

November 1994

**The Magazine
of the North
American
Data General
Users Group**

FOCUS

Focus On:

System Management

**The philosophy of
system management:
skills, knowledge,
experience, flexibility,
and happenstance**

Plus

**Unix Notebook:
Death to DOS**

**Getting it all with one
call at the Data
General CSC**

**Migrating legacy Cobol
applications**

**Message from Steve
Pounds, NADGUG's
new president**



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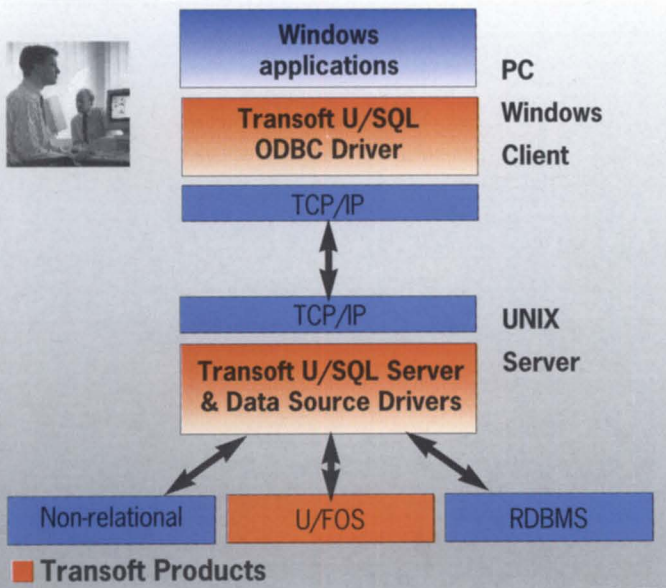
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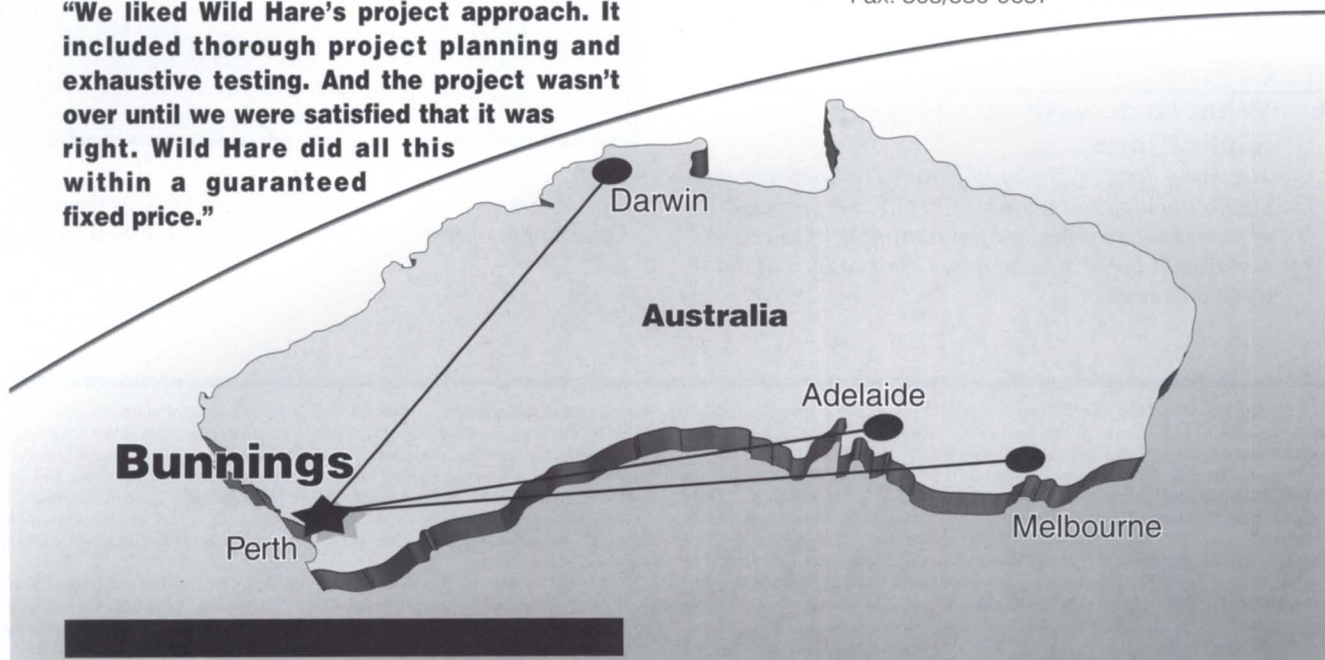
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FOCUS

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*About the cover: Original photo courtesy of the Texas
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On the northbound express

As your president for next year, I felt it would be appropriate to introduce myself.

I first learned of Data General and NADGUG back in 1985 when I left public accounting and went to work as corporate controller for Security Forces here in Charlotte. (For those of you who haven't heard of Charlotte, it's in beautiful North Carolina, home of the NBA Hornets and the brand-new NFL Carolina Panthers.) At that time, we had an S140 running RDOS. I'm a non-techie myself.

My boss, Don Clark (NADGUG president for 1988-89) had gotten involved in the local Data General users group. There were a lot of issues at that time concerning proprietary systems. As I got involved in the local users group I, too, realized that there were plenty of benefits to getting together with fellow DG users.

When I attended my first NADGUG conference in New Orleans in 1989, it became even more obvious what the value of a group like this is: getting together with the largest gathering of DG users that takes place anywhere during the year for training sessions, networking, fellowship, and information about the latest products available.

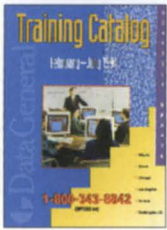
I hope all of you who attended NADGUG 94 in Nashville last month found this still to be true. If you



Steve Pounds

by Steve Pounds

1994 - 95 NADGUG PRESIDENT

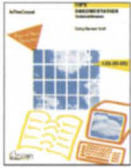


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weren't there you, missed a great learning experience and a great time.

Get on the train

As we look ahead to our future, I see a lot of challenges. To use an analogy, NADGUG is sitting in the train station waiting on the northbound train. The northbound train is Data General heading into the world of open systems.

We could choose not to get on the train. If we don't go where Data General goes, then the group as we know it will cease to exist. We have to be sensitive to the needs of the open systems group. I include myself in that category because our company just recently bought an Aviion machine. Aviion server systems and Clariion mass-storage products are now by far DG's biggest revenue producers. Most of the company's new customers are buying Aviions.

Data General has not forgotten its Eclipse MV customers, however, and

neither will NADGUG.

As you might imagine, we are going to be on that northbound train with Data General. The real challenge is to convince those folks who are not NADGUG members that they need to be on that train with us.

What services, programs, etc., do we need to provide that we aren't already providing?

How can we do a better job of marketing ourselves? NADGUG wants to be on the A-List of organizations that users know they must be members of. We want to be on that A List of conferences that users know they need to attend.

On the right track

We all have a common bond as Data General hardware users. However, when these users look around at organizations they can be a member of, and conferences they can attend relating to open systems, NADGUG needs to be their organization and conference

of choice.

I believe that Data General and NADGUG are on the right track, but we need your input. If you have suggestions as to how we can improve our organization through new services, or how to attract new members, please fax me at 704/335-0446.

I assure you that our Board of Directors will consider each and every suggestion carefully and seriously. Believe me, we don't have all the answers.

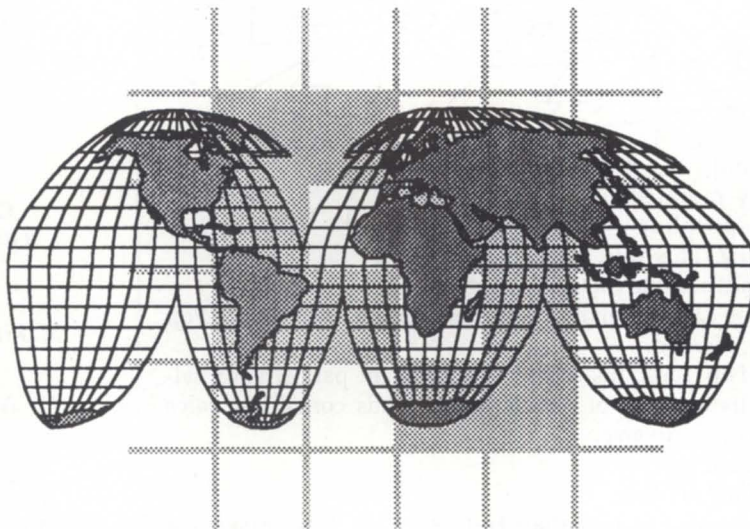
I look forward to serving as your president during the following year. I hope to see all of you at NADGUG 95 next October 23-26 in Washington, DC. Don't miss it. △

STEVE POUNDS has also served as NADGUG vice president (1993-94), treasurer (1991-93), and as the North Carolina Charlotte Area Users Group president.

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Doug Johnson

Junk mail? Or just breakfast?



The package measured about 3.5 inches wide by 5.5 inches long by half an inch thick, and arrived encased in a shiny-metallic wrapper that looked quite appealing—and even potentially appetizing. This was, I thought, either a packet of advertising materials (known in more cynical circles as “junk mail”) or a free sample of Kellogg’s Pop Tarts. Blueberry with frosting, I hoped.

But alas, no luck on the Pop Tarts. Instead of “a significant part of your balanced breakfast,” this was a lively stack of several dozen cards containing sales pitches for everything in the Unix universe.

“Free Trial Offer!” exclaimed one.

“Save over \$600!” trumpeted another.

“Up to Twice the Performance at less than Half the Cost,” promised yet another.”

I could send off for a “Free Catalog” or agree to “Boost RAID Performance!”,

by Doug Johnson

FOCUS EDITOR

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or divine "The Secret of Smarter Networks", or take advantage of something "Just Released!"

Every question has an answer here. "How do I remember Unix system commands?" They're ready to tell me. "System backup? No problem." And how is it that this pleasant bundle ended up in my mailbox? Simple, because I have subscribed to a certain computer-industry magazine.

I wish the rest of life came with a handy set of cards, complete with solutions to even the toughest of challenges. "Car won't start? No problem!" That's what I want to see. Or: "Dog dug up the petunias? Call Us!" I want to know "The Secret of Finally Getting Back in Shape," and how to "Boost Garage-Cleaning Motivation and Performance." And free catalogs are always nice, but they lead to information overload.

Too, too, too much

If you think junk mail is mountainous now, just you wait until we're all online and legions of semi-intelligent software agents are banging at your cyberspace front door, and maybe even picking the back-door lock and sneaking in that way. Call them software robots, or "softbots."

They'll be like an army of tiny traveling brush and encyclopedia salesmen. "Sir or Madam, please let me show you the latest in . . ."

Only these artificially created go-getters living in the global networks will never get tired, never go off the clock, never give up. To borrow a line from the "Terminator" movies, "They will not stop, ever, until you buy."

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You'll need your own softbot butler to answer the door and snarl, "Go away!" It's not legal to kill human traveling salesmen (not yet, at least), but maybe there would be a way to forcibly delete these electronic intruders.

You'll need other softbots (or additional aspects of the first one) to pick up flyers and brochures dropped electronically into your system's mailbox.

You'll need softbots to sift through all the worthless chaff and separate out what you said you wanted to see. They'll know to throw some things away, but the rest they will bring to you for further review.

You'll even need a softbot to report about what was there that you didn't see. Someday you'll want to retrieve something, you know, and the softbots will do that, too. You'll need them to compile, manage, and perform janitorial services on an incredibly huge and perpetually swelling personal database crammed full of everything you need to know. Someday maybe we frail humans won't actually *know* anything at all. Our softbots will live our lives for us.

No, that's too gloomy. Your life will be no less busy, no less congested with worthless information. But as time goes by, and if you train your softbots properly, you'll see less and less of the irrelevant stuff. Information overload is a scary concept. It reminds me of my garage—an endless, eternal cleanup project that's perhaps best left unbegun, the stuff of panic attacks.

I don't know about you, but I think I'm approaching my limits. I get older every year. I type faster than I did just 5 years ago. Maybe I even read and write and understand faster, too. Maybe I'm more productive, but we humans aren't easily re-engineered. How much more can I do? My brain's CPU desperately needs an accelerator board with a robust RISC chip.

Computer systems, meanwhile, increase in power, speed, and sophistication at dizzying, terrifying speed, and with no slowdown in sight. Complexity proliferates. There's always more to know. How many different publications do I read these days? I've lost count. Help me, I'm drowning in information.

Enough of that. Ten years from now I'll look back at 1994 with a wistful smile and and try to tell some youngster it was "a simpler time."

A favor, please

The next time you contact a *FOCUS* advertiser for a product or service, even if you're just shopping around, please remember to infuse your voice with forthright sincerity and say, "I

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This magazine customarily maintains a 50-50 balance between advertising and editorial matter. In a typical 40-page issue that means 20 pages of

ads and 20 of editorial. The magazine's size customarily increases around NADGUG conference time. Our October issue was 68 pages, up 8 pages from the conference issue last year. That's good.

Data General has changed a lot over the years, especially in the last 5 since the company introduced its Aviiion family and sallied forth into the future of open systems. As Data General has changed, so has NADGUG, and so has *FOCUS*.

It doesn't take a complex content analysis to show that editorial topics in the magazine have moved toward open systems and Unix, Data General's DG/UX, Clariion, client-server issues, etc. Just as NADGUG must reach out to Aviiion users who may be new to Data General, *FOCUS* must show prospective advertisers in open systems that an advertising message in this publication will reach the audience they want to reach.

When there are more ads, there can be more pages. More pages mean more articles. It's all connected. So please do your part and let advertisers know that their ad messages work. And maybe the *FOCUS* editor and advertising director will get raises. Maybe . . . well, we're not holding our breath on that.

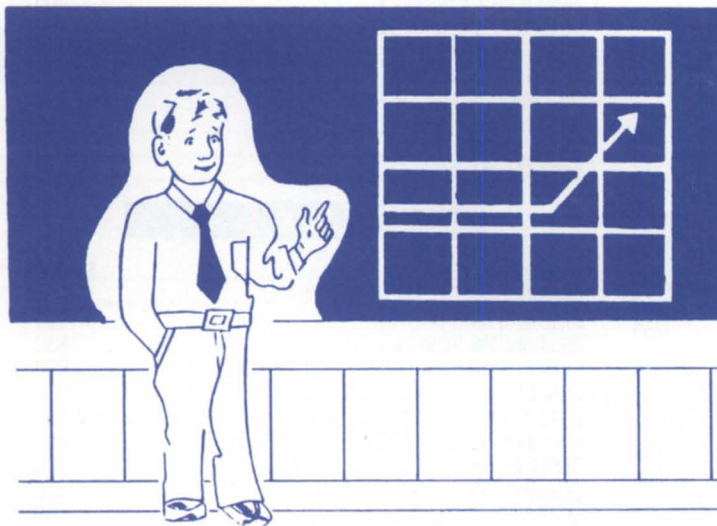
Past tense

It's strange to write about something in the past tense when it hasn't happened yet. This is the November issue. It appears after the NADGUG 94 conference in Nashville October 17-20 has come and gone. But we begin working on each issue about two months ahead of time, and that means I'm writing this note in late September.

So I haven't actually left for Nashville yet; don't yet remember what I haven't yet seen or done there; haven't learned yet from seminars I have yet to attend. But it's not difficult to guess how it will go. From a *FOCUS* editorial standpoint, the NADGUG conference is a great battery recharger, a source of ideas and articles that helps drive what we do for the next year.

See you [It was great seeing you] there. Δ

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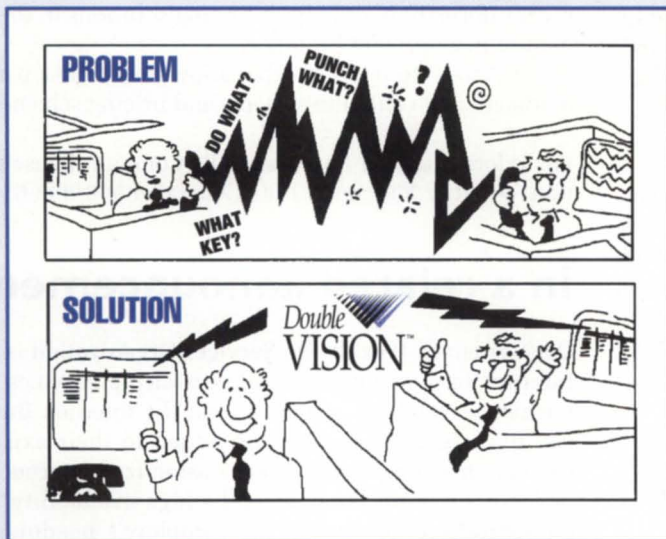
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Having trouble navigating the Internet? Try using some common sense. Data General's Common Sense Connection, that is, an interactive information library and worldwide forum for technology and related business issues.

The Common Sense Connection lets Internet users tap into all of Data General's publicly available information and a variety of feature articles and white papers on technology and industry issues. DG customers can also browse through product and service catalogs, place orders, and schedule training classes.

Stephen Gardner, DG's vice president of Corporate Marketing, said: "Our customers and our major sales partners throughout the world are telling us that they want to conduct more and more business electronically—from getting price quotes for re-engineering projects, to ordering products and receiving customer support. The Common Sense Connection makes this possible."

Making the connection

Users can connect to the DG information server through either Mosaic (www.dg.com) or Gopher (gopher.dg.com) graphical-user interfaces.

The Common Sense Connection offers:

- Shopping catalogs covering the company's full range of products and services, as well as software solutions offered by independent software vendors, resellers, distributors, and integrators;
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- "Common Sense Viewpoints" on major technology and business issues of the day, featuring industry consultants and business leaders;
- A full range of information about Data General, including business overviews, financial information, company event schedules, and news releases;
- Profiles of customers and channel partners, information from the North American Data General Users Group, and

access to the DASH (Direct Access to Support Help) electronic bulletin board for up-to-the-minute customer and product information.

- A button that lets users ask for price quotations, technical information, or help in finding solutions to their information-management problems;
- Access to programs that allow major sales partners to automatically configure systems and pricing schemes.

For information on Data General's Common Sense Connection, call **Ray Thomas** at Data General at 508/898-6545.

In a related announcement . . .

Data General's **Worldwide Services Organization** is offering Internet implementation and consulting services to help businesses establish a presence on the Internet. Businesses can have Internet capabilities added to their existing DG servers, install pre-packaged or customized Internet servers, or lease space on Data General's high-availability Internet configurations located at the company's headquarters in Westboro.

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Data General, **Oracle Corporation**, and **Datalogix** are combining forces to develop the perfect recipe for process manufacturing management.

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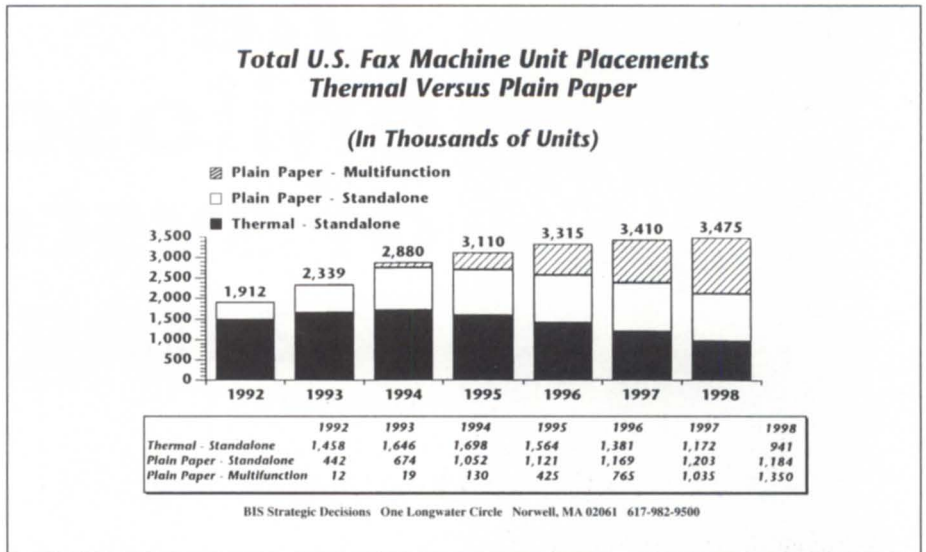
maintain and repair its Eclipse/MV line of computers.

The facts on fax machines

Do you remember the first time you saw a fax machine? How amazing it was that you could place a paper in a machine and seconds later a copy of that paper would appear hundreds of miles away?

Today, those standalone machines that only sent faxes are evolving into multifunction machines with PC and network connectivity.

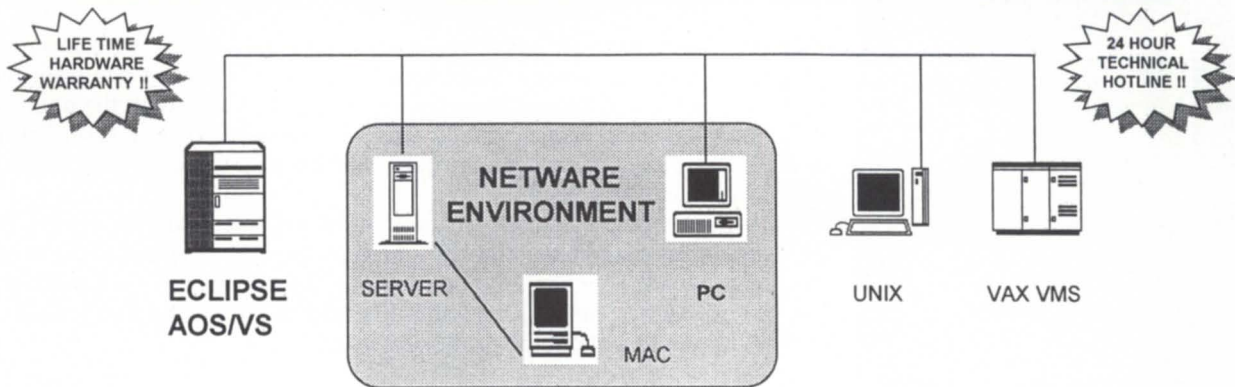
According to recent research by BIS Strategic Decisions, worldwide advisors on information technology, more than one million multifunction, plain-paper fax machines will be sold by 1998, making these multifunction devices the leader of all fax machines sold.



Optional PC fax, printing, and scanning functions (in that order of priority) are offered by most fax machine manufacturers today. The machines are still fax-focused, but that will change as the market matures, according to BIS.

Do you have an item of interest for *In General*? Contact **Robin Perry**, *Focus* magazine, P.O. Box 200549, Austin, TX 78720; Phone: 512-335-2286; Fax: 512-335-3083.

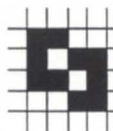
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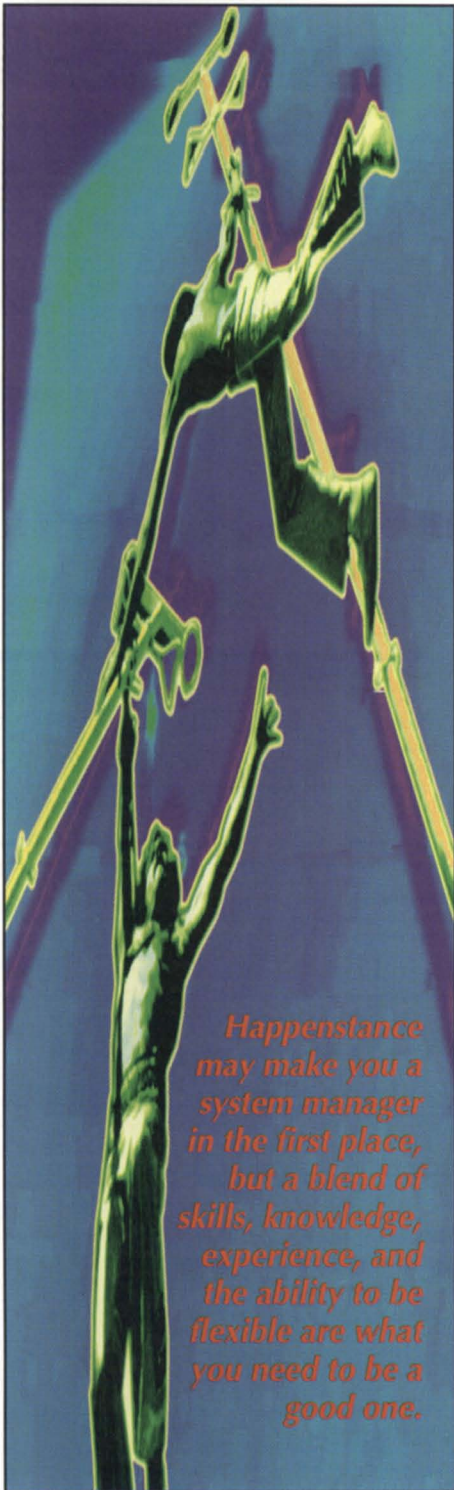
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The philosophy of system management



Happenstance may make you a system manager in the first place, but a blend of skills, knowledge, experience, and the ability to be flexible are what you need to be a good one.

Editor's Note: This article has been excerpted from **The Keys to Successful Unix System Management**, © 1995, published this fall by Prentice Hall PTR; 316 pages; ISBN: 0-13-948381 (94838-0).

System management has long been a neglected subject. As computing environments have become more sophisticated, however, it has been receiving more attention. Several good books now exist to help with the nuts and bolts of the job. System management is finally being recognized as an essential function for most computing environments, but little attention has been paid to the *philosophy* of system management.

The person who takes care of computer systems and computer users is generally referred to as a system administrator. Because of the neglect of the field of system management in general, the position has never been very well defined. Someone wanting to become a system administrator has probably had a difficult time finding information about the profession itself.

How you become one

Sometimes it's a surprise. You're sitting in your office, minding your own business, when a vice president (or other equally high management type) walks into your office and says, "Dale has just resigned; we want you to be the new system administrator."

Your first reaction is one of curiosity. Later, the curiosity changes to fear as you realize that you have no idea what a system administrator does. Your previous experience, other job responsibilities, or even the fact that you were not trained for the job won't matter. The job is yours.

Sometimes you wind up as a system administrator by working your way

by **R. King Ables**

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Steve Marquez, Systems Director, CACI (right)
with (left) Mike Edwards, Chairman, Transoft
(centre) Terry Radford, General Manager, DG UK & Ireland
- the partners behind Open Miracle.

When the international business systems supplier CACI acquired the rights to Miracle, a powerful financial software package based on Data General’s AOS/V5 INFOS database management system, it faced a serious dilemma.

How do you move a popular software product running on a costly, proprietary hardware platform to Open Systems to meet user demands?

The traditional solution to the problem - moving to an alternative database management system and rewriting the software from scratch - was not economically feasible. As CACI’s Systems Director Steve Marquez recalls: “We wanted to migrate our software in full from Data General’s proprietary MV platform to an Open Systems environment, but it seemed an impossible task.”

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Fortunately for CACI, the AIM product set from Transoft does precisely that, without the need for costly re-engineering or retraining.

Steve confirms: “Using AIM we were able to convert a complete module of the package to ANSI-standard ACUCOBOL running on an AViiON in just two weeks - with no significant problems.”

He is clearly delighted with the results. “The conversion was better than I expected and the support we have received from Transoft throughout the project has been excellent.”

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through a technical support organization. You're not really sure how you got there, but there you are. You know quite a bit about the machine and the people, but you have never really had any formal training in system management because so little was available.

People newer to the computer

industry may have been able to identify the job early and work toward it. No matter how you came to have the job, you have it, and there are few resources, other than experience, from which to learn how to do it properly.

Not enough wizards

System management has often

been a job shrouded in mystery and left up to the so-called gurus. It isn't that the job itself requires a degree in Mystical Engineering, but the information you need to know is not available in one place and much of it is not available in any manual at all.

Traditionally, a new system administrator learns the ropes by becoming a wizard's apprentice to an experienced system administrator. This has worked fairly well in informal circles, but it is mysterious to managers and others not directly involved in the process. With the explosive growth of Unix in the marketplace, this is no longer an effective solution. There just aren't enough wizards to go around. As the world moves to distributed computing, the scale of the problem is getting larger, not smaller, so the need for experienced system administrators will only increase. Many vendors have made great improvements in their training programs, but no single source exists to explain how to be an effective system administrator.

Examining the philosophy of managing computer systems and helping the people who use them will help you learn what tasks are necessary and where to find more detailed technical information. Without a grasp of the big picture, a system administrator may wander blindly through a seemingly endless sea of random problems. It is difficult to do a job well when you do not know what is expected of you. It is also difficult to perform to everyone's satisfaction when they have unrealistic expectations.

Rarely is the system administrator an expert in all topics, although he or she may have special knowledge in some of them. Some see this person as a "generalist," whose expertise includes some knowledge of almost every aspect of the computing environment. This grasp of the big picture and the ability to learn more about specific pieces are a system administrator's most valuable traits. Don't worry that you do not (and indeed probably won't ever) know as much about any one topic as other people. You should worry only if you feel completely lost in a topic.

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Unix evolution

The strange and seemingly magical evolution of Unix and Unix-based environments has led to a somewhat distorted view of Unix in general, and especially of Unix system management. Unix had its origins in the laboratory. In its early days, no one could have envisioned the impact it would have on the computer industry. Its designers had no idea how its use would spread. It solved a problem, nothing more. It provided the designers with an easy-to-use and easy-to-modify operating system for their other work.

Because of its informal development, many capabilities that are associated with most modern operating systems were not originally implemented in Unix. It was not a product, so there was no need. Unix has not so much been developed as it has **evolved**. System management is one major area where the original designers chose to take shortcuts. Now Unix is making its way into the business world, where users are not accustomed to "flying by the seat of their pants," as the traditional Unix user has been willing to do.

Fortunately, in the past few years, many people have set out to correct this situation by publishing articles and books on the intricate details of Unix system management. In addition, vendors are attempting to provide more consistent and usable tools to help manage systems. System

administrators are no longer tolerant of the baroque traditions surrounding the care of a Unix system, and these publications have significantly helped to remove some of the mysticism Unix has acquired over the years.

However, many who are new to Unix and system management are also new to computing and are not aware of the generic functions necessary to maintain the smooth operation of a computer system. Before getting detailed help with Unix system management, these people need some background in general system management issues.

Even at sites where sophisticated computing environments already exist, the hiring managers who search for a system administrator often do not know much about the job itself. They take a shot in the dark when hiring someone, hoping that as long as they get a technically competent candidate, all will be well. Sometimes this works, but often it backfires.

Every site is different, and the needs of a site vary as widely as the user community and the hardware and software. You will solve your own problems in the way best suited to your local computing environment and its users. Your solution will not be exactly the same as anyone else's, but it should be an informed decision.

Who are these people?

The term "system administrator" conjures up different images in the

Titles and reality

A company where I once worked assigned titles somewhat arbitrarily. System administrators within departments were given the title Systems Analyst, but the system administrator for the company MIS department was a Systems Manager. All the various system administrators of the departments worked independently of each other (including the MIS system administrator). When we asked someone in personnel why this one title was different from all the others, the answer was "because you all work for him, right?" It was obvious at this point that the titles meant nothing since they in no way reflected reality! —R.K.A.

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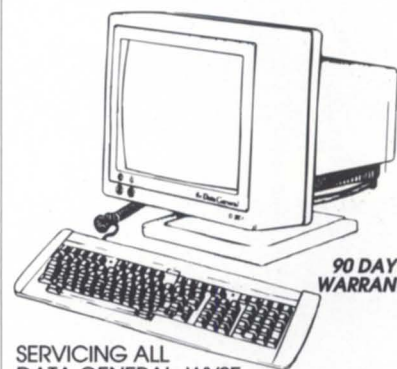
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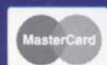
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Who they are

Your site might have several people employed, each managing a different aspect of your computing environment. The following list of traditional computing center jobs exemplifies the responsibilities that fall under the broad heading of **system management**. Each title represents a different job function. In any particular organization, one person may perform more than one function:

- **Clerk:** Usually fields requests from users and directs them to appropriate members of the support staff. Also processes forms and paperwork such as purchase requisitions and maintenance contracts.

- **Operator:** Generally thought of as a junior-level technical person, possibly in training to advance. Typical duties may range from mounting tapes and filing printer output to performing regularly scheduled support and maintenance tasks such as daily backups, account management, running daily production jobs, or performing preventive maintenance on computers and printers.

- **Technician:** The resident hardware expert; diagnoses hardware problems, replaces defective components, and performs periodic preventive maintenance. In a large installation, spare parts may be maintained on-site so that the technician(s) can solve the immediate problem. May also coordinate repair and restocking of spare parts with the hardware service provider.

- **Systems analyst/programmer:** Resident programming expert who does specialized programming to customize local software and possibly fix problems in the system software. Traditionally, the systems analyst designed software systems, whereas the programmer simply implemented them. But in recent years this division has become blurred since the same people often do both jobs. The resident Unix expert may also help the user community with programming problems from time to time.

- **Operations manager:** Oversees the operators (in a large organization) and acts as the focal point for dealings with other groups, management, and users. May work with the site manager (see below) when dealing with equipment and service budget issues.

- **User services consultant:** A contact person to assist users in the use of the computers and applications they run. Has a strong technical background with experience in using any of the tools and applications with which the users might have problems or questions. In large organizations, several people with overlapping expertise make up the user services group.

- **Network administrator:** Manages the operation and growth of the local network, as well as the interfaces of any external networks that connect to the local network. Usually a technical position since the protocols and routing mechanisms involved must be well understood. Job often also requires manual skills such as climbing in ceilings or through tunnels to string cable. In modern computing environments, the network is becoming the most critical single aspect of system management. Without a local network, distribution of information and communication between users is impossible. Many applications and tools are dependent on the infrastructure provided by the network in order to function.

- **Site manager:** Has ultimate responsibility for the entire computer site: hardware, software, and support personnel. Supervise the operations and user services managers to ensure the correct operation of the computer environment so that all user needs are being met. Takes care of the overall budget and other high-level administrative tasks such as conveying the needs and accomplishments of the department to upper management.



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minds of different people. No one-and-only definition for a system administrator has ever been found. Only an examination of the job from the broadest possible perspective will provide a model that is close to reality.

A system administrator is the person (or a member of the group of people) responsible for the proper operation of the computing environment in any organization. For our purposes, this job will cover every possible level of support and maintenance from clerk to operator, from programmer to executive. The entire function is usually called "system management." Some choose to view system administrators and system managers differently (the "system manager" might be thought to have some additional managerial responsibility). Others use the terms interchangeably. Some also use the plural "systems administrator" since, in modern computing environments, there are usually many systems. This sometimes causes an unfortunate miscommunication between people. The choice is largely a matter of taste.

Many functions and responsibilities fall into the category of "system management." How they are divided up between people, and what titles are assigned to these people, is up to the individual site. In a small organization, a single person may do all of these jobs. In a large organization, no one person could do even one of these jobs alone. No two sites will use the same division of labor or number of people to support their computer systems and users. The number and expertise of the people involved depends on the number and type of computers as well as the number of users, their expertise, and the tasks for which they use the computers. Some sites may find that 20 users per system administrator is optimal for providing the needed services, while a site with self-sufficient users may be able to support hundreds of users per system administrator.

The "system administrator" might be anyone—from an extra-bright high school student earning money in a part-time job, all the way up to a multi-degreed technical person

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responsible for an entire computer center. It is up to each site to decide which functions will be assigned to which personnel in a way that makes the greatest use of available talent.

The function of any computing environment is that of a tool. The users may use this tool to generate financial reports, produce programs that the company sells, track information important to the organization, or simply communicate information between people and places.

Many system administrators and their managers find it hard to quantify the work of a system administrator. It is unlike most jobs because it is difficult to establish a well-defined set of goals to be achieved. "Keep the users happy," is a pretty vague workplan, but to some degree that's exactly what the system administrator does. Since a great part of the job is reacting and adapting to situations that were not predicted, the definition of the job must reflect this. Ideally, all changes are anticipated and prepared for, but it never quite works out that way.

Some system administrators believe that upper management has no concept of the job they do (and in many cases, this is true). Some managers think system administrators unpack computers, plug them in, and then sit back and relax. Of course, those of us who have done the job know that nothing could be farther from the truth.

The bottom line is, if your users are happy with your service and it has helped them accomplish *their* goals, then you've done a good job. Of course, not everyone will always be happy and there may be some valid reasons for some user unhappiness (not everything everyone wants is always possible). But over time, you (and perhaps your manager) will be able to differentiate between a spoiled user who is looking to blame someone else for a missed deadline and a user who truly thinks more or different services should be provided by the system administrators.

How the system administrator is perceived can run the gamut from totalitarian czar to overly helpful mother. Users will resent the czar who hoards all the secrets and hands them

out only to those deemed worthy of the knowledge. At the other end, if the system administrator mothers the users and is so helpful that nothing else gets done, users will be happy in the short term but the overall health of the computing environment will suffer.

A good system administrator falls somewhere in between these two extremes. You have the authority as well as the responsibility to make the computer environment a useful tool for your users. This means enforcing policies that are for the good of all, without unduly hindering people from accomplishing their tasks. A system administrator should be cooperative, but being so helpful that the last request received is the one that always gets serviced, no one will ever get the full help they need. One of the system administrator's primary tasks is to determine the priority of pending services and requests for new services.

Most activities performed by system administrators can be grouped into several, broad categories. These are high-level tasks every computing environment needs performed by somebody, somewhere. If your site doesn't have a system administrator, look around and see who is taking care of these things for you, because *someone* is doing it.

The daily grind

The term *operations* refers to the day-to-day running of the computer environment. This includes maintaining the availability of system services, performing necessary routine maintenance, and performing regular administrative tasks.

This also involves keeping a watchful eye out for problems. Even a well-established and smoothly running computing environment will develop problems from time to time. Disk space and other resources can become exhausted. Configuration files can become outdated if every equipment change isn't fully documented. Entropy is a strong force, even in the electronic age.

A system administrator must maintain the ever-changing information that defines the environment. This means keeping the net-



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work information tables up to date as people add and remove devices. It means keeping the list of valid users accurate (making accounts for new users and deleting accounts that no longer require access). It means doing a complete set of backups in case some disaster occurs. It means monitoring the environment to watch for unauthorized accesses, identifying and stopping them if and when they occur.

Examining event logs kept by the system may show security or hardware problems before you might see any other indication. A failing disk drive may start to show a few bad sectors long before completely failing. Identify the problem early and you can replace the disk before losing data, and diagnose the problem offline or send the unit to the manufacturer for repairs. This is *much* easier than waiting for the disk to fail and having to replace it and restore data from backup tapes.

When things go well, you're invisible

The system administrator is responsible for maintaining the usefulness of the computer environment, and restoring that usefulness when a failure occurs. This can be a double-edged sword. It is a highly visible job, but that visibility usually comes when something is wrong. When everything is working well and users are busy working, some will wonder why they bother having a system administrator. Everything runs so well all by itself! Some system administrators find the job thankless since the blame for problems lands on them, but often the praise for smooth operation lands elsewhere. If you do this part of the job perfectly, you are invisible.

Much of your time will be spent improving the computing environment. No environment ever reaches a point of being static; something is always changing. As time goes by the need for new software, faster hardware, more disk capacity, or higher-quality printers will always keep a system administrator busy. You will coordinate the ordering and installation of new software and hardware. You may even need to connect

your site to new networks.

Satisfying the users, planning for the future

Depending on the environment, a large part of a system administrator's role may be in supporting the users of the computer equipment. This usually involves being a sort of on-site technical support contact for some or all aspects of the computing environment (which means being more versed in its use than the average user). It might also include writing programs and documentation to address specific local needs not met by operating system or applications software. And being able to deal with people effectively on an interpersonal level is a critical skill.

Not all of the system administrator's activity is technical in nature. Administrative concerns and planning for the future are two of the most critical areas of activity performed by a good system administrator. Without planning and organization, a computing environment will become disorganized.

Why need one at all?

Lately there has been a debate over whether or not the need for system administrators is decreasing. Many feel that since operating systems are becoming increasingly user-friendly, computers will one day run themselves and the need for a system administrator will vanish.

Let me assure you, the job is here to stay. This is not to say that it will remain exactly as it is (not that anyone has been able to come up with a clear and completely appropriate definition for it, anyway). The job will continue to evolve, but it will remain essential for any computing environment to have a resident expert to solve problems, maintain security, do routine maintenance, and generally be available for user assistance and in case of emergencies.

How do you know if you need to hire someone? The only way to know *if* is to understand *why*. Why does a site need someone devoted to the care and maintenance of computer equipment? If you can answer *why*, then you will also have a task list to use in

a job description and a beginning for your search.

Not everyone can be an expert

Some will argue that as computers become easier and easier to use, users will administer their own systems and the system administrator will become unnecessary. Remember the old saying, "He who represents himself has a fool for a lawyer"? The same could be said of system administrators, even in the PC world. Hidden costs of setting up equipment, installing new programs, and customizing environments add to the cost of purchasing and operating computers.

A recent study estimated the typical five-year cost of a personal computer for a large corporation to be \$40,000. Much of this cost is attributed to employee time spent working on the computer rather than using it. Some PC users believe they "fiddle"

with their PCs as much as 20 percent of the time. This is 20 percent of their time not spent doing the job the computer is supposed to help them do faster. A Unix machine often requires even more fiddling than a PC. It is not cost-effective to require each employee to become a computer expert. It is much more efficient to centralize the problem-solving function in a staff of system administrators. The system administrators will benefit from having seen the same problems with other users and will be able to quickly replicate the fixes.

System suppliers are working to make the system administrator's job easier, but it will never be so simple that someone with no interest in performing the function can be effective. To perform effectively as a system administrator, one must understand the concepts of system management and be at least somewhat technical. Most users still are not at that level, and indeed often do not need nor

wish to be there. Do you take your car to a mechanic or do you fix it yourself? Just as some of you like to work on your own cars, there will be some users who will wish to tinker, but many more will not. It is much more efficient to centralize that expertise (as with the mechanic) than to duplicate it among an entire group of users. Δ

Next month: Even in organizations where no one is designated with the responsibility of managing systems, someone is still regarded as the resident expert, the one to whom people look when something goes wrong.

ROBERT KING ABLES has been managing systems and networks and developing systems and network-management tools since 1983. He currently does freelance writing, programming, and system administration consulting in Austin, Texas.

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David Novy



Death to DOS

Our columnist looks forward hopefully, with great anticipation, longing expectation, to the day (soon, maybe even next year) when he can say a final goodbye to a long, cherished [?] relationship.

For a while this week I was suffering from writer's block. What could I do for an encore after the Internet and DCE articles of the past few months?

A tremendous amount of change

The answer came to me after reading this week's computer trade newspapers and magazines (this week being mid-September).

There is a tremendous amount of change going on, and it is beginning to come together. It isn't anything major, not just one big thing but rather many small things that are going to combine. As a result, how people go about computing—especially on the office desktop—will be completely different just a year from now.

I thought I would begin my analysis of the brave new computing world of next year by discussing my love/hate affair with Microsoft's MS-DOS: By the end of 1995 MS-DOS will be all but dead, and it will die none too soon for me.

By the end of 1995 MS-DOS will be all but dead, and it will die none too soon for me.

I hate MS-DOS with a passion. MS-DOS just plain stinks.

Sorry for the outburst, but I feel a lot better now. I have had about all I can take with the MS-DOS operating system. I run SunSoft PC-NFS on my machine. My free DOS memory space is just 424 KB.

If I load one more application on my machine, so that free memory falls below 420 KB, my machine nearly ceases to function. The only reason I continue living on the edge of such disaster is that I need several MS Windows applications to get my work done.

I've tried substitutes, but they're not the same. My need for certain Windows applications is so strong that for nearly two months I tolerated knowing that I could not run DOS from MS Windows without my machine locking up.

I spent days trying to fix the problem, but without success. I finally solved it by becoming so frustrated that I formatted my hard drive and reloaded *everything*. After two days

*It won't
be Beauty
or Windows
95 (Chicago)
that will
kill the
DOS Beast.*

of reloading software and rebuilding *CONFIG.SYS* and *AUTOEXEC.BAT*, things began to work again.

I think I was lucky that everything worked at all after I was done.

It won't be Beauty or Windows 95 (Chicago) that will kill the DOS Beast.

The big buzz around my office is that Windows 95 (Chicago) will soon be here and that all our DOS problems will be over.

I think it will be other factors that finally doom DOS.

Why? First of all, it's doubtful that a viable version of Windows 95 will be available before late in 1995. Microsoft itself is saying the debut of Chicago could be as late as May 1995. That will entitle you the user to have the first production run of a new operating system from Microsoft (you get to find the bugs).

Does anyone remember what fun it was to work with the original Windows 3.0? Newer and improved Chicago 3.1 won't then be available

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until early 1996.

I don't know if people will be willing to wait that long, especially since useful alternatives to Windows 95 and DOS are already emerging.

OS/2: here today

One of the alternatives is IBM's OS/2. It is here today. It is 32-bit. It runs Windows. It does not need DOS.

And it works well.

The problems with OS/2 are a lack of market share compared to Windows, incompatibility with Windows for Workgroups, and the fact that Microsoft has stated that one should not assure that future releases of its desktop products will be compatible with OS/2.

So if you want to be on the cut-

ting edge with regard to Microsoft Office desktop products, you will be a little leery of OS/2.

On the other hand, office desktop applications are becoming so powerful that you may no longer need to be the first on the block to run a new application in order to gain a competitive advantage in your business.

IBM OS/2 works well today with *all* DOS and Windows applications. But then again, IBM's access to Microsoft code has expired, so OS/2 2.1 may not be able to provide native support for future iterations of Windows.

If you can afford to wait a few months for IBM to figure out just what the sneaky people at Microsoft did in their latest release to make their new applications incompatible, and then modify OS/2 accordingly, maybe then you can have the benefits of a 32-bit OS/2 operating system that works well today with Windows applications and will continue working in the future as well—although perhaps on a delayed basis.

Wabi world

Another possible means to eliminating DOS from your life is the upcoming release of SunSoft's Windows emulation package, Wabi 2.0. This version of Wabi is much stronger than earlier releases because it includes support for Microsoft's Windows Sockets, an application programming interface that lets applications communicate via TCP/IP.

It will probably not run DOS applications, but to someone familiar with Unix, not having DOS is not a great loss.

Wabi is important because Windows applications have won the battle for office desktop supremacy. Some people claim that it's Windows

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itself that was the victor.

But in reality it was Windows applications combined with the plummeting cost of powerful PC hardware that carried the day. The Borland, Lotus, and Microsoft office desktop application suites are simply awesome in their power.

There is nothing in the Unix arena that comes close to them. The victory for the desktop applications was so decisive that most desktop software vendors have given up any effort to port their applications to Unix.

Instead of continuing to fight against overwhelming odds, Sun

Microsystems adopted a clever strategy. They developed software to allow users to run Windows applications directly on Unix without the need for DOS or Windows.

At present, only 20 Windows applications have been certified to run on Wabi 2.0. However, these 20 applications account for 90 percent of the Windows apps that have been shipped to date. People who have used the new version of Wabi say that it works, and that it works well.

Next to impossible

Another reason for the future demise of DOS is the new Macintosh Power PC from Apple with its new RISC processor architecture. It was already very difficult to get owners of Motorola 68xxx-processor Macintoshes to switch to DOS and Windows.

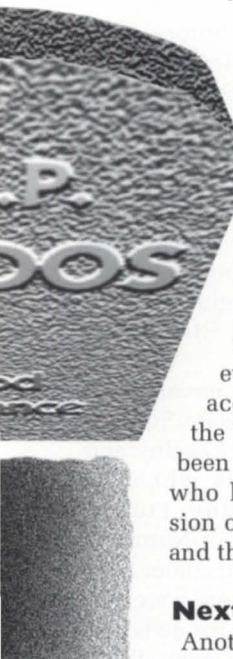
To get a Mac Power PC user to switch will be next to impossible, especially since Microsoft announced

recently that Microsoft Office 4.2 is now available for the Mac, and it is fully compatible with Microsoft Office 4.2 for Windows.

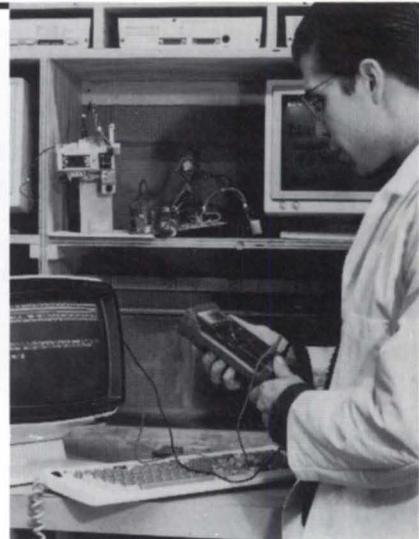
If Microsoft had ported Microsoft Access to the Mac as well, I'd probably have run out the door to the nearest Mac dealer to purchase a Mac Power PC. But Microsoft did not port

Access to the Mac, so I'm hoping that Wabi 2.0 will allow me to have my MS Access without the frustration of DOS.

So, within a year I hope to be able to write that I no longer need DOS to get my work done. It will be a date I will remember fondly for years to come. Δ



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

Circle 33 on reader service card.



Getting it all with one call

Since it was established in 1981, the Data General Customer Support Center has evolved into a unified, worldwide problem-tracking system for every division of the company

In the beginning there were computer companies selling a heap lot of hardware like there was no tomorrow. All was well, business boomed. *This could go on forever*, they thought.

But then one day a customer wearing a frown came back and said, "Mine's broken. Fix it." And so was born the need for customer service.

That's simplifying things just a little overmuch, but post-sale service and repair have grown and evolved into an aspect of the computer industry fully as important as (maybe even more important than) the original sale of the equipment itself. What do you do when you have a problem? Who do you call? The company that sold it to you better have an answer.

If you're a customer of Data General Corporation, you can pick up the phone and call 1-800-DG-HELPS. You

may not be aware of it at the time, but you have reached a nicely landscaped business-park complex in Norcross, Georgia, a suburb of Atlanta. There, at the Data General Customer Support Center (CSC), your call becomes an "incident." It is assigned its very own ID number and is entered into the CSC's problem-tracking system. "And that incident number follows the problem or issue regardless of where it goes in the company," says Bryan Scoggins, director of the CSC's Aviiion hardware and software product support.

Convergence

Mr. Scoggins is a longtime CSC veteran who can testify to how customer service has undergone a lot of changes over the years.

"Our Customer Support Center was established as an entity in 1981," he says, "and it was formed by com-

binning a software support center that was owned by Systems Engineering, located in Norcross, with activities from our Field Engineering headquarters." Those activities were RAC, for Remote Assistance Center, the group that dialed in and provided diagnostics support on MV-class machines.

That was also back before open systems, when Data General was an Eclipse MV and Nova company.

The Phone Assistance Center (PAC) provided telephone support for PC-based products. And there were also at that time entities called Corporate Tech Support, and National Software Technical Support, both of which coordinated DG's field-engineering operations in the United States and worldwide.

"So in 1981 we all converged in Norcross in the old Software Support Center facility," says Mr. Scoggins, and stayed there until 1984 when we moved into our new facility, 110,000 square feet, also located in Norcross, under the banner of the Customer Support Center." However, there were still four or five different service activities going on, with about that many different tracking systems. "Yet we were all located with the same phone system and in the same building."

The next goal, Mr. Scoggins says, "was to combine all those tracking systems into a worldwide problem-tracking system for every service division of the company." Jim Foxworthy, a 30-year IBM veteran, was hired to shape the new CSC. It was a job Mr. Foxworthy had done before in the setup and implementation of IBM's support center in Tampa, Florida.

Cliff Izer came in to manage cus-

by Doug Johnson

FOCUS EDITOR

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FOCUS MAGAZINE NADGUG's monthly publication is devoted exclusively to users of Data General equipment. FOCUS is full of technical articles, product reviews, user profiles, and announcements of the latest products — no matter what kinds of systems you're running, FOCUS has the information you need!

ANNUAL CONFERENCE AND EXPOSITION NADGUG's Conference and Exposition is part of the largest annual Data General gathering in the world. In conjunction with DG's Sales and Systems Engineers meeting, NADGUG provides Data General users the ultimate forum to confer with everyone who is anyone in the Data General community.

ELECTRONIC BULLETIN BOARDS NADGUG's member bulletin board system is run by Rational Data Systems, with US Robotics modems for service from 1200 to 9600 baud. Dial 415-499-7628 to communicate with other users and to download/upload programs and utilities!

NADGUG members can also access Data General's DASH, or Direct Access for Support Help, Bulletin Board. Dial 800-327-4272 for on-line sign up today!

SOFTWARE LIBRARY NADGUG now has two software collections available for members. Both the AOS/VS and UNIX library tapes are full of programs, utilities, and macros — for any Data General system!

NADGUG MEMBER DIRECTORY The annual directory provides members with a personal guide to users with similar hardware, software, and system needs. This year's directory will present for the first time a Product/Service section.

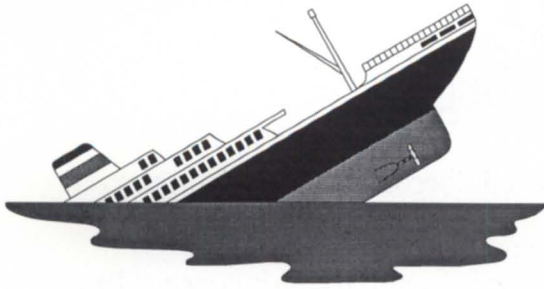
REQUEST FOR ENHANCEMENT PROCESS Through NADGUG's Special Interest Groups, members have the opportunity to review and prioritize specific product Requests for Enhancements (RFEs). In addition, at NADGUG's annual conference, SIG forums review product enhancements and present them to the development teams with their recommendation for inclusion in the standard product or for follow-up.

REGIONAL AND SPECIAL INTEREST GROUPS RIGs and SIGs are two of the most effective ways that NADGUG promotes the free-flowing interchange of valuable information. RIGs are organized by people who are interested in getting together on special occasions or on a regular basis. SIGs are put together by people who want to share information about common products, technologies, or applications. Join one today!

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tomer satisfaction, and the CSC also began developing a closer relationship with NADGUG. The CSC has for years sent representatives to NADGUG conferences and board-of-governors meetings to report on support activities and new services.

The new CSC's 1-800-DG-HELPS phone number consolidated what previously had been several different service lines. Now, "a customer needs to make one call, and we do the rest," says Mr. Scoggins.

A U.S. Navy veteran with experience as a programmer, analyst, ops, manager, and developer, Mr. Scoggins has been with Data General now for 15 years. He started in Research Triangle Park, North Carolina, as a software developer, moved to the Raleigh sales office as a systems engineer, then on to Houston, Texas, as the systems engineering manager and later as sales manager. In September 1983 he moved to Atlanta and became the Area 2 (Southeast) field software service manager, and shortly after that was named manager of software support at the CSC.

Just this past March the CSC underwent a significant reorganization, with Tom Rizk taking over as DG vice president of customer support. Mr. Scoggins heads up Aviion hardware and software support. Ron Gilmore oversees all hardware and software responsibility for the Eclipse product line. Tim Rice directs hardware and software support for PC network products.

More sophisticated

Data General's product lines have become more varied and sophisticated, especially in the last five years as the company developed its newer Unix-based Aviion family. Service has become more sophisticated as well.

"Our role in the DG support strategy is to do as much of the service as we can remotely," says Mr. Scoggins. "We can be more timely, and certainly more effective than dispatching a field engineer every time there's a service call."

To be able to do that, Aviion systems must be savvy enough to speak up and say, "I've got a potential problem here," even before there really is one. They do it with AV Alert, a set of programs built into every Aviion now. Included is Service Manager, which runs under Data General's DG/UX operating system and provides constant monitoring. "And when certain thresholds are met in the error log, or certain activities happen, it actually dials home, to a system in Atlanta, and opens a service call," says Mr. Scoggins. Automatically.

DG provides the modem and cabling; the customer provides a dedicated phone line, but that's all AV Alert needs. Data General touts AV Alert's ability to improve service response time and effectiveness.

"It's interesting to note that for those machines equipped with AV Alert, for those customers who have given us that phone line, we resolve more than 50 percent of their hardware issues remotely, and 98.5 percent of their software issues," says Mr. Scoggins. By contrast, for customers who opt out of the automatic dial-in capability, it means dispatching a field engineer. That also means a delay. "Even for those cases where we take a remote service call and can't fix it remotely," Mr. Scoggins adds, "we're

able to run diagnostics, and most of the time send a field engineer out with the correct part."

Open systems and communications

A quite-visible cornerstone of the CSC these days is DASH, the Direct Access to Support Help Bulletin Board (1-800-DASH-CSC), available 24 hours a day for about two years now. DASH basic, available to anybody who wants to sign in, offers user-to-user e-mail, a forum for discussing system problems and fixes, plus an electronic-search program for checking the status of STRs (software trouble reports).

DASH Plus—for Aviiion and Eclipse contract customers, as well as NADGUG members—is all the previous plus the ability to submit hardware or software trouble reports, and the ability to download patches (added earlier this year).

Even better, for those with Internet connections, DASH is there, too, just within the past year (address 128.222.159.141).

"One of the things that open systems have done for us is to increase our awareness of open-systems communication vehicles, such as the Internet," says Mr. Scoggins.

Another change attributable to open systems is Data General's willingness to provide support for those "other" companies' equipment. In the past, says Mr. Scoggins, "if it didn't have the DG name on it, it was rare that we supported it." But in the open-systems world, especially since the mid-1980s, "we've become extremely flexible, and now provide remote support to just about everything." To put that into perspective, "There are over 2,200 model number of printers and terminals and disk drives and things that we support, that are in the open-systems world that don't have the DG sticker on them."

Looking ahead

At the time this article was written, Mr. Scoggins was spending the bulk of his workdays at Research Triangle Park setting up what DG (in an announcement at NADGUG 94 in October) calls the Enterprise Customer

Support Center. It "will be another activity of our Global Support Center in Atlanta," says Mr. Scoggins. The plan is to provide remote support for applications that run in the enterprise space, using the support center's tracking systems and techniques, but also R&D and corporate support in RTP's labs. The new service will be managed under Mr. Scoggins as part of overall Aviiion support.

Service and support have become worldwide phenomena. "We have people from Sweden and Germany, and Australia and New Zealand logging onto our DASH system," says Mr. Scoggins.

DASH also has played a role in redefining what kinds of problems really need a service call, and what kinds individual users can take care of themselves. Unix began mainly in academia, among people you might expect could and would want to do a lot of self-help tinkering. But Mr. Scoggins notes, "We were surprised at the number of customers outside of academia who would use self-help kinds of programs such as DASH."

Not that you don't need to buy DG support, but it *is* possible in certain situations to dial into DASH and say, "I've got Unix version whatever and I just had a panic number thusand-such," and find out that yes, the problem has been reported and fixed, and the patch number is nnnnn. And then download the patch and fix it yourself. All at midnight.

And surprisingly, that capability "relieves us of workload," says Mr. Scoggins. DASH's capabilities "don't cost us much labor, the customers like it, and it helps fix their problems for them."

Mr. Scoggins also likes to tout the CSC's recent (August last year) ISO 9001 certification. "The purpose of that certification is to ensure that everybody who calls for service gets the same service. It ensures that the people delivering the service have the training, the same policies, procedures, and tools, to deliver the answers. So if you're a customer and you decide to test the system and call 10 people in Atlanta, and ask them a question, you'll get exactly the same answer 10 times in a row." Δ

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What to do with those legacy applications

As companies evaluate alternatives for deploying the latest technologies with their associated benefits, often the most complex issue to resolve is that of their so-called "legacy" applications. With a wealth of manpower, experience, expertise, and data already invested, the question for most companies is really not, "Scrap or migrate?" but rather, "How best to migrate?"

The most common options available (other than scrap-and-rewrite) are:

- Rehost in emulation mode.
- Convert to an open systems Cobol and rehost.
- Convert to an open systems Cobol and rapid application development (RAD) environment, and rehost.

Unwanted shortcoming propagation

Rehosting in emulation mode is sometimes the least expensive and shortest path to take, resulting in little or no retraining. However, the new technologies often cannot be fully utilized. There is significant system overhead in emulating the original environment. Available productivity and data access tools are not compatible, and there are no gains in application development and maintenance productivity. All that has been accomplished is a recreation of the previous environment—with many of its drawbacks—on a new platform.

Simple code conversion and rehosting results in a full migration to the new platform, with the ability to embrace those tools and facilities offered. No gains are made in programmer productivity, however, or in code maintenance, or in an upgraded and updated look and feel of the applications.

In both of the above cases, the existing shortcomings in the Cobol source code are propagated onto the new platform. Non-normalized Cobol file system design, nonstandardized code, inadequate documentation, and overall poor maintainability leave the application in no better position to make the jump to a relational database or 4GL toolset than they were previously.

Migrating legacy Cobol applications to open systems environments need not result in a propagation of past shortcomings, nor the scrapping of the huge investment in existing people, Cobol code, and data.

by **George Luntz**

SPECIAL TO FOCUS

There are a number of tools on the market that do more than simply migrate Cobol source code. One example, FlexGen 4GL from Sinc, Inc., of Dayton, Ohio, offers a combination of Cobol tools, methodology, and services to make the transition from MV-series Cobols to DG/UX and a rapid application development environment for Cobol developers. Sinc's Legacy Liberator Cobol re-engineering tool kit offers migration of legacy Cobol code, plus the integration of existing applications into a repository-based RAD tool set.

For the Data General MV user, not only has rehosting to an open-systems platform been accomplished, but the legacy application has been migrated to a programming environment that offers significant gains in programmer productivity, existing code maintenance, and new application development.

At a minimum, complete rehosting is accomplished with a central data dictionary and repository built for improved program maintainability, enhanced application development, and complete integration with the system's end-user-based data access tools. At its best and depending on the state of the initial Cobol source code, a complete facelift can be achieved—adding color, pop-up windows, record-browsing, and cursor control to aging applications.

4GL migration alternatives

In any instance where attempts are made to preserve legacy Cobol code while achieving greater levels of productivity, maintainability and look and feel, options exist:

1) Rewrite the application completely. This is the most expensive and highest-risk option, and longest of time frame. The end result, it is hoped, is a totally new product that meets all of the developer's goals. Call this "Re-engineering Level 0".

2) Re-engineer the existing code completely and automatically to salvage all usable code, while totally overhauling the user interface—updating the look and feel, incorporating 4GL technology, and placing everything in a centralized repository. This

is the least-expensive, lowest-risk options, and of the shortest time frame. Call this "Re-engineering Level 4," the highest level of re-engineering.

It's the ideal situation. But since an automated filter is used to convert the source code, the prerequisites for the old code are:

- Consistent design and coding standards.
- Use of screen sections and a single routine for screen-handling.
- No random display and accepts.

3) Where these prerequisites are not met, a practical middle ground is available. This is the path that 90 percent of all organizations will take: re-engineering into a 4GL environment, with **no** changes to the user interface. This approach:

- Is low-risk.
- Is relatively low cost—about the same as a straight Cobol migration.
- Preserves existing Cobol business logic.
- Integrates with the 4GL (in our example FlexGen) and repository-based environment, upon which to progressively migrate the product to a totally new look and feel while leveraging existing Cobol expertise. Call this "Re-engineering Level 2".

The gains are immediate

A migration solution should do more than just a quick Cobol conversion. In the process, file FDs should be examined for inconsistencies in design and naming, and then cleaned up. And a data dictionary is created. All file and report I/O should be modified to reference the data dictionary definition, so that at the aforementioned Re-engineering Level 2, the following immediate benefits are achieved:

1) All programs, objects, and data elements should be defined in a single, integrated data dictionary and repository. This provides: cross-referencing capabilities by data element, object, and program; multiple compilation capability for all items affected by an object change; data integrity and standardization; and applications automatically docu-



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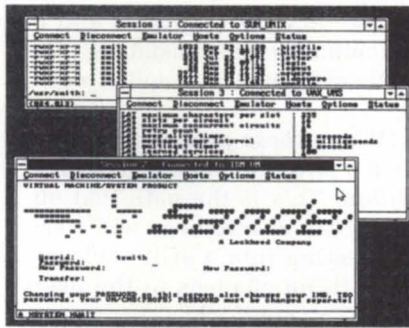
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2) **Reports should have a consistent look and feel** throughout the applications, including options for DISPLAY, PRINT, FILE, KEEP, RIGHT, and LEFT. Automatic page-up and page-down capabilities should be standardized. This facilitates use of a query report writer for end users, and will result in a common look and feel between "canned" and custom reports.

3) **FDs will be cleaned up** to achieve a higher level of normalization, facilitating the use of a relational database for data storage. This will place the application into a far more appropriate position to use an underlying SQL database.

4) **Developers can write new programs or extend old programs** while maintaining a consistent look and feel—and with significant productivity increases. A product such as FlexGen, for example, offers a high-level Cobol code generator, called "The Constructor."

5) **A WYSIWYG forms-and-windows painter** can be used for application maintenance functions, providing additional productivity improvements.

6) **Enhancements and corrections will be less costly and require less time**, since all programs are now maintained in this case in the FlexGen dictionary in interim source code (a combination of Cobol and higher level constructor code). Time and costs should be reduced in adding new functionality to a program by using the system's high-level functions and macros.

7) **The final application should be in a Cobol-oriented 4GL environment** that enables developers to take advantage of appropriate development tools, end-user data access and presentation tools, and a systematic migration path to GUI interfaces and client-server technology.

Where a single-step to Re-engineering Level 4 is possible, not only is the above achieved but also:

8) **The implementation of an updated, new look and feel to the application**—color, look-ups, shadow-

ing, function-key usage, cursor control, and windows. Automatic forward migration to the upcoming environment is then achievable with no additional migration or conversion effort.

How do you get there?

An effective approach to helping companies migrate legacy applications should include a practical, low-risk methodology with frequent and early checkpoints to facilitate timely and informed decisions on how and whether to proceed.

Step 1 should involve a source-code review, in which the migration provider evaluates a sampling of representative source code. This evaluation would result in the publication of a source code review checklist, with a written assessment of the re-engineering level that can be achieved cost-effectively.

A positive assessment for Level 2 or Level 4 Re-engineering is followed by **Step 2**, a short pilot migration project. This should include a detailed analysis of the overall application; the actual re-engineering (including building the data dictionary) of 4 or 5 representative programs; project sizing and estimation; and the formulation of a project plan.

At the conclusion of the pilot, your migration company should identify the cost of migration alternatives for **Step 3**:

- Training the developers staff to re-engineer the applications with a re-engineering tool set.
- Tool customization to adapt to the source Cobol environment.
- Optional ongoing project aid and consulting during the project.
- The cost of a complete turnkey project.


Shaun Presser, project leader at

GEORGE LUNTZ, vice president of sales and marketing at Sinc, Inc., in Dayton, Ohio, is past president of MCBA, a multi-platform MRP software vendor, and COO of Scanning Management Systems, an open-systems POS software vendor.

Wisconsin Lift Truck, worked with Sinc on his company's migration. "Our goal [was] to build a 4GL interface that will give our users consistency whether using the new or existing applications. We have already noticed that modifications to the new applications can be performed in much less time and with greater accuracy than our existing

Cobol applications."

Migrating legacy Cobol applications to open systems environments need not result in either a propagation of past shortcomings, nor the scrapping of the huge investment in existing people, Cobol code, and data. The benefits of a 4GL, open-systems environment await even those steeped in a deep Cobol tradition. Δ



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Enterprise management station

New York City—Data General's Aviiion Business Unit announced the Enterprise Management Station, an integrated set of graphical, PC-based products to help MIS personnel better assess and manage the effectiveness and performance of distributed Unix-based systems.

The initial components of the Enterprise Management Station are DG/UX Manager, a GUI tool for monitoring and assessing Aviiion system resources, and DG/UX Clariion Manager, a GUI tool for managing Clariion disk arrays on Aviiion systems. Capabilities can be based at any point around a network to monitor and manage resources anywhere else on the network, permitting remote "lights-out" systems management.

The new applications are the first in an ongoing series of PC-based, integrated management applications for open enterprise servers and networks. Because they are based on Windows and HP/OpenView, they additionally let users take advantage of a wide variety of off-the-shelf system tools to meet business-specific goals.

DG/UX Manager: Administrators can monitor Aviiion servers and their subsystems, including processors, memory, printers, and peripherals. Develops and maintains categories of dynamic system information, including resource utilization and performance using a graphical presentation via the PC. Access from the Windows environment to system data via the Simple Network Management Protocol (SNMP) agent and other source points within DG/UX.

DG/UX Clariion Manager: Assists the system administrator in determining the status of many remote and local Clariion arrays and their internal components, all from the Enterprise Management Station PC. Indicates critical events using on-screen color treatments, e-mail, beepers, or other remote alert devices. Maintains full records of Clariion disk-array activity, providing statistical presentations as required, via the GUI, which interacts with the user, the network management system and agents with DG/UX.

DG Enterprise Management Station Environment: PC-based hardware prerequisites include 8 MB of RAM for Windows, or 20 MB for Windows NT; 30 MB available disk space after EMP software installed; network adapter software; SVGA color display (800 x 600, 16 colors); and a mouse or other pointing device.

The software complement for the Enterprise Management Station consists of Windows 3.1 or Windows for Workgroups 3.11, and DG's Enterprise Management Platform. The

EMP includes HP/OpenView for Windows Workgroup Node Manager, TCP/IP stack, basic TCP/IP applications, and X-server software.

Typical configurations of the DG/UX Clariion Manager configured with the GUI and agents start at \$2,150. DG/UX Manager configured with the GUI and agents starts at less than \$1,000.

DATA GENERAL CORPORATION

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CL

Automatic failover

Westboro—GuardWare, a high-availability solution from Data General's Clariion Business Unit, combines failover software with disk-array technology to monitor hardware and application software failures and direct user-specified recovery procedures automatically in a mission-critical application environment.

Monitoring dual Sun servers that share a Clariion disk array, GuardWare provides failover capabilities for the server applications as well as for the servers themselves. The product runs as an application on both Sun servers, requiring no kernel modifications and no system reconfigurations.

GuardWare supports symmetric operations in a multi-server installation. Critical applications can run on both Sun servers simultaneously, each covering for the other in event of failure. Other features include:

- Two high-availability daemons on each server to monitor system status and each other.
- Redundant paths to monitor the heartbeat connection continuously.
- Standby ethernet connection to impersonate the IP address of a failed server, allowing transparent client access in a failover scenario.

GuardWare works with a wide range of Sun SPARC server systems, running in configurations supporting Solaris 2.3 or greater with Clariion RAID storage products. Pricing for two servers is \$14,995.

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AV

Forté environment

Oakland, CA—Forté Software, Inc., announced general availability of the company's advanced Forté application-development environment for enterprisewide client-server computing. The announcement follows an extensive beta-test program at 30 major organizations worldwide.

The Forté application-development environment simplifies the complexities of developing, deploying, and managing enterprisewide client-server applications. Designed to support programming teams, the object-oriented Forté environment supports an iterative style of development that does not require time-consuming compilation and linking.

Forté's component tools include a GUI-designer, a fourth-generation language, a set of class libraries and a class browser, an interactive debugger, and a development repository. Most Forté applications can be built completely with the Forté-supplied tools, without additional coding in a separate third-generation language such as C or Cobol. Encapsulation of existing applications is supported, so an organization's existing program infrastructure may be enhanced with new Forté capabilities.

North American pricing for the Forté environment starts at \$75,000 for a core development system, which includes a license for 5 developers, 10 users, a choice of one client, one RDBMS interface, and one server platform (such as an Aviiion), a repository, a computer-based training course, and 5 days of classroom training. Licenses for additional developers range from \$4,000 to \$6,000 and licenses for additional users range from \$200 to \$750 depending on the number of licenses purchased.

FORTÉ SOFTWARE, INC.

1800 HARRISON STREET

OAKLAND, CA 94612

510/869-3400

AV

Next-generation optical storage

Westboro, MA—Data General announced new hierarchical optical-storage solutions for its Unix-based Aviiion systems. OpStar 2.0 offers optimized access to large volumes of data stored on mixed-media systems using optical and other types of storage.

The four primary software functions are summarized as follows:

- **Migration Manager**, the key hierarchical-management element, allocates data to the appropriate storage medium for optimal performance. When data enter the system they first reside in magnetic and media, and then are migrated around to other types of media depending on frequency of use and other factors.
- **Optical File Manager**, which is integrated into the DG/UX operating system, lets users create and manipulate files using DG/UX commands. Dynamic space allocation permits writing files larger than one side of a platter, and to have multiple platters allocated as a single media set. More storage space is allocated automatically if needed.
- **Removable Volume Librarian**, which manages all optical media, online or in nearline storage, facilitates disk retrieval, and keeps track of file status and location.
- **Version Manager** provides a continuous and incremental backup and recovery system.

New optical storage devices in the OpStar 2.0 solution include a new line of rewritable 5.25-inch drives and jukeboxes, with capacities ranging from 1.3 GB for a single drive unit, up to 72.8 GB in a 56-platter jukebox. Twelve-inch optical drives are also offered, with capacities ranging from 6.5 GB to half a terabyte.

Prices for the new models of 5.25-inch optical devices range from \$5,000 to \$35,000 for capacities of 1.3 GB to 72.8 GB, including OpStar 2.0

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software. This represents reductions of 30 to 40 percent below previous prices. Typical OpStar 2.0 12-inch WORM optical devices with 6.5 GB to 504 GB storage capacity, including OpStar management software, are priced from \$30,000 to \$230,000, about 10 to 30 percent below current prices.

Current Data General Aviiion customers with Software Subscription Service can be upgraded to the new OpStar software free of charge. OpStar 2.0 is available immediately.

DATA GENERAL CORPORATION

4400 COMPUTER DRIVE

WESTBORO, MA 01580

508/366-8911

MV, AV, PC

*Special government pricing
for ARC, AIM, TurboTran*

Germantown, MD—Data Bank Associates (DBA) of Germantown, MD, and Ogden Government Services announced that DBA's ARC, AIM, and TurboTran products will now be available through Ogden's GSA Schedule 70 contract.

Under GSA contract GS00K94AGS5280, federal agencies can purchase the approved DBA software without any additional procurement requirement for justifying the source or pricing. GSA has already negotiated highly favorable pricing for all federal procurements.

DBA's ARC product creates a library of compressed files that are cross-platform compatible with all Unix, MS-DOS, OS/2, and Data General AOS/VS operating systems. Files or programs may be added, moved, deleted, updated, printed, or executed from the library. An ARC library can be moved and used, as is, to or from any of these systems, even from systems supporting long filenames to those only supporting the standard DOS file naming.

The software release includes ZARC, to complement ARC libraries on PCs. ZARC permits full access to the longer filenames while under DOS or OS/2. ZARC is being distributed as freeware to licensed ARC users.

Under Unix, ARC provides options such as a switch to force filenames to lowercase upon decompression, an option to convert line endings to the target platform, and even an option to encrypt files.

AIM provides for the use of ARC libraries in the Data General CEO (office automation) environment. Documents can be manually or automatically flagged for the online archive with an overnight update of the library.

TurboTran, a file-transfer utility for Data General AOS, AOS/VS, and AOS/VS II systems, provides Xmodem and Ymodem capability to transfer files to and from any personal computer using almost any terminal-emulation soft-

ware. TurboTran supports transfer speed up to 38,400 baud.

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GERMANTOWN, MD 20874

800/289-3224

MV, AV, PC

CQCS toolset

Denver, CO—Cyberscience Corporation announced release of CQCS Version 5, a fourth-generation language (4GL) that provides the capability for writing complex commercial applications that are fully portable across a wide variety of platforms.

The CQCS toolset consists of Visual Cyberquery (VCQ), a menu-driven, high-speed report writer that provides a set of reporting options designed for novices as well as programmers; Cyberscreen, used to build online transaction entry, maintenance, and inquiry screens; Csbatch, for batch-processing requirements; and a data dictionary that is integrated with all CQCS products.

Version 5 features provide a menu-driven report writer, improved file access methodology, increased performance, and other additions for expanding functionality and ease-of-use. CQCS runs on a variety of operating environments, including Unix, DOS, and AOS/VS.

CYBERSCIENCE CORPORATION

10065 E. HARVARD AVENUE, SUITE 800

DENVER, CO 80231

800/451-1544

AV

Speeding up SQL queries

Boston, MA—Expressway 111 from Expressway Technologies speeds up almost all standard SQL queries and provides direct support for Sybase and Oracle databases, with support for other popular databases under development. The company has also added more data warehousing-specific capabilities to Expressway.

The new release features the ability to add or delete records rapidly and on a regular basis, without needing to

COMPANY	PG#	RS#
Ames Sciences, Inc.	44	1
Asset Remarketing	11	67
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Bluemoon Computer	21	68
Chase Research	4	12
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Claffin & Clayton, Inc.	17	6
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Computer Wholesalers, Inc.	44	9
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Data Bank Associates, Inc.	34	11
Data General Corporation	3	2
Data General SEPAC	24	14
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Digital Computer Consulting, Inc.	10	17
Digital Data Systems, Inc.	10	72
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Gerry Manning & Associates	26	22
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ON-LINE HELP

WHO TO CALL FOR ANSWERS ABOUT
NADGUG AND FOCUS

<p>FOCUS Magazine address: c/o Turnkey Publishing, Inc. P.O. Box 200549 Austin, TX 78720 FAX: 512/335-3083</p>	<p>NADGUG address: c/o Danieli & O'Keefe Assoc., Inc. Chiswick Park, 490 Boston Post Rd. Sudbury, MA 01776 FAX: 508/443-4715</p>
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NADGUG:
Membership, RIGs, SIGs
 NADGUG staff **800/253-3902**
 Michelle M. Dube, association manager . . **ext. 1228**
 Marg Takarabe, membership operations . **ext. 1222**
 (Outside the U.S and Canada.) **508/443-3330**

Electronic bulletin boards
 DASH bulletin board
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 Data General
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rebuild indexes, improving the speed of incremental nightly updates and database schema changes, and keeping disk space usage to a minimum even on multi-gigabyte databases. The system also incorporates index compression, which results in the ability to index an entire database for ad hoc query in as little as 50 percent of the size of the raw data.

For access from end-user desktops, Expressway's "Onramp" open API with Sybase DBlib and Microsoft ODBC support, has been certified with a wide variety of client applications, including Powerbuilder, Q+E Database Editor, ClearAccess, Microsoft Access, and Andyne's GQL. More than 300 PC, Macintosh, and Unix-based development environments and query-building applications are supported by Expressway Onramp.

Expressway and the related Onramp are available on a variety of Unix operating systems, including Data General's DG/UX.

EXPRESSWAY TECHNOLOGIES

CORPORATION

100 FIFTH AVENUE

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800/GET-XWAY (800/438-9929)

AV, PC
Event-driven

Buffalo, NY—ESI/Technologies added two modules to its EMIS family of native Oracle 4GL-based software solutions for the global manufacturing enterprise. Each of the new modules—Event driven Requirements Planning (ERP) and Activity Based Cost Management (ABCM)—fully integrates with ESI's Enterprise Management Information System (EMIS) in providing enterprisewide solutions for manufacturing, distribution, and finance.

The new ERP module offers real-time requirements planning, enabling the enterprise to maximize its time-based management strategies and eliminating errors resulting from

manual data entry, offering flexibility in materials management, and enabling a rapid response to changes.

The ABCM module enables companies to identify costs that each product consumes in an online, real-time format, helping management to capitalize on activities that are corporate strengths, and to restructure activities that do not contribute to corporate objectives. Financial managers can better predict costs and measure performance by focusing attention on managing actual work activities rather than manipulating numbers.

EMIS operates on more than 80 platforms, including most PCs, minicomputers, and mainframes. ESI/Technologies is a strategic partner with Data General.

ESI/TECHNOLOGIES

RAND BUILDING, SEVENTH FLOOR

BUFFALO, NY 14203

716/852-8000

PC

Software test tool

Fullerton, CA—UART Expert, a software test tool from Tall Tree Software, assists computer professionals in diagnosing problems with asynchronous communications. If your business requires connection to computers at other locations, communications failures may result in lost business and inability to service customers.

The UART (Universal Asynchronous Receiver/Transmitter) chip on the PC performs all tasks required for asynchronous serial communications, simplifying the work of providing access to all parameters on the UART chip and direct visibility of all characters sent and received, including control and extended characters. All parameter settings can be modified, with all status settings immediately visible as change occurs.

UART Expert provides a terminal emulator to view all responses as a PC sends and receives characters

from a device. All connectivity parameters can be selectively set until a legible response is received in reply to simple input. Baud rates from 50 to 38400 are supported. The system interprets a variety of character sets for 5-, 6-, 7-, or 8-bit data, including ASCII and EBCDIC. UART Expert runs on MS-DOS or MS Windows and is priced at \$150 per copy.

TALL TREE SOFTWARE

P.O. Box 3501

FULLERTON, CA 92634

714/773-0301

AV, PC

It's all Relevant

San Ramon, CA—Relevant Business Systems, Inc. announced the release of Infimacs, a series of integrated financial and manufacturing-control systems software programs. Infimacs is written in the fourth-generation language (4GL) of Informix Software, Inc., and is intended for use in client-server and networked PC environments.

Relevant sells its Infimacs product through a direct-sales force and selected business partners throughout the United States.

RELEVANT BUSINESS SYSTEMS, INC.

3130 CROW CANYON PLACE, #300

SAN RAMON, CA 94583

510/867-3830

PC

Service, service, service

Burlington, MA—The W-6 Service Scheduler from IET Intelligent Electronics Ltd. enables faster, more efficient service-call scheduling and resource allocation.

The Window-based system features automatic and manual scheduling with decision support, helping the scheduler find the most qualified,

closest available person to deliver the service required.

The user describes entities involved in service operations, such as service engineers and their skills, customers, tools, and spare parts needed, and equipment serviced. Other components such as company goals, policies, customer and labor contracts, and equipment-related requirements

are input using the systems natural-language interface.

From input data W-6 Service Scheduler automatically generates a schedule or provides decision support as the user places assignments manually. A color-coded scheduling board allows the user to double-click on any component for more details. W-6 Service Scheduler generates a variety of

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Pricing for PEEK for UNIX ranges from \$200 to \$2000 per system. PEEK for UNIX is available for IBM's AIX, HP-UX, SUN (SunOS4 and Solaris2), DG/UX, DEC Ultrix, MIPS RISC/os, and others.

Computronics • 4N165 Wood Dale Road • Addison, IL 60101 USA

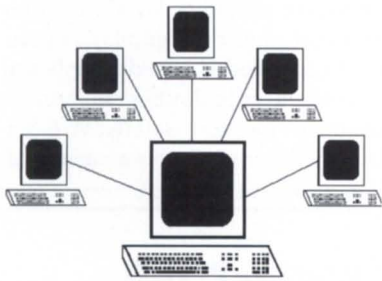
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standard reports to help in controlling service operations.

W-6 Service Scheduler is an open system, supporting ODBC-enabled SQL databases and providing import/export capabilities for scheduling-related data, such as work orders, customer records, and inventories.

System requirements include 486 PC, 8 MB of RAM, 10 MB of available disk space, and Microsoft Windows 3.1 or higher. Pricing starts at \$1,495.

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PC

Strategic software engineering

Sebastopol, CA—**Multi-Platform Code Management** (354 pgs., ISBN: 1-56592-059-7, \$39.95) from technical publisher O'Reilly & Associates is a step-by-step guide to techniques for advanced software engineering environments that Unix and MS-DOS programmers can use to structure large projects over many releases and platforms.

On two diskettes provided with the book, author Kevin Jameson offers a system for managing directories, makefile templates, and source code revisions. Free software and tools developed by the author are included.

Topics covered include:

- Multi-platform directory structures for isolating and controlling platform-dependent code.
- Automatic makefile-generating tools to promote uniform, portable makefiles on your projects, and to save you time.
- File-sharing tools that make it easy to share the latest versions of files among multiple developers and software products, automatically.
- RCSDO, a tool that performs version-control operations on entire

trees of files at a time.

The two accompanying diskettes' source code runs on at least 15 platforms, including MS-DOS (Borland), MS-DOS (Microsoft), OS/2, NeXT, and a variety of Unix variants. Call for information about porting to Data General's DG/UX.

O'REILLY & ASSOCIATES, INC.

103 MORRIS STREET, SUITE A

SEBASTOPOL, CA 95472

800/998-9938 OR 707/829-0515

AV, PC

Printing directly on mail pieces

La Crosse, WI—PostWare Inkjet 4.4 from Postalsoft is a software module for midrange systems and microcomputers.

It works with PostWare Presort products and inkjet printers to print addresses and messages directly on mail pieces.

This update of the product adds new reporting capabilities and updated printer drivers to match the latest inkjet printer specifications.

Inkjet 4.4 can now produce four types of reports. The Inkjet Simulation Report shows exactly how the inkjetted information will look on the mail piece.

The Tape Set-up Report helps bindery line operators determine how Inkjet 4.4 stored the address and messaging information on magnetic tape.

The Job Summary Report provides a record of the settings the user has chosen for the job. And when using the software's "breaking" feature to split the output into units, the Unit Summary Report details what records are in each unit. Δ

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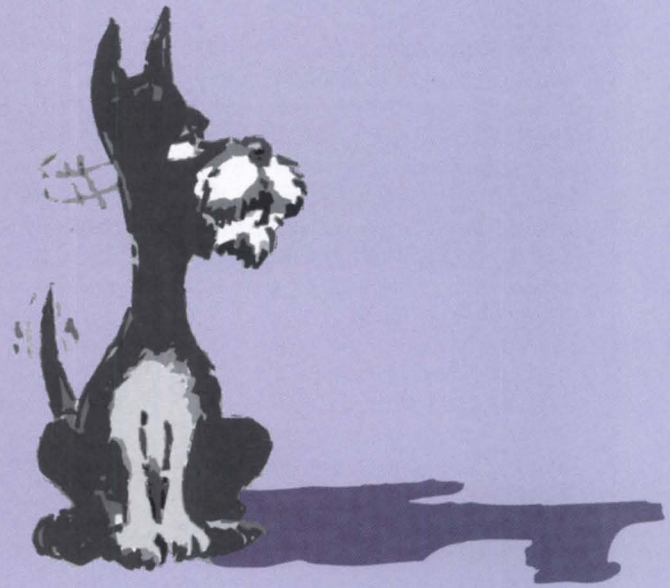
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WITH COBOL

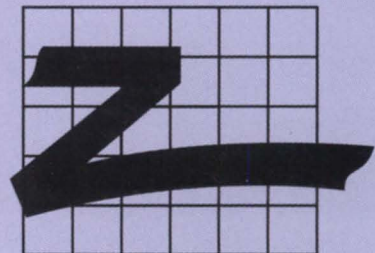
```
IDENTIFICATION DIVISION.  
PROGRAM-ID. CALLDOG.  
ENVIRONMENT DIVISION.  
SELECT ANIMALS  
  ORGANIZATION IS INDEXED  
  ACCESS IS DYNAMIC  
  KEY IS ANIMAL-TYPE  
  ASSIGN TO BEASTS.  
DATA DIVISION.  
FD ANIMALS  
  RECORD CONTAINS 16  
  CHARACTERS  
  DATA RECORD IS ANIMAL-REC  
01 ANIMAL-REC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

WITH SYSTEM Z

Here, Spot.



**Thanks for
your support
at NADGUG!**



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FAX - (615) 361-3800

DASH Items...*Notices and queries posted on the board.***Prohibiting dial-in access**Author: **JOE AMARAL**

I would like to prohibit some of our users from having dial-in access. Can this be done easily? Is there a permission file that I can use to block certain users out?

Reply by: **JAMES E. LEINWEBER**

It can't be done easily, as there is no permission file for dial-in logins, unlike *cron*, *ftp*, and so on. Three methods that would work, though:

- Use call-back (in the modems, the PBXs, or a replacement for *ttymon*);
- Replace the service *ttymon* starts on your modems with something that does the extra access checks before exec'ing login;
- Replace the login shell for non-dial-up users with something that disconnects on dial-up lines and exec's login otherwise.

Reply by: **ELLIOTT LAVY**

Another option is to put something in */etc/profile* that checks *LOGNAME* or the *uid* against a file. We've actually put an extra password in such a program so people logging in on a modem line must pass an extra layer of security. Of course the program must know which *ttys* are modem lines and only check logins on the modem lines.

Reply by: **TOM GUTNICK**

Another approach to your problem—admittedly it might be overkill—is to use the Trusted DG/UX C2 option. This will give you a lot of good commercial security features, including file access control lists, comprehensive auditing, etc. In the login world it allows

you to grand service authorizations (*login*, *telnet*, *ftp*, etc.) on a per-user basis, as well as location (i.e., modem lines, specific remote hosts) and time-of-day restrictions per user.

Third-party SCSI devicesAuthor: **JOHN NOONE**

I asked this question awhile ago about hard drives, but I thought I'd ask it again concerning other storage peripherals. How about SCSI NEC CD-ROM drives and Exabyte 8 mm tape drives? And, with the right cable, could you plug these (external) devices into the SCSI connector on the back of your Aviiion?

Reply by: **EARLE MACHARDY**

CD-ROM drives are very generic. A company called Young Minds several years ago tested a few dozen CD drives with DG/UX. They all worked fine. The Exabyte 8 mm tape will probably work, but DG does do some improvements to the firmware of those devices (i.e., shipping from DG with slight changes to the firmware). Be sure to clean those Exabytes . . . they have a tendency to screw up unless you constantly run that cleaner tape.

Of course, if you pick a particular brand of drive that does not conform exactly to the SCSI standard, then you will have trouble. Many claim to be "standard," yet turn out to be slightly off the mark.

Terminfo files for DG terminalsAuthor: **GARY BURNS**

I have just installed an AV 8500 computer. I have an existing MV/30000 that I have attached to the

same network. I have TCP/IP running on the MV. The AV 8500 is running a Micro Focus Cobol application. It wants either a DG terminal running in Unix mode or an IBM 3151 terminal. I have tried a DG terminal in regular mode and everything seems to work okay, except that the screen is not drawn correctly. The function keys work and I can enter data, but the position on the screens is off. Is there any way to modify the info for the terminals to rectify this? I can use the DG terminals to run *vi*, so I think that I have the correct *TERM* setting. Any help would be appreciated. I have been using AOS/VS II for many years, but am a novice with Unix.

Reply by: **DG CUSTOMER SUPPORT**

Check the Micro Focus Cobol 3.11 release notice from DG. It lists several DG terminals and the correct setting for MF. In most cases, you have to run 7-bit ANSI for MF screens. Also use *stty tab0* to turn off the 'tab3', which is on by default; *tab3* has caused some screen-drawing problems. Δ

DASH runs on an Aviiion 5200 server at the DG Customer Support Center in Norcross, Georgia. Bulletin boards are available 24 hours/day, 7 days/week, free of charge. DASH is accessible via Internet address 128.222.159.141, or by calling 1-800-DASH-CSC (1-800-327-4272) for the modem rotary.



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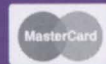
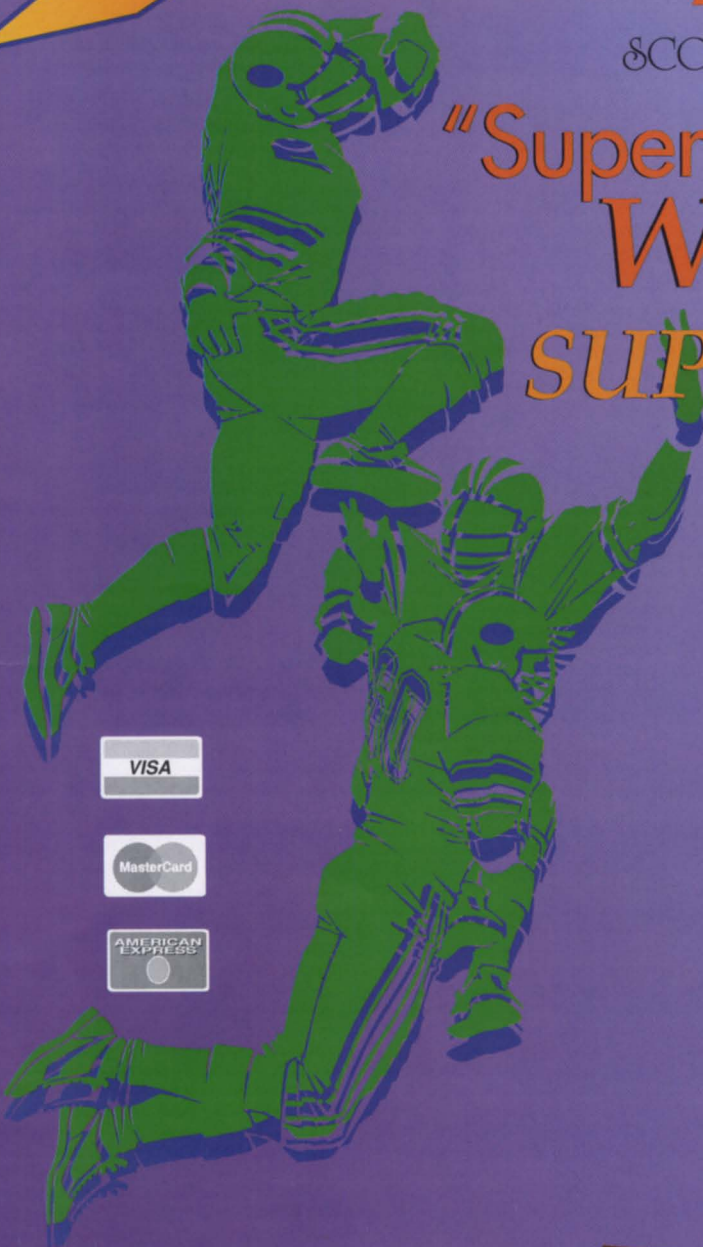
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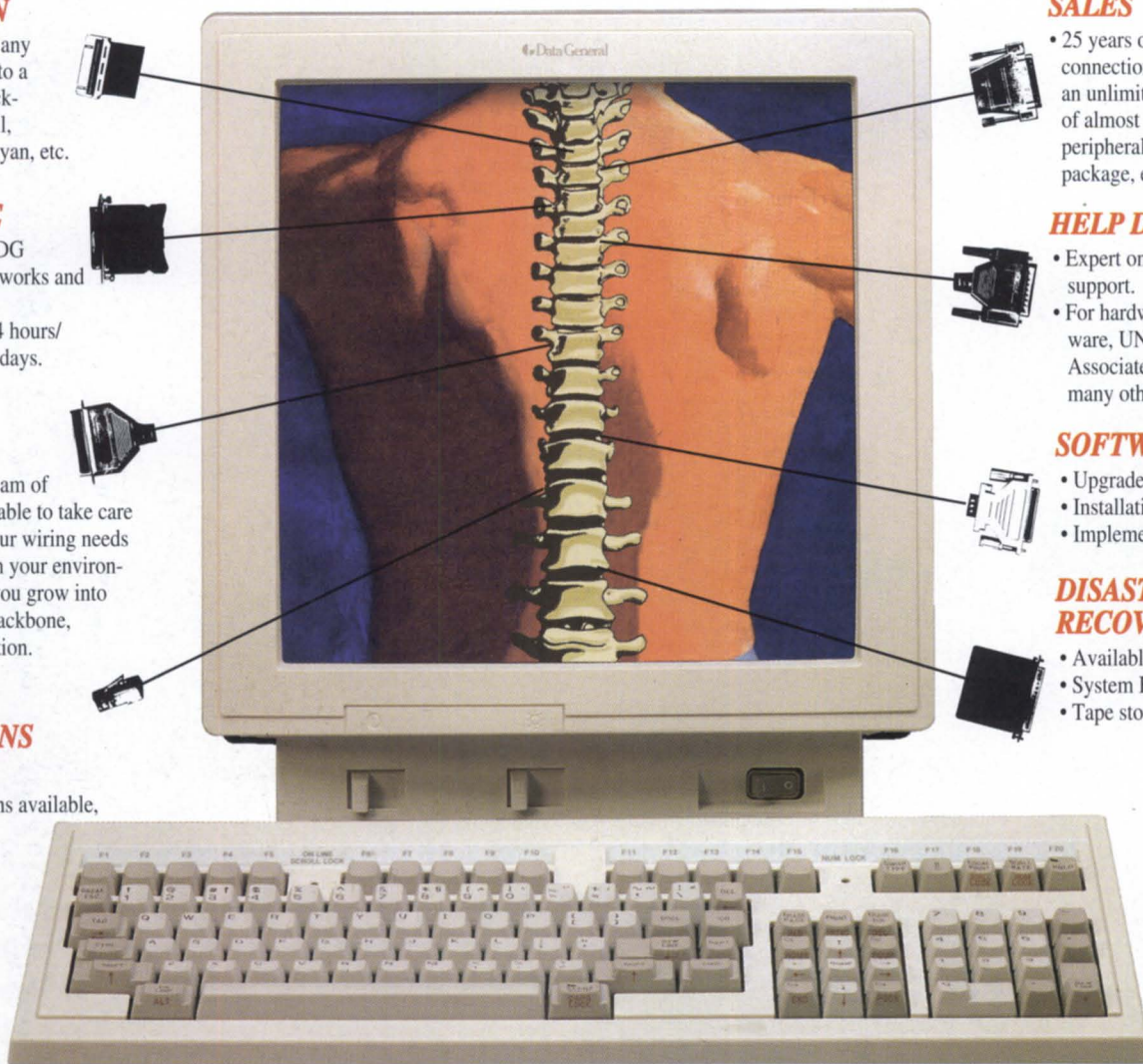
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