May 1987

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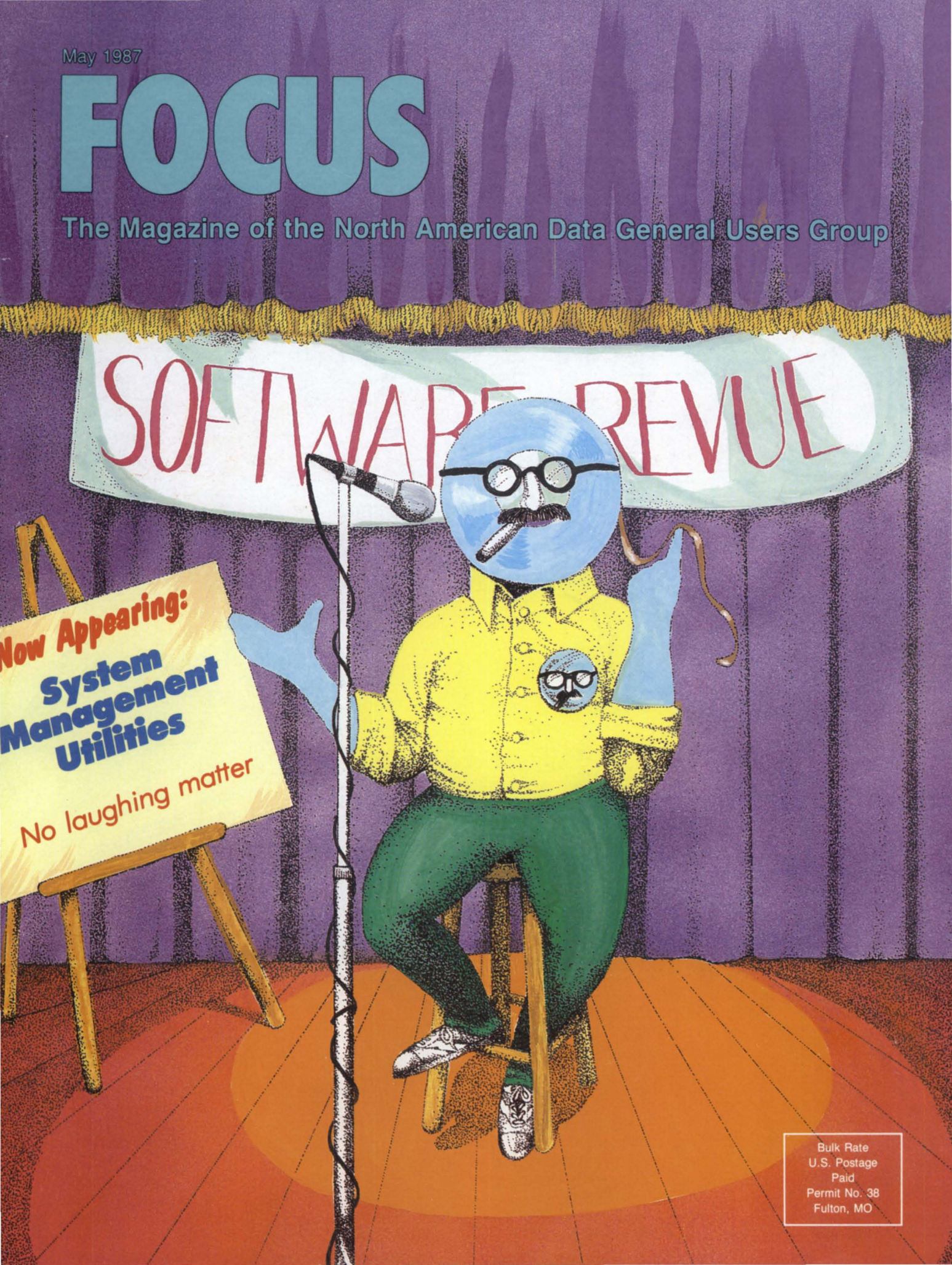
The Magazine of the North American Data General Users Group



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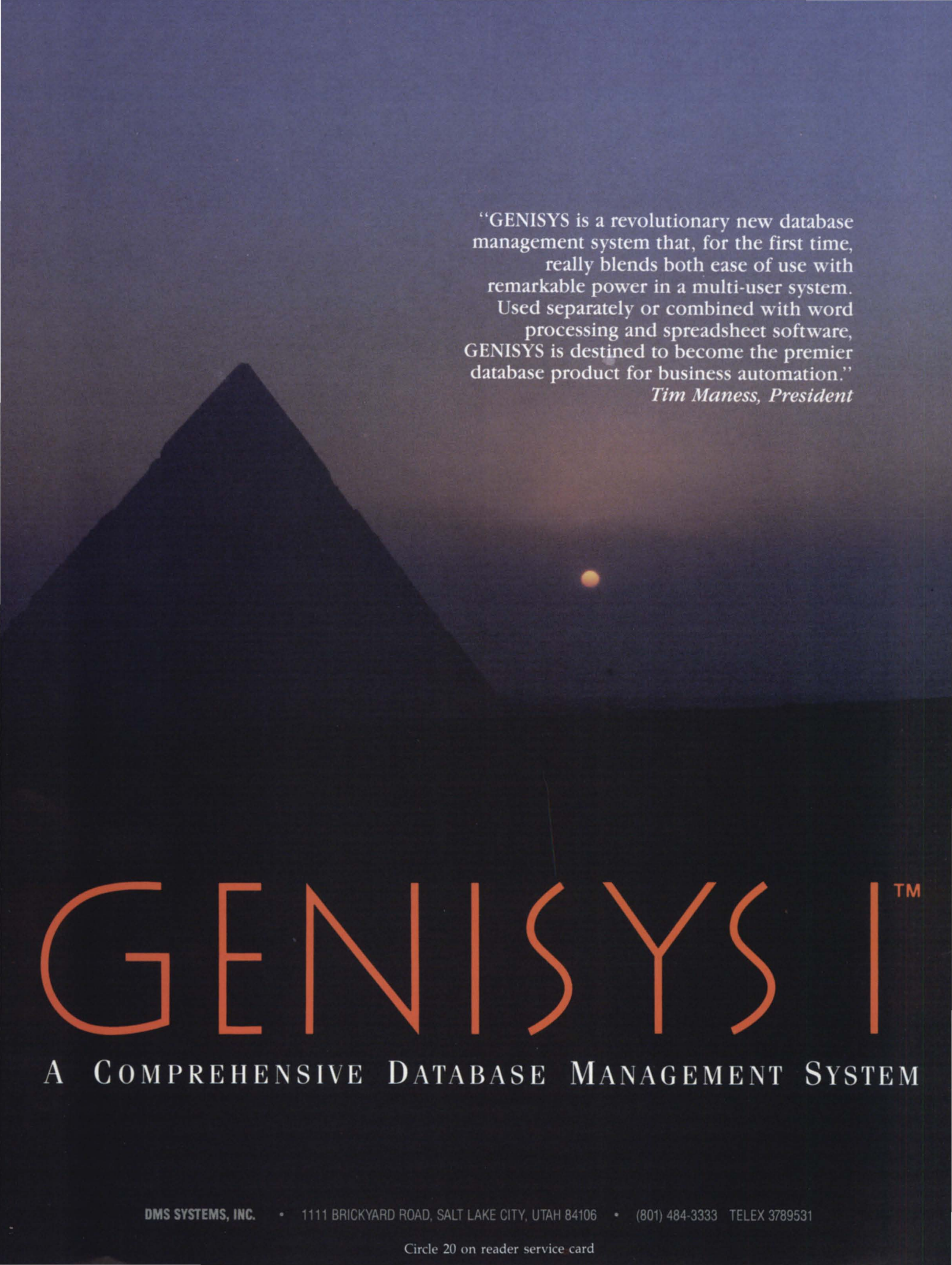

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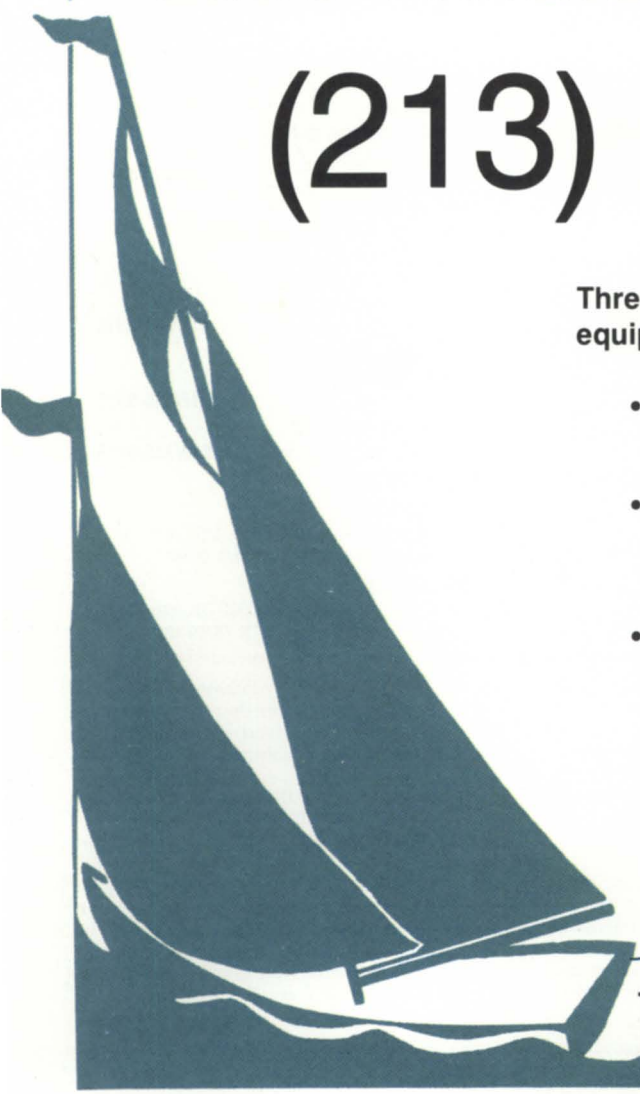

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ECT REPORT WORDPERFECT REPORT

WordPerfect is world's most popular wp product

Just about everyone in the Data General world knows the name WordPerfect. What DG customers may not know is the popularity of WordPerfect in many other markets.

WordPerfect is not only the most popular word processing product in the U.S. PC market, but it holds more than 50% of the PC market in Norway and 75% in Holland. Its fast, easy, resourceful style is well known throughout Australia, Canada, Europe, Scandinavia, and even the Far East.

In addition to software for DG and IBM PC computers, we also have versions for the VAX and Apple IIe/IIc/IIGS. Later this year, we will be running on the Macintosh, Amiga, Atari ST, IBM 370 mainframes, and some UNIX computers.

Down-home concern

Such widespread success in other markets does nothing but strengthen our commitment to the DG Division.

To enhance our telephone support, we recently hired Chuck Swank, previously the Factory MIS Manager at Ore-Ida foods. We've also organized a new testing group to carefully inspect the quality of the software you receive.

In the last year, we have more than tripled our development resources in the DG Division to upgrade existing products and develop new software. Word processing is only a part of our product line.

After just four months in the market, WordPerfect Library for AOS/VS, our office automation solution for DG systems, is now installed on more than 150 machines. The integrated electronic mail, calendar, scheduler, shell, and phone message systems are proving to be valuable office tools.

In *Data Base Monthly*, Tom Robinson described WordPerfect Library: "Their technique for putting jobs on hold and switching among them is easy to use, easy for users to grasp, fast, efficient, and just plain clever."

In addition to WordPerfect Library, MathPlan (our spreadsheet) and P-Edit (our program editor) round out the WPCORP product line for DG hardware.

More on the way

As DG introduces more machines, we're ready with the software to get the best performance. Our price for WordPerfect on the new MV/15000 is $5000 for Model 8, $6000 for Model 10, and $7000 for Model 20. The prices are the same for WordPerfect Library on each of the three models, and MathPlan runs $3000, $3500, and $4000 for models 8, 10, and 20, respectively.

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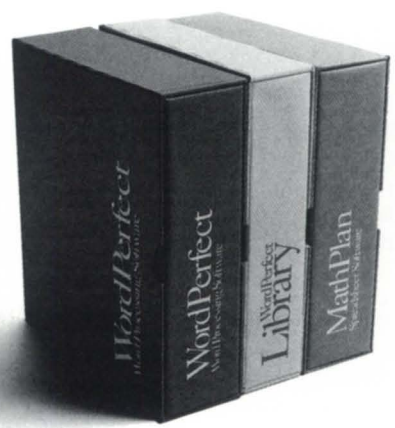

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JUST IN FROM LAS VEGAS

Notes from the NADGUG Executive Board's spring meeting

by Calvin Durden
NADGUG President

We had a record turnout in Las Vegas—almost 40 members of the Executive Board met for two solid days in March to review the activities of NADGUG's staff and committees, and to make plans for our annual conference next October.

Some had worried that it might be hard to get much business done in a party town like Las Vegas. I think we can lay that idea to rest now, because this was one of the most productive meetings of the board I can recall. Once we got out of the hotel registration area (it opens onto a casino) and into the meeting rooms, it was time for work.

NADGUG's twice-a-year board meetings really serve to point out how much the organization depends on volunteers working in their RIGs, SIGs, or committees. It was impressive to see how much progress these volunteers were able to report to the board. Here are some highlights:

- We are setting up an exchange program with the United Kingdom User Group to encourage our members to attend their meetings, and vice versa. In addition to the exchange program, we will offer a reduced registration fee for UKUG members if they are able to finalize their plans to charter a special flight to come to Conference 87 next October.
- Our efforts to increase the visibility of NADGUG among users, vendors, and Data General personnel are paying off. If you include the special promotional memberships we recently offered to RIG and SIG members, our membership grew by 137 percent during the past year.
- Conference 87 is shaping up very well. 27 presentations are scheduled so far, and we will do our best to organize them into three parallel tracks (addressing the interests of end-users, system managers, and MIS managers). 35 vendors have already said they want booths in our conference exhibit area.
- Several of the new RIGs and SIGs that had formed since our last board meeting gained formal recognition, and we had more RIG and SIG representatives at the meeting than ever before.

■

We also had to deal with some tough issues in Las Vegas. One of them is the budget. As NADGUG has grown, we have been taking responsibility for paying more of the bills that Data General used to take care of for us. With the increases we have seen in our conference expenses, we had to decide whether to increase the registration fees, or cut back on the conference services. (We decided on a small increase in fees.)

One result of the efforts we have been making to increase our membership is that we now provide services like *Focus* to a lot more people. The budgetary impact of this is that we have additional expenses right now, but the corresponding new revenues won't come until sometime in the future. Therefore, we have to be careful as we weigh the benefits of providing new services to our members, and make sure that we don't get out ahead of our revenues.

In fact, there were some very interesting proposals to the board for new services that we could provide to RIGs and SIGs. The planning committee will be reviewing the benefits and budgetary impact of these ideas over the next several months, and we will take them up again at our next meeting.

■

Of course, it wasn't all work and no play. Although I was prepared to try my luck at some of the games downstairs, I kept getting sidetracked and never made it to the casino. Most of the board members were more diligent about their diversions than I was, though. Several told me about their forays downtown, and just about everybody seemed to have a good time.

Even for those who had no interest whatever in the usual Las Vegas attractions, the conference hotel had a lot to offer. The Tropicana has a beautiful outdoor pool and courtyard, and very nice health club facilities. The Las Vegas area also has quite a variety of tourist attractions. I think the consensus was that Conference 87 will be a winner. Δ

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LETTERS

A safer way to IMPORT DIF files

In the February 1987 issue of *Focus* (page 6), Gary Sanford offered a way to confuse CEO into allowing a user to READ a DIF format file into a spreadsheet document. I would like to offer the following as a *safe* way to accomplish the same thing.

First of all, if one has a file of type "DIF" in one's :udd:username directory, one can simply IMPORT the DIF file into the CEO filing system (as a DIF type document). Because the AOS(/VS) type of file is the same as the CEO Document type requested on the IMPORT, no document conversion is needed nor attempted by CEO.

At this point, as Sanford instructs, one can create a CEO spreadsheet document (type SPD) and READ the IMPORTed DIF file into the SPD document. Finally, if desired, the IMPORTed DIF document can be deleted (as well as the AOS/VS file, if you want).

I feel a lot better if my users are not doing deletes in the :CEO_FILES directories. With this method, users need not be concerned with any directory other than their own UDD.

If the AOS/VS file TYPE is *not* DIF, all the user need do is:

```
)CREATE/TYPE =DIF newfilename
)COPY/A newfilename oldfilename
(if desired) delete oldfilename
```

Then the user can IMPORT newfilename.

Mark D. Ward
Sr. Systems Engineer
Data General Corporation
1500 Rosecrans Ave.
Manhattan Beach, CA 90266

In defense of the System/38

I just got to column two of the Focus On: Promising Technologies "R&D Q&A" in the March 1987 issue of *Focus* (page 18). I can't believe Don Lewine's comments about the IBM System/38. I also can't believe that Tom West would allow such comments to be printed. These people know absolutely nothing about the System/38.

I have a large System/38 and an MV/4000 in my shop. The System/38 drives just about any application system you can think of including manufacturing, accounting, marketing, human resource management, payroll, spreadsheets, and word processing. The newly acquired MV/4000 drives a CAD system, which we intend to expand to CAM and eventually use to drive NC equipment on the shop floor.

The System/38 has been around for a few years, and contrary to Don's statement, "I suppose that there were quite a few of them actually installed just by virtue of the size of IBM," the machines were, and still are, installed because of their hardware and software integration, which provides the most effective relational data base environment available today. His statement, "But it was a dead end," indicates that he is not aware that IBM has recently announced upgrades that would put the largest Data General gear to shame. The architecture of the System/38 allows growth that will parallel any of IBM's own mainframe systems. In fact, today's high-end System/38 will outperform any Data General equipment on the market.

I did not finish reading the article.

Brian W. Waldron
Manager, data processing
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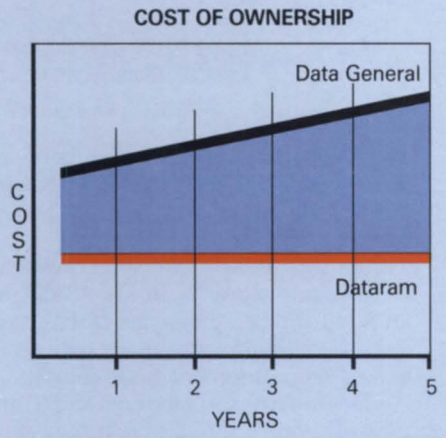

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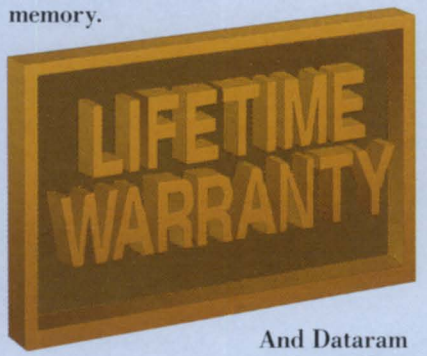

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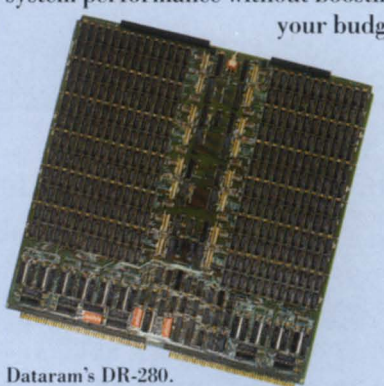

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THE FLOODGATES ARE OPEN

DG disaster industry is ready for any downpour

by Carolyn Kelly
Focus Staff

Photo courtesy of Fast Track Systems

Hot sites are a hot issue—especially among those companies offering disaster recovery services to the DG minicomputer market. So far, four companies have advertised computer facilities to help businesses stay in operation if their computer systems malfunction. These companies are competitively searching for potential clients and trying to establish a unique identity in the Data General community. Meanwhile, computers and office space remain idle and empty. As of yet, none of them have had to respond to an actual disaster.

Data Assurance, Fast Track, NPA, and Sysgen Recovery Services all announced their services within the last two years. This burst of interest in the disaster recovery industry coincides with the overall burgeoning of the DG market and stiffening government regulations demanding that financial institutions provide better security for information assets. As a result, these companies have targeted the banking and stock brokerage industries as the most promising prospects.

Two-year-old Data Assurance, based in Englewood, Colorado, has slight seniority over the other three companies. Since its inception, the company has made considerable strides, growing from 9 clients a year ago to 37 as of January 1987.

Data Assurance offers a computer center equipped with an MV/10000 and an S/140 with 2.5 gigabytes of disk storage. Clients provide their own software. The equipment pool consists of Anderson-Jacobson modems and Timeplex IIE statistical muxes that they send to a client to ensure compatibility with whatever is on both ends. If all goes well, Dan Kilburn, president, anticipates upgrading to an MV/20000 and opening a second recovery center by

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the end of this year.

Kilburn and his partner, Roger K. Crosby, stress the hot site and planning aspects of disaster recovery. Data Assurance provides a crisis-stricken client with a compatible computer via telecommunications in order for the client's business to continue without interruption.

"We are in the business to protect a company from major financial losses because of a disaster that could render them inoperable for weeks. If a company could survive that, then they don't need our services," Kilburn said.

If a disaster should occur, the client would transport all their information to Data Assurance along with an operator to operate at the backup facility. The client may send an operator to Colorado to run the software, but Data Assurance does not rent out office space for businesses to temporarily take over. Although that practice is the direction disaster recovery initially took, it is "logistically unworkable," according to Kilburn. Data Assurance, for example, has clients scattered across 20 states, but few are located in Colorado.

Each client is guaranteed three test runs a year. Testing has run smoothly so far, although a few minor snags have occurred. One time they ran a telephone modem into a dirty plug, causing a malfunction. Another time, they were able to help a client who had moved locations over a weekend. The next Monday morning, the equipment did not work properly. Data Assurance took over for one day until their computers were running.

Typical of the other companies, costs are pro-rated, depending upon the number of modems and mux lines needed and the size and type of computer and other equipment the customer requires. Payments are made on a monthly basis similar to an insurance policy. At Data Assurance, one client pays as low as $450 per month.

Data Assurance's first customers were credit unions. Perhaps their biggest contract to date will arise from an affiliation with Citicorp Information Resources, which endorses Data Assurance for their in-house bank DG users.

According to Kilburn, financial institutions are more likely to need disaster recovery services since the Federal Home Loan Bank Board issued a policy called Circular 67 in September 1986. This document strengthened existing regulations covering savings and loans' insurance of their assets, which includes information. He expects other agencies such as the FDIC and FSLIC to also issue stronger policies. "I'd bet a month's pay on it," he said. Kilburn also has targeted healthcare and travel-related industries as possible niches in the disaster industry.

The three other companies, all operating out of New York, are looking for similar niches. NPA, located in Holbrook about 40 miles west of Manhattan, has existed in various planning stages for about a year, but the oldest contract they have is four months old.

NPA divides its services into four categories: (1) Vaults provide off-site disk storage in rooms that are 10' x 10' x 8' with 2' thick walls. A sprinkler system has been installed in case of fire. (2) Cold sites allow customers to rent computer room by the square foot out of an available 20,000 square feet. According to Nick Aroniades, NPA president, the space can accommodate up to 200 users. (3) Warm sites are hot sites operating strictly through telecommunications. (4) Hot sites provide a complete duplicate standby system of the customer's system. NPA is equipped with MV/10000, MV/8000, and MV/4000 systems. Clients provide their own software.

After nearly scratching the project twice and twice reviving it, Aroniades hopes to get in on the ground floor of a business that could boom. "We get an enormous amount of inquiries," he said. He hopes those inquiries will become contracted customers, especially inquiries from the stockbrokers nearby on Wall Street.

But for now, they are waiting for businesses to warm up to the idea of hot sites and disaster recovery planning. "We're waiting. That's the hardest part—to see who really needs the service. We don't know which way it's going to go. If we find a big customer, we'll go in with both our feet. We're still losing money. . . but the future will come moving at 150 miles per hour," he added optimistically.

Fast Track is another company with the same optimism. According to president Burt Hochstein, the company started in August 1986, but didn't "hit the street running" until November.

As an affiliate of Track Data, they have three MV/10000s more than 8 gigabytes at the Manhatten hot site, and one MV/10000 at another hot site in Chicago. Pending feedback from the Data

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General community, they plan on opening a third site either in Dallas or on the West Coast.

Fast Track also offers one unique service—a mobile recovery center. The fully equipped transportable trailer acts as a computer center. It is large enough to accommodate any DG computer that the customer would need to place in it, according to Hochstein. However, he admits that it is a less viable alternative than the use of telecommunications. "It's more of a peace-of-mind device," he said.

"100 percent of our business requires telecommunications. With Track Data, that's where we have our expertise," he said. "A client in Midtown (New York) would still want telecommunications, although we might recommend that some of their staff come over here. The stockbrokers don't want to come here to my site for a quotation even if it's three blocks away," he said. A future goal for the company is the use of satellite communications.

They also offer disaster planning and analysis and the storage of tapes and forms in fire-proof safes. Although they do not consider their company a primary backup source, they store approximately 12 tapes per month of each company's system software.

As of January 1987, they had approximately 10 clients. Now, according to Hochstein, "We are ready to make our push with no limitations. We have the machinery to handle quite a few clients and the capacity to bring in even more."

Lastly, Sysgen Recovery Services Inc., in Ronkonkoma, New York, announced its opening in November 1986, intensifying the growing competition. The June opening date was accelerated because of Fast Track's announcement. Sysgen Recovery, a division of Sysgen Group, has an MV/10000, MV/8000, MV/8000 II, MV/4000, and Eclipse M/600. They offer both hot and cold sites in the same 10,000 square foot room. Data General is the first minicomputer market the company offers its services to, although they expect to have Hewlett-Packard and Wang on-line within the next two years.

Sysgen has two clients—a mail-order pharmacy and an investment banking firm. As of now, they have a staff of 10 people including system programmers and telecommunications experts who are on call 24 hours a day.

According to Raphael Feldman, chairman of Sysgen Group, their services are divided into five categories:

- Disaster processing—used if an "out-and-out calamity" occurs. They use micom stat muxes that are split off of one mux with four terminals operating off of one line and an abundance of telephone lines. Clients may also send personnel to the Sysgen site to continue their operations.
- Emergency standby processing system—used if Data General can't fix a computer problem within a four-hour period.
- Overload—used when a company's "horsepower on their own CPU isn't enough," for example, at the end of the month. They can download and dial into Sysgen's system so that their system becomes live again.
- Consultations—a staff analyzes the situation ahead of time and writes a manual on the procedures to follow during a disaster situation. They authorize, for example, who has the key to the vault, or who declares a disaster.
- Data storage—provides back up storage in a cinder block building. Lead netting around it prevents any magnetic forces from entering.

Feldman considers Sysgen's location an asset because of its proximity to MacArthur Airport. Clients' employees could be dispatched to the area quickly. According to Feldman, no other DG MV user operates from the same electrical power grid. Sysgen could still provide disaster services to other New York businesses in the event of power outage.

Cost depends upon the MB disk storage needs and the number of terminals. For example, an Eclipse would cost about $400 a month; an MV/20000 would cost about $2,000 a month. If, for example, a customer wanted a constant backup of an MV/10000 and didn't want processing to stop for a moment, it would cost about $8,000 a month.

"The point of what we do is similar to insurance," Feldman said, "but an insurance company reimburses after a loss has occurred. We prevent the loss from occurring."

Data Assurance Corporation, 6551 S. Revere Parkway, Suite 130, Englewood, CO 80111; 303/792-5544.

Fast Track Systems, 61 Broadway, New York, NY 1006; 212/943-4555.

NPA Systems, Inc., 761 Coates Avenue, Holbrook, NY 11741; 516/467-2500.

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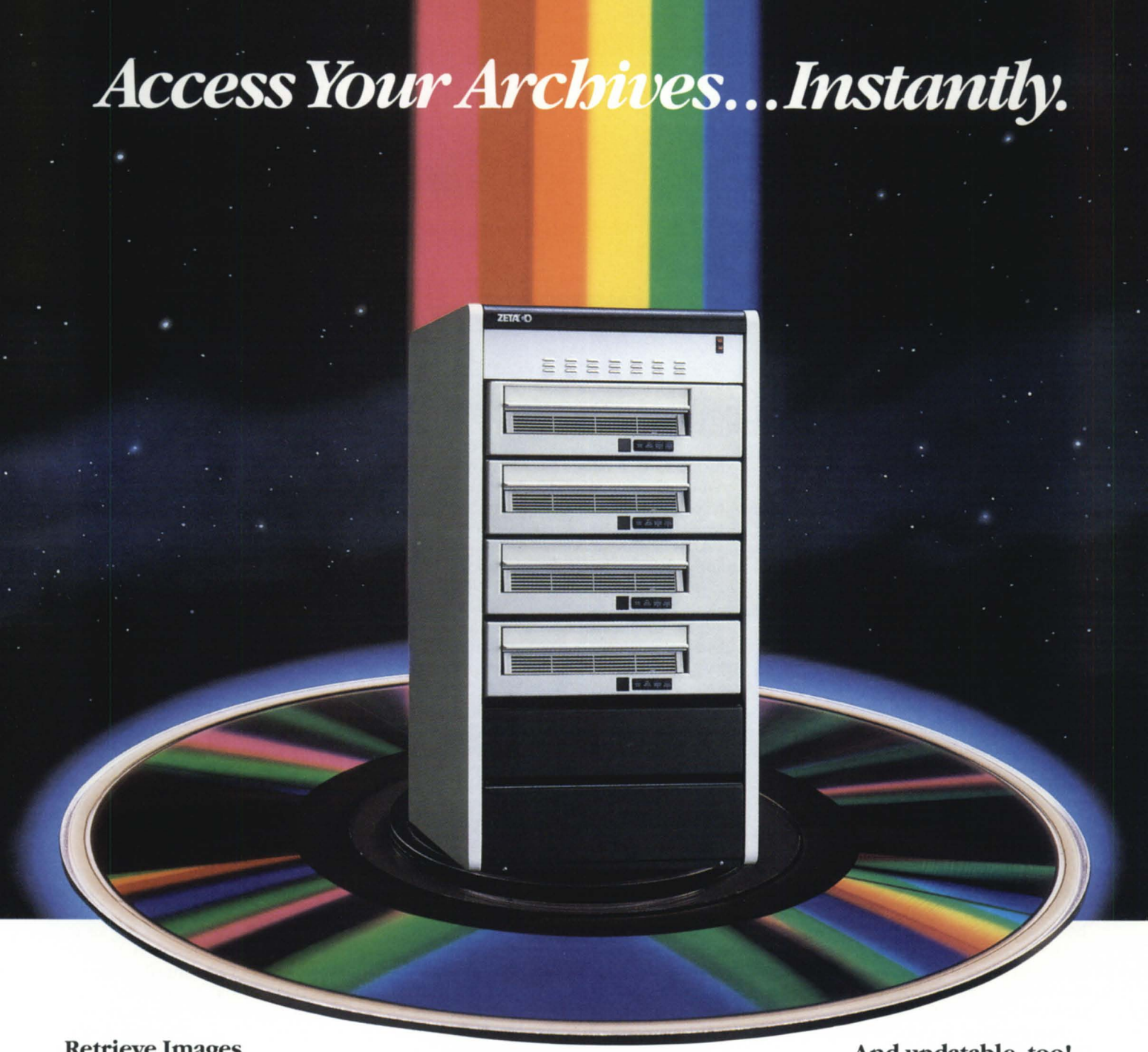

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ACID TEST

You can't have confidence in your disaster recovery plan unless you've tested it

by Mark Willer
Special to Focus

When Royal Credit Union (RCU) began in-house processing back in 1977, it wasn't long before we began to realize how dependent we had become on our on-line operation, and how important it was to have a good backup plan. RCU is the second largest credit union in Wisconsin, with over $135 million in assets and 35,000 members. Considering our commitment to provide quality credit union services to a three-county area, an alternate on-line data processing capability, or hot site, became a major objective.

We kicked around various alternatives, but there were very few available. For several years, we depended on a reciprocal agreement, a batch processing arrangement whereby, should the unthinkable occur, we would process on another credit union's computer facility.

Obviously, we could not afford to build a totally redundant system. It would have to be in another location so the same disaster didn't wipe out both. And every time we added something to our primary facility, it would have to be added to the backup site. Just the cost of duplicating the lease lines to each of our branches made the idea economically unfeasible.

It wasn't realistic to think we could function by sharing another credit union's data processing facility until an alternate facility could be reconstituted—(that is, assuming our systems were still compatible). Would the other credit union be able to accommodate our work load in addition to their own? Could we give them enough processing time? Not likely.

Assuming the worst case scenario, destruction of either credit union's data center, there just aren't enough hours in a day to handle the critical processing for two financial institutions.

After years of concern and uncertainty, we finally had the opportunity to solve our dilemma. In 1985, we learned about Data Assurance Corporation (DAC), a Data General equipped disaster recovery company located in the Denver, Colorado metropolitan area. Under their concept, we would be able to access a fully configured, compatible computer facility over WATS telephone lines using multiplexors and dial-up telephone modems from DAC's in-place communications equipment pool.

Despite being somewhat dubious about the adequacy of DAC's hot site to keep our six offices fully operational in the event a major disaster struck, we knew it was technically feasible, and we decided to sign a contract. It was clearly what we needed.

After some preliminary tests, designed to test specific elements of the backup capability, Royal and DAC decided to prove that we could dial up DAC's MV/10000 in Denver and keep all six of our Wisconsin offices running simultaneously—on-line—while conducting normal business activities.

Four members of Royal's management team were chosen to oversee execution of the test. They included the data processing manager, the executive vice president, and the vice president and manager of research and development.

We scheduled the first comprehensive "live" test of the remote, alternate processing capability for mid-December 1986. The test had three major objectives·

- Demonstrate the capacity and compatibility of the hardware, software, and communications;
- Uncover any potential problem areas within the plan prior to an actual disaster; and
- Provide employees and staff with a high level of confidence in our backup plan.

It would turn out that we would all be quite surprised and very pleased at how easily all three of these objectives were met.

While no specific disaster scenario was chosen for this test, it was assumed that a catastrophe of some proportion had wiped out our data processing facility. To prove the feasibility of operating our credit union on-line with our backup data processing facility in Denver, an outline was developed that listed the major tasks to be completed.

Specific tasks and completion dates were assigned to each member of the team. Tasks ranged from making airline reservations to terminating the test in the event of major complications. A memo was issued to all credit union employees describing the test and our goals.

The test of our data processing recovery capability was scheduled to begin Friday, December 15, shortly after our normal close of business at 6:00 p.m. The simulated disaster was declared by our president.

As a matter of daily routine, Kent Stelter, Royal's data processing manager, creates two sets of backup tapes, one set to be kept at our off-site storage facility in Eau Claire, and one that would be potentially needed at our hot site location. At 7:30 p.m. (CST), he left Eau Claire's airport and headed for Denver, hot site backup tapes in hand. He carried them on board to make sure they did not get lost.

At the same time, other team members disconnected existing multiplexors from the leased telephone lines to RCU's main system and, in turn, connected them to 4800 baud, dial-up modems supplied from DAC's equipment pool. DAC modems and multiplexors were also connected to the ter-

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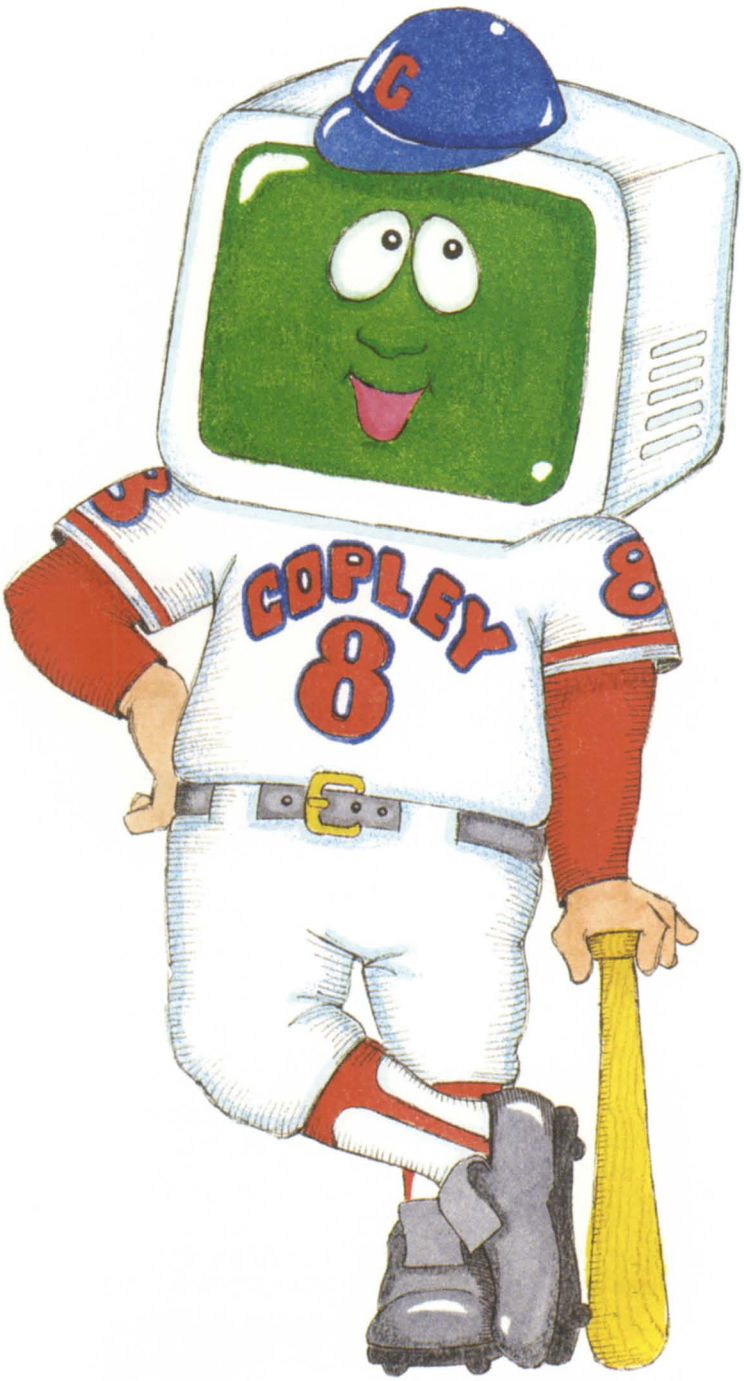

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minal devices at our main facility.

While Kent was enroute, other team members established the initial connection with DAC's MV/10000 via their 800 lines to verify the communications. One line problem was encountered due to noise from electrical equipment in the main office furnace room, but it was quickly solved by re-routing the cable. Within a very short time, all offices had been successfully connected to DAC's system in Denver.

Kent arrived at Denver's Stapleton Airport at 11:30 p.m. and was at DAC's hot site 30 minutes later. He restored Royal's complete data files and programs without encountering any problems. Several programs were run to verify the file integrity. At about 5:00 a.m. Saturday morning, just 12 hours later, we were ready to go live. The team members arrived at their designated places at 7:30 a.m.

Our drive-ups were scheduled to open at 8:00 a.m., and the doors to our offices at 9:00 a.m. By 7:45 a.m., all peripheral devices at each location were on-line with DAC's computer in Denver, and Royal Credit Union was ready for "business as usual."

The actual test was uneventful. Our members were completely unaware of the fact that their transactions were being processed on a computer in Denver. Credit union employees were surprised that they could not detect any discernible differences while connected to DAC's Denver computer.

As many as 13 devices were connected at 4800 baud over a single phone line. The response time remained excellent throughout the test, and we processed more than 2,500 transactions during the four hours the credit union was open to its members.

When business ended for the day in Eau Claire, Kent did a normal close-down at the hot site, including printing summary totals and other daily reports on their high-speed printer. He then backed up the system, making two extra copies of all files just to be on the safe side. He left Denver Saturday evening, and was back in Eau Claire by midnight.

Sunday morning, RCU's system was restored from the tapes created at DAC. No re-entry of any transaction was necessary; the files balanced right to the penny, and no problems of any kind were encountered.

Needless to say, the test was a complete success—every goal had been achieved. As Royal's president, Charles Grossklaus, said in a letter to the Data Assurance Corporation staff, "you. . . make it possible for [our Board of Directors and employees] to rest easier, knowing that we have a complete backup [capability] off premises." Δ

Mark Willer is a vice president with Royal Credit Union in Eau Claire, Wisconsin. He has more than ten years of experience in the financial industry, with heavy involvement in data processing and disaster recovery planning. Address questions or comments to him at Royal Credit Union, P.O. Box 970, Eau Claire, WI 54702–0970, or call 715/836-9800.

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MASTER YOUR DISASTER

No plan is not a good plan

by Joe Cannata
Special to Focus

Disaster planning should cover four levels: daily planning, emergency planning, disaster planning, and contingency planning

You are on vacation in some tropical paradise. You realize that you have lost your wallet. All of a sudden Karl Malden bursts on the scene with a chorus about using American Express traveler's checks. You find yourself wishing you could roll back the clock.

Let's switch the setting to your computer room, only this time it's not your wallet you're worried about. Before you is the dark, charred remains of what was once a highly efficient data center. There is no backup, no plan for recovery, no insurance, and not even Karl Malden to lend a sympathetic ear. The plan you always meant to develop, but never had time, would look great right about now. All of a sudden, life has gone sour, and will get much worse in the immediate future.

The preceding scenario could have been dealt with easily if there were some sort of prior planning to handle a major problem. Call it disaster recovery, survival, contingency, or emergency planning, but it should be designed to detail and outline necessary and corrective measures to guarantee survival from any seriously damaging event to the business operations, including and not limited to the MIS/DP function.

The planning should cover four levels. Daily planning includes provisions for the day-to-day operational problems. Emergency planning should include any destruction of master files, hardware down time, program problems, and loss of data. Disaster planning covers more serious problems such as fire, operator error, damaged facility, or malicious destruction of data. Contingency planning includes large-scale fire, explosion, civil disturbance, severe weather, and epidemic. The more serious the problem, the more involved the plans will get.

Why bother to have a plan at all? This common question seems almost moot. When you ask someone if they have a plan, odds are they don't. 35 to 40 percent of the Fortune 500 have plans, but only 5 to 10 percent have tested them. Twelve percent of all companies have viable plans in place. This was found in a survey by the Computer Security Institute in January 1985.

The reasons for a plan vary. The obvious one is common sense. Management can be held personally responsible for the assets and profitability of a corporation, so a plan is personally advantageous. If you are a bank or savings and loan, there are federal regulations requiring a plan. An outgrowth of the planning process is good documentation, physical inventories, exposed organizational weaknesses, and safety. As information gets centralized, the threat of loss increases, so a plan minimizes that threat.

Most major disasters are caused by fire. Theft, weather, and bad data are the next most frequent causes.

Disaster recovery planning should be an ongoing part of doing business. It requires regular review, managing, and updating. Top management must be involved and highly visible throughout the process to foster support. Planning should be built into job descriptions for managers. People are the key resource in a project like this.

There are several objectives for planning.

1. **Survival, not business as usual.** The main goal of the plan is to continue the business under austere conditions, *not* to function under normal everyday procedures. Many plans try to replicate normal operations and as a result become too cumbersome and unfeasible. Adjustments and concessions will have to be made under these circumstances.
2. **Early detection minimizes problems.** It is easier to plug a hole before a leak starts. Any potential problems should be rectified before they actually become a problem.
3. **Minimize effect on the operation**. The plan should provide for business to continue in a manner that is close to the normal operation. New procedures should be implemented only if necessary. The disaster has caused enough change, without introducing alien methodology. Yes, things will change, but they should not change totally.
4. **Minimize down time.** The longer business is interrupted, the greater the loss. Careful planning should significantly decrease the loss.
5. **Protection of corporate assets.** The plan should protect assets such as people, data, records, and equipment.
6. **Fair delegation of responsibilities.** The individual contributions to the planning process and implementation should be distributed evenly throughout the corporation. This is not a function limited to MIS; users need to be involved as well.

Your vendor can be a very important contributor to the development of the

overall plan. For example, Data General's software products and services division offers a disaster recovery planning service. Their consultants use an established methodology to guide your team through the process, avoid common pitfalls, and reduce the time required to develop the plan. They are also available to review your plan and recommend changes or enhancements.

Before entering the planning process, some key internal arrangements are necessary. Sound records retention and rotation (backups) should be in place. Some physical (site) security should be established, as well as software security.

The parties involved in planning should understand that the goal is *survival, not business as usual*. Disaster recovery planning should not be done hastily. It can take six months or more.

There are six phases to the planning process. There is always maintenance, which is an ongoing function.

The first phase is preparation, which is when you must sell your top management on the idea, and gain their support and involvement. It is necessary for them to give disaster recovery planning a stated priority, or it will never be completed properly. The key personnel in each area should be identified. Any education on the subject for all constituents should be done at this time. Some questions to consider cover potential losses, the cost of not operating each day, financial penalties involved with not operating, and legal responsibility.

A recovery team needs to be established as the governing body during a disaster. The members should have specific functions and serve as the focal point for recovery process information. This team should oversee testing as well.

In the assessment phase, it is necessary to look at the current business and data processing environments, and document any vulnerabilities. It is also at this time that critical functions must be reviewed and prioritized. This is where the system users become heavily involved. Checklists and surveys should be distributed and evaluated upon return. The survey should also include which personnel, facilities, and equipment will be needed during the recovery period. Also, all master files should be documented during this time.

In the backup selection phase, several points must be considered when selecting a method that best suits the organization. The level of survival/protection, how much loss can be endured, how fast recovery should be, and what types of applications are running all need to be evaluated. There are several contingency options available, ranging from minimal to extremely comprehensive. The selection should be made on sound consideration, not out of fear or frugality. Never forget that the recovery process will not be long term, but business survival is.

Testing is the most important step in the process. No plan is a viable plan until it is tested.

There are eight basic variations of contingency methods:

1. Reverting to manual procedures
2. Reciprocal agreements
3. Hot sites
4. Service bureaus
5. Cold sites
6. Consortiums
7. Duality
8. Absolutely nothing

There are advantages and disadvantages of each, and the costs range from zero to very expensive.

Once a contingency method has been chosen, the backup phase doesn't end. Different measures must be taken when formulating the plan. Preventive measures include fire alarms, fire extinguishing systems, off-site storage, neatness and organization, and keeping equipment, records, and data away from potential hazards. Detective measures include locating potential hazards and hazardous materials, researching local flood history, and modeling different disaster scenarios. Corrective measures that should be taken include training of employees in prevention, testing evacuation facilities, and moving equipment away from potentially disastrous locations.

In the documentation phase, the plan is actually written. Once a draft has been developed, the contents should be reviewed and revised. As the final version takes shape, formal approval and signoff is next. Copies should be distributed to all involved. Note that plan copies should be kept off-site in easily accessible locations. A plan is useless if it is destroyed in the fire, or in somebody's inbox in CEO. Along with the plan, complete system documentation should be kept off-site. A master distribution list for plan copies should be created and maintained so that any revisions to the plan can be incorporated into each copy.

The training phase involves making employees and management capable of writing and following a plan. The pre-plan training may come before the documentation phase, depending upon the skill levels of the participants. The use of a case study is helpful in developing awareness.

You need to condition employees to four concepts: the probability of disaster is low, but if one occurs, it could be 30 to 45 days long; we are talking survival, not business as usual (I can't stress that enough!); practical and simple solutions work best; and the success of the plan determines how much a disaster *doesn't* cost.

The testing phase has the greatest impact. You can spend countless hours, untold energy, and lots of dollars to formulate your plan, your living legacy to the business, and in time have it turn into the headstone on your grave. All of this because your great and wonderful plan worked fine on paper, but was never tested. Testing is the most important step in the process. No plan is a viable plan until it is tested.

The testing should be all-encompassing and simulated to the level of a real disaster. Always remember that no test completely fails, because you can learn from the events and experiences. It is important to gain management's approval for the test. Employees should be made to feel that testing is a part of their job. Hold pre- and post-test meetings, and encourage feedback from all participants. Log all events during the test, and stick to the pre-stated time frame. Never use a test to develop procedures. Publish the test results for all concerned. During a disaster situation, eight basic stages always emerge.

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Certain actions are dictated by each stage. The stages are: detection, reaction, assessment, authorization, notification, mobilization, restoration, and reconstruction.

During the detection stage, the proper disaster team must be notified. In the reaction stage, safety procedures are initiated, equipment, forms, and data are carried away from the building, emergency help is called (fire and police), and evacuation is begun. The next step is to assess the damage, and to estimate the down time. The premises must be secured. In the authorization stage, then (and only then) is the disaster declared. Usually two or more people decide whether or not a disaster should be declared, and the plan is put into action.

Now that a disaster has been declared, the notification process is begun. The traditional method is using a call tree. This method should be tested beforehand, to measure "hit rates." If not found to be reliable, other means should be devised. When all of the employees are in place, the mobilization stage begins. Resources should be retrieved and taken to the alternate facility if applicable.

Data restoration and facility setup are next. The last stage of reconstruction may take the longest, but it is during this stage that you will try to survive until the disaster can be overcome.

In sum, you can read about a disaster happening to someone else and hope that it won't be you. You can put off writing a plan because of time, money, or any other excuse you can devise. However, should that day come and your turn arrives, one thing is for sure—a well-prepared installation will survive. An unprepared one will probably be close to extinction. Instead of wishing something away, divert your energies toward creating a plan that will provide and protect you, and pay you back even if a disaster doesn't occur.

For a more indepth treatment of this topic, I recommend that you attend "Recovery Workshop: Techniques for System Crisis Management," a two-day seminar from DG's educational services. Call 617/366-2900 for more information. Δ

Joe Cannata is a training specialist with Data General's educational services at their Washington, D.C. training center in McLean, Virginia.

TRAINING

An effective tool for system managers

by Paula Jacobs
Special to Focus

What's the most efficient way to learn the intricacies of a new operating system? Can you improve the efficiency of your current system? What's the optimum way to help maximize performance as your system configuration changes? These may be the most common problems facing both new and experienced system managers.

Data General offers a number of tools to help system managers with their responsibilities. According to Richard Jaross, director of Data General's educational services, "One important tool is training, a key ingredient in the smooth startup, increased productivity, and continued growth of a computer operation."

Jim Geary, the educational services sales manager, said, "We offer a broad product line that caters to our entire spectrum of users and wide range of customer requirements. The advantage, of course, is that our program is targeted specifically at Data General computer users."

System managers can select from a wide span of offerings presented in a variety of formats. These include lecture courses, technical seminars, and hands-on workshop programs at DG's customer education centers. In addition to traditional instruction, educational services also offers computer-based training (CBT) and self/study courses, as well as "CEO at a Glance" job aids and mail order documentation from its technical information and publications service (TIPS).

Since educational services works closely with Data General's product design and development groups, it can provide indepth comprehensive training programs as soon as new products are announced. As a result, system managers can stay current with the latest technological advancements.

Technical seminar program

The technical seminar program delivers new and current systems training backed by a team of nationwide subject matter experts. Instructors are experts in real-life systems solutions, and share their technical know-how and expertise on topics ranging from advanced CEO support to DG/SNA application design.

As seminar program manager Malcolm Lawson said, "Our objective is to deliver up-to-date technical information focused mainly on system managers and system programmers. We try to offer the latest information to help make better use of Data General systems. For example, when AOS/VS rev 7 was announced, the new functionality and performance issues were incorporated into a new course, *AOS/VS Enhancements 06 & 07 (SM504).*

These seminars provide information about functionality, as well as an overview of all system features and possibilities. "This way," said Lawson, "we can save our system managers research time by helping them achieve a better understanding of the system. This point is worth emphasizing because the underlying concept is to provide immediate gains in system productivity and efficiency."

An important concern of system managers is maximizing system performance. Educational services offers a number of seminars related to this topic, including *"AOS/VS System Performance Workshop (SM412)"* and *"AOS/VS Systems Performance for System Managers (SM524)."* The second course offers a pragmatic approach to system performance and is taught by members of Data General's system and evaluation and performance analysis center (SEPAC) in Atlanta.

SEPAC performance analysts draw from their extensive performance experience and have worked with over 100 customers analyzing and solving performance problems. As a result, this seminar can help system analysts and system managers who want to obtain the best results possible from their systems for the minimum cost, as well as to estimate capacity requirements for future system growth. This three-day seminar compares specifications of CPUs and disk drives, gives "rules of thumb" for performance parameters, and teaches methods of implementing performance tuning requirements.

The AOS/VS system performance workshop, targeted at system managers, as well as other technical personnel, provides an understanding of system operation and the factors affecting system performance. It offers an analytical approach to performance, using models to identify and solve performance problems. Topics include modeling AOS/VS using a central server queuing model, performance measurement, memory management, CPU scheduling, and use of AOS/VS performance package utilities to measure activity.

At DG's educational centers, seminars are also offered on topics such as advanced CEO support, MV/UX, artificial intelligence, data management, and data communications including local area network (LAN) design. Seminars such as DG/UX can be delivered on-site at customer locations. In fact, these on-site seminars are presented by the same industry experts who teach the courses at DG's education centers. For many customers, on-site courses offer significant advantages, including convenience, security, and savings in travel dollars.

The emphasis of the seminar program is on education rather than training. Lawson said, "The process is to first find subject matter experts. Seminars are then developed based on the expertise of the instructor. As you can see from our technical seminar brochure, we are fortunate to have leading experts delivering our seminars."

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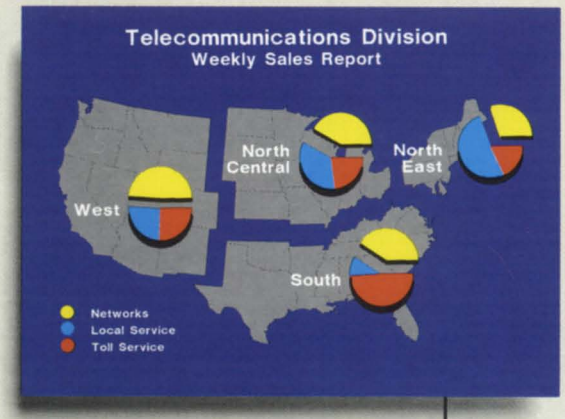

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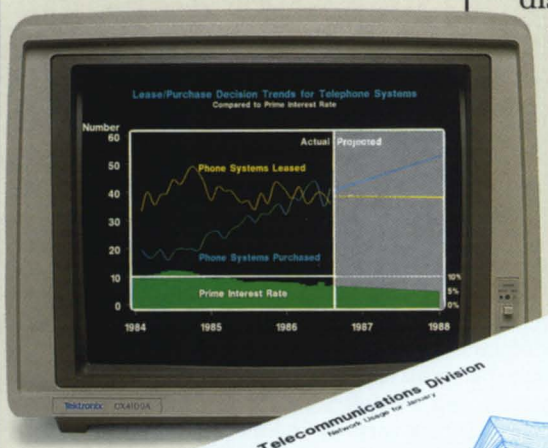

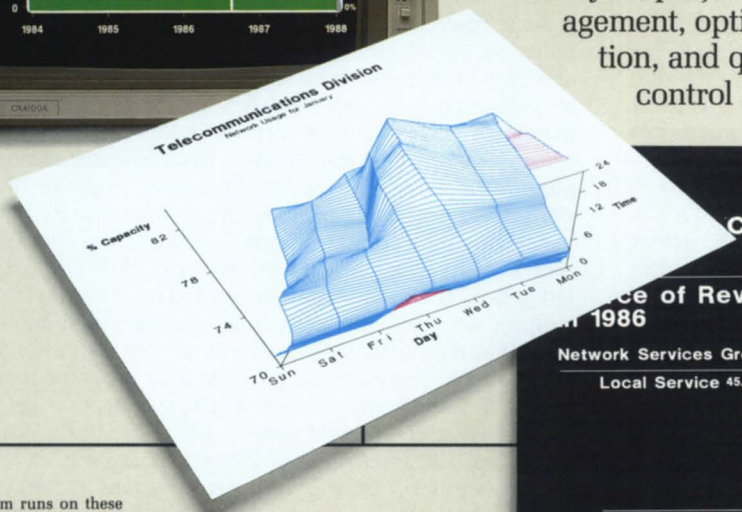

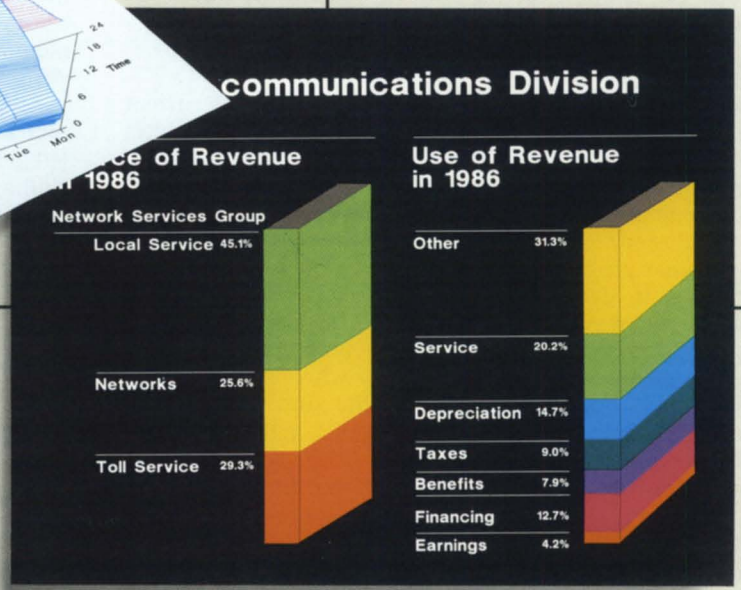

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Lecture courses

A wide range of lecture courses is also available for both new and experienced system managers. Since system managers' responsibilities may vary considerably, there are courses covering the entire range, including CEO and data communications system management topics. For example, *AOS/VS System Manager (S219/VS)* teaches students new to AOS/VS system management how to install, generate, maintain, and manage AOS/VS on an Eclipse MV/ family computer system. *CEO System Manager (S221)* teaches how to control Data General's CEO system, including the system structure of CEO.

One of the newer course offerings, *Eclipse MV/2000 DC System Operator (S224)*, teaches how to operate and manage AOS/VS on an Eclipse MV/2000 DC system. Topics include system startup, shutdown, monitoring, and error recovery. "In sum, we offer system managers courses to set up their systems, to manage their systems efficiently, as well as courses designed to maximize system performance," said product marketing manager Judy Glasgow. "And, like our seminar programs, these courses can also be delivered on-site at customer locations."

Hands-on workshop programs

The newest addition to educational services' programs is a series of hands-on workshops including a recovery workshop titled *Techniques for System Crisis Management*. This program can help DP/MIS managers formulate workable disaster recovery plans for their installations. Taught by educational services instructor Joe Cannata (also in this issue), this program was developed in response to tremendous user interest aroused by a paper on this topic introduced at NADGUG's Conference 86.

Another workshop of interest to system managers is *CEO Implementation Workshop: Automating Your Workplace*, which is designed for CEO office managers who must develop standardized user environments. It offers a practical approach to CEO implementation, with students requested to bring to class their own special requirements during the workshop. Using CEO user migration, students can bring the default private user back to their office and load it on to their own systems.

Obviously, a wide array of courses are available. Yet, how does a busy system manager determine which course will provide the maximum benefit? According to Richard Jaross, "We recognize that sometimes it is necessary to use the services of a professional to help define a training need or to assist with the design of an internal training program. . . . Data General's educational consultants work with our customers to define and implement the solution best suited to a specific business."

Educational consultants are based at six customer education centers and can help customers develop a complete training package, and determine the best format and schedule. In addition, customers can call Data General's central registration in Westboro, where a telemarketing group can answer questions about course offerings and registration procedures.

Paula Jacobs is a marketing communications specialist at Data General Corporation.

For registration or enrollment information, call central registration and information at 617/366-2900 or write to Data General Corporation, 4400 Computer Drive, Westboro, MA 01581–9973, Attn: central registration, educational services, MS G214.

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Detailed course information can be found in the brochures described below. These and a variety of other customer documentation are available by calling or writing Data General educational services central registration at the number listed above.

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A GIN'S TONIC

Producer's Cotton Oil Corporation puts VS Toolbox to work

by Gerry Hawkins
Special to Focus

Producer's Cotton Oil is the largest private cotton ginner in the west. Included in our operations are cotton and safflower oil production, cotton marketing and storage, bale compressing, and farm loans.

Our basic computer management problem is that a major part of our business takes place during only three months of the year—October through December—when we are spending 24 hours per day ginning between 300,000 and 500,000 bales of cotton. We create a huge data base in that time and need to have it as quick and efficient as possible so that we can invoice daily.

In the past, it could take up to two days for an analyst to look through the file system and rebuild it for optimum speed. So, we began to look for a utility to rebuild INFOS files without taking up extensive programmer time.

> *The Terminator solved the problems we had with the PBX system . . . allowing our 10 PBX lines to be shared by 20 users*

In addition to this basic problem, we needed to monitor the system's performance, to close particular files and make them inaccessible to users while doing backups, and to control unused terminals to permit shared PBX lines.

The system we are working with is an MV/8000 with approximately 70 terminals. With our PBX system, remote sites can access the computer on 10 lines for 20 terminals. The primary workload for the system is accounting, including grower accounting and payroll accounting. During our off-peak time, the system is used to manage loans to our growers and to maintain information on the crop. We become, in essence, a large banking firm.

We knew we didn't want to write the

VS Toolbox

Description: VS Toolbox is a set of 16 utilities written specifically for AOS/VS and INFOS II users. The VS Toolbox includes utilities for:

System security and performance—The Terminator tool uses a set of rules defined by the Senator to determine which of the system's processes it is to monitor. CEO users are able to eliminate WP processes that have been left on the system but are not in use. It can also limit certain users or programs to specific times of the day or night.

The Secret Agent monitors the system's resources throughout the day and reports various statistics (CPU usage, disk activity, swapped processes, etc.) at pre-selected intervals. Values are displayed graphically and numerically. Peak usage times can be determined and some activities transferred to other times. Other bottlenecks (CPU or disk bound or memory capacity) can also be determined.

Monitor and improve INFOS performance—Using Architect and Rebuilder, INFOS files can be reorganized to enhance storage space and CPU time. The Inspector and the Investigator can then be used to measure actual improvement in file organization.

Other INFOS utilities include the Director, which redirects indirect records to improve INFOS processing time; the Cross Examiner, which compares two copies of an INFOS file and reports differences; and the Manager, which enables space management on an INFOS index or data base.

The Enforcer facilitates backups performed on INFOS files— locking new users out of the data base(s) and waiting for current users to close—then allowing batchfile processing.

The Paramedic helps to protect an INFOS data base that might otherwise be corrupted during a system crash. It reads a data base volume or differential volume and generates a standard AOS/VS file containing the data records.

The Extender allows an additional volume to be added to an INFOS index or data base.

Improve AOS/VS file access—The D.A. and Surgeon are tools designed to help users optimize the hash frame size of directories and the element size of files—in order to reduce the amount of work the operating system must do to access files.

The Tailor works to determine the hash frame size that best fits—by minimizing the average number of FNBs that the system must access when it searches for a filename.

Cost: The initial cost of the VS Toolbox license, including all 16 utilities, is $2,750 for the first copy with discounts for subsequent ones. Licensees of the VS Toolbox will receive additional utilities that are added free of charge for the first year after purchase. Software support and enhancements are available for subsequent years for 10 percent of the initial licensing fee. Trial copies of the VS Toolbox are available.

Contact: VS Toolbox is produced by Eagle Software, Inc., 169 E. Cloud, P.O. Box 16, Salina, KS 67402-0016. Milton Larson, vice president, product development (913/823-7257).

necessary system utilities ourselves, so we started to shop around. Eagle Software (in Salina, Kansas) had Rebuilder, an INFOS file rebuilder, so we took a test look at it. Then we discovered that they had other utilities we hadn't been shopping for. We tried them—and they worked.

The Director was a pleasant surprise. It is designed to redirect indirect records to improve INFOS processing time. It was helpful to us because our INFOS files had *lots* of indirect records that we didn't realize existed—or at least we didn't think we could do anything about them.

The Terminator solved our problems with the PBX system. In our case, it allows a time limit of 15 minutes for a terminal to be inoperative. If someone is not actively using the system after that time, they can be prevented from dialing on—if the user is in a program where the data won't be corrupted. This allows our 10 PBX lines to be shared by 20 users.

The Tailor allows you to look at different hash frame sizes in order to determine which would be the best for a directory. This helps the operating system find files faster. However, we've found that the drawback to this utility is that it takes longer to do a backup.

Our only difficulty was that we had to use FED to let Secret Agent know what type of disk drives we had. Eagle solved the problem by developing the Installer. This allows you to install so that the utilities know what they are looking at.

What we basically discovered as we worked with Eagle was that they will bend over backwards to help you. If we called with a problem, they got on it immediately. For example, we found as we used it that their Rebuilder used up too much space—writing everything to another file. So, Eagle provided a switch to allow us to take a glimpse at the records. This eliminated the read, write, and show to screen or file. We also told them that we weren't very pleased with the Cross-examiner's display—so they changed it.

Another discovery is that they enjoy getting new ideas thrown at them. In fact, when we mentioned our need to close files while backing up, they developed the Enforcer at no extra cost. If you ask for a utility and it's reasonable, they'll include it in the Toolbox. Δ

Gerry Hawkins is operations supervisor for Producer's Cotton Oil Co. He can be reached at P.O. Box 1832, Fresno, CA 93717; 209/487-7890.

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DBR

Easier recovery, peace of mind

by William M. Ashley
Special to Focus

Recovering individual files from a DUMP tape is easy compared to recovering them from a PCOPY tape

Every system manager needs an efficient disk backup and recovery utility. My first priority when we installed our Data General MV/8000 II five years ago was to develop a reliable backup and recovery system. The utilities DG provided, PCOPY and DUMP_II/LOAD_II, seemed sufficient for the job. Using an alternating schedule of PCOPY and DUMP_II backups, I felt secure about how our data was being protected.

While I did have my files backed up, I soon learned that neither of these two utilities is overly efficient. The first time I needed to recover a single file, it took what seemed an eternity to search through reel after reel of DUMP tapes so I could load the file back onto disk. (Naturally, the file you need is always on the last reel.)

Of course, recovering individual files from a DUMP tape is easy compared to recovering them from a PCOPY tape. We found that it was easier to use the DUMP from the day before and manually update the file than to DUMP the drive, PCOPY back onto the drive, save the necessary files, then restore the drive. We decided that recovering single files from a PCOPY tape would only be done if we had no alternative. Still, although our backup procedures weren't very efficient, at least I felt my data was secure.

Then disaster struck. A batch job had gone astray during the night and corrupted a large portion of our data base. No problem. We had used PCOPY before starting the batch job. We assumed we would just restore the data from tape and be on our way. Unfortunately, reel 4 had the dreaded bad block. PCOPY aborted—and we had half of a restored drive. After many tries and lengthy consultations with Data General, we had to restore from tapes that were 24 hours old. My partners and I weren't very happy about losing a day of work.

A few months later, while reading *Focus*, I saw an ad for a Disk Backup and Recovery System from DMS Systems, Inc. It claimed to solve the problems associated with DUMPs and PCOPYs. I figured the investment in their utility was worth a try, so I purchased it and loaded it up. It's now the only DUMP/LOAD utility used on our system.

The two things that interested us most about DBR were its ability to handle bad blocks and to load from the reel that has the needed file, rather than beginning with the first volume. One of the command switches is to create a DUMP index. This index contains the same

DBR—Disk Backup and Recovery System

Description: The DBR system is designed to create backup copies of files and directories and to restore them. With full AOS and AOS/VS compatibility, it can be used interchangeably with CLI DUMP, CLI Load, DUMP_II, and LOAD_II.

DBR's LOAD and DUMP can:

- Handle hard tape errors when DUMPing and loading—regardless of whether they were created using DUMP, DUMP_II, or DBR DUMP.
- Make an index for a DUMP which may be used to find the tape location of specific files that need to be restored. The index produces an on-line reference of all DUMPed files, including location, file type, date, and file length.
- Resume a DUMP or load that has been interrupted—without starting over. DBR DUMP allows the user to retry writing on the bad block, skipping to the next block, or stopping to mount a new tape.
- Begin loading with any volume of a multi-volume set.
- Continue loading even when a hard tape error occurs—without losing remaining data or working to recover files.
- Monitor the status of a DUMP or load.
- Locate and retrieve files from any tape without lengthy sequential searches.

DBR can also be used to recover files from tapes created by either of the CLI DUMP programs. The procedures used by the DBR system are designed to safeguard data and to save system operators' time.

Cost: Licenses are for a single primary CPU. Additional CPUs at the same site may be licensed for $300 per CPU, with multiple-site licenses available upon request. Prices listed here include a one-year software subscription. Subsequent year subscriptions are 20 percent of the current list price. A 30-day DBR trial system is available for $50.

AOS/VS MV/20000—$3,000
AOS/VS MV/10000—$2,000
AOS/VS MV/8000, MV/7800—$1,500
AOS/VS MV/6000, MV/4000—$1,500
AOS/VS MV/2000—$750
AOS All models except Desktops—$750
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Contact: The Disk Backup and Recovery System (DBR) is available from DMS Systems,Inc., 1111 Brickyard Road, Salt Lake City, UT 84106. Eric R. Fredrickson, vice president, marketing (801/484-3333).

Δ

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information you get from the CLI's FILESTATUS/ASSORTED command, along with the tape volume, file number, beginning block, and beginning byte of each file.

When a file needs to be loaded, you get the starting position of the file from the index, then you execute the load command with the location. On our 1600 bpi drive, the longest it can take to recover a file is 10 minutes (which is how long it would take to reach a file that was at the end of a reel) plus loading time. The actual DUMP and LOAD time is faster than DUMP_II/LOAD_II. We average almost 12 MB a minute throughput (one of the handy numbers provided by the STAT switch option). The index also logs bad blocks.

When a bad block is encountered, DBR doesn't abort; instead, it asks the operator whether to retry the block, try the next block, or quit.

When a bad block is encountered during a DUMP, it is flagged so it can be skipped automatically during a LOAD. If a new bad block is hit during a LOAD, and retry still can't read it, you can continue the load by going on to the next block. Then the single bad block can be overlayed onto the file from another dump tape. If the index switch option is used, the index file can be queried for a bad block list. We do this nightly before starting a dump to see if any tapes should be replaced.

Generally, DBR supports the same switches as Data General's DUMP/LOAD and has several additional switches. For example, element, hash frame, and CPD sizes can be manipulated when loading. The documentation is very complete and readable. The few times we needed additional help, the support people at DMS were both helpful and knowledgeable.

Since installing this utility two years ago, I now really feel secure about the integrity of my backups. We haven't encountered any problems that the utility couldn't handle. I highly recommend this utility to every Data General site. Not only is the product very reliable, but by saving time with quick file recovery and transfer rates and no bad block aborts, the utility paid for itself within the first year. Δ

William M. Ashley is a partner and system manager for Allied Administrators, an insurance marketing and administration firm. Send comments or questions to him at 911 Broadway, Kansas City, MO 64105; 816/474-1200.

GRAPHIC EVIDENCE

:PERFMGR spots performance bottlenecks and monitors system usage

by Leryl Cash
Special to Focus

Here at American-National Can we have been using Data General MV/ series computers for more than three years. During this period of time, we have been steadily purchasing more DG computers for our offices and plants. We currently have about 24 machines, and may be up to 40 by the end of next year.

All of these machines are supported from our Chicago headquarters. Since nearly every application has different needs, each hardware configuration is individually tailored. We needed a tool to evaluate each location's configuration—is more memory needed, or do we need increased I/O bandwidth, or even more CPU horsepower? Needless to say, we also get performance complaints from the field from time to time. Since we have no technical staff on site, we need to have both an ongoing, performance data logging program, and an interactive one that can give us instantaneous information.

After evaluating the available products, we were convinced that AOS/VS :PERFMGR, from :SYSMGR (based in San Francisco), was the best answer to our needs. We evaluated another activity monitor that costs much more, but it also impacted the system much more. We also checked out a package included with a popular INFOS tool kit. It wasn't bad, but both it and the more expensive monitor were limited in the usable information provided, or in how you could use the output. (By the way, we did purchase that INFOS tool kit, to obtain its powerful INFOS tools. That's another review, though.)

The :PERFMGR log files were by far the easiest to use, and they contain the most useful data. By using the data in the log files, we can decide what hardware to get for a given location, or what system tuning needs to be done. We can also use PERFMON, part of the :PERFMGR package, for real-time monitoring of system activity.

Installation of :PERFMGR is simple enough. Follow the easy instructions provided in the product release notice for loading it onto disk, and create a link for your system symbol table. Bring the global server process up as a son of PID 2, using the macros provided, and you

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Description: A performance monitoring and analysis package for AOS/VS systems. Can be used to collect performance data continuously without tying up a terminal or batch stream. Can be used to produce long term resource utilization data for capacity planning purposes. Provides instantaneous and average values for:
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Cost: Initial license fees are fixed, regardless of the model number of the processor. Single-site and multi-site licenses are available. A license fee entitles you to a one-year subscription service covering updates and new releases. 1987 price: $399. Includes a 30-day, money back guarantee. A free 10-day trial version is also available.

Contact: :PERFMGR is available from :SYSMGR, 41 Sutter Street, Suite 1512, San Francisco, CA 94104. Brian Johnson, president. Carla Perumean, marketing director (415/550-1454).

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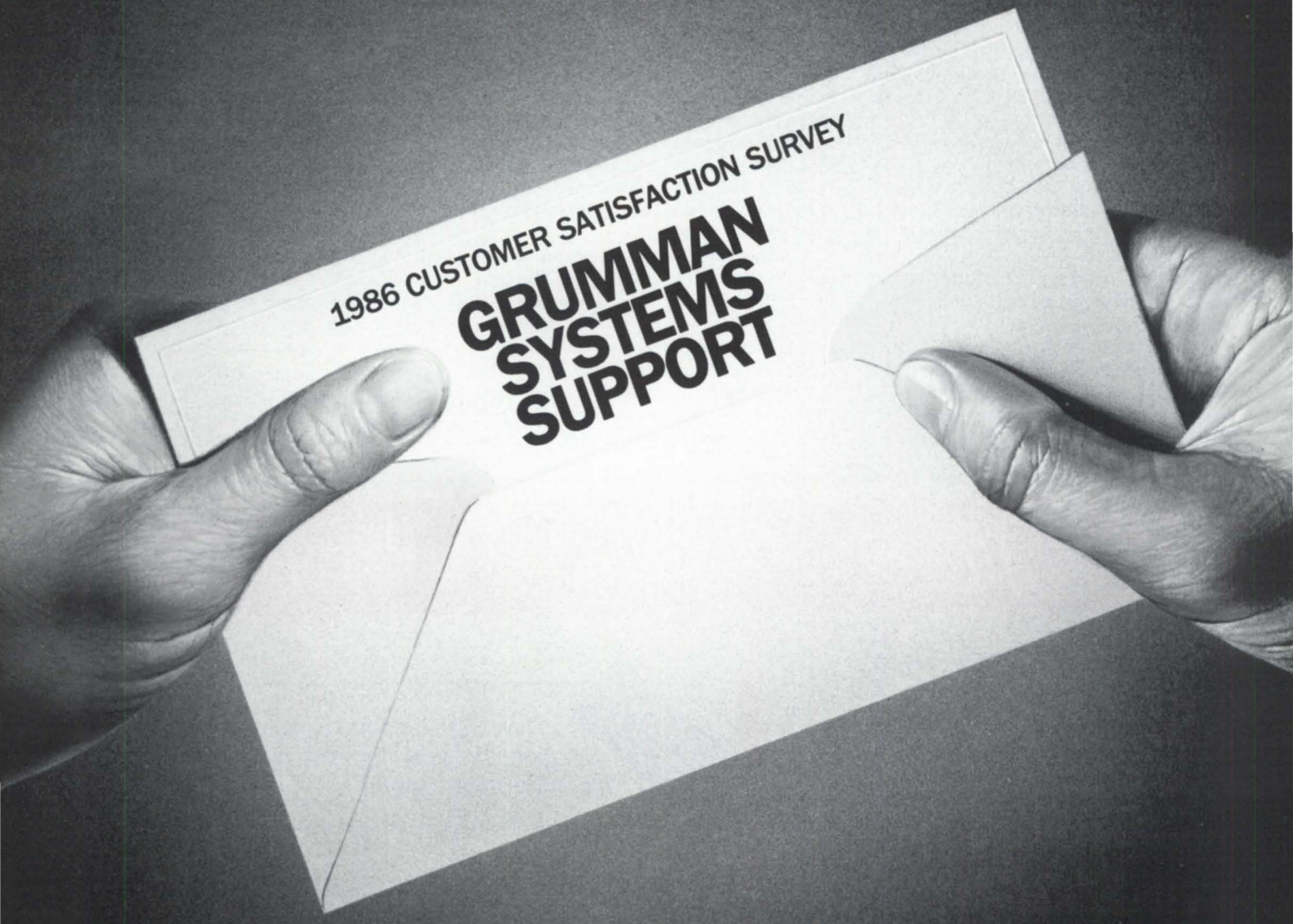

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are ready to make a call to :SYSMGR in San Francisco to have it activated.

Once this is done, you are ready to begin logging—one 128-byte record with over 30 data items every minute. The :PERFMGR program can then be executed from CLI for an instantaneous picture. It interfaces with the global server and gets updated information every 15 seconds. A report program is also included. However, I use my own routines for preselecting the data, as I will discuss later.

:SYSMGR is great in terms of support, too. There is no waiting on the phone for long periods of time or talking to people who don't know the product (which can happen with some larger companies). When I installed 7.54 of AOS/VS, the global server wouldn't come up. After one five-minute phone call, I had a new version on the way to me.

I have a series of CLI macros and sort/merge routines using Present and Trendview, and I can get graphs of interactive response time, free memory, idle CPU percent, etc. Any of the fields logged can be graphed. Using sort/merge, I can either get a 24-hour graph for our plants, or extract specific records for an 8 a.m. to 6 p.m. graph for our office environments.

The next step I hope to work on is a high-level language program that will replace the macros, sort/merge routines, and Present, and prepare data for Trendview. I can envision graphs for each month, showing average daily values for some of the logged data, as well as minimum and maximum points. This can all be done using the :PERFMGR log files. The limit is your imagination or desire. By using the graphs produced, we can watch for trends in system use and compare similar systems.

On the other hand, the real-time displays from PERFMON, the on-line part of :PERFMGR, allow a user to see instantly what is going on at a particular time. More importantly, it does this without contributing to or distorting the system activity. In order to evaluate the products, we did this nonscientific test while we had exclusive use of the computer. We brought :PERFMGR up and down while using the more expensive monitor. We then reversed it, and monitored on :PERFMGR while we brought the other monitor up and down. The results were unbelievable. We could see a noticeable effect of the more expensive monitor—much more memory consumed and CPU used, while :PERFMGR was barely noticeable. PED confirms this, too.

A word of caution to those who might be new at performance monitoring. While the documentation provided with :PERFMGR is helpful, I would suggest that you take the course titled "SM516, Systems Performance: A Practical Perspective" from Data General education services. The information accumulated through the use of :PERFMGR will be of much greater use with a better understanding of what it all means. This class will provide that knowledge. Δ

Leryl Cash is senior systems programmer at National Can Corporation, 8101 Higgins Road, Chicago, IL 60631-2985.

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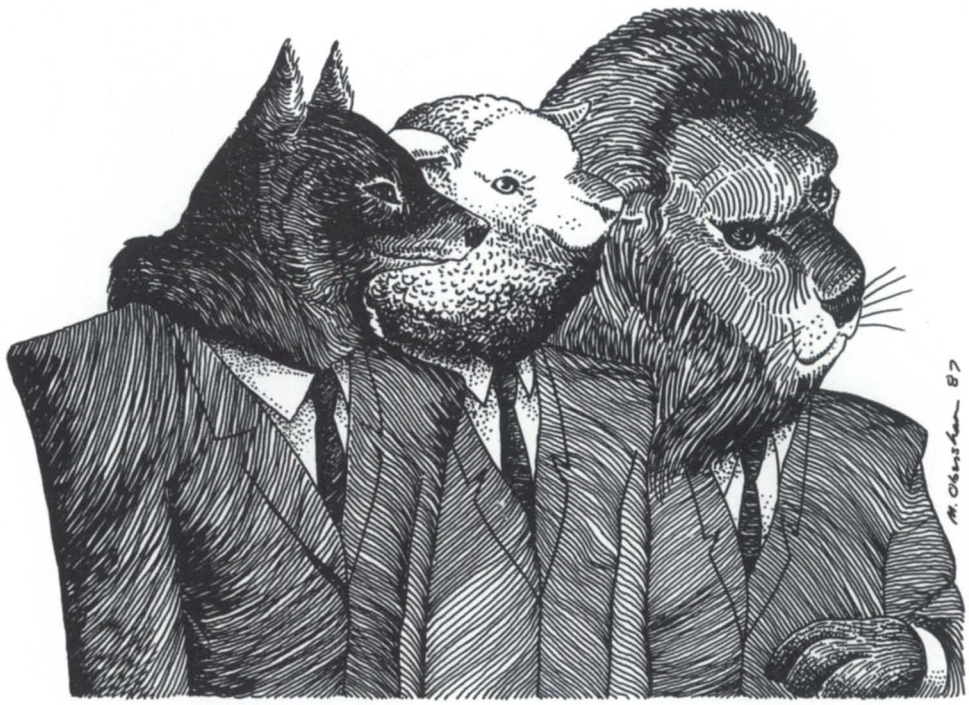
WOLVES, SHEEP, AND LIONS

The "people" side of Data General system management

by Dennis J. Berman
Special to Focus



Sad but true, system management does not exist in a vacuum. Life would just be too easy. You have the end-users with their needs, system managers with their worries, and system (MIS) directors with their goals. Getting these groups to effectively function together is about as hard as finding a good buy on pre-formatted MV/2000 tape cartridges (and about as profitable).

My goal is to bring to light the ways I have seen these groups of people work (or not work) together. I will also offer some suggestions for peaceful coexistence.

The opinions I express here are strictly my own. They in no way directly reflect the management tactics of my current or past employers. I write all my *Focus* contributions on my own time. The only thing that influences me while I write is the productive din of MVs (and an occasional frozen strawberry-banana margarita—hold the salt).

I am well aware of the fact that not all Data General installations consist of a group of users, a system manager, and a system director. I have something to offer—no matter what your system environment is. For ease of discussion, I have grouped all Data General installations into three basic categories: the Lone Wolf, the Departmental Sheep, and the Corporate Lion.

The Lone Wolf is a person or small business whose only contact with Data General was a purchase of a small workstation-oriented product like the DG/One portable PC. This is the guy who was able to sneak the device into his budget by writing it off as "annual paper clip costs." The Wolf is his own system manager. He does not have to answer to any end-users or directors because nobody even knows he has the computer. These types of people can help themselves. Read on.

Departmental Sheep are probably the biggest group of the three. They are the ones who already have a non-DG (probably "Big Blue") corporate mainframe in place. Frustrated and adventurous, the Sheep decide to build their own little Data General empire by purchasing a small flock of MV minis. They might be using them to create a word processing network for their legal department. Or maybe the library at the local university uses it to track overdue issues of *Sports Illustrated* (especially in February). Either way, the Sheep have somehow managed to bypass the desk of the system director to create their own self-contained collection of number crunchers.

Our final Data General installation group is the Corporate Lion. Data General struck it big here. The Lion is a company's main computing resource. It runs the whole show—from maintaining journal voucher entries, to printing the employee paychecks. It is a part of the company's five-year plan. Everybody knows it is there.

Not every installation falls neatly into one of these three categories, but for the sake of discussion, let's assume tidiness. I hope that you have noticed a common theme running through these groups (besides just the animal kingdom). It is the good ol' system manager.

In my opinion, a system is only as good as the person who has the dubious task of running it. To figure their worth is simple. Add up all the CPU model numbers they are in charge of (example: 20000 + 4000 + 140). Then multiply the sum by two, in order to arrive at their appropriate annual salary. A few rules of thumb are: 1) dyadic processors count double, 2) never pay system managers less than $40,000, and 3) if you plan to pay them more than $80,000, please give me a call.

There are two types of computing systems that must be avoided at all costs—ones that provide too little and ones that produce too much. The Lone Wolf types can often be a victim of the former. They will sometimes buy a computer just because everyone else around them seems to be doing the same. Their company's information center (if they are lucky enough to have one) will

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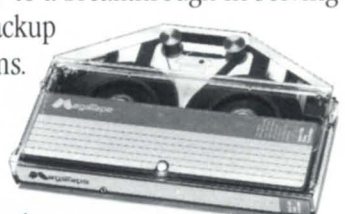

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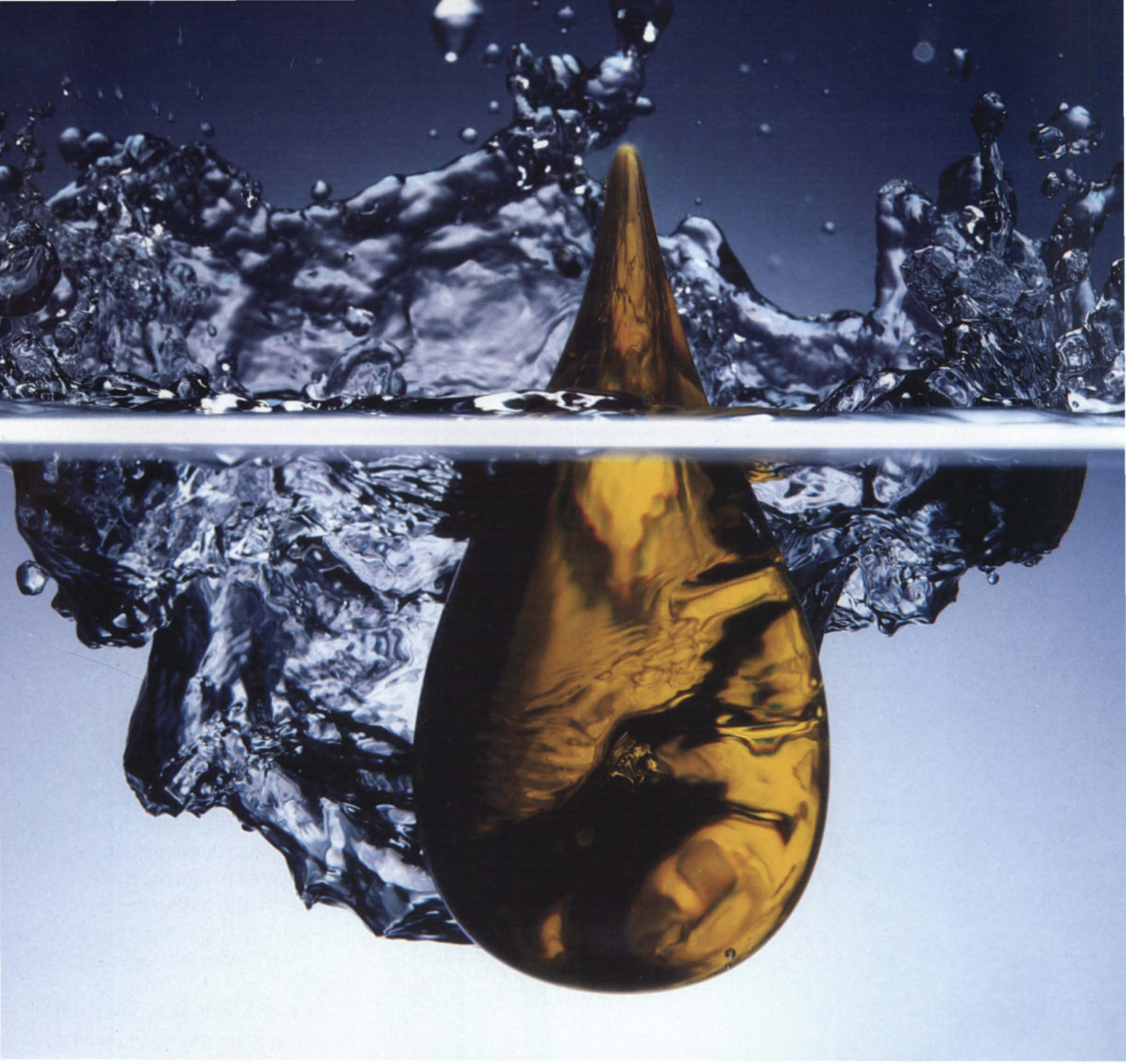

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probably not support them since their purchase was not done through proper channels. By the time the Wolves pay for all the hardware, software, training, and maintenance costs, they sometimes realize it would have been cheaper and faster to get along without the computer.

My brother, an Annapolis endodontist, is an example. He often drilled me to get to the root of his office system needs. (Aren't puns a gas?) He wanted me to pick out a nice desktop computer and some software that could help him manage his single-partner office. Upon review, we realized that, due to the nature of the root canal business, he only needs to see his patients maybe twice in their lifetimes. For this reason, I recommended he purchase an inexpensive "smart" memory typewriter and combine it with a noncybernated (look it up) filing system.

On the other hand, my other brother, the Cherry Hill pediatrician, has a multi-partner family practice. A couple of PCs were "just what the doctor ordered" to keep track of each patient's return visits. (Yes, I'm the only one in my family who isn't a doctor—but at least my student loans are paid off.)

What is worse than buying a computer you really don't need? How about buying one that nobody really wants to use. You can do all the cost justifications you want, but if the system manager cannot gain the support of the system director, or the confidence of the user community, the project will be a flop. It pays to use a little psychology, and a lot of common sense when developing any new computer system. The average human is easily intimidated by a computer.

I have found the best defense against scaring people away is to keep the system simple and consistent. A system that produces a daily report that cannot possibly be digested in one day (before the next daily report is produced) is very offensive. Having an application program react one way on Monday, and then react a completely different way on Tuesday, and the supplied documentation saying it should react yet a third way altogether, tends to foster insecurities.

Response time is an often overlooked item. Most new systems are phased in. This means a new person or department may be added to the system each day or week until the entire user community is on-line. The people brought on at the beginning of the project will almost always see a progressive increase in system response time (i.e., the system appears to be growing slower) caused by the climbing CPU, memory, and disk I/O requests.

The following may sound a little sleazy to you, but I have had very good results with building in artificial system delays that decrease as system response time decreases. This helps maintain a constant system response time throughout your load-up process. You can accomplish this by placing simple counting loops inside or outside application programs. For the more daring, try fooling around with process priorities (PREDITOR) or CLASP. Just don't let any of those users read this article. It will spoil our secret. And make sure you remove all those loops and readjust your priorities for optimum performance once everyone is on-line.

There are two types of computing systems that must be avoided at all costs—ones that provide too little and ones that produce too much

The best way for the system manager to score points with the users and directors (and themselves) is to squeeze as much out of the available system hardware and software as possible. A good imagination is quite helpful here. When I was told that I would not be able to purchase DG's Comprehensive Electronic Office (CEO), I had to improvise. I spruced up a version of the MAIL.CLI macro that is reviewed in the AOS/VS manual. It now serves as my electronic mail system. I taught the users how to use Data General's SED text editor for their word processing needs.

For those of you who have not already done so, while in SED, try the SPELL command. It will feed back a list of words that start with the letters you are requesting (do not use CLI templates). The system searches through a file called SED.DICTIONARY. This file is usually supplied, but you can create your own. Make sure that you restrict access (ACLs) on it. I know a few people that would not hesitate to add some select words to the dictionary just for shock value.

The point I am making is that all you need to do is dig through a couple of manuals and print out a few release notices. You'll be surprised at what you find. Did you know that Data General has had multi-file capabilities in Present (ad hoc reporting facility) since before March 1986? You would never have found documentation on this unless you were looking for it. Sounds like a good topic for a future article.

Automation is another great way to win people over. CLI is much more powerful than most people give it credit for. With the help of some local Data General gurus, I was able to write a series of simple CLI macros that controlled our synchronous modem lines—thus eliminating the need for operation intervention. Later, I discovered that Data General had a package called "Unattended RJE80" that did much the same thing (I think). Inexpensive packages like "GATE" (DG's General Asynchronous Terminal Emulator) are great for tapping the resources of timesharing or other Data General computing systems.

In conclusion, whether you are a Wolf, Sheep, or Lion, and whether you are an end-user, system manager, or system director, your computing goals are always going to be the same—increase productivity while controlling your costs. The end-user who uses resources wisely is more apt to be taken under the helpful wings of the system manager. System managers who truly strive to capitalize on their system's capacity will more than likely have that purchase of the 8 MB memory board approved by their system director. And the system director who can maintain realistic goals is more likely to be around long enough to enjoy retirement. Δ

Dennis J. Berman is the data processing facilities supervisor at Crown Central Petroleum Corporation, an independent producer, refiner, and marketer of petroleum products. He can be reached at 1 North Charles Street, Baltimore, MD 21202; 301/539-7400.

OLD IDEA, NEW TRICKS

New applications for a venerable concept

By Brad Friedlander
Contributing Editor

Intelligent workstations have existed since the advent of computers. Only the size of the workstation and the characteristics of the users have changed.

This column, along with the accompanying article, begins a new feature in *Focus*. The topic will be the use of intelligent workstations in distributed networks.

This month, we will define some terms, look at the evolution of intelligent workstations, and make some guesses about their future.

Since our profession seems to use the same words to mean many different things, I thought it would be helpful to tell you what I mean by the terms I use.

- Intelligent workstation: a workstation that has a processor, memory, and I/O devices dedicated to its use.
- Workstation: any device with a minimum of a keyboard and a display.
- Distributed network: A collection of intelligent workstations and servers in which the processing workload and, optionally, the data are distributed among the various workstations and the servers.
- Server: Any multi-user processor that provides a resource to the intelligent workstations. The services provided could include computation, file handling, and printing.

As I said earlier, we have always had intelligent workstations. If we look back at the earliest computers, we find that they fit the description quite well. They could only be used by one person at a time. The difference, of course, was that one workstation filled a basement or two, and the user had to be an extremely knowledgeable scientist or engineer. Also, the workstation interface with humans was often limited to panel lights, switches, punched cards, and printers.

As time passed, we found ways to put multiple users onto a single processor. Each user could now have his or her own workstation—but it was no longer intelligent. Luckily, things were changing quickly. The KSR 33 teletypes gave way to dumb video terminals, and then to intelligent terminals. The latter could do some local editing, but little else.

A few of our colleagues saw a need to return to the intelligent workstation. This led to the "minicomputer revolution"—including the DG Nova. It wasn't too long ago that I had a Nova 1200 all to myself. I didn't need a basement, but it still took up a lot of space in an office.

ALL ABOARD!

DG/Ones help automate and decentralize a railroad's freight quote system

by Kim L. Medlin
Special to Focus

When I started working for Data General in 1980, a complex commercial application was defined as one that had a lot of programs. Currently, a commercial application is thought of as complex if it is integrated with data communications. (Perhaps this is why data communications experts tend to drive Mercedes and BMWs.) If you think about it for a moment, one of the most complex—and exasperating—challenges anyone ever encounters is communications, whether between computers or people.

In 1986, I had the privilege of managing a software development project for Data General's software products and services division (SPSD). Among other things, SPSD specializes in providing custom software to Data General customers. The purpose of this article is to share some of the techniques we acquired in the development process, so that readers can learn more easily some of the lessons we received the hard way.

Our customer in this project was a leading railroad company that covers most of the contiguous United States. The application we wrote for them is called the rate quote system. This system represented a classic example of a manual system that needed conversion to an automated one. I won't dwell on the details of the now-replaced manual system, but a brief overview will give you a better understanding of the total project.

The manual system

Imagine, if you will, a staff of about 15 seasoned railroadmen strategically located throughout the United States with the responsibility of selling all the intermodal business generated by the railroad company. For my article's purposes, the word intermodal means "hauling goods on railroad cars."

With the manual system, much of these salespersons' time was spent providing rate quotations to customers in the highly competitive intermodal market place. To provide a quote, they referred to large manuals that listed every possible price combination for every U.S. city linked by railroad tracks. Imagine the size of these publications.

The following issues in the manual system had to be resolved:

- The physical size of the rate information made it impractical to keep a hard copy readily available for each salesperson.
- Rate fluctuations made it difficult to maintain and update the rate data on a timely basis.
- Customers required a written copy of each quotation.
- Various offices within the company required a notice of each issued quote.
- A secretary was notified at the local office to send a notification to the mainframe computer about the quote for accounting purposes.

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Circle 16 on reader service card

Pretty soon, users were not content with having these minicomputers sitting by themselves. The systems evolved in two directions. First, they became multi-user processors (remember unmapped RDOS with two grounds?). Second, they were attached to the mainframe computers and used as peripheral concentrators and entry devices.

More time has gone by, and once again I have my own intelligent workstation; now it is a DG/One that fits in my briefcase. I'm no longer alone. Thousands of people who don't know a computer from a terminal are now using intelligent workstations in their daily lives.

With all this power being distributed to individual users, it soon became apparent that the biggest problem in using a computer was not in getting the right program, but getting the data. Suddenly, everyone wants to connect their intelligent workstation to some bigger computer to get and to share data. Unfortunately, vendor support for this is still in its embryonic stage.

Although we can easily transfer files, that is hardly enough to qualify as a distributed network. In a distributed network, the workstations and servers cooperate in solving the problem. This requires a certain awareness of the entire network by each component.

Where does it all lead? Already, yesterday's personal computer is being forced into duty as a multi-user processor. The pendulum is swinging back again, but not for long. I believe that users have become accustomed to the advantages of an intelligent workstation and will insist on maintaining those advantages.

The chief advantage is consistent response time. Since the intelligent workstation is a single user environment, there are no queueing delays due to another user running a massive data base search, compiling a program, or playing games. A second advantage is the ability to work even when the next higher system (in the network hierarchy) is not available. Associated with this is the ability to use the workstation while traveling. I have gotten more useful work done on my DG/One while flying than when I'm sitting in an office.

I see a continuing development of network servers and intelligent workstations. In a few years, today's briefcase portables will seem primitive. The downward limits on the size of our workstations will be determined by human factors, rather than technology—they have to be big enough for our fingers and eyes. New input devices and packaging techniques promise to substantially increase the computing power available to users of intelligent workstations.

Intelligent workstations are here to stay, but for now, we are waiting for the hardware and software vendors to provide the tools that will let us tap the potential of these workstations in distributed networks.

In the months to come, this column will highlight ways in which people are already using intelligent workstations in distributed networks, and the hurdles they cleared along the way. I hope you will consider the column a forum for presenting your needs and asking questions about current DG products and solutions. Δ

A consultant with Arthur D. Little, Inc. and a past president of NADGUG, Brad Friedlander specializes in the implementation, operation, and maintenance of mini and microcomputer systems. He is a new contributing editor to Focus and serves on the magazine's Editorial Advisory Board. Readers with questions, suggestions, and ideas for articles can contact him at Arthur D. Little, Inc., Information Systems Division, 17 New England Executive Park, Burlington, MA 01803; 617/864-5770.

The automated system

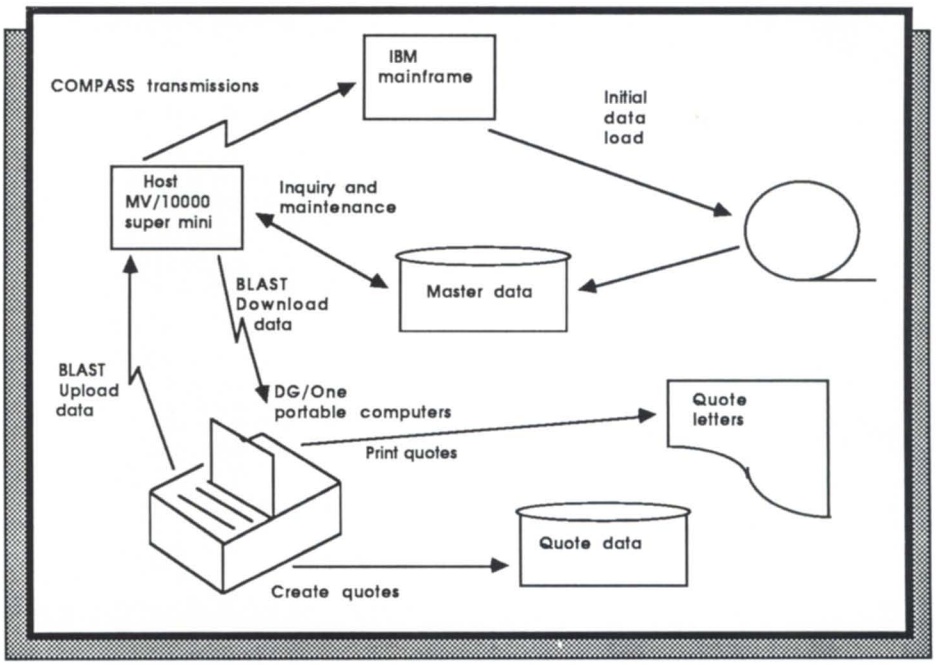
Figure 1 depicts the flow of information in the rate quote system we designed.

Using the tools available from the Data General product line, the application's fundamental design was fairly easy to resolve. The DG/One Model 2 laptop solved many design challenges, and became the primary input device for rate quotation entry.

To eliminate the problem of each salesperson maintaining a set of rate information in manuals, we put all rate matrices on the DG/One's 10 MB hard disk in the form of indexed files.

A salesperson may start a typical day by downloading all updated matrix data from a host Eclipse MV/10000 computer. The data communications software we selected was BLAST (from Communications Research Group). We chose BLAST because it is readily available, reasonably priced, and communicates between MS-DOS and AOS/VS. We used standard telephone lines with the DG/One's internal 1200 baud modem.

Figure 1: System Flow Diagram



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Circle 5 on reader service card

To provide for accurate data entry on the DG/One, the rate entry program allows full validation of each item of information as it is entered. We designed the program so that the salesperson could easily create "what if" scenarios with the information that makes up a quote. Once a quote is issued, the hard-copy version of the quote is automatically printed on the DG/One's portable printer.

Periodically, all issued quotes are transferred back to the host MV/10000 computer where the master versions of all files are maintained. When necessary, the system manager at the MV/10000 transfers all quote data received from the salespeople to the corporate IBM mainframe. The communications protocol used is SNA/SDLC/APILU. We selected ICOBOL as the language for the application because of its compatibility between MS-DOS and AOS/VS.

The good stuff

I sincerely hope you benefited from the above discussion, but now I'm going to tell you about the good stuff, those small discoveries that are made during every development project that may not be expected after a functional design.

The rule of thumb that has become second nature to me is to minimize the data to be transferred over a 1200 baud line. This makes sense for a number of reasons:

- 1200 baud is not particularly fast; less data allows you to stop waiting and start working.
- Minimizing the data reduces your long-distance phone bill.
- Phone lines are notoriously noisy; therefore, the less time you stay on the line, the less chance of something bad happening to your data.

One of the first techniques that became apparent was that we shouldn't transfer Minisam files over 1200 baud lines. Even an empty Minisam file consumes 50 blocks of data. This means that at 1200 baud it takes about a minute to transfer one file of "nothing." The many files that were designed into the system made this approach impractical. Instead of transferring the Minisam file itself, it made more sense to us to transfer the Minisam records in the form of a flat file. This means we had to dump the Minisam records to a flat file on the sending machine, transfer the flat file, and load the records back into Minisam format on the receiving machine. This required more processing on each side of the file transfer, but there was significant improvement in overall throughput timings.

Another technique that helped file transfer efficiency was the elimination of unnecessary records from the flat file. This again contributed to greater processing before and after the file transfer, but it improved throughput timing substantially. In fact, the impact on this application was so significant that we spent a great deal of time writing sophisticated algorithms to select only those records that really needed to be transferred.

One issue that absolutely had to be resolved was recovery from transfer failures. The type of failure I am referring to has nothing to do with any of BLAST's shortcomings. I'm talking about failures related to bad phone lines, power losses, unexpected user interaction, and the like. Bear in mind that this application has complex file transfer algorithms that incorporate not only file transfers but also automatic execution of programs and CLI macros on both machines. As we all know, the more complex a system is, the more likely it is that a breakdown will occur.

Because our DG/One users weren't computer sophisticates, we couldn't expect them to recover from such problems on their own. We created a solution called the "BLAST reporter." The reporter has two basic parts:

- During file transfer, BLAST logs each command it processes and its degree of success (if possible).
- After file transfer, a program on the DG/One reads the BLAST log file, notifies the user concerning the status of the transfer session and gives recovery instructions, if necessary.

Using the BLAST reporter concept, users are much more able to recover from a crash. Even if the DG/One loses power during a transfer, the reporter automatically runs upon re-booting, and notifies the user of necessary recovery procedures.

Another area of extreme concern was the user interface. Because the application had to be portable, user manuals in the field were unacceptable. We therefore designated line 23 on each screen as an instruction line. From the time a DG/One is booted, users are well informed of available options. And at fields that require validated entry, the CEO software index key can be pressed to display a list of possible values. In the words of one railroad employee, the system went beyond "user-friendly"—to "user-seductive."

The automated system affords functionality never even imagined during manual days. All salespeople can now inquire on the master data base on the host Eclipse MV/10000 from their remotely located laptop computers. The salesperson simply selects a menu option from the DG/One. BLAST then automatically logs on to the host and executes an application program that allows the salesperson to run selected Present macros.

Some of the ICOBOL programs needed to perform certain functions differently, depending on whether the current operating system was MS-DOS or AOS/VS. We wanted our programs to be able to use statements like the following:

```
IF MSDOS-USER
PERFORM SINGLE-USER-FUNCTIONS
ELSE
PERFORM MULTI-USER-FUNCTIONS.
```

This was very easy to accomplish. In the procedure division, say:

```
ACCEPT USER-NAME FROM USER NAME
```

where USER-NAME is defined in the WORKING-STORAGE SECTION as:

```
01 USER-NAME   PIC X(15).
88 MSDOS-USER
VALUE SPACES.
```

Because MS-DOS is a single-user operating system, ICOBOL returns spaces when accepting the user name on MS-DOS. ICOBOL returns the AOS/VS user name when running under AOS/VS.

The rate quote system is a success for many reasons. In the area of application software, the factors that have made the greatest contributions to its success are:

- On-the-road processing with the DG/One makes quotations easy to create from almost anywhere.
- User-seductive software, including immediate field validation and CEO-like field indexing, makes data entry easier and more reliable.
- Distributed data processing affords control of data at the logical source.

Keeping the above concepts in mind, I hope your next application using data communications will be easier to design, develop, and manage. Δ

Kim L. Medlin, consulting services manager for Data General's software products and service division in the southeast area, can be reached at 404/448-6072 ext. 2007.

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LETTERS TO THE EDITOR

Getting the best of both SPEED and CRTEDIT

One of the first things any system manager needs is a text editor. In the RDOS/ICOBOL world, that usually means SPEED or CRTEDIT. I'm going to ignore ICEDIT for the purposes of the article—I don't really consider it an editor. It's more like a medieval torture device designed expressly for programmers.

SPEED and CRTEDIT are both command-driven editors. Using an editor like WordPerfect or WordStar, you type in the text and use various function keys and control sequences to alter text. Using SPEED or CRTEDIT, you can't just type and have the characters appear on the screen, because commands are normal letters followed by two escape codes. Thus, to insert a line, I need to type:

```
IWHATTHEHECK IS THIS LINE FOR?
```

and hit the escape key twice. On screen, the double escape sequence looks like $$, so that's how I'll show it throughout this article. Note the leading "I"—this is telling the editor to insert the following, and nothing is added to the text until the command is finished. If you leave out the "I", CRTEDIT will see the "W" and use this command to close your input file, take all the changes you have made, and put them into a file called "HATTHEHECK"—not what you intended at all.

This means it is much easier to alter text with these editors than it is to write new text. I've found that even when I'm writing something completely new, I use some old program and modify it, so I don't have much of a problem. But if I want to write completely new code—or impress someone—I use a combination of SIDEKICK and CRTEDIT. Remember from last month that my "DG terminal" is really a PC? I use the NOTES feature from SIDEKICK, with its WordStar-like commands, insert the text into CRTEDIT, and get the best of both editors.

SPEED has a long history, going back to the days of SOS—the Standalone Operating System—and paper tape. For a long time, it was the only editor available on DG machines. It is a line editor, and not a full-screen editor. If you've ever used EDLIN on a PC, SPEED looks very similar. Although it sounds like CRTEDIT would be the editor of choice—after all, who wouldn't prefer a full-screen editor—SPEED has some advantages that cannot be easily overlooked.

The main advantage of SPEED is that it's a common denominator. It's kind of like WordStar. WordStar may not be everyone's first choice for a word processing program, but it runs on a wide range of machines, and it seems like *everyone* has a copy. If you have to learn a word processor for the PC world, WordStar is probably the way to go. SPEED will run on everything from a Nova to an MV/20000, and just about everyone has a copy. If you have a number of different machines to support, and you don't want to learn a separate editor for each one, SPEED is the editor to learn.

SPEED also has some commands that, for one reason or another, were left out of CRTEDIT. From inside SPEED, you can execute any CLI command—a very powerful feature. For instance, I can edit OEMENU.CO. The command XICOBOL OEMENU will compile it, and if the compile works, XICX/I/B/C OEMENU will run the program. If there are any problems, I'm still in the editor and I can change the program. XCLI will return you to the CLI, and from there you can run anything—including another copy of SPEED—until you pop back into SPEED.

SPEED also gives you the option of breaking out of a command string by typing ctrl-A. This comes in very handy if, for example, you find yourself inserting a line 65,536 times—which is easier to do than it sounds. CRTEDIT used to be able to break out of a command using ctrl-D, but this feature disappeared somewhere around rev 7.00 of RDOS. If any of you guys down at RTP should happen to see a ctrl-D lying around someplace, would you please put it back in?

I'll admit to being very prejudiced in favor of CRTEDIT, but there's at least one instance where I don't have any choice—I *have* to use SPEED. That's when I'm editing a SYSGEN dialogue file.

SYSGEN has the /V option to produce a file containing the instructions that you gave it. Then, at a later date, you can use the /A option to generate a new operating system, using the old dialogue file. Why would you want to do that? Well, normally you would have changed something in the old dialogue file—the number of subdirectories, or memory, or something.

So, you get into CRTEDIT, load up WHATEVER.SG, change the number of directories to 20, save it as WHATEVER2.SG, and run SYSGEN. What you get back is END OF FILE:SYSGEN.SV. If you saved a dialogue file of this new sysgen, you would see ENTER PROCESSOR NUMBER 63 times. What gives?

It seems that SYSGEN adds a null after each question that it asks—a particularly nasty thing to do, and one that will apparently be changed with the next revision of DG/RDOS. CRTEDIT, realizing that this isn't a character that it can do anything with, strips the nulls out of the file. So what you have left is a perfectly valid text file that SYSGEN won't handle at all. SPEED, on the other hand, doesn't strip nulls, and will edit the file perfectly. So, while I use CRTEDIT in my day-to-day editing, the only editor in my SYSGEN subdirectory is SPEED.

But if I'm editing programs, I turn to CRTEDIT. I've used a lot of editors on PCs and DGs, and this one is still my favorite. Apparently I'm not alone—I got a letter a few months ago asking about CRTEDIT on AOS and AOS/VS (I don't *think* there is a version—someone give me a call if I'm wrong). CRTEDIT has the obvious advantage of showing you exactly what you are doing. If you're going through a program and making a lot of changes, SPEED requires that you enter a "T" command after each one to make sure that the name you changed is the name you *wanted* to change. CRTEDIT shows you exactly what you've done. Both editors can use powerful macros to implement changes—but CRTEDIT makes it a little easier. One of the things I have to do all too frequently is write a file out to a sort file. Normally, this involves 20 or 30 lines that look like this:

```
MOVE CUSTOMER-NAME TO NEW-CUSTOMER-NAME.
MOVE CUSTOMER-STREET-1 TO NEW-CUSTOMER-STREET-1.
MOVE CUSTOMER-CITY TO NEW-CUSTOMER-CITY.
```

and so on. Now, I could type each one in, but it's a lot easier to use the editor. First, I bring in the FD (FICUSTOMER.FD$$). The portion we're interested in looks like this:

```
03 CUSTOMER-NAME      PIC X(30).
03 CUSTOMER-STREET-1  PIC X(30).
03 CUSTOMER-CITY      PIC X(15).
```

I then type in the following CRTEDIT macro:

```
XC$XG$-2L$C03$MOVE$S  $-M$Q03$ $C03 $TO NEW-$S $-M$Q.$$
```

It looks complicated, but it's really pretty simple. To break it down: copy this line and insert it. Change the first 03 to MOVE, search for the tab between the name and the picture, and back up one. Erase all of the characters between here and the next 03 and insert a space. Change the 03 and space to TO NEW-, search for the tab again, and erase until the period.

It's a lot of work to do to save typing three lines. My customer file FD, however, has 120 lines of data names—this macro saves a *lot* of time.

The difference between CRTEDIT and SPEED on something like this is that when you type a command in SPEED and hit escape, the command disappears after it executes. To use it again, you have to retype it. CRTEDIT keeps the command, and to invoke it again, all you have to do is hit the escape key.

CRTEDIT also has a command editing mode. If, after you typed the above command line, you discover that you made a mistake in the first character, there's no need to retype it. Just hit F10 and you can use the same commands that you're using to edit the file to edit the command.

There is one drawback shared by both SPEED and CRTEDIT—they are limited in the size of file that they can handle. Remember, CRTEDIT was written in the days of 64 KB memories, and SPEED even before that. SPEED starts giving you the **CORE** message at about 14 KB (even the error message tells you this editor is old). CRTEDIT's maximum is about 52 KB—a good size file, but still a limitation.

The way around this is to break the file into pages. Pages are created by inserting a ctrl-L into the file. The file may be broken at any point, into as many pages as you like. When you edit the file, only the first page is brought into memory. Then, to bring the next page in, you use the R$$ command. Although this works, it's annoying. There is no way to do backward paging other than starting all over again. So if you're on the tenth page and discover a mistake on the previous page, the only way to get to get to it is to close the file, open it up again, and read nine pages. There must be an easier way to do it—either allow for the larger memory sizes of today's machines, or include a READ BACKWARD command. Somehow, though, I don't think that a lot of Data General's resources are going into SPEED and CRTEDIT.

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A real problem is what to do with large files from another editor or system. Since these will most likely not be broken down into pages, they can't be edited by SPEED or CRTEDIT. To handle files like these, you need yet another editor—the octal editor, OEDIT. I'm not going to get into that, since OEDIT is a column or two by itself. But if you need to break up a large file and you're not familiar with OEDIT, give me a call.

I know I said I wasn't going to mention ICEDIT, but I think that I have a duty to—if only to warn people away. Our now-defunct OEM gave me one good piece of advice. When I told him we were going to use ICEDIT, he said, "Don't."

For those of you who haven't had the pleasure, ICEDIT is an editor, written in ICOBOL, that can be run within ICOBOL—a true multiterminal editor. I admit that I'm the one who's been up on a soapbox about all of the people saying, "You can't do *that* in COBOL." Of course you *can* write an editor in ICOBOL. It's just that you *shouldn't.*

Let me give you some examples. In CRTEDIT, it took about 11 seconds to create a new file and load a 1900-line program into it. ICEDIT accomplished the same thing in 144 seconds. I had CRTEDIT search for a string I knew was at the end of the file. It took three seconds. ICEDIT needed 223 seconds to do the same thing—almost four minutes to find a string! Do you really want your programmers staring at a screen for four minutes every time they do a search? Remember, this is on an unloaded S/140 with a meg of memory and a fast disk. Imagine it on a CS-40 with a Phoenix and three or four programmers pounding away.

ICEDIT writes a program into an ISAM file, with the line number as the key. Using my example, the original 50 KB source file resulted in a 207 KB .NX and .XD. In order to compile, you then have to write out the indexed file to a line sequential file—a process that takes another four minutes, and results in a 60 KB .SR file. You now have 267 KB worth of files out on the disk, which is more than a fivefold increase, and it's taken you better than 10 minutes to change a single line of code.

Believe me, it's cheaper to buy DISCOS and run multiple copies of SPEED or CRTEDIT than it is to buy another disk drive to hold the programs plus hire another programmer to get programs out on time. So, there's the combination of editors that I use to put out code—CRTEDIT for writing programs, and SPEED for SYSGENs and for when I need to go to a strange system. They're similar enough that it's easy to learn them both. Oh, and remember to stay away from ICEDIT—don't you have enough headaches already? Δ

Tim Boyer is EDP manager at Denman Rubber Manufacturing Company, president of the Northern Ohio Data General Users Association, and a contributing editor for Focus Magazine. 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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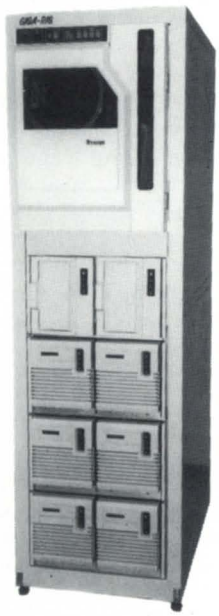

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IMPLEMENTING ^C INTERRUPTS

"Excuse me, Mr. Chairman, may I interrupt the proceedings?"

Breathing is a reflex action. You don't have to think about it or learn how to do it. It is always there. The AOS{/VS} ^C^A and ^C^B control sequences are certainly not as important, but they are taken for granted in the same manner as breathing: you rely on them. Try to imagine the CLI without ^C^A—there would be no way to abort a TYPE or COPY command. Perhaps you have admired the CLI ^C^A interrupt mechanism, but didn't know how to implement it in your application program. As in previous articles in this series, I will show you how to "package" this call so you can add it to your toolbox.

While AOS{/VS} (PMGR) intercepts ^C^B without special coding, the ^C^A interrupt is only meaningful if your application has made the appropriate system call (?INTWT). Since your application has better things to do than simply wait for ^C^A, a parallel task is needed that will wait for ^C^A, while the rest of the application proceeds as usual. Figure 1 shows how I have packaged the ?INTWT call (see page 49).

There is no accumulator input or output to these three system calls, and I have ignored all errors. When the subroutine is called, it waits for ^C^A and only returns to the caller when ^C^A occurs.

Now that you have the capability to detect a ^C^A sequence, what are you going to do with it? Use your imagination! ^C^A might be the signal to clear or redraw the console screen. You could also restart the application (perhaps a file transfer) or suspend it while you enter new processing parameters. If the program was written to process data silently without any screen output, then perhaps you can use ^C^A to tell the program to report its current status.

Sometimes users get confused between programs and macros, especially if the programs are invoked with a "shell" macro, i.e., a macro XXXXX.CLI that contains XEQ XXXXX. Most users know that they can use ^C^A to abort a CLI command, but that ^C^B is required to abort a program. Of course, if they XEQ the program then they know that ^C^B is required, but if they use a macro that executes a program, they may become frustrated in their attempts to abort it with ^C^A. They may not realize that the macro has started a program. If you write your application with ?INTWT to wait for ^C^A and then STOP when ^C^A occurs, then the program can be aborted with ^C^A, just like a CLI command. This presents a consistent interface for the user, so there is no difference between a macro and a program.

My favorite use of ^C^A interrupts is to toggle the state of a Boolean (F77 LOGICAL) DEBUG variable to turn on or off a debug mode. For example, you could code your application as follows:

```
do i=1,n
   if(DEBUG) write(10,*)'processing i =',i,' of ',n
   . . .
end do
 . . .
subroutine xxx
if(DEBUG) write(10,*)'I'm in subroutine XXX now'
 . . .
return
end
```

A /DEBUG switch is a good method of setting the initial state of DEBUG (see the GET_SWITCHES routine I presented in the September, October, and November 1986 issues of *Focus*). However, once you have set the DEBUG state, there is no way to change it while the program is running. Even if you only want to view the debug/trace output near the end of the program, you must enable DEBUG when the program is started up and then suffer through an interminable stream of debug messages. Your application will run more slowly with all of that screen output. Also, if there is no way to turn DEBUG on and off while the program is running, you will probably use fewer debug statements in your program, thus limiting their usefulness. With ^C^A, you can toggle DEBUG on and off any time a program is running.

Figure 2 (see page 49) shows the way I use WAIT_FOR_CA_INTERRUPT to toggle a DEBUG variable.

If you have implemented a multi-level debug method using an integer variable (as I described on page 36 of the October 1986 issue of *Focus*), then you can increment the value with each successive ^C^A:

```
do while(.true.)
   call WAIT_FOR_CA_INTERRUPT
   IDEBUG =mod(IDEBUG +1,6)![0,5]
end do
```

so that the debug mode ranges from off (IDEBUG =0) to full debug (IDEBUG =5) and then switches off again at the next ^C^A.

The output does not necessarily have to be debugging or trace output. You may wish to use ^C^A to toggle a flag which controls normal output to the screen or LISTFILE by either turning it on or off or redirecting it to a different file.

In the example above, I have set the task ID to 2 because the main program is task 1. The task priority is set to the highest priority (0), and a value of 0 is used for the task stack. (This tells F77 to set up the task stack.) Also, remember that you must LINK your multi-task programs with at least /TASKS =2.

The WAIT_FOR_CA_INTERRUPT routine assumes it is being called in a loop, with some sort of processing being done immediately after it returns to the caller. Task scheduling is disabled after receipt of the interrupt so that common variables may be accessed or modified without interference from the other tasks. When WAIT_FOR_CA_INTERRUPT is entered again, task scheduling is re-enabled.

The ?INTWT system call only responds to the ^C^A interrupt. There is another system call (?KWAIT) that provides a mechanism for implementing all 26 ^C sequences from ^C^A through ^C^Z. In similar fashion to WAIT_FOR_CA_INTERRUPT, I have packaged ?KWAIT with WAIT_FOR_CAZ_INTERRUPT (see Figure 3, page 50).

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For each application, you can write a custom task module that handles all of the valid ^C sequences and ignores the rest. Figure 4 (page 50) is an example.

Most keyboard input is nonbinary and, therefore, PMGR will intercept a ^C^B sequence and terminate your program. On the other hand, if you are doing binary keyboard reads (with the ?IBIN bit set in offset ?ISTI of the ?READ packet), then PMGR ignores ^C^B and it is passed to your application. The break key can be used to exit binary mode so PMGR will terminate your program when you enter ^C^B. However, this assumes your current CHARACTERISTICS settings include /BREAK =BMOB (default). ?KWAIT sets up a similar situation to the binary mode reads, but you *must* intercept the ^C^B sequence yourself to terminate the program (assuming that is what you want), because PMGR passes all ^C sequences to ?KWAIT. If you use ?KWAIT, you can't even use break to force PMGR to trap the ^C^B.

There is one more feature provided by ?KWAIT. If you have CHARACTERISTICS/BREAK =CFOB, then a break key will generate a ^C^F sequence for you and ?KWAIT will intercept it. This allows your program to detect the break key. In this situation, ?KWAIT cannot tell the difference between the break key and a ^C^F sequence entered from the keyboard. You can also use /BREAK =CAOB and /BREAK =CBOB and the break key will generate ^C^A and ^C^B sequences, respectively. These don't require ?KWAIT and can be used with the CLI and/or any application programs.

I never did get ?KWAIT to recognize ^C^S and ^C^Q, because PMGR intercepts the ^S and ^Q as normal XON/XOFF flow control characters. The test program had no other I/O (just ?KWAIT), and I tried all four combinations of /OFC and /IFC, so I guess ^S and ^Q have precedence over ?KWAIT.

The ^C^X sequence in the example is another idea. It allows you to flush the current LISTFILE output to the printer and start a new listing (assuming that your LISTFILE is set to a printer, i.e., @LPT). F77 logical unit 12 is preconnected to @LIST (the current LISTFILE).

At any time, you can temporarily disable ^C interrupts and then re-enable them later. If you are using ?INTWT, then ?ODIS will disable ^C^A interrupts and ?OEBL will re-enable them. ?KIOFF and ?KION will disable and re-enable ^C^A-^C^Z interrupts for ?KWAIT. They are simple to use—none of them have any accumulator input or output.

With ?KWAIT, you can implement 24 different ^C interrupt sequences (excluding ^C^S and ^C^Q) in your application program. Now all you have to do is come up with 24 different items in your program that you want to control or modify with interrupts.

John A. Grant is a geophysicist with the Geological Survey of Canada. He is also a contributing editor for Focus magazine and "system manager, chief cook, and bottle washer" for the Exploration Geophysics subdivision's MV/4000. He may be contacted at 601 Booth Street, Room 591, Ottawa, Ontario, K1A 0E8; 613/996-2325.

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Figure 1: WAIT__FOR__CA__INTERRUPT

```
    subroutine WAIT_FOR_CA_INTERRUPT

    integer*4 isys,ac0,ac1,ac2,ier
    include   "qsym.f77.in"

c>>>begin
c-->re-enable scheduling
    ier=isys(?ersch,ac0,ac1,ac2)

c-->wait for ^C^A interrupt
    ier=isys(?intwt,ac0,ac1,ac2)

c-->disable scheduling
    ier=isys(?drsch,ac0,ac1,ac2)

    return
    end
```

Figure 2: Program main

```
    program main

    integer         tid,tpri,tstack
    parameter  (    tid=        2,              !task id
   #                tpri=       0,              !task priority
   #                tstack=     0   )           !task stack

    integer*4       idummy,ier
    character*32    cdummy
    common/stuff/   debug
    logical         debug

    external        toggle_debug

c>>>begin
c-->read /debug switch
    call get_switches(0,idummy,cdummy,ier,
   #                  debug,"debug",0)     !/debug?

c-->start task to wait for ^C^A
    call tqstask(toggle_debug,tid,tpri,tstack,ier)
         if(ier.ne.0) call errcode(ier)      !fatal

c-->normal processing
    ...
    do i=1,n
         if(DEBUG) write(10,*)"processing i=",i
         ...
    end do
    ...
    end
    subroutine toggle_debug
    common/stuff/   debug
    logical         debug
    do while(.true.)
         call WAIT_FOR_CA_INTERRUPT
         DEBUG=.not.DEBUG
    end do
    end
```


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Figure 3: WAIT_FOR_CAZ_INTERRUPT(c)

```
c>>>begin
c-->re-enable scheduling
     ier=isys(?ersch,ac0,ac1,ac2)

c-->wait for ^C interrupt
     ier=isys(?kwait,ac0,ac1,ac2)
     c=char(ac0+100k)                          !make [A,Z]

c-->disable scheduling
     ier=isys(?drsch,ac0,ac1,ac2)

     return
     end
```

Figure 4: Interrupt_processor

```
     subroutine interrupt_processor
     character*1    c
     common/stuff/  debug,output_enabled
     logical        debug,output_enabled
c>>>begin
     do while(.true.)

          call WAIT_FOR_CAZ_INTERRUPT(c)

          if(c.eq."A") then
               write(10,fmt='("<14>",$)')     !clear screen

          else if(c.eq."B") then
               stop

          else if(c.eq."O") then
               output_enabled=.not.output_enabled

          else if(c.eq."D") then

               debug=.not.debug                !toggle debug

          else if(c.eq."X") then
               close(12)                       !start printer
               open(12,file="@list",status="old",
     #           access="sequential",form="formatted",
     #           recfm="datasensitive",
     #           carriagecontrol="fortran",position="end")

          else
               write(10,*)""C""//c//" ignored"
          end if
     end do
     end
```

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BY BRIAN JOHNSON

HASHING IT OUT

An inside view of the AOS/VS file structure

:UDD:USER:F:FO:FOC:FOCU:FOCUS:+

The primary goal of a good filing system is to ensure that you will have to do the minimum amount of work necessary to find what you're looking for, regardless of the number of items stored. That's as true for metal file cabinets, drawers, and paper file folders, as it is for keys and records stored on disks.

The solution adopted by the designers of AOS/VS was to use a "hashing" scheme to locate files, using filenames as the keys.

:HASH:SCHEMES

A hashing scheme has as an advantage the ability to provide the absolutely fastest access (i.e., least disk I/Os) to a large collection of stored items (filenames). It has the following disadvantages:

- It needs to know ahead of time what the maximum number of keys will be.
- It wastes space when the number of keys is not near the anticipated maximum.
- Its performance degrades less than gracefully if that maximum number of items is exceeded; in fact, the worst case cannot be predicted in advance.
- It is impossible to choose a hashing algorithm that doesn't behave badly under some circumstances (in spite of what Hewlett-Packard's IMAGE data base manual used to say).

In contrast, balanced trees (B-trees), like those used by INFOS, have slightly poorer average performance, but degrade gracefully when the initial estimate of the size turns out to be wrong, and have a finite and predictable worst-case number of I/Os required to locate any key for a given number of keys. However, balanced trees have disadvantages too. They require verification after a "rude" cessation of processing.

Fundamentally, a hashing scheme involves taking something that means something to somebody else (like a user-selected filename) and converting it to something you (the operating system) understand better (like the address of a record within a file).

The classic method involves creating a set, say N, of identical size "buckets," each capable of holding a collection of keys, and then applying a computationally inexpensive randomizing algorithm to the key that will (we hope) result in a uniform series of random numbers, called "hash values" or "hash codes," between 1 and N. This number then tells the system which bucket to go perusing to see if the key already exists, and, if not, where to put it.

Typically, keys with the same hash value are stored in the bucket in no

Figure 1

```
) CREATE/DIR/HASH=29 PROGS
) CREATE PROGS:PROG0(<0,1,2,3,4,5,6,7,8,9><0,1,2,3,4,5,6,7,8,9>).PR
) CREATE PROGS:PROG1(<0,1,2,3,4,5,6,7,8,9><0,1,2,3,4,5,6,7,8,9>).PR
) CREATE PROGS:PROG2(<0,1,2,3,4,5,6,7,8,9><0,1,2,3,4,5,6,7,8,9>).PR
) CREATE PROGS:PROG3(<0,1,2,3,4,5,6,7,8,9><0,1,2,3,4,5,6,7,8,9>).PR
) CREATE PROGS:PROG4(<0,1,2,3,4,5,6,7,8,9><0,1,2,3,4,5,6,7,8,9>).PR
) PERFDHA PROGS

:PERFMGR:PERFDHA 1.30 analyzing PROGS...

The directory has a hash frame size of 29. The directory file
is 75264 bytes long and contains 147 Directory Data Blocks
(DDBs). There are 2 index levels.

*** ANALYSIS BY HASH VALUE ***

      10 files have hash value  0.
      15 files have hash value  1.
      20 files have hash value  2.
      25 files have hash value  3.
      30 files have hash value  4.
      35 files have hash value  5, 1 overflow DDB exists.
      40 files have hash value  6, 1 overflow DDB exists.
      43 files have hash value  7, 1 overflow DDB exists.
      44 files have hash value  8, 1 overflow DDB exists.
      43 files have hash value  9, 1 overflow DDB exists.
      40 files have hash value 10, 1 overflow DDB exists.
      35 files have hash value 11, 1 overflow DDB exists.
      30 files have hash value 12.
      25 files have hash value 13.
      20 files have hash value 14.
      15 files have hash value 15.
      10 files have hash value 16.
       6 files have hash value 17.
       3 files have hash value 18.
       1 file has hash value   19.
zero files have hash value    20.
zero files have hash value    21.
zero files have hash value    22.
zero files have hash value    23.
zero files have hash value    24.
zero files have hash value    25.
       1 file has hash value   26.
       3 files have hash value 27.
       6 files have hash value 28.
----
 500 files using a total of 30 file name DDBs, including 7
overflow DDBs.

     *** ANALYSIS BY FILE NAME LENGTH ***
Short names ( 1-11 characters, 31 names/block): 500
Medium names (12-27 characters, 15 names/block):  0
```

particular order, so a sequential search of the bucket contents is required to locate a key, or to determine that it doesn't exist. Since most system programmers seem to prefer numbers that start at 0, it's more common to produce a series of random numbers between 0 and N-1. The exact algorithm chosen by the designer of the original DG DOS (1970 DOS begat 1972 RDOS, which begat 1976 AOS, which begat 1980 AOS/VS, which begat 1985 AOS/DVS, which begat. . .) involved taking the ASCII value of the characters in the filename and adding them up (two at a time for DOS and RDOS, one at a time for everybody else), dividing by a "magic number" (the hash frame size), and taking the remainder. It was hoped that this would produce a random number between 0 and the hash frame size, and that a uniform distribution of numbers would be produced so that the buckets would fill up evenly. It sometimes doesn't (see Figure 1).

Clearly, picking a prime number for the hash frame size when using this algorithm would yield the least number

```
Long names (28-31 characters, 10 names/block):     0


Using Data General's estimate of 20 filenames per DDB gives a
recommended hash frame size of 25. The actual average number of
file names per DDB in this directory is 17.

Choosing a prime as a hash frame size results in the least chance
of overflow. However, even the largest possible prime hash frame
size (251) still results in overflow when storing these file
names. The best strategy in this case is to break the directory
up into smaller directories, if at all possible. This list
summarizes the results of simulating the directory structure for
all prime hash frame sizes:

Hash       File
frame      name        Overflow   Overflow
size       DDBs        DDBs       percent
-----      -----       --------   --------
  1          17          16         999%
  3          18          15         500%
  5          20          15         300%
  7          21          14         200%
 11          22          11         100%
 13          26          13         100%
 17          24           7          41%
 19          26           7          37%
 23          30           7          30%
repeats...
251          30           7          30%

) DELETE PROGS
) WHEW!
```


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of synonyms (filenames that produce the same hash value). However, DG dropped this recommendation from their documentation a while back, for a good reason: It doesn't matter that much in the majority of cases; any old number will usually do nicely. Some of us old dogs, however, still stick with the prime numbers. I even have a file in my help directory: CLI.TPC.PRIMES. DG's right, though.

:HASH:BUCKET:OOPS

But what do you do when you go to add a new key to a bucket and it's already full? Simple. You add another bucket to the collection and put a tag on the bucket which says, "To whom it may concern: Once upon a time this bucket overflowed; go look in bucket number N for the overflow items."

When another bucket overflows, you add a new bucket to the collection, number N+1, and put a note on the full bucket which points to bucket N+1.

There is no reason why this scheme can't be applied to the overflow buckets themselves. When they fill up, we add yet another bucket (Y.A.B.?) to the collection and attach a note to the preceding overflow bucket.

When the last key is deleted from an overflow bucket, can we return the bucket to the barn and remove the note from the previous bucket? Maybe, but not if the bucket that just became empty has a note on it pointing to yet another overflow bucket. Couldn't we repack all the buckets for this hash value and perhaps reclaim some of the now-empty overflow buckets? Yes. In fact, we could do it each time a key (filename) is deleted if our goal was minimal space consumption, regardless of processing time and disk I/O.

Like most operating systems, AOS/VS is (correctly) optimized for minimum processing time and disk I/O at the expense of space when it comes to managing directories. It does not spend time repacking and reclaiming blocks when filenames are deleted. FIXUP, however, will reclaim an overflow bucket under the following conditions: a) it is the last one, and b) it is empty.

I assume it does this recursively (I'm pretty sure it does). FIXUP will not repack the buckets to reclaim space. There are lots of forward and backward pointers associated with filename entries which would require some fancy resetting. And anyway, all of us users are just lurking around waiting to overfill the directory again as soon FIXUP is done, right?

:GORY:DETAILS

OK, so now that you know how AOS/VS filename hashing works, what exactly does an AOS/VS directory look like internally? Well, it looks just like any other ordinary disk data file, but it operates under a slightly different set of rules:

1. Its element size is always just one disk block. This means that a directory grows to a second level of Random Index Blocks at only 64 KB.
2. AOS/VS will refuse any request to read, write, or modify it using tra-

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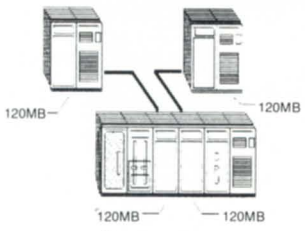

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ditional methods (?RDB/?WRB/?READ/?WRITE). Only ?GOPEN/?OPEN/?GNFN/?CLOSE/?GCLOSE are allowed.

When you create a directory file (DIR or CPD), AOS/VS creates a directory entry in the parent directory, and sets the current length to zero bytes. LDUs differ slightly. They are created by DFMTR and have no parent directory.

The first time the directory is read or modified (FILESTATUS or CREATE dir:FOO), the system creates the following structure within the file (assuming you defaulted the hash frame size to 7):

Block no.	Contents
0	Bucket 0
1	Bucket 1
2	Bucket 2
3	Bucket 3
4	Bucket 4
5	Bucket 5
6	Bucket 6
7	1st DDB
8	Bitmap
9	Unused
10	2nd DDB
2047	Last DDB

Blocks 10 through 2047 are allocated only after block 7 fills up. That explains why it's so common to see directories with default hash frame sizes that have a length of 4608 bytes (512 times 9).

DDB stands for Directory Data Block. This contains all the information about the files in the directory, except for the name; e.g., file status (the stuff you see when you do a FILESTATUS command), ACL string, UDA block, and link resolution.

DDE stands for Directory Data Element. It is the minimum quantum of storage used within bucket blocks and DDBs. DDEs are 16 bytes long, and there is one bit in the bitmap for every DDB DDE.

All intra-directory points are organized as a relative block number within the directory file (11 bits), and a relative DDE number within the block (512/16 = 32, or 5 bits). This effectively limits the size of a directory to 65,536 times 16, or 1 MB (2048 blocks), making a one-block DDE bitmap sufficient. Any attempt to grow a directory beyond 1 MB will result in the error message "INSUFFICIENT ROOM IN DIRECTORY." Ever seen that one? I have.

Within the buckets, filenames are stored in Filename Blocks (FNBs) using 1, 2, or 3 contiguous DDEs, depending upon the length of the filename. The first four bytes of the FNB are used for a flag, the DDE word length, and a pointer to the File Information Block (FIB) stored in one of the DDBs. The last byte of the last DDE is used to hold the null terminator for the filename, so a one-DDE filename can only be a maximum of 11 characters long. A two-DDE filename can be up to 27 characters long. 28 to 31 character filenames require three DDEs.

:RUDE:AWAKENING

Does this mean that the total number of files that can be stored in the buckets depends upon the length of the filenames? You betcha. Up to 31 (1 DDE is the overflow pointer) short names, 15 medium names, and 10 long names can be stored in each bucket. Now you can see why the DG documentation recommends using an average of 20 names per bucket to estimate the required hash frame size (see 093-243-07, page 15–27). Suggestion for a Software Trouble Report (STR): Why is this info in "How To Generate and Run AOS/VS" instead of in the CLI manual? And how come the same manual says a "short" name is up to 10 characters long instead of 11?

Obviously, the amount of I/O it takes for the system to access/update directory entries depends on several factors:

1. How long does it take to locate a file; i.e., how many overflow blocks have to be read, on the average, to find a given filename?
2. How long does it take to collect and/or update the information about the file; i.e., how fragmented are the DDBs containing the rest of the information about the file? Are they clustered together or are they scattered all over the disk?
3. How many levels of Random Index Blocks have to be located in the cache (CPU-intensive), or read in from disk (I/O-intensive), preliminary to accessing the required buckets and DDBs?
4. What is the typical use made of the directory: is it subject to frequent searches (typical of directories occupied by humans doing F/AS/S), or is it primarily accessed randomly (typical of directories in search lists)? Is the directory static (like :UTIL or :HELP), or is it constantly subjected to CREATEs and DELETEs which will tend to fragment the DDBs?

A directory that averages only one overflow block per bucket can be twice as slow as one with no overflow blocks, depending upon the efficiency of your system cache (remember that Directory Blocks and Random Index Blocks are cached. (See my October 1986 column in *Focus*, page 27).

:ANALYSIS

Let's look at the problem from the other end. What bad effects are caused by directories with lots of files in them? Well, we've already seen that big directories tend to take longer to access, cause more disk I/O, and cause more system cache activity.

But what happens if we size the hash frame correctly for an over-filled directory? Doesn't that solve the problem? Unfortunately, the answer is no.

If you have a thousand files, it takes about 50 blocks to store the filenames (1000/20), and about 200 blocks worth of DDBs to store the rest of the information. Sizing the hash frame correctly has no effect on the total number of blocks required to store all the names, only on their organization (i.e., whether or not they exist as overflow buckets).

A command involving a template (like FILESTATUS with no argument, or with arguments that include wild cards) must necessarily search all of the buckets and DDBs to satisfy the request. FILESTATUS/SORT is even more expensive, because the buckets have to be searched twice. When you're searching all the buckets, 50 blocks are 50 blocks. A correctly specified hash frame size only helps specific directory accesses (like DELETE FOO.LS, not DELETE FOO.+).

A more subtle effect of large directories, regardless of their hash frame size, is that they have a very detrimental effect on the system cache efficiency. The efficiency of the cache is primarily determined by its size, the number of blocks competing for it, and the rate at which the blocks are being requested. (Infrequently requested blocks get pushed out of the cache.) Running the PERFDHA program (the output is given as Figure 1) caused 250 of the 512 blocks in my system cache to get used. Had anyone else been on the system when I did that, their blocks would have surely been flushed back to disk (or maybe they would have flushed mine instead). If only 10 users are active at a time on a system with a 512-block cache, each user can reasonably expect to have only 51 cache blocks available for its use. 51 blocks is just

(continued on page 66)

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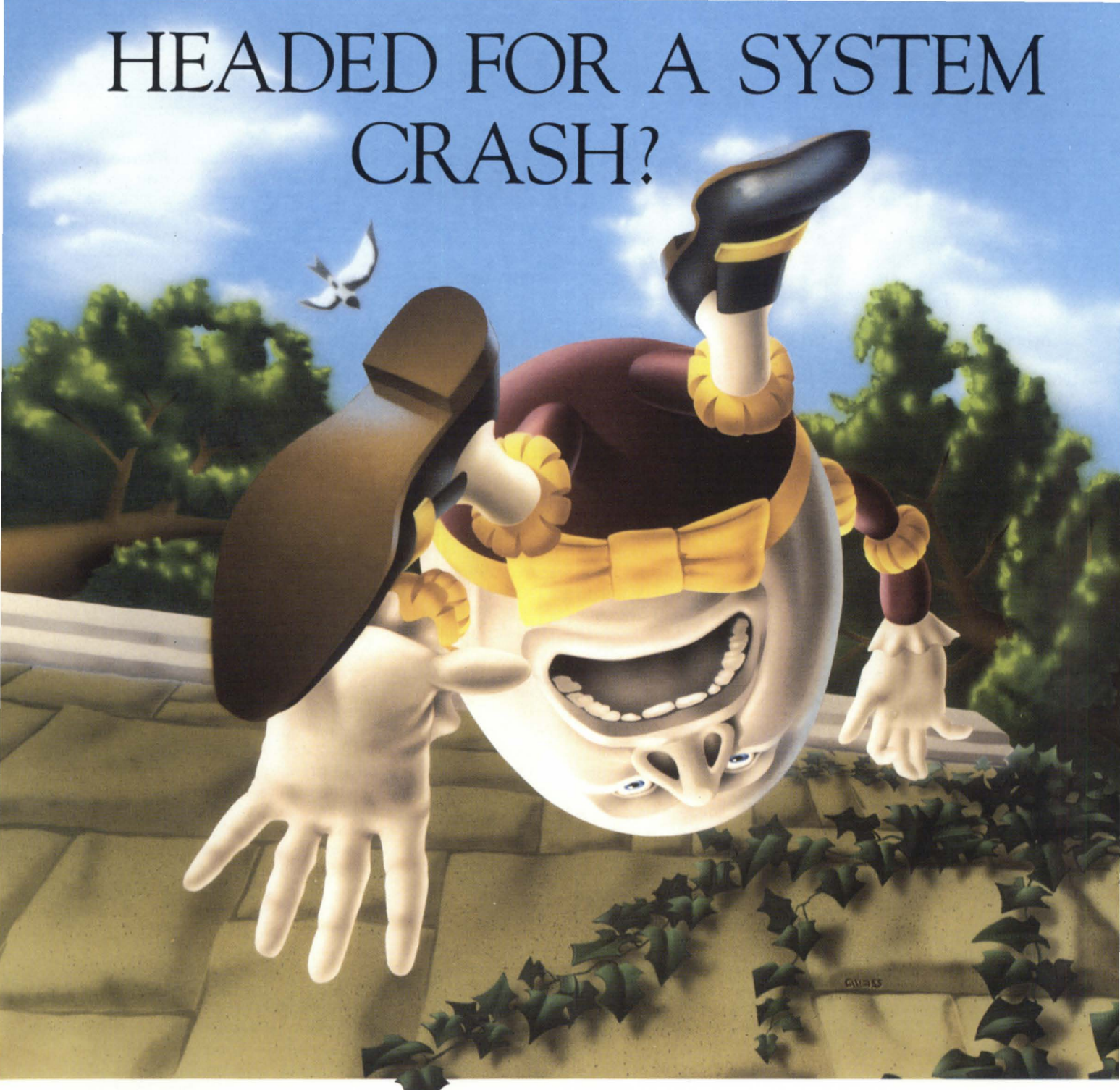

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BBASIC BUSINESS

BY GEORGE HENNE

BBASIC HALL OF SHAME

When I told my co-workers that my next column was going to cover how not to program in Busines BASIC, they all agreed that I was just the person to do it.

Actually, kidding aside, over the years, we've seen a lot of substandard code written in BBASIC. MAXON has pretty strict programming standards for its own stuff, but we do get involved in conversions from customers' old, unmaintainable code. We also see the mistakes our own programmers make when they start.

The problem is rooted in the same thing that makes Business BASIC such a good language for business applications—its power. However, in the multiple manuals describing hundreds of commands and options, there is nothing to tell you how to write a good program. The only examples that come with the system are the programs in $SYSLIB, which I think are among the most badly written programs ever distributed.

Small wonder that some programmers, after reading the manual and looking at the examples, copy the style and technique of those programs and produce a mess.

Business BASIC is an unstructured language, as opposed to a structured one such as PL/I or Algol. It allows the programmer to use GOTO statements indiscriminately and has no objections whatsoever to executing complete spaghetti. I find some of the best BBASIC programmers actually came from a structured programming environment. The discipline they learned there helps them to construct clear, readable programs.

Now let's look at some of the terrible things a programmer can do in BBASIC. Welcome to the BBASIC Hall of Shame!

1. **GOTO statements in or out of an IF/THEN/ELSE/ENDIF block**—The block IF was one of the best enhancements that ever came out for BBASIC in terms of improving readability. Every time you use it, you use a couple less GOTO statements, plus your logic gets nicely indented in the listing. The block IF is a standard feature of structured languages. Incidently, if BBASIC had a DO WHILE. . . END construct, it would be possible to write fully structured code.

I'm always amazed, therefore, when a programmer does a GOTO out of the IF block without ever getting to the ENDIF. Sure, you can get away with it, but you pay a horrible price in the readability of the program. Do you really want to maintain this stuff for the rest of your life, or would you like someone else to be able to do it so you can move on?

Even worse are GOTOs that go into an IF block without doing the IF statement.

2. **GOTO statements in or out of FOR/NEXT loops**—These aren't all bad: the exception is GOTO a statement after the NEXT if some condition has occurred, simulating a DO WHILE construct. If your purpose for the GOTO out of the FOR/NEXT is clear, it's probably OK. GOTOs in the middle of a FOR/NEXT (without doing the FOR statement) are inexcusable.

3. **STMA 8,0 (or ,1 or ,2)**—This statement clears the GOSUB and FOR/NEXT stack, and was clearly invented by someone with a pathological hatred of structured code. What an incredible idea—a GOSUB you never have to RETURN from because you can tell the system to forget you did it.

4. **GOTOs or GOSUBs not to REM statements**—BBASIC has a very nice feature: a REM statement that is the object of a GOTO will print beside the GOTO. As GOTOs are to line numbers, this feature improves readability tremendously. Excuses I've heard for not using this feature include the execution time a REM statement takes (give me a break!) and the bytes of program space the REM statement takes.

I've always felt that if your program is so large you can't afford to have REM statements, it's time to reexamine your whole approach. A 26 KB program with no REM statements is not maintainable.

5. **GOSUB routines that GOTO another routine to RETURN**—The point of using a GOSUB is to put a clearly identifiable section of code in a block by itself. When you read the program, you just have to understand what the block does, without having to read it closely. Why knit your GOSUB routines together then? They get awfully confusing.

6. **ON ERR for anything but the unexpected**—It's possible to write programs in BBASIC without ever needing to use the ON ERR statement. It's a good idea. The ON ERR is a very unstructured concept, causing execution of the program to jump to another location. It can create very confusing results when the error condition forcing the jump is different than the one the programmer had in mind when he or she wrote the code. Furthermore, if you have another error while still in your ON ERR mode, the result can be chaos and a hung terminal.

An exception might be a global ON ERR to trap unexpected errors in live systems. This prevents the terminal from going into console mode and may make recovery easier for the operator.

7. **Boolean Expressions**—In the last year, full Boolean expressions have been added to BBASIC. Now, just because it's OK to create statements such as

```
A=B=C
OPEN FILE(1,4+(N>4)),FILE$
X$="ABC"+A>B+"GGG"+L$="WHAT?"
```

doesn't mean that it's a good idea to do so. Some of the conditions I've seen in IF statements involving AND, OR, and NOT defy human comprehension. Programs have to be readable to be maintainable.

This point goes a little wider. There is nothing wrong with Boolean expressions. It's all in how you use them. Like many other features in the language, they can be used to write clearer, easier to understand code. Conversely, they can come back to haunt you.

The best programmers I know (i.e., the most productive in producing the most error-free code) also write the simplest code. Rather than spending an hour getting a complex statement to work using a clever algorithm, they write 10 statements they used once before that worked just fine. Even if it does execute more slowly (and usually it doesn't), remember how much cheaper computer time is than programmer time.

How long would it take you to rewrite the programs on your system so they ran twice as fast? Six months? A year? Forever? Yet, for about the price of three months' salary, you can add another couple MB of memory or B32 and get the same result. Next month, I'll get to more horrors of BBASIC code.

In other news, I had a call from DG with respect to my March column

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on upgrading from RDOS to AOS/VS (page 33). They had no real objections to my column, but wished to bring out a few points that the readers might find of interest.

RDOS Business BASIC is still a strongly supported product within Data General. Rev 8.2 of Business BASIC is the first to use the RDOS system calls for terminal handling instead of its own code. This has a real benefit in DG/RDOS, the version of RDOS that runs on the MV/2000 DC. DG/RDOS supports the intelligent multiplexors on the 2000, unloading a lot of work from the CPU.

Business BASIC for the Nova went Category "C" with the final release of 7.50 in Feburary 1986. The product is now sold essentially "as is"—no further releases are planned.

It is possible to use older disk drives with the new MV/7800: you don't have to purchase a brand new 354 MB drive to go with it. On the other hand, I should note that the older drives may be more trouble to hook up and suffer from much higher maintenance rates. Furthermore, you will certainly want to have more disk available under AOS/VS.

There are also circumstances where an MV/7800 may not be faster than an S/140 under RDOS. In purely compute-bound operations, there is no inherent advantage to the 7800. For the average business application, however, there will probably be a real difference. While RDOS BBASIC rev 8.0 eliminated most of the lockout problems that plagued earlier releases of BBASIC, the ability of AOS/VS to use shared pages results in substantial improvement under many different conditions.

Finally, perhaps the last notes on MV/7800 performance. The latest release of the microcode seems to help a bit. Rev 7.X of AOS/VS seems to run more slowly than rev 6.X. Interestingly enough, the difference in speed between the two revs is apparently not as noticeable on other MV machines.

We've installed four MV/7800s in the last couple of months, using AOS/VS rev 6.6. The clients have been happy (but they did upgrade from Novas), and we've had no problems. Since then, we've ordered four or five more of them. If expectation levels are set properly when buying the machine, there is no reason to be disappointed.

Paul Gibson, of First United Leasing in Illinois, was one of the users who was initially disappointed with the machine. He's upgraded to B32, and reports the machine now meets expectations fully. Δ

George Henne, a contributing editor to Focus, has worked with Business BASIC users for nearly a decade. He is the vice president of MAXON Computer Systems, and can be reached at 575 Madison Avenue, Suite 1006, New York, NY 10022; 416/445-4823.

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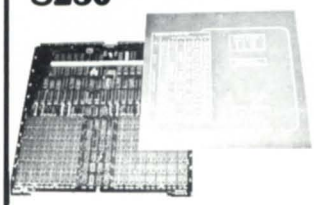

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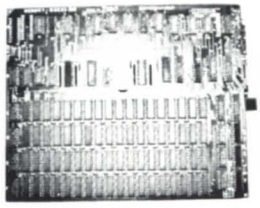

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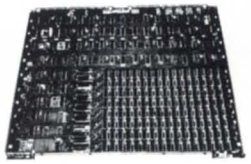

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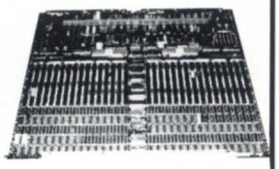

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BY TIM MANESS

PEST CONTROL

No matter how good the code, you still need to understand SWAT and DEBUG

This month's article is about debugging. I spend most of my time managing software development, and therefore, plenty of time fixing code. There are plenty of good articles on programming that describe how to write good code, but no matter how good the code is, there are bound to be some cases that have been forgotten, unanticipated conditions that occur, and plain old mistakes that need to be fixed. Quickly locating the problems in code is probably an art, but there are tools and techniques that can help.

For most languages, there are two tools available from DG to use when debugging. These are SWAT, the high-level symbolic debugger, and DEBUG, the old-fashioned, assembly language debugger. Both debuggers allow you to do the same things, but at different levels. SWAT allows you to work with your programs at the source code level. You can reference line numbers and variables just as they appear in your source listing. DEBUG is a lot more complex to use, because you must make your requests at the assembly language level. You can reference subroutines by their names, but variables and specific instructions must be referenced by address.

You pay a price to use the higher-level debugger. Before you can use it, you must recompile each routine you want to reference from SWAT. Using SWAT greatly increases the amount of disk space associated with a routine, the .ob file is larger, and there are additional files (.ds and .dl) containing symbol and line information.

DEBUG does not have the disk space overhead and can be used without any advance preparation of the program. You can even run the debugger on programs for which you don't even have the source. With DEBUG you can also patch .PR files, which can be a very handy thing to do on occasion.

Using both debuggers in combination is usually the most effective way to track down problems. For example, if you have a program that hangs, you can use DEBUG to track down the routine that is the culprit and then recompile the offending routine and use SWAT to figure out the specifics.

The rest of this article will cover how to use DEBUG. Although SWAT may be the tool of choice in many cases, not everyone has it, and it isn't always appropriate. And there is a lot less to explain about SWAT.

Setting break points

After a program is started in the debugger you can set break points by typing an address and pressing $B. (A short note here about the syntax used in DEBUG: it is *terrible*. The AOS debugger used real words for commands, but with the AOS/VS version the product regressed. I'm convinced it was written by a mad RDOS person who tried for the most obscure command syntax possible.) When trying to narrow down a problem, it is usually best to set initial break points at the beginning of subroutines. The address to reference is the name of the subroutine plus 2, for example:

```
_ROUTINE+2$B
```

will suspend the program in subroutine ROUTINE at a point where the arguments may be accessed. You can set up to 20 break points (which isn't many when you've got code of any magnitude).

Return address

Once the break point is reached, the following lines are displayed:

```
0B ROUTINE+2
00000000013 00000000000 37777777777
  16006671374 00000000000
```

The 0B refers to the first break point, and ROUTINE+2 is the address of the break point. The set of numbers displayed on the next line are the contents of accumulators 0 through 3 and the carry bit (this is the high-order bit of the program counter).

It's possible to get really carried away poking around at this level, but understanding a few basic things will let you accomplish quite a bit.

One thing it's nice to know is who called this routine. This can be a big mystery in some circumstances. To find out, use the address in accumulator 3. If you type in the address and press backslash (\), DEBUG will display the address of the instruction this routine will return to. If you set a break point at this address, you will stop there after the routine exits and you can use the $B command to see what routine the address is in. In the example above:

```
_16006671374\ 16021517155 _
_16021517155$B
_$B

B0 ROUTINE+2 #1
B1 CALLER+456 #1
```

So we now know for a fact which routine called us. This may or may not be a surprise. Sometimes, this is enough of a clue to get you started looking for a problem in the right place. If not, you can continue looking for clues by checking the values of any arguments.

Looking at argument values

Most high-level languages available on MV/ systems use the same type of mechanism to pass parameters to subroutines, so this explanation applies to Fortran, COBOL, Pascal, etc. When a subroutine is called, the addresses of the arguments are put on the stack in the reverse order of their appearance in

the argument list. The location of these addresses can be found by subtracting an offset from the address in accumulator 3. (This is the frame pointer.) For example, if the calling sequence for the CALLER routine is ARG1, ARG2, ARG3, then the addresses of the arguments are the value in AC3 minus 14, 16, 20. (These are octal numbers and continue to grow by 2 for each argument.) To check the value of ARG3 do the following:

```
_16006671374-20\ 16000034546 (This is the
  address of ARG3)
_16000034546\ 00000000004 (This is the value
  of ARG3)
```

So without much effort, and no time to recompile and relink, we now know where we came from and with what values.

Looking at global variables

Checking the values of global variables is straightforward. You just reference the name of the common area and by knowing what data items are in the common, you can look at the appropriate offset. For example, if there is a common area with a variable that is supposed to have a filename, you could check the value by typing the name of the common area and pressing backslash. To see the words following press CR.

```
_FNAME\ 07225242104 _
_FNAME+2\ 07220444403 _
_FNAME+4\ 13626444516 _
_FNAME+6\ 07216033537 _
_FNAME+10\ 11520251000 _
```

As you can see, 32-bit octal values are not always the most enlightening way to view your data. DEBUG allows you to use function keys to change modes to see values in bytes, 16-bit integers, ASCII text and as instructions (if you want to really get into it). By pressing CTRL F7, the mode will change to display ASCII text. By redisplaying our filename, we discover its value:

```
_FNAME\ :UDD_
_FNAME+2\ :BI<3>_
_FNAME+4\ ^ZIN_
_FNAME+6\ :87_
_FNAME+10\ MAR<0>_
```

If we thought we should be trying to use a file called :UDD:BILLING:MAR_87, this could be a clue as to the problem. At this point in time, the filename has not been set up correctly. If ROUTINE was failing on an open, we now know that ROUTINE is not to blame; it didn't have a good filename.

By spending a little time in DEBUG, you can do some preliminary checking before taking time to recompile and relink. This use of DEBUG can save time and make the use of SWAT much more efficient. Δ

Tim Maness is a contributing editor to Focus, and president of DMS Systems, Inc., a software development firm specializing in data base management. He can be reached at 1111 Brickyard Road, Salt Lake City, UT 84106; 801/484-3333.

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Bring all the pieces together

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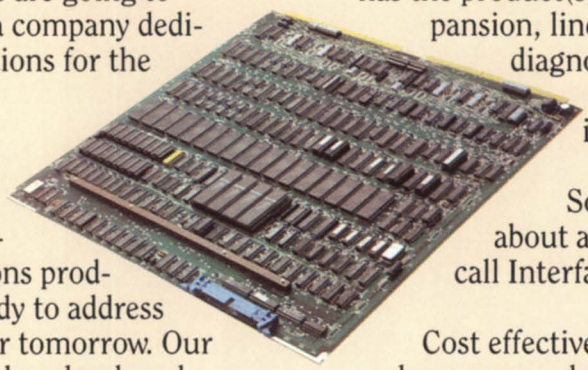

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Data Conversion Services converts all data

Novata, CA—A new company, Data Conversion Services, offers a system for converting a client's data from more than 1,000 different computer formats. The firm offers nationwide, same-day pickup and has a 24-hour production schedule. Services are available in all 50 states and Canada.

DG tape media and formats the company can handle include: 800 bpi, 1600 bpi, 3200 bpi, 6200 bpi, 6250, ASCII, and nine-track. Data General floppy disk formats include the DG/One, AOS (5¼-inch), and the DG/20 (either 8-inch or 5¼-inch). They can convert all reel-to-reel ½-inch mag tape. However, they do not work with any cartridges.

Jonathan Chilvers, owner, says the most popular conversions are from older models of word processors, such as Displaywriters and Wang's OIS, to general-purpose computers, such as PCs, ATs, and MacIntoshes. People also commonly need to download data from mainframe magnetic tapes to floppy disks or exchange data between incompatible computers.

Data Conversion has developed programs to import data into widely used application programs such as Lotus, dBase III, and WordPerfect.

Free over-the-phone technical assistance is available by dialing the company's national toll-free hot line, 800/327-0330.

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DG introduces tape management system

Westboro—Data General has announced the AOS/VS Tape Management System (TMS) for the company's Eclipse MV/ family of computer systems. TMS provides an efficient means of managing large tape libraries. TMS is easy to use and can manage tapes across distributed systems, as well as in a standalone environment.

Targeted at customers with significant magnetic tape processing requirements, TMS offers a full range of control and reporting capabilities, according to Data General. This system automatically monitors and analyzes information, such as tape creation date and retention cycles. As a result, users can implement procedures for tape maintenance, expiration, backup, and restore programs. TMS is suited to users whose applications generate large numbers of tapes or require long tape retention periods.

According to Ed Connor, director of the company's software products and services group, "The system is particularly effective for a full range of commercial and technical environments with massive record-keeping needs. Typical environments include government agencies, large data processing centers, manufacturing and process control, seismic analysis, and automatic

test equipment."

The product features extensive security mechanisms designed to protect against accidental or inadvertent deletion of data, as well as access by unauthorized users. To maintain system security, TMS implements a set of software profiles that prevent unauthorized access to tape data. System managers can assign privileges, differentiating between general users and those with special privileges.

TMS features a centralized data base that can be accessed through remote systems. A networking scheme allows users to put the tape management system software on one Eclipse MV/ family system, but access TMS data bases by any of the other systems running TMS. TMS is completely portable and can be transported across the entire MV/ family product line. A transaction journal monitors system use.

The product includes a menu-driven query utility. This features allows users to view, retrieve, change, and update tape information, as well as generate printed reports.

DG's software products and services division offers a consulting service to help users install and implement the AOS/VS Tape Management System. This consulting service includes single-site installation and setup, user and tape librarian review, as well as general assistance and guidance. Data General can also provide installation and setup for additional sites.

The AOS/VS Tape Management System is priced at $15,000. Δ

Data General announces X.400 for CEO mail

Westboro—Data General Corporation has announced DG/X.400, the company's implementation of the CCITT X.400 standard recommendations for message-handling systems. DG/X.400 lets users of the DG CEO automation system exchange messages with users on other vendors' X.400 compliant systems. X.400 defines a common interface between diverse office systems, providing a way for different companies to communicate electronically.

According to Joseph Forgione, manager of the Data General communications product marketing group, "Our customers need to send messages between groups with hardware systems from a multitude of vendors. X.400 is significant because it offers a viable messaging standard allowing diverse multi-vendor system communications."

The X.400 messaging protocols are particularly important in the European market, where all public electronic mail services of the Post Telephone & Telegraph (PTT) utilities in Europe have committed to supporting X.400.

DG.X.400 is integrated with CEO. Using CEO electronic mail menus and features, it lets CEO users send and receive messages and documents directly with other X.400 users. The prices range from $660 for a DS/7500 to $10,450 for an MV/20000. Δ

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(from page 56)

about the total number of directory blocks involved in an F/AS/S inside a default directory with 100 or so files.

Given that humans can only comprehend a handful of items at a time, it makes no sense for them to be doing operations involving templates in a directory containing more than a hundred or so files. On the other hand, it frequently make sense for some directories that humans rarely work in to contain upwards of a thousand files (e.g., a directory containing all the production .PR files and macros for your system, as long as it is only accessed via a SEARCHLIST).

:NET_NET

In general, the sort of directory operations users can do will place far greater demands on the system cache than would the file index blocks of heavily randomly accessed, but well organized files. (Well organized is a zero- or one-level index, or a two-level index with only a handful of index blocks.)

It's OK for a directory to contain more than a few hundred files, as long as: a) humans don't spend a lot of time doing template things in it, and b) its hash frame size is appropriate for the number of files it contains.

It's OK for a directory to have an excessive number of overflow blocks (more than 10 percent) as long as it is a) rarely occupied, b) rarely the subject of CREATEs/OPENs/CLOSEs/DELETEs/RENAMEs, and c) never in anyone's searchlist. In other words, the directory contains archival information, or files that are opened and then left open for long periods of time (like :NET:LOGFILES).

It's not OK to excessively oversize (more than about 25 percent) a directory's hash frame size just to be safe. Searching lots of nearly empty buckets in response to a template command takes almost as long as searching full ones (the bucket search CPU time is negligible compared to the cache search time and the I/O time). This implies that directories with proper hash frame sizes that are subject to frequent template searches (and which used to be full, but have been broken up into small subordinate directories) should be dumped and reloaded into a directory with a proper hash frame size.

Is it time to issue a memo to your users forbidding filenames longer than 11 or 27 characters? Hardly. One extra F/AS/S, in order to refresh your memory as to what overly abbreviated, short filename you picked, will more than offset the gain achieved by using short filenames. Meaningful filenames are wonderful (just ask ex-RDOS users); use them without worrying about their lengths.

If your users are fond of operating in directories containing more than a few hundred files, you should acquaint them with the benefits of breaking up their directories in a way similar to the way they organize their paper files. Most users will find that it makes their life easier, and all users will benefit from the improvement in system performance.

Is this the Silver Bullet you're been searching for to change your 30-second response time to less than a second? Nope. Two seconds to one second? Maybe.

:OLD_BUSINESS

My March 1987 column on the increased memory requirements for AOS/VS rev 7 (page 51) has certainly stimulated some ugly phone traffic. I sense a lot of unhappiness out there, especially among you OEMs who just spent the last 12 months shipping mind-boggling numbers of 2 MB eight-user MV/2000s. The first big stink may have already taken place at the U.K. Users Group meeting on April 2–3 by the time you read this. (This column was written on March 15th.) I may skip across the pond just to act as an unofficial *Focus* correspondent. Any of you with similar feelings may want to plan on attending this year's national conference in Lost Wages so we can do what we're supposed to do at national conferences: make our feelings known.

Also, you may want to show up just to take part in voting for the 1st Annual Red Barn Memorial Trophies (to be donated by B.J. Inc.), which will be awarded to the groups within DG responsible for the introduction or rerelease of the most blatantly impressive products during the past year. Δ

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SAS Institute, Inc. recently dedicated a new $6.8 million software R&D facility in Cary, North Carolina. The 125,000 square foot building will house about 500 employees when filled. SAS, the developer of a widely used data management and statistics package, was recently included in *Inc.* Magazine's "Inc. 500 Honor Roll," which profiled the six companies that have been named to the Inc. 500 list of the fastest-growing private U.S. companies for all five years that the list has been published. SAS Institute's 1986 revenues were $102.4 million.

■

Wheelways Insurance and Financial Services, Inc. is installing an MV/20000 equipped with CEO at its headquarters in Wynnewood, Pennsylvania. Currently writing about $60 million in annual premiums for car lessors, manufacturers, and dealerships, Wheelways insures Volvo of America, more than 1,000 GM, Ford, and Chrysler dealers, and more than 1,000 U.S. banks. "The fact that Data General provided a single integrated system to meet our office and business processing needs both today and over the long term made them the right choice for Wheelways," said James J. Maguire, president.

■

Dynamic Air Engineering, Inc., a leading manufacturer of air circulation and cooling systems for the aircraft and aerospace industries, is installing DG's TEO/3D modeling and data base system. TEO/3D, which will run on a DS/7500 workstation, will communicate via Xodiac with the company's MV/4000, which runs accounting and manufacturing operations. By using the new system, engineers will be able to create designs that can be loaded directly onto the computer's numerical control equipment without manual CNC programming. According to Hugh J. Morrison, executive vice president, "We have been a Data General user for 10 years and are truly impressed with its equipment, maintenance, and personnel."

■

"Data General In Concert" is the name of an event that DG President Edson D. de Castro says is unique in the company's 18-year history. The three-day exposition will premiere at the Chicago Marriott Downtown on April 7 before traveling to other major U.S. cities later this year. DGIC is built around three components: a "corporate capabilities center" to highlight DG's history and corporate strategies, a "solutions demonstration area" to feature integrated solutions to an array of typical business problems, and a series of executive seminars presented by leading industry consultants.

The seminar topics will range from applications strategies to departmental computing, personal computer integration, and cost-of-ownership/return-on-investment considerations.

"We have often heard that Data General's communications and integration story is the best kept secret in the computer industry," said Robert R. Johnson, director of DG's marketing operations. "For the first time in our history, we are showcasing our complete corporate capabilities and product strengths in one location."

■

Data General Europe and Cognos Inc. signed a joint marketing agreement to promote Cognos' application development language PowerHouse on DG computer systems. The agreement follows DG Europe's recent decision to install PowerHouse in 26 of their regional and national MIS centers.

Cognos also expects to release PowerHouse version 5.00 on April 15. Version 5.00 was developed by Cognos in cooperation with Data General's development teams. Version 5.00 includes DG/SQL support, CEO integration, and full DBAM support for INFOS users.

■

Approximately 35 DG users from the United States and Canada met for the first meeting of the Can-Am Rig held March 3 in Buffalo, New York. Newly elected officers are: Scot Love, chairperson; Ed Czajka, vice chairperson; and D.A.N. Davis, secretary/treasurer. Committee chairs include Ralph Prouxl, membership chairperson, and John Gogniat, program chairperson.

The second meeting will be held April 29 at 6 p.m. at the same location (the Hilton in Buffalo). Tony Scrimanti, a communications specialist with Data General will talk about communications including topics such as DG GATE and BLAST. There will be a review of the membership survey results. Members will also vote on the by-laws.

■

Also in New York, the Metropolitan New York RIG will hold its next quarterly meeting Tuesday, June 16, from 9:30 a.m. to noon at the Data General offices in Saddle Brook, New Jersey (Park 80 West, Plaza One). They will discuss "AOS/VS System Performance."

Anyone interested in attending the meeting should contact Stephen Kern at 201/327-6300.

■

The fourth meeting of the Colorado Data General User's Group (CODGUG) brought about 50 people together March 12. President Nancy Walters hopes the trend continues at the next meeting, which is to be held May 14 from 6:30 p.m. to 9:15 p.m. at the U.S. Forest Service Building, 11177 West 8th Avenue, Lakewood, Colorado.

CODGUG member Bruce Carey of the Association of Operating Room Nurses will give a technically oriented talk titled "Improving Performance with Tools at Hand—Part II." There will also be a tutorial session and a short business meeting.

The last meeting included a tutorial on how to build user menus within the CLI. A panel of four speakers spoke on the subject of data bases. They included David Piper of Cybertek, John Hoxmeier of 3CI, Laura Nagle of Cognos, and Peter Watson of Oracle.

For more information about CODGUG, contact Terry Spencer, vice president, at 303/236-9484.

■

Good news for Ada users: An Ada SIG is being formed. Anyone interested should contact Richard Lehman, MC–C07A, 2400 NASA Road 1, Houston, TX 77058; 713/483-8329.

■

"We need 32-bit help," writes Paul Duck. "The Ohio MV Users Group is actively seeking new officers. Due to several recent changes in local personnel, we need strong leaders to head up this dynamic group." If you can help, call Paul at 216/261-0237 or Mark Palmer at 216/459-0990.

■

The editors of Focus are always looking for stories and information that NADGUG members will enjoy—and use. We especially want to hear from you if you have something to say about any of the special features that are planned for the rest of this year:

- August—Real-time
- September—DG in education
- October—Statistics
- November—Data base systems
- December—DG in government

Just use one of the "Quick Connect" cards in this issue to tell us about yourself or somebody we could contact for more information. And don't worry—this doesn't commit you to write an article. We simply need more sleuths out there to identify the stories we might miss otherwise. Δ

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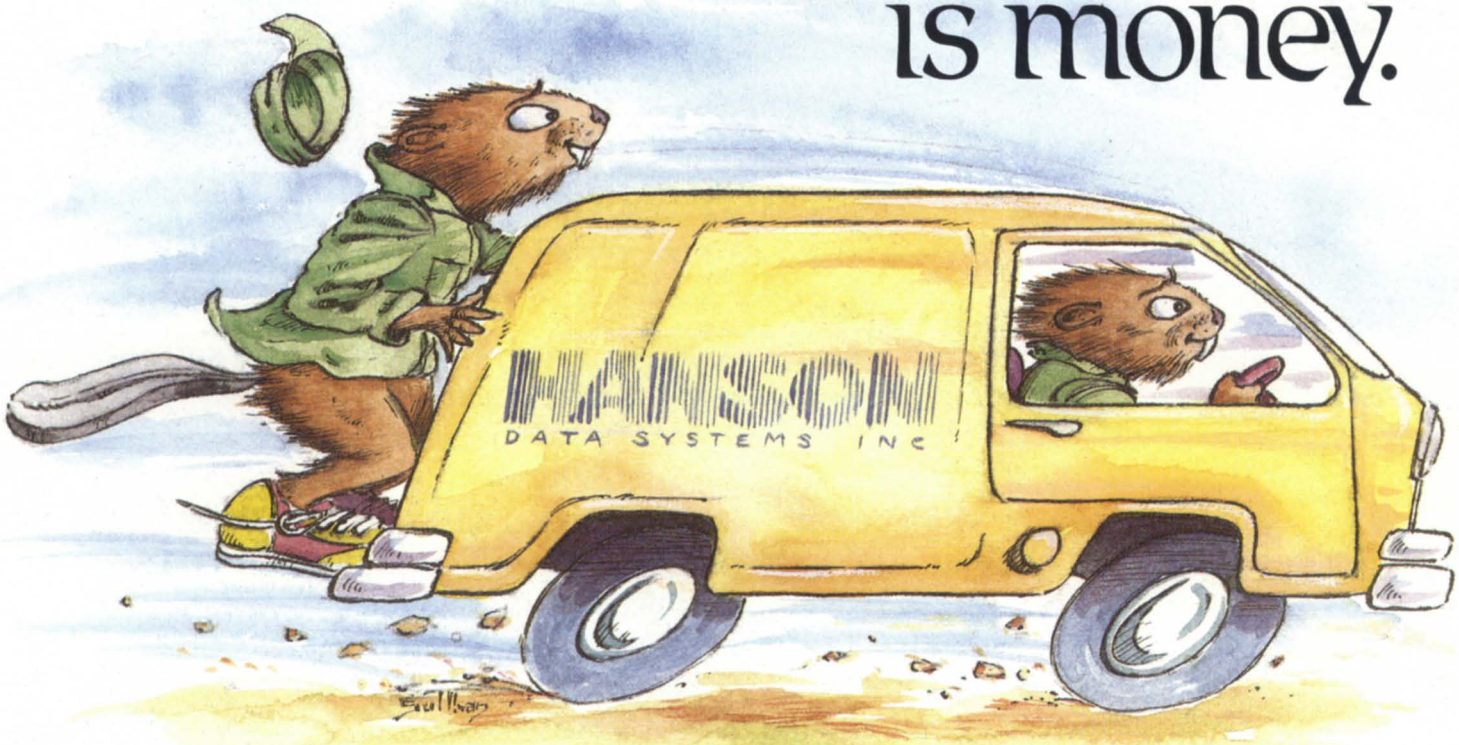

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