer Systems of South Caulfield, Australia, for the distribution of RDS's PC-integration products in Australia, New Zealand, and New Guinea. Mini Computer Systems, a distributor of third-party software products such as Wordperfect and :PERFMGR, is a Data General VAR. MCS supplies peripherals, software, and support to customers in manufacturing and importing, as well as wholesaling, retailing, and service industries.

Data General's European operation has been restructured to strengthen marketing and sales. Subsidiaries in Austria, Belgium, Denmark, Finland, Holland, Norway, Portugal, Spain, Sweden, and Switzerland now fall under the single category of Data General European Area. Additionally, the Multinational and Large Accounts, Distributor Sales, and Systems Support groups have been combined into Large Accounts and Distributors. To oversee these changes, Kristoffer Sygel, Lucien Fradin, and Primus Berger have been named division vice presidents within Data General's European operations. They report to Dave Lyons, vice president of Data General-Europe.

Data General and Diversified Computer Products (DCP) presented CBO (Comprehensive Banking Office), a branch banking automation system, at the U.S. League Business Show. DCP and DG worked together to develop the CBO system, which integrates personal computers and minicomputers to perform teller, customer service, and administrative functions.

CBO runs on Eclipse and MV minicomputers, DG PCs, and PC/AT-compatible workstations.

Cognos Inc.'s newest office in Madrid, Spain, marks the company's 39th office worldwide. Headed by country manager Philip Little, the new office sells directly to major customers, and increases support to the nine Spanish distributors now representing Cognos products.

System reliability is the most important criterion for small business system managers when determining what hardware and telecommunication systems to purchase, according to an analysis by The Yankee Group, a market research and consulting firm in the computer industry. Based on the study, price ranks eighth in importance for evaluating products. The Yankee Group defined a small business as one with sales of \$1 million or more, 20 percent or more growth, three years or more in business, and 10 to 500 employees.

Charlene Kirian, NADGUG's RIG/SIG Committee chair, has ventured into her own business with Computer Training Associates (CTA). Based out of Columbus, Ohio, the company specializes in training for Data General users on DG products, including Comprehensive Electronic Office (CEO), CEOwrite, and CEO Connection. CTA also offers training in Lotus 1-2-3, Wordperfect, 20/20 spreadsheets, and basic and advanced DOS.

Other services available include on-site training, consulting, and seminar planning.

Data General's fiscal year 1988 proved healthier than last year, with an overall revenue increase of 7 percent to \$1.36 billion. Fiscal 1987 revenues totaled \$1.27 billion.

For fiscal 1988, which ended September 24, the operating income came to \$42.8 million, not including a restructuring

charge of \$48.7 million. Counting the restructuring charge, operating losses for 1988 were \$5.9 million, compared to a loss of \$60.4 million in 1987. Figures from fiscal 1987 also entail a restructuring charge.

Looking at the fourth quarter, Data General's revenues of \$341.5 million showed a 3 percent increase, compared to the same period of the previous year. Operating income was \$2.2 million before the restructuring charge. Net loss for the quarter was \$49.8 million, or \$1.76 per share (including the restructuring charge of \$48.7 million), compared to a loss of \$24.6 million or 86 cents per share (including a charge of \$26 million from a litigation settlement) in the fourth quarter of last year.

Grumman Systems Support has designated its Gaithersburg, Maryland, depot facility specifically for maintenance and repair of Data General products. Its other two sites have similarly been allocated for special purposes. The center in Woburn, Massachusetts, now services workstation products and the center in Woodbury, New Jersey, now services DEC and IBM products.

:SYSMGR donated the 1,024th (1Kth) copy of its :PERFMGR Performance Monitoring package for AOS/VS to the Central New York Data General User's Group for the group to raffle away. Jim Recknall of the New York State Power Authority won a random drawing, and plans to install it on the Authority's MV/20000 model 2.

Penta Systems International, Inc. of Baltimore announced the sale of five networked publishing systems valued at more than \$2 million to a publisher in Paris, France. This purchase by Groupe Liaisons is the largest single order ever received by one of Penta's European subsidiaries.

Taipei, Taiwan, is the location of one of Data General's newest branch offices. The new office, headed by Anthony Wan, is part of Data General's plan to strengthen its efforts in the Asia North region.

Wan is the former sales manager for Distributors in Asia North. As the general manager for Taiwan, he will support and coordinate the sales, marketing, and service of DG's distributor, Tatung Company.

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