

December 1993

FOCUS

The Magazine of the North American Data General Users Group

Clariion greetings



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An ever-increasing need

What used to be enough data storage for your entire system is now barely enough to do anything useful. Where does it end? Well, it doesn't

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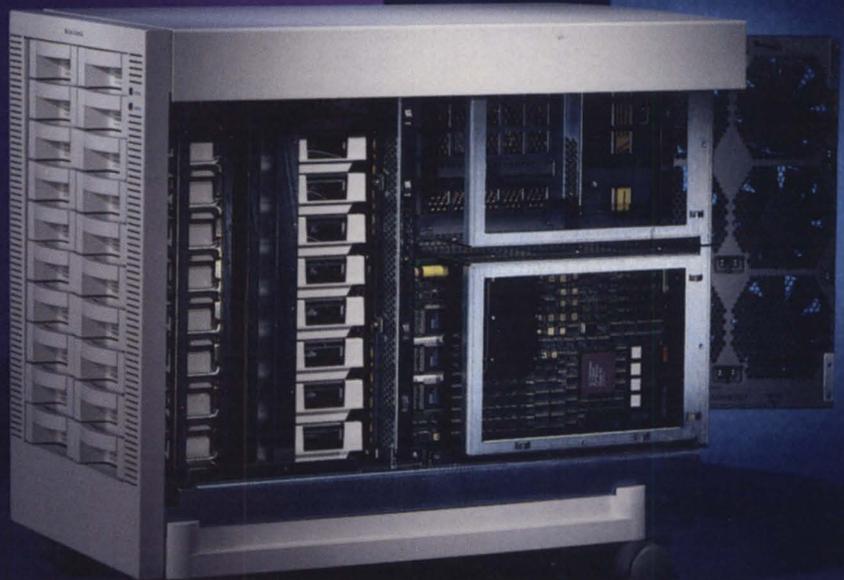
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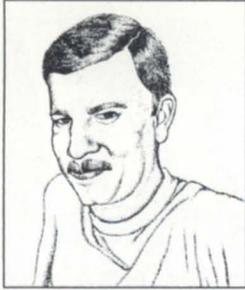
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Tim Boyer

My, how times have changed

I'm writing this on my way back from Atlanta, the celebration of the 20th anniversary of NADGUG and the 25th anniversary of Data General. Allow me to introduce myself: I'm the new NADGUG president. I've been around the organization and the company for a good part of their lifetime, having bought a CS-40 in 1979, and attended my first annual conference in San Francisco in 1981. Strangely enough, when I first joined NADGUG was also in an operating system transition.

Back then, the change was from RDOS to AOS (eventually to AOS/VS). The process was *not* pleasant. I was, of course, a diehard RDOS fan, and there was more than one night that Dennis Doyle and I stayed up until 2 a.m. arguing with individuals inimical to the operating system. We believed DG wasn't treating its installed base well.

My, how times have changed! Now the transition is from AOS/VS to Unix. Instead of trying to liquidate AOS/VS, DG is actually throwing massive amounts of money and manpower at the MV line, and has brought out two new generations of hardware to run AOS/VS. In fact, there were two new MV/60000 models announced at the conference. And we're getting frequent and meaningful updates to AOS/VS. This time around DG seems to be saying to us: "We think the future of the industry is open systems, and we're committed to that. But if you want to keep running on the 32-bit Eclipse line, fine; we'll keep bringing out new models." The users get to make the choice.

In 10 years the industry has metamorphosed from being hardware-driven to being software-driven. In 1980 I was an RDOS fan because I had one and only one CPU type in the office, and it would run only RDOS. Today's MV users are also likely to have an Avision or two around, and will almost certainly have a machine running MS-DOS or Windows or OS/2. They'll all be talking to each other and using the same

software on different platforms. A decade ago, the goal of proprietary hardware companies was to be exclusionary. Today, hardware companies are falling over each other to get software to run on their platforms. "Come on over! Of *course* we run the ABC data base and the XYZ word processor!"

Welcome to end user heaven. In 1980, one of the reasons I chose ICobol was its portability. It would run on the entire Data General line without changes. Later, ICobol would even run on different manufacturers' machines. Today, most of us are using spreadsheets, data bases, and so on, that will run on many different hardware platforms. The benefit to the user is twofold. When it's easy to take my software and go to another hardware platform, the people at DG must work hard to keep their price and performance at the top. They've consistently done so. Secondly, they must work to keep their software top-notch, or I can bring in someone else's to run on their hardware. Once again, DG has kept me happy. Competition—I love it!

How does this affect NADGUG? As usual, we're caught in the middle. We also believe that open systems are the wave of the future, but can't (and won't) abandon our MV membership. Like Data General we're committed to supporting both groups. But trying to keep two groups happy sometimes results in a perceived favoritism toward one or the other. Rest assured that we're doing our best to keep the group balanced.

Please feel free to give me a call at 216/675-4249. Or leave me a message on the DASH or RDS bulletin boards, I'm on them daily. If you really feel strongly about an issue or just want to help out, consider volunteering. We need help in many areas. Call Michelle Dube, NADGUG association manager, (800/253-3902, ext. 1228) and she'll give you the details. △

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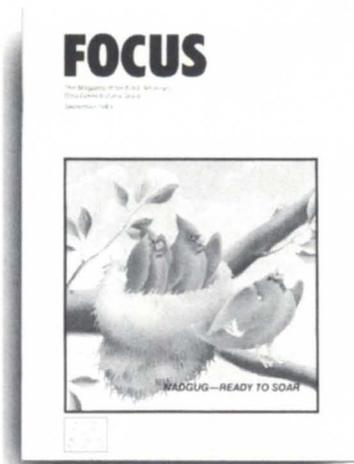
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A notable event

by Doug Johnson
Focus editor

We haven't been around long enough to pile up all that extensive a list of anniversaries and milestones, but this December 1993 issue does represent something of a notable event. It is the 100th issue of *Focus* since the publication upgraded itself from a newsletter to being a real, full-sized monthly magazine printed on nice paper. That first *Focus* magazine was the September 1985 issue. The front cover featured a trio of baby cardinals about to leave



the nest. One feathered youngster stood poised on the branch, extending its wings confidently. "NADGUG—Ready To Soar," read the headline.

"Why Birds?" asked the headline on Publisher/Editor Greg Farman's editor's note. "Probably half the people who pick up this premiere issue of the new *Focus* are wonder-

ing the same thing: what in the world are those birds doing on the cover?" The birds symbolized an expanding role as NADGUG moved toward a more independent status. The cover illustration established a precedent for imaginative artwork, much of which over the years has been done by our steadfast art director, Ann Soto. In a ret-

rospective article from that first issue titled, "NADGUG Comes of Age," *Focus* Managing Editor John Hartzell commented, "In keeping with the computer vernacular, NADGUG might be said to have booted itself up." Various NADGUG officials of the time—outgoing President John Brudz, incoming President Rene Dominguez, former presidents Mort Kahl and Brad Friedlander, and Treasurer J. Calvin Durden—forecasted big things.

The rest of the table of contents for that September 1985 issue included the very first column from famed "System Manager's Log" writer Brian (BJ) Johnson, but the standing head on his column at first (more NADGUG trivia here) was "SYSMGR".

There were 4 issues in 1985. There have been 12 issues in each of the years following, from 1986 through 1993. This one makes 100. Here's to the next 100 *Focus* issues, and to whatever gets written in a similar editor's note for the April 2002 issue. Δ



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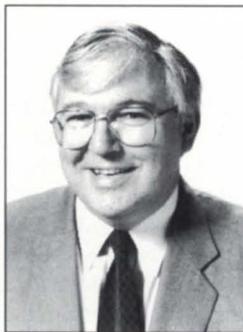
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IN GENERAL

Donald Zereski joins Data General

Industry veteran **Donald P. Zereski** was named vice president of Data General's Systems Integration Unit. Mr. Zereski joins Data General after a 30-year career at **Digital Equipment Corporation** (DEC) where he served in a number of senior executive positions, most recently as vice president, U.S. Area Operations, from 1991 to 1992.



*Don Zereski, Vice President
Systems Integration Business Unit,
Data General Corporation*

Prior to that he served as vice president, Corporate Customer Service, from 1989 to 1991, and vice president, U.S. Field Service, from 1985 to 1988. He was elected a Digital vice president in 1983.

"Don Zereski is one of the industry's recognized leaders," said **Ronald L. Skates**, Data General's president and chief executive officer. "A key element of our strategy is to expand our presence in the systems integration marketplace," said Mr. Skates. "With his knowledge of the industry and proven record of success, Don Zereski is the ideal choice to head this strategically important area."

Mr. Zereski said, "In today's marketplace the ability to offer strong systems integration capabilities has become extremely important as a competitive differentiator. Customers are increasingly looking for vendors, like Data General, who have the expertise to provide the best solutions for their enterprisewide information-processing needs by effectively integrating their hardware, software, and communications resources."

Beneficial takes AIM

Beneficial Data Processing of Peapack, New Jersey, selected and installed **Data Bank Associates'** Archive Interface Module, AIM, software. Beneficial is one of the largest single users of Data General's CEO office automation software, with more than 4 million documents on-line. Full access by users will take place in stages as each department compresses its older documents.

The AIM survey module lets system managers obtain a picture of an organization's CEO environment. For the first time, Beneficial can review the total number of documents in the system, the aging of the documents, the ownership of the documents, and file space used.

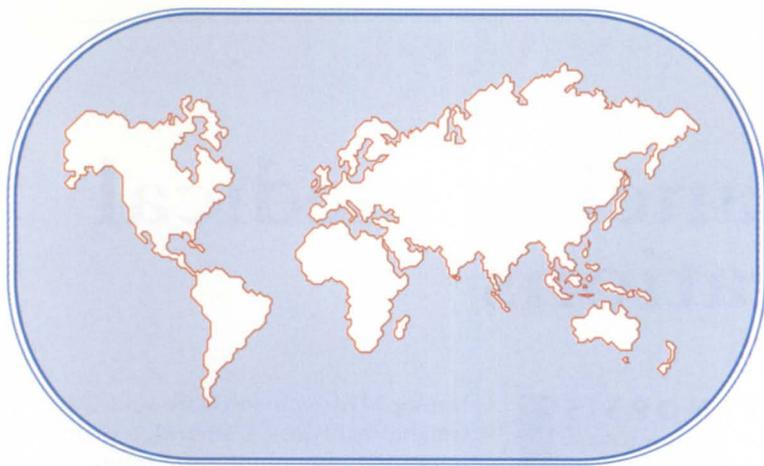
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The *E-Mail Policy Guide*, from the **Computing & Communications Law & Protection Report**, examines the legal and liability issues of protecting information systems, plus laws, cases, and regulations pertaining to electronic commerce and intellectual property protection, computer crime, and privacy. To obtain a free copy of the guide, write to P.O. Box 5323, Madison, WI 53705-0323.Δ

Robin Perry compiles the In General section. If you have an item for this column, please sent it to Robin's attention at FOCUS Magazine, P.O. Box 200549, Austin, TX 78720; Fax: 512-335-3083.



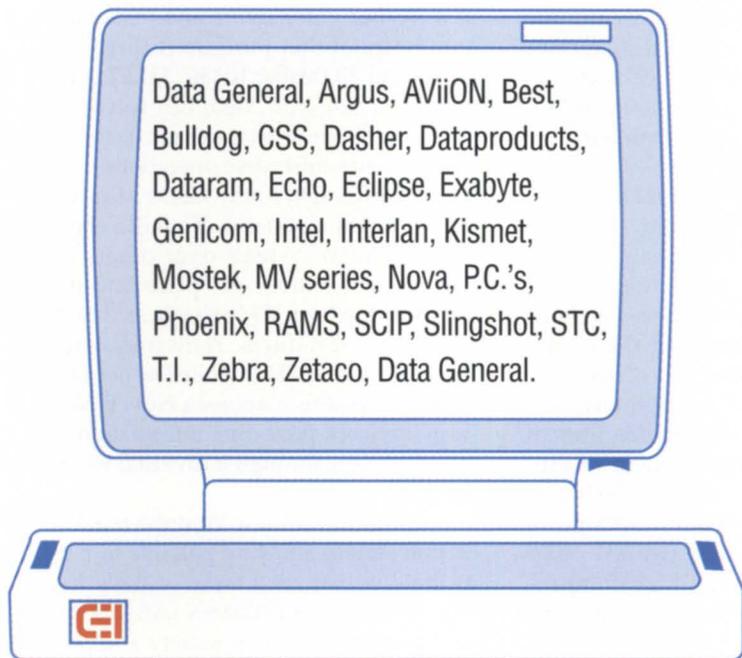
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HEALTHCARE

Enhancing medical operations

SYNOPSIS

A profile of two locations where Data General equipment help improve healthcare services.

by Dana Marruffo
Focus staff

The past several decades have seen the health-care industry improve procedures and recordkeeping through the use of computer technology, allowing medical facilities to quickly retrieve important data and monitor in-house resources and operations.

Cambridge Hospital and Youville Hospital and Rehabilitation Center are two facilities that chose to use Data General systems with medical software to enhance daily operations including clinical, financial, and administrative procedures.

The Cambridge Hospital of Massachusetts is a 176-bed municipal Harvard teaching facility focusing on primary care and aid to the homebound elderly, teen parents, non-English-speaking immigrants, and the homeless. Cambridge Hospital officials in 1986 decided to implement the Meditech Hospital Information System (HIS) with a computer system to provide quick and easy access to the hospital's needs. The key factor influencing the decision to purchase two MV/4000 minicomputers was the high compatibility between the hardware and the Meditech software.

Terri Hughes, director of hospital information systems, states that she has "found that DG has been more responsive to our needs," and has been "pleased with the performance of our DG hardware."

Today, the hospital has one DG MV/7800IP, four DG Aviion 6200s, Model 5220 NT color terminals, terminal servers and network transceivers, and a DG Walkabout laptop. By com-

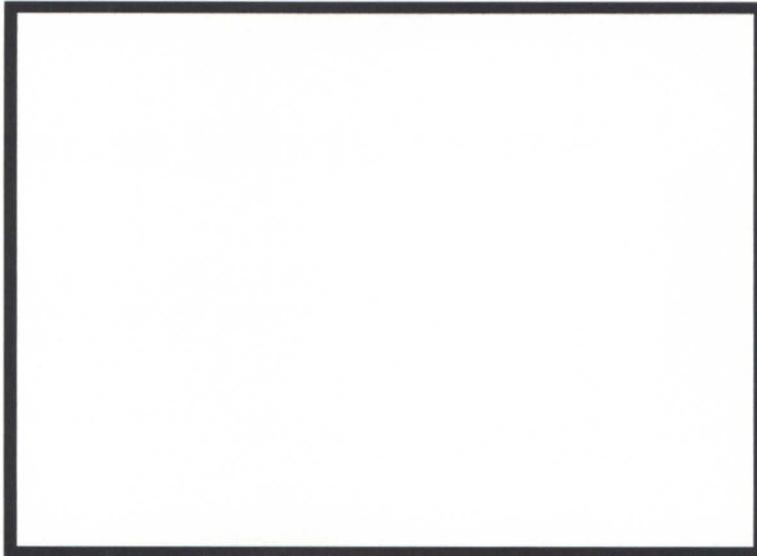
bing Meditech software and Data General hardware, Cambridge Hospital's daily operations have improved the ability to meet regulatory agency demands and provide quick access to data files needed for monitoring utilization of the many resources within the hospital. Other departments benefited include the Laboratory, Pharmacy and Radiology, Registration and Medical Records, and general applications such as patient billing and electronic mail. Cambridge Hospital has six surrounding neighborhood health centers and several community based programs.

Youville Hospital and Rehabilitation Center, also located in Cambridge, is a 305-bed chronic care and rehabilitation hospital that purchased three AV 6200s and 30 Dasher II-486/33LE2 computers to run with Meditech software. The combination eases clinical, financial, and administrative operations.

According to Kathy Blaine, director of information systems, Youville chose Data General systems over others on the market because of "price and the relationship" with Meditech in developing new products. Aviion systems operate the main HIS while Dasher PCs work on Meditech across a Novell Network providing information to all employees through individual workstations.

"Easy Street" is a Youville rehabilitation service allowing patients to participate in everyday tasks of daily living. The service prepares patients for their venture back into society and provides job-skill training on hospital grounds with supervision by clinical members. A future addition being discussed for the Easy Street project is to create an office setting equipped with personal computers to give patients hands-on experience in an office environment. Discussion is underway for the possibility of Data General donating a line of PC systems for the project, but no decisions have been made yet. Δ

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An ever-increasing need

SYNOPSIS

What used to be enough data storage for your entire system is now barely enough to do anything useful. Where does it end? Well, it doesn't.

by R. King Ables
Special to Focus

The amount of information used in a modern computing environment has exploded in the last decade. Way back in the early 1980s, two or three megabytes of space was enough to hold all the information you could possibly imagine. Now it's barely enough for a triflingly small data base or software project. Where will it end? How do you plan for what you know will be an ever-increasing need for more space?

The first thing to do is make sure you're managing your current disk space as effectively as possible. Managing disk space is a challenge, to be sure, both for the user managing individual files as well as for the system administrator overseeing an entire system's disk space. Disk space isn't like space on your desk, where once you fill it you have no choice but to clean it up and get rid of some of it. You can't just go buy another desk and start filling it up (unless your office is simply much too large). If your disk fills up, you *can* just go buy another disk, but that doesn't solve the problem.

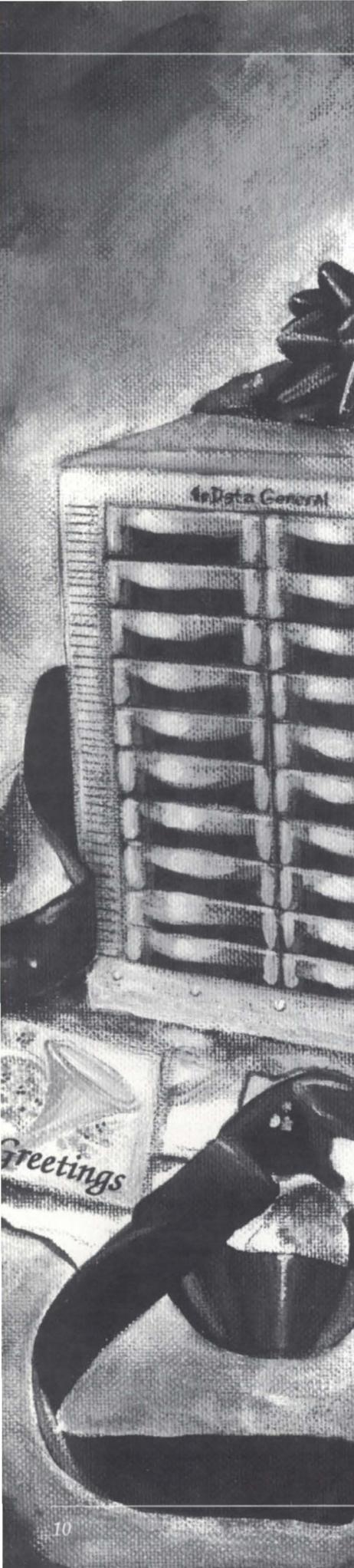
You can't really expect to keep everything. Say that again: *You can't expect to keep everything.* But we certainly try to, don't we? Since bits that represent the information in your files don't take up any physical space, we are often tempted to try to save everything. You never know when you might need it, right?

Wrong. I know people who in many cases don't even know what they have on their disks. Often they have so much, that searching through it takes as much time as getting it from another source (paper hardcopies, tape backups, etc.) or doing without. Having something and not being able to find it is the same as not having it at all.

Sorting information and purging what you don't need or have little reason to think you will need is becoming very important. Not only does it save storage space, but it reduces the amount of superfluous data you have to search through to find what you *do* need. Data that can be regenerated by a program—such as mathematical model information, printer or plotter output—can be deleted when space is at a premium. CPU time is much cheaper today, and these data can be recreated more quickly and more easily than in the past.

Data that you just can't bring yourself to give up (but that you also don't need on a daily basis) can be moved onto some kind of archival medium. Until recently, this usually meant a diskette (if it was small) or a tape. Optical-disk archive systems are now providing another alternative for large installations. These are still quite expensive, but if you need to archive a large amount of data and still want access to it in the future without having to search for a tape to load, it may be well worth it.

Now you've deleted all but your most important data, and you *still* don't have much space left. How can you forecast what you'll need in the future? A very wise man once said to me: "*You want as much disk space as you can possibly afford.*" Of course, he was a salesman for a disk-drive company, so he may have been a little biased. But



the general idea of his statement is correct. Several factors affect how your site uses disk space and how quickly that use will increase as time goes by:

- the types of disk storage you have
- the types of file systems stored
- the types of data used, and
- the types of processing being performed on those data.

The type of storage you use plays a part. If your office has personal computers with 10 MB hard drives and diskette drives, the users are probably accustomed to these limitations and they simply make do. If their requirements have never pushed them to use large servers, their mental model tells them that 5 MB is "a lot of space." If you have to increase the disk space by "a lot," you're still talking about 5 MB.

In an office that uses a server with a few hundred megabytes, "a lot" is going to be viewed quite differently. If data archiving is a common part of your environment, users may take a more active part in sorting and purging their data. If there is no alternative for questionable data other than keeping it on the disk or deleting it, they will choose to keep it.

The types of file systems you have affect your overall use of space. Regular or striped file systems (where the file system is written on more than one disk device) simply add to your total use of space. A mirrored file system (where the file system is actively copied to a secondary location for safety or read-only access) will cause twice as much space to be used, as the file system actually contains data (since there will be two copies). Mirrored file systems are valuable, but they do come with a price. A file system with built-in compression algorithms will allow you to (apparently) store more data than you actually have free disk space (by compressing the data before writing it to the disk). Compression will enhance your capacity without adding more physical disk space.

The types of data stored on the disk have a large effect on how fast the space need will increase. User data are usually what you are most concerned with, and what increases the fastest. Users who manually compress their

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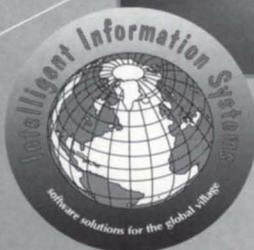
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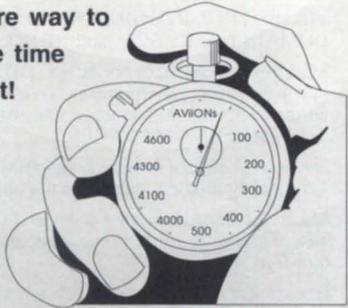
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FOCUS ON: DATA STORAGE

files will see some increase in how much data they can store. Note that manually compressing a file in a file system that compresses data as it writes it to disk will not save much more physical disk space;—compressing data a second time rarely has much of an effect. Data stored as part of the operating system (commands, libraries, or other data files) take up significant space, but generally do not grow exponentially over time, although new releases of operating systems are almost always larger than the previous one. If a great deal of your disk space is taken by operating-system files, then your growth rate should be low.

Temporary data are among the most likely uses for large chunks of disk space. Data acquisition information from sensor equipment, digital audio clips or video images, and memory images used by programs or the operating system can use up hundreds of megabytes on a large system. The good news is these data usually don't stay on your system permanently; they're used and then deleted. But you still must have enough "scratchpad" space for them to be stored while being used.

The types of processing being performed also affect the amount of data. Ten years ago when processor speeds were far slower than they are today, complex processing on large data sets could run for days. Unless the information was extremely important, it was rarely worth the wait. Jobs that formerly took weeks can now run in just a few minutes. So of course we've found many *other* things we would also like to do with these data, and now we need even more data. As is so typical in this industry, the more power and capacity we have, the more we'll figure out to do with it.

"Multimedia" is the buzzword of the 90s. Unfortunately for disk space managers, multimedia files (digitized audio data and video images) can be dauntingly large. If your organization is involved in multimedia, you can just about give up trying to make any kind of rational forecast for future data storage requirements (you can guess and you might even come close, but it will be dumb luck). The "as much as you can afford" advice from my wise friend comes into play here.

Needs that are due to other large files (census data, simulation data, data gathered from some real-time monitoring device, and of course large data bases) can be predicted with somewhat more accuracy. However, you are at the mercy of how many test cases the users do and how many samples of whatever activity they need. Your best defense involves talking with users, keeping up with what they're doing, and understanding what they believe is "enough" or "a lot" of storage.

To forecast the future needs of your site, you must look at your current use of space and how it relates to the factors we discussed. The reason for an increased need will have an impact on its significance. If you suddenly decide that all user file systems should be mirrored, your disk space requirement has almost doubled overnight. If free disk space is shrinking slowly because of "normal" growth of data bases or programs and documentation being written, then a linear pattern will probably suffice for our forecast.

Over a period of a year or more you can get a feel for the increased use of your current resources. If you're lucky, the increase will remain linear. It will more likely be somewhere between linear and exponential. If you have historical data or you can monitor use for several years, you may be able to extrapolate a usage pattern that would continue, barring drastic changes in the factors we've already discussed.

Monitor the complexity of the data and the processing being done by your users. If the complexity stays the same, your increases will probably be linear. If a workgroup jumps into a multimedia application with both feet or your file system management strategy changes, your space requirements will jump as well. Be ready to deal with that ever-increasing need. Δ

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Onward with Clariion

SYNOPSIS

Data General's Clariion Business Unit seeks to broaden the market for its disk and tape array products.

by Doug Johnson
Focus editor

Having evolved from the perhaps less charismatically named HADA (High Availability Disk Array), Data General's Clariion storage subsystems stand ready to write their own distinct product-line history. The Clariion identity fits in readily with the company's stated mission, to be "an open computer systems company specializing in servers, storage products, and services for information systems users worldwide," with special emphasis on "open." Clariion fills the bill for the "storage products" end of things.

DG evidently believes the data storage device market will take off, creating a wave the company can ride on its way back to triumphant profitability. Such thinking could be wonderfully right. Newer, bigger applications create ever larger data files, thus driving the need for ever more expanded space just to put stuff until you need it.

Last year when HADA became Clariion, Data General did an uncharacteristic thing by announcing that its storage products would be sold for use *with other companies' machines*, like IBM and Sun. Most recently, Data General in late September introduced new versions of its Clariion 2000 series redundant arrays of inexpensive disks (RAID) aimed at servers running Novell Netware. By mid-1994 will come support for Microsoft Windows NT.

Data General seeks to broaden the market for its Clariion subsystems as part of an effort to build it into a stand-alone OEM business that enhances its overall systems sales (see sidebar, page 17).

New Clariions

The Series 2000 Clariion disk array provides Netware users with high-level data availability and integrity needed for mission-critical applications. The new Clariion Series 4000 tape array provides unattended, high-speed fault-tolerant backup.

"Our goal is to provide advanced storage for the open enterprise, a market in which Netware plays a key role," said Larry Hemmerich, vice president and general manager of DG's Clariion Business Unit, in a company press release. "Clariion storage systems will be important to Netware users, who are becoming a cornerstone of enterprise computing. In fact, International Data Corporation [IDC] values the current Netware storage market at \$1.8 billion

and expects 50-percent annual storage growth."

Clariion Series 2000 for Netware stores up to 40 GB at speeds of up to 900 I/O operations per second. Features include concurrent support for RAID levels 0, 1, 3, and 5; also redundant fans, power supplies, and storage processors. There's a fast and wide (20 MB per second) SCSI-2 interface, and "dual-active" storage processors capability. Planned enhancements include a write cache for improved RAID 5 performance.

The new Clariion disk array supports all EISA-based 386, 486, and Pentium PCs, and is certified by Novell, Inc., for Netware 3.11 and 4.0. Certification for SFT III (system fault tolerance level III) is planned by the end of 1993. Each Series 2000 array is configured

From the DG milestones timeline

March 13, 1991	5.0 GB HADA introduced.
Jan. 14, 1992	2.5 GB HADA is introduced.
April 7, 1992	HADA/MV introduced.
July 14, 1992	HADA II introduced.
Sept. 15, 1992	Clariion family of mass storage subsystems introduced.
Dec. 9, 1992	Dickens Data Systems to distribute Clariion mass storage subsystems to IBM RS/6000 computer users.
Jan. 26, 1993	ERI adds Clariion storage subsystems to the open systems solutions for its Sun Microsystems customers.
Feb. 16, 1993	Groupe Bull to integrate Clariion with its open systems solutions.
March 17, 1993	Clariion Series 4000 tape array is introduced.
Sept. 21, 1993	DG and Storage Technology announce strategic, long-term OEM agreement to integrate Clariion open storage technology into Storage Technology's Nordique disk array product.
Sept. 27, 1993	Clariion Series 2000 disk array and Series 4000 tape array available for Novell Netware.

with an interface kit for installing a Netware environment, including an EISA host bus adapter, cables, utilities, and documentation. A Netware-loadable module (NLM) is provided for array management and administration.

The disk array is available in desk-side or rackmount configurations, and may be configured with up to 20 3.5-inch drives. Users may choose 520 MB, 1.0 GB, or 2.0 GB drives for scalability from 2.5 GB to 40 GB.

"It's highly scalable. We're not looking at attaching products to desktop PCs," said Joe Uniejewski, director of marketing with the Clariion Business Unit. "We are looking at PC LAN servers and client/server environments. It does scale from basically \$20,000-class products all the way up to hundreds of thousands of dollars."

As for storage, Uniejewski said, "it's designed to be expandable over time by either adding additional disk drives within a single Clariion chassis, or mounting multiple Clariion chassis

in a rack, and then connecting those to multiple host-bus adapters in a server environment."

While the use of RAID ensures the availability of data, "it cannot guarantee that data stored within an array is never corrupted or accidentally changed," said Hemmerich. "Data General has developed several patented techniques to prevent this rare but devastating event from taking place. It is a key differentiator for us."

The Netware version of the Series 4000 Clariion tape array provides fault-tolerant backup for the Series 2000 disk array or for any other online storage subsystem, simultaneously striping data and parity information to several 4 mm (digital audio tape) drives using a unique RAID-like algorithm. Data striping enables the tape array to operate up to six times faster than conventional tape devices. The tape array does not stop if a tape cartridge or drive fails during backup or restore operations, because parity data stored on remain-

ing tapes makes it possible to recover any lost data.

The Series 4000's wide SCSI-2 connection to the host provides improved throughput. Tape arrays may be configured with up to 7 DAT cartridges for a total uncompressed capacity of 14 GB. Using a 2-to-1 average compression ratio and accounting for parity, the Series 4000 offers total capacity of 24 GB. It is designed to be host-independent, and appears as a single, large-capacity tape drive. It may be used with any Netware server currently supporting a 4 mm DAT device.

"Users can back up data stored on their Netware networks at speeds of up to 3.5 GB per hour," said Hemmerich. "Equally important to improved performance, users can perform large backups without operator intervention."

Pricing

The 5-drive Clariion Series 4000 tape array lists in the U.S. for \$19,000.

Continued on page 18

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A burgeoning market

SYNOPSIS

Excerpts from an interview with Joe Uniejewski, director of marketing with the Clariion Business Unit.

The Clariion Business Unit

"It was about a year ago that Data General formed the Clariion Business Unit, with the mission of providing advanced storage solutions for the open enterprise. And the last 12 months was really putting the infrastructure and product plans in place, to help us execute that mission. We signed up a couple of OEMs early on—we signed up Bull in Europe. Most recently, as a result of our work over the last year, we publicly announced that we signed up with Storage Technology. They're going to be integrating our Clariion RAID 5 disk arrays into a much larger main-

frame storage project, called Nordique. We expect that to be about \$100 million [in revenues] over the next three years."

Clariion's scope

"We've also put together a number of Unix attachments. We support the entire Sun product line today, under both Sun OS and Solaris. We also support IBM's RS/6000 product line. And [in September] we announced support for native Netware with our Clariion disk and tape array products. We've really positioned ourselves to be able to offer our products in the PC server space, with Netware; in the Unix midrange server area on Avion, Sun, and IBM; and we're even taking products through an OEM, Storage Technol-

ogy, to the mainframe storage area."

• • •

"We're going to continue to add additional host-based connections and support over time, and we'll also further evolve our product offering, with both lower-end and higher-end disk products, and higher-capacity tape array products, taking us into the carousel and near-line archiving area."

The future

"We're looking at the Avion revenues being a strong contributor to the company, but also recognizing that there's a much larger market opportunity for our open storage products—disk arrays and tape arrays. We've embarked on a strategy to exploit the in-

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vestment we made in our technology, and make that available on other vendors' platforms and focus on solving a critical issue, which is protected storage for mission-critical applications."

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"Data General is really a company focused on providing open storage, open servers, and services to the enterprise, so I think the three key elements of our strategy over the next 5 years and beyond is going to be to focus on delivering excellence in server products in Aviion, in storage products with Clariion, and then in the services to support customers and their evolving needs over time, in a professional services service area. I think that 5 years from now, . . . we'll be truly recognized as one of the leaders in open systems. And I think that will have been the completion of a transition from proprietary to open." Δ

Storage Technology Corporation will integrate Data General's Clariion open storage technology into its Nordique disk array product, as part of a long-term strategic OEM (original equipment manufacturer) agreement between the two companies. Announced in late September, the agreement also links Data General and Storage Technology in working to further advance data storage and data management technologies. The anticipated value to DG of this OEM agreement will be more than \$100 million over the next three years.

"We chose Data General's Clariion technology after an extensive evaluation demonstrated that Clariion offers superior RAID 5 performance, scalability, high availability, and unmatched data integrity," said Donald S. Swatik, Storage Technology vice president of random access data solutions. "The fast-changing economic realities of the 1990s require that technology leaders enter into partnerships such as this so they can most effectively leverage their combined strengths to provide industry-leading enterprise solutions."

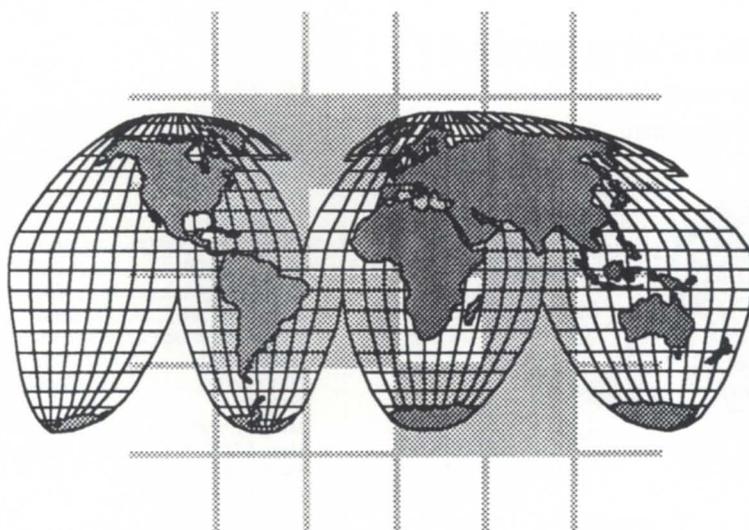
Skates added that the establishment of Data General's Clariion Business Unit a year ago included a commitment to the formation of a strong distribution channel. "This new partnership with Storage Technology is a key step in making that strategy successful," he said.

Storage Technology Corporation designs, manufactures, markets, and services information storage and retrieval subsystems worldwide for enterprise computer systems and networks. The company reported revenue of \$1.52 billion in the fiscal year ended Dec. 25, 1992. Δ



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Continued from page 15

Prices for the Series 2000 disk array begin at \$28,000 for a 2.5 GB entry-level system. The 5 GB system is priced at \$32,500. The 40 GB maximum-size system is \$109,500. All models are cache-ready and feature wide SCSI interfaces.

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1. b; 2. c; 3. a; 4. c; 5. b; 6. b
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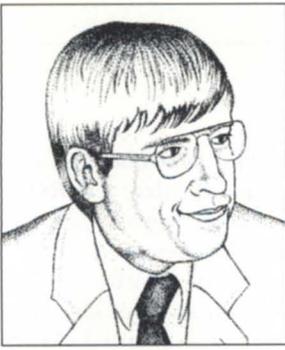
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David Novy

Shaken from complacency

SYNOPSIS

It's true that disk drives are commodity items nowadays, but even if disk specifications themselves are no longer as important as they once were, using them to the best advantage is still critical.

With the "Focus on:" topic this month being data storage, at first I thought it would be difficult to do a useful discussion because disk drives have become commodity items. You can purchase disk drives with reliability figures of 500,000 hours MTBF (mean-time-between-failures), access times of about 8 milliseconds, and a cost of less than \$1 per megabyte. So what else is there to know?

Well, a weekend outing with the Boy Scouts and a recent newspaper article by Tom Peters (author of *In Search of Excellence* and *Thriving on Chaos*) taught me that I still have much to learn. The Tom Peters article addressed complacency. Companies today get in difficulties, he wrote, when they become complacent. In order to remain successful a company must constantly strive to reinvent itself—to become, internally, its own toughest competitor.

Peters gave an excellent example of where corporate complacency led to serious problems—Apple Computer. The Apple Macintosh is one of the finest personal computers available. It is intuitive to use and extremely well integrated. For several years the Apple Macintosh had no peer in the ease-of-use category, so Apple was able to charge a premium for its products, often 50 percent more than the competition. But today Apple is struggling. The reasons involve the price war for Intel processor-based computers (PCs) and the Microsoft's Windows operating system. PC-market price wars drove the entry-level cost for powerful desktop computers down to unbelievably low levels. Before Apple reacted by cutting its own prices, it reached a point when Apple Macintoshes cost twice as much

as PCs with similar computing power.

If one company's product costs 100 percent more than that of its competitor, and the higher-priced product offers at most only a 15-percent advantage in its primary differentiator—ease of use—common sense says the high-price company will have trouble making sales. If you also consider that the PC has always enjoyed a significant market share advantage compared to the Macintosh, you can see why Apple Computer found itself in severe financial difficulty. It was forced to cut costs drastically to survive, and the only way to do that in the short term is to lay off people.

Peters showed me dangers of being complacent. This notion was reaffirmed when I attended a Boy Scout training seminar. I was made to realize that adults and children learn differently.

Children want to know the "Why?" of nature. Why do leaves turn red in the fall? Why doesn't a bowline knot slip? Adults, on the other hand, are not interested in "Why." Most adults want only to know what the job is that needs doing, what tools are available, and if they can be left alone to do the job as they see fit. You can see that the adult method of learning does not lead to innovation; it is a form of complacency that can lead to serious problems.

At first, because of experience, an adult can often outperform youth. But eventually, just having young minds around asking "Why?" all the time will lead to innovation and breakthroughs. Then the adult's job may become superfluous, which can lead to people with 27 years of seniority being put out of work. Finding a well-paying job after

such a layoff can be extremely difficult. I know one leader who finally landed a new job after extensive retraining and a year-long search. Another quite capable individual is earning \$7.50 per hour driving a bus while he continues his search. Both of these people were earning more than \$40,000 per year before they were laid off.

A bit of rethinking

Having been shaken from my complacency, I thought it would be useful to re-examine computer storage. It is true that disk drives are commodity items. But even if disk specifications themselves are no longer as important as they once were, using them to the best advantage is still critical.

The Seagate Barracuda II disk drive is a leader in the disk-drive market today. It is a 3.5-inch form factor drive with a formatted capacity of 2.1 GB and a mean time between failures (MTBF) of 500,000 hours. It can read and write data at a rate of 2 MB per second. If you choose to use another drive, you should have a good reason for your decision.

So here are some reasons for *not* choosing a Barracuda II:

The price is too high. Even though the price is only \$1 per megabyte, it still costs \$2,000. To some people that's too much money for a disk drive.

The drive runs "hot." The drive consumes 15 watts of sustained power. That is less than the 20-plus watts of sustained power needed by a 5.25-inch drive, but it's substantially more than the 9 to 10 watts consumed by a conventional 3.5-inch drive.

The drive may be too big. Many portable computers today use drives that are 2.5 inches and even smaller. A

3.5-inch drive may be too large and consume too much power.

The drive may not be supported. Some people prefer to work with only one computer vendor for support and maintenance, especially in remote areas. The Seagate Barracuda II may not be a supported drive. In addition, many RAID (reliable array of inexpensive disks) may not support the Barracuda II.

The Seagate Barracuda II is an excellent drive, but it may not be the drive for you. Remember to determine what you really need versus what you merely want whenever you purchase new computer equipment. Purchase only from dealers who can answer your questions in terms you can understand.

There are several other factors to consider when buying a new drive:

A drive with an impressive MTBF reliability rating does not guarantee that you will rarely have a disk failure. If a specific drive has an MTBF rating of 500,000, it means that on average a

drive of that type has a 1-in-500,000 chance of failure. Statistically, some drives of that type may have shorter lives and some have longer lives. If you have 10 such drives, each with an MTBF of 500,000 hours, then you can expect a drive failure every 50,000 hours. The MTBF for a group of similar drives is the MTBF number divided by the number of drives. If you had 20 drives, expect a failure every 25,000 hours.

You should use SCSI (small computer system interface) drives. SCSI drives are becoming the drives of choice for computers, but they are not the normal type of drive for a PC because of their slightly higher cost. PCs generally come with IDE or ESDI drives. SCSI drives may cost a bit more, but they are more portable and the high-performance tape backup and CD-ROM drives use SCSI disk controllers. Over the next 12 months SCSI drives will become the standard drive for high-performance PCs. They are already the standard in the Unix market.

Be careful that someone does not try to sell you an obsolete CD-ROM drive. Recent developments in optical-disk technology has resulted in CD-ROM drives that can transfer data at 300 KB per second, and yet still cost about the same as the older CD-ROM drives that transferred data at 150 KB per second. CD-ROM drives with transfer rates of 600 KB per second are also beginning to appear.

When faced with making a choice between performance and reliability, favor reliability. Do not even consider buying a drive with less than 200,000 hours MTBF. There is no worse job for a system manager than trying to recover lost data. Δ

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.

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Application tuning utilities and the Unix environment

SYNOPSIS

The author continues a series of articles explaining the application and kernel tuning utilities available for solving some of the most common bottlenecks that affect DG/UX overall system performance in a multi-user server environment.

by Thomas E. Soukup
Special to Focus

Recent installments of this series have examined aspects of using the Unix system activity reporter (August and September). Last month (October) we looked at Unix process and network management. This article will begin explaining application tuning utilities and techniques in the Unix environment, and leading up to kernel-tuning utilities and techniques.

To assist in application tuning there are numerous manuals available from Data General Corporation's Technical and Publication Service (TIPS). This specialized group within Education Services is dedicated to providing customers with current documentation for both the MV and Aviiion product lines.

TIPS has recently published a new manual, "Analyzing DG/UX Performance (093-701129)." I highly recommend this technical manual to anyone interested in system performance. For ordering information contact TIPS in the US at 800/343-8842, or in Canada at 800/668-0712.

In a typical multi-user server environment the percentage of time spent in user space should range from 40 to 80 percent. Time spent in the system (kernel) space should range from 10 to 40 percent. Idle time should range from 0 to 40 percent of the total CPU time. To investigate CPU usage, use the Unix *sar* command with the *-u* switch. If your CPU usage is outside these ranges, or your applications are not running as fast as expected, you may need to tune your applications or the DG/UX kernel.

Often rehosted or newly developed applications need to be analyzed to ensure they work efficiently. Many times, analyzing an application with a debugging or profiling utility will expose modules of the code that consume extensive system resources. By using debugging and profiling utilities, either fewer system-resource-intensive calls can be made, or a less-resource-intensive algorithm can be used. For example, if an application is written in C, replacing the C call, *getchar()* with *getc()* can affect overall system performance.

Other potential performance problems may occur in the application's record-locking scheme. In a multi-user server environment for optimum performance, use locks only when necessary. For example, you do not need to lock a record that is read-only. If you must use a lock, lock only that record being updated or written for as short a time as possible.

Other potential performance problems may be uncovered by closely monitoring your overall system-usage patterns. Give prime-time usage to the most important jobs. By default DG/UX attempts to schedule jobs giving on-line terminal users more system resources than to non-interactive batch and compute-bound jobs. Long-running, resource-intensive batch jobs should be started during off hours. If batch jobs need to be run during prime time, start them with a lower priority. For example, use the Unix command *nice -4 Process_ID* to start the job at four priority levels below interactive

Figure 1: Standards & Software Development Environment

	Bcs	Ocs	Posix	SVID/2	SVID/3	Xpg/3	ANSI C
<i>m88kdguxelf</i>	No	No	Yes	No	Yes	Yes	Yes
<i>m88kocs</i>	Yes	Yes	Yes	Yes	No	No	Yes
<i>m88kbcs</i>	Yes	No	Yes	Yes	No	No	Yes
<i>m88kdguxcoff</i>	No	No	Yes	Yes	No	No	Yes

"Yes" means the environment conforms to that standard.

jobs. To reduce the priority of a batch job already running, use the Unix command *renice 4 Process_ID* to reduce its priority by four levels.

Software development environment

A software development environment (SDE) is a set of tools, libraries, and system definitions designed specifically to work together in building an

application that possesses certain qualities. The environments provided in the DG/UX 5.4 release are:

- **m88kdguxelf.** Used to create ELF objects and executables that make use of full DG/UX 5.4 features.
- **m88kocs.** Used for creating COFF objects and executables that can be linked and run on other vendors' 88open OCS-

BCS-conforming platforms.

- **m88kbc.** Differs from **m88kocs** because it allows the use of certain features (such as Berkeley signals) and optimizations (such as the macro implementation of **getc**) that are prohibited from the OCS environment. (This is unchanged from DG/UX 4.3x.)
- **m88kdguxcoff.** Used to create COFF objects and executables that make use of DG/UX 4.3x-level features. This option is interesting to software developers who have COFF-dependent tools, such as third-party debuggers, that they want to use on the DG/UX 5.4 release (the same as **m88kdgux** on 4.3x).
- **m88kdgux.** The default for all past and future revisions. It refers to the largest feature set supported by the DG/UX system. In DG/UX 5.4 this is equal to **m88kdguxelf**.

Support for multiple development environments is handled by the *sde-target* mechanism. It allows you to specify the appropriate development environment for your needs, while other users (or you, in another context) may be using a different development environment at the same time. You select your environment by setting the environment variable **TARGET_BINARY_INTERFACE** to one of the environment names listed above. The *sde-target* command provides a convenient way to set that variable. Note that the variable name has changed from **SDE_TARGET** in DG/UX 4.3x. The name was changed because additional variables that control the "sde target" in ways other than the binary interface are likely to be introduced in the future. The *sde-target* command will not change, but it might set multiple variables in the future.

The environment variable set by *sde-target* is used in two contexts. When you invoke a software development tool such as **/bin/cc** or **/bin/ld** you are actually calling a small program that calls *sde-chooser*, which checks the environment variable and invokes the appropriate target-specific tool. Secondly, tools that read libraries, such as **ld**, use the *elink* mechanism, which uses the environment variable to find the appropriate system libraries.

The four environments will compile to either ELF or COFF format. The ELF environment allows programmers

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to create and use shared libraries that greatly reduce the size of an executable file and will use less main memory at execution time. However, there is a performance penalty for loading the first application. A general guideline is to use the ELF environment whenever multiple users (5 or more) are running the same applications.

The *m88kdguxcoff* COFF environment creates a static executable that does not use shared libraries. The resulting executable is larger and will use more main memory at execution time. A general guideline is to use the COFF environment whenever users are all running different applications. ELF and COFF environments may be mixed. Refer to the on-line manual pages on *m88kdguxelf* and *m88kdguxcoff*.

Some third-party, third-generation languages will allow the use of only one environment. Therefore be sure to read the product's release notes. You may want to order the following TIPS manuals: "Porting and Developing Applications on the DG/UX System" (069-701059); "Programmer's Guide: ANSI 'C' & Program Support Tools" (093-701104); "Programmer's Guide: System Services and Application Package" (093-701103); "Programmer's Guide: Character User Interface (093-701107); "Programming with TCP/IP on the DG/UX System (093-701024)"

Third-generation languages (3GLs)

Most third generation languages supply debuggers and profilers to assist programmers in optimizing code. User application profilers are addressed in a later section. Data General Corporation has developed a multiple-language debugger called *mxdb*. Check the release notes of the third-generation language to see if it is compatible with *mxdb*. This debugger will allow you to perform debugging activities with multi-language application programs.

It is best to create a single file system for the application executables. This file system in a production environment is mainly read-only; therefore, you can use a large file element size of either 32 or 64 when making the applications directory. This will enhance the speed of loading applications. In most cases it is also recommend to use the Unix command *strip* to remove the

symbol table that results in a smaller executable file size.

The symbolic debugger

The DG/UX system currently supports *sdb*, the symbolic debugger, for debugging C, F77, and assembler-language programs. *Sdb* may be used to examine executable program files and core files. It may be used also to examine live processes in a controlled execution environment.

The *objfile* argument is the name of an executable program file. To take full advantage of the symbolic capabilities of *sdb* this file should be compiled with the *-g* (debug) option. If it has not been compiled with the *-g* option, the symbolic capabilities of *sdb* will be limited, but the file can still be examined and the program debugged.

The *corfile* argument is the name of a core image file. A core image file is produced by the abnormal termination of *objfile*. The default for *corfile* is core. A core image file need not be present to

use *sdb*. Using a hyphen (-) instead of *corfile* forces *sdb* to ignore an existing core image file.

The directory-list argument is a colon-separated list of directories used by *sdb* to locate source files used to build *objfile*. If no directory list is specified *sdb* will look in the current directory. You may want to order the the following TIPS manual: "Programmer's Guide: ANSI C and Programming Support Tools" (093-701104).

The source-level debugger

DG/UX currently supports *dbx*, the source level debugger, for debugging C, F77, and assembler-language programs. The *dbx* utility is a tool for source-level debugging and execution of programs under the DG/UX. *Objfile* is an executable file—one that has been compiled and linked. The compiler must use the appropriate flags to produce symbol information in the object file. The machine-level facilities of *dbx* can be used on any program not linked

with the *-s* option. If no *objfile* is specified, *dbx* looks for a file named *a.out* in the current directory. When a core file is specified, *dbx* can be used to examine the state of the program when it faulted. Again, you may want to order the following TIPS manual: "Programmer's Guide: ANSI C and Programming Support Tools" (093-701104)

Multi-extensible debugger

Data General Corporation offers *mxdb*, the multi-extensible debugger, as a separate product for debugging the same languages. Some of the features of *mxdb* are as follows:

- Provides complete programming language evaluation and detection facilities for each supported language—C, Fortran, ICobol, and others.
- Takes advantage of a graphical user interface. *Mxdb*, optionally, uses X-Windows to debug a program and view its output in separate windows.
- Linker performance is fast. Storage of *mxdb* symbol table information is separate from the object file, thus eliminating the need for the link to process the information.
- Large applications initialize and start fast. Since *mxdb* reads the debugging information into memory for a module as needed, the amount of swap spaces is reduced.
- Provides support of data breakpoints, which allows the debugger to monitor data efficiently for random storage.
- Provides options you can customize and offers easy-to-use advanced command-line processing features, such as command substitution.
- Provides profiling of applications with the command *mxprof* to generate profiling information from which you can determine which routines in your application consume the most execution time.

You may want to order the following TIPS manuals: "Using the Command Processor, *mxdb* (093-706), and "Using the Multi-Extensible Debugger (*mxdb*) for DG/UX" (093-710).

Other programming support tools

The *strip* command removes the symbol and line number information from an executable file. You should *strip* all executables once they have

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1993 subject index of Focus articles

AVIION

Monster machines. There may be many potential Data General customers out there who could make great use of Aviiion file servers for doing enterprisewide information and document management, if the proper software were available. *David Novy*, *Unix Notebook*. Jan 93, pg. 20.

The System Activity Reporter. The author begins a series of articles explaining the performance monitor utilities available for solving some of the most common bottlenecks that affect DG/UX performance in a multi-user system server environment.

Thomas E. Soukup. Aug 93, pg. 8.

'Benchmark shock.' Data General's Aviiion line expands again, offering eye-popping numbers and tantalizing possibilities. *Doug Johnson*. Sep 93, pg. 8.

Philosophically speaking. Excerpts from an interview about the new Aviiions with Data General's Stephen Gardner, Vice President Aviiion Marketing. Sep 93, pg. 10.

New DG/UX features. Sep 93, pg. 13.

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Process and network management. The author continues a series of articles explaining the performance monitor utilities available for solving some of the most common bottlenecks that affect DG/UX process and network management performance in a multi-user server environment. *Thomas E. Soukup*. Oct 93, pg. 27.

The letter. With the release of its new Aviiion 8500 and AV 9500 Unix file servers, DG seems to understand what it takes to be successful in the commercial marketplace. *David Novy*, *Unix Notebook*. Sep 93, pg. 30.

Nostalgia. Our columnist offers a toast to the memories of bygone times in the computer industry (they weren't all that good, by the way), and sees a promising future for a reorganized Data General. *David Novy*, *Unix Notebook*. Oct 93, pg. 20.

Application tuning utilities and the Unix environment. The author continues a series of articles explaining the application and kernel tuning utilities available for solving some of the most common bottlenecks that affect DG/UX overall system performance in a multi-user server environment. *Thomas E. Soukup*. Dec 93, pg. 21.

BACKUPS, ARCHIVING, DATA STORAGE

Archiving without palpitations. Data se-

curity and delaying the need for more disk space are among the many benefits to consider when choosing an archiving system. *Gordon Campbell*. Jan 93, pg. 24.

FSCOPY: a new backup tool. If you have a lot of data to back up, and you need a consistent, fast solution, FSCOPY will likely satisfy your needs. *Mark Wilding*. Sep 93, pg. 40.

Easing a record burden. Medical forms imaging, from scanning to archiving, has come a long way in recent years. The author profiles two up-to-date product offerings from Data General. *Joe Cannata*. Nov 93, pg. 28.

An ever-increasing need. What used to be enough data storage for your entire system is now barely enough to do anything useful. Where does it end? Well, it doesn't. *R. King Ables*. Dec 93, pg. 10.

Onward with Clariion. Data General's year-old Clariion Business Unit seeks to broaden the market for its disk and tape array products. *Doug Johnson*. Dec 93, pg. 14.

A burgeoning market. Excerpts from an interview with DG's Joe Uniejewski. Dec 93, pg. 16.

Shaken from complacency. It's true that disk drives are commodity items nowadays, but even if disk specifications themselves are no longer as important as they once were, using them to the best advantage is still critical. *David Novy*. Dec 93, pg. 19.

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Transferred support. What will it mean for Data General to turn over future BBASIC development to an outside company? *George Henne*. Jan 93, pg. 28.

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WASHing machines. BJ explains some inside history of the celebrated WASHI chip, and offers a solution to one performance quirk. *Brian Johnson*, *System Manager's Log*. Jan 93, pg. 10.

Tidbits, technology, and buzzwords. It's potpourri this month for our Unix columnist: What's next with Next? Running X-terminals over asynchronous modems actually seems to work. And you should check out the pleasant possibilities offered by workgroup software. *David Novy*, *Unix Notebook*. May 93, pg. 12.

The wide, wide world of document imaging. Data General's new AV Image product will attempt to lead the way in this burgeoning market. *Doug Johnson*. Jul 93, pg. 10.

Of time and the computer industry. Data General has gone through birth, growth, adolescence, a bit of middle age,

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'Forever' has arrived, and sooner than we thought. *David Novy*, *Unix Notebook* (sidebar). Oct 93, pg. 20.

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DATA BASE DESIGN

Designing relationally. This article's purpose is to provide the nonrelational data base designer or programmer with some understanding of the principles used when designing relational data bases, and how to apply these principles to nonrelational data base design. *Robert Howell*. Feb 93, pg. 26.

Staying memory resident. BJ walks you through the procedures and pitfalls of writing an example Cobol program to handle a read-only, memory resident data base. *Brian Johnson*, *System Manager's Log*. Mar 93, pg. 20.

Building codes. The author continues a discussion begun last month about data base design ("Designing relationally"). This article will address data base normalization and entity relationships. *Robert Howell*. Mar 93, pg. 29.

A design case study. Modular programming with relational data base files offers many advantages. If you're not already programming this way, it's worth a look. *Steve Handlos*. Jun 93, pg. 24

Program for efficiency. If you design your major systems with relational principles in mind, then software will not become the bottleneck as the organization grows, adds more users, and more records to the files. *Steve Handlos*. Nov 93, pg. 39.

Multidimensional elegance. Data are what gets managed, not information, and DP professionals should look for the data model that provides the greatest ease and flexibility in accessibility. The Pick multidimensional data model shows the way in this postrelational era. *Daniel Sapir*. Nov 93, pg. 43.

DATA GENERAL

New Year, new structure. You may not need a program to know the DG players these days, but a diagram could help. *Stephen Nikitas*. Feb 93, pg. 16.

Dial up that STR. Through the Customer Support Center's DASH bulletin board, you can check on the status of particular software

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Users, privileges, and permissions. In

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How Data General solved imaging network bottlenecks. *Jules H. Gilder,* reprinted from *IMAGING MAGAZINE.* Jul 93, pg. 16.

The wide, wide world of document imaging. Data General's new AV Image product will attempt to lead the way in this burgeoning market. *Doug Johnson.* Jul 93, pg. 10.

DG's "imaging" niche. Our columnist perceives that Data General's new AV Image system achieves remarkable sophistication, but wonders anyway where this emergent

document-imaging market will go. One thing seems certain, competitive pressures will force companies to move away from paper. *David Novy.* Unix Notebook. Jul 93, pg. 20.

Easing a record burden. Medical forms imaging, from scanning to archiving, has come a long way in recent years. The author profiles two up-to-date product offerings from Data General. *Joe Cannata.* Nov 93, pg. 28.

HEALTHCARE

Easing a record burden. Medical forms imaging, from scanning to archiving, has come a long way in recent years. The author profiles two up-to-date product offerings from Data General. *Joe Cannata.* Nov 93, pg. 28.

Delivering service to the medical environment. Data General open systems users can take advantage of a variety of innovative professional service solutions to streamline administrative, clinical, and patient-care processes in the rapidly changing healthcare industry. *Paula Jacobs.* Nov 93, pg. 32.

Enhancing medical operations. A profile of two locations where Data General equipment help improve healthcare services. *Dana Marruffo.* Dec 93, pg. 8.

ICObOL

Quick fixes. Have you used reorg lately? Does the idea of setting up a modem give you chills? Don't sweat it out alone! For those who are learning to use DG/UX ICObol, someone who's been through the experience (and survived) shares his solutions to problems you may encounter. *Ephraim Nussbaum.* Jan 93, pg. 8.

Onward with ICObol 2. These are exciting times if you're using ICObol. NADGUG 92's ICObol roundtable produced a wealth of information about ICObol 2, the new product from the recent ICObol/ICHOST agreement. *Tim Boyer,* Screen Test. Jan 93, pg. 16.

Totally RADical ICObol. Object-based technology is the simplest method of adding PC-like features to ICObol applications. *Vibeke H. Arentz.* Aug 93, pg. 29.

Legacy for the future. ICObol is a mature (read "legacy" or "old"), semi-proprietary Cobol language created to address multi-user, data-entry applications in the 1970s. It performed its initial job admirably in the 70s and 80s, but needs to adapt to future user requirements if it is to remain an effective application language. *Bruce K. Ray.* Oct 93, pg. 22.

INFOS

Infos IIFC, or not to FC? Infos II customers have a choice of two products. *Joseph Cannata* and *Tony Coor.* Mar 93, pg. 36.

Tweaking and twiddling. With a little experimenting, you can customize the X-Windows environment to your liking. *Joseph Cannata.* Apr 93, pg. 26.

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Users, privileges, and permissions. In the switch from AOS/VS to Unix, system managers must get familiar with differences and terminology. The author takes a look at the mechanisms used by DG/UX to restrict access to files, devices, and other resources. *Brad Clements*. Jan 93, pg. 4.

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Your /path/directory to Unix. History has taught that revolutions are usually bloody. At the very least, migrating to Unix involves overcoming obstacles. But by adopting an organized approach, you can protect the financial and personal investment you've already made. *Phil Goodwin*. May 93, pg. 25.

NADGUG—(see USER GROUP)

NETWORKING

Enterprisewide network service. In network integration as in other aspects of the computer industry, it's service after the installation that counts. *Paula Jacobs*. Feb 93, pg. 9.

Life in the fast LAN. The Fiber Distributed Data Interface (FDDI) offers improvements in high-speed data transfer for tomorrow's networks. *Katherine Jones*. Apr 93, pg. 32.

Tidbits, technology, and buzzwords. It's potpourri this month for our Unix columnist: What's next with Next? Running X-terminals over asynchronous modems actually seems to work. And you should check out the pleasant possibilities offered by workgroup software. *David Novy*, Unix Notebook. May 93, pg. 12.

Adventures in PC Land. Almost anyone can manage a single PC. But managing a PC network is another matter. It requires the kind of manager who's willing to work at the trial-and-error learning process needed to master the fast-changing technology. *David Novy*. Jun 93, pg. 14.

The need for network speed. Whether it's a PC environment or a Unix environment, use the right networking tool for the right job. And: Our columnist recounts still further "adventures" with MS-DOS 6.0. *David Novy*, Unix Notebook. Nov 93, pg. 24.

PERFORMANCE MONITORING

The System Activity Reporter. The author begins a series of articles explaining the performance monitor utilities available for solving some of the most common bottlenecks that affect DG/UX performance in a multi-user system server environment. *Thomas E. Soukup*. Aug 93, pg. 8.

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Guarding the gates. If system security is easy and manageable, you stand a better chance of keeping intruders out of yours. Guardian offers a wealth of features to shore up your password defenses and shut out hacking miscreants. *Tim Boyer*, Screen Test. Mar 93, pg. 26.

Peaceful optimization. Imagine the complexity of a disk optimizer written for a multi-user machine—files constantly created and deleted, multiple users accessing multiple records in the same file, Infos volumes. An optimizer peacefully coexisting with all this chaos? Not bloody likely, say you? Well, check out DISK_PAK. *Tim Boyer*, Screen Test. Jul 93, pg. 22.

A debugger to fall in love with. ICobol debuggers have in the past fallen short of potential, opines our columnist, but not anymore. Get ready for a soon-to-be-introduced tool called RAID from Wild Hare Computer Systems. *Tim Boyer*, Screen Test. Oct 93, pg. 16.

PRODUCTIVITY

Remarkable tools. Relational data bases and 4GLs have matured into cornerstone tools for software development efforts. *Kim Medlin*. Mar 93, pg. 10.

Desktop productivity. Want to increase your productivity? Learn to type faster. And take advantage of productivity tools for the Unix office environment that are rapidly approaching parity with those available in other markets. *David Novy*. Mar 93, pg. 15.

The obvious things. The best and greatest productivity tool is your own intelligence. *Doug Johnson*. Mar 93, pg. 17.

A quick tour of the SQL language. Though you've probably heard of SQL (structured query language), perhaps you've never used it. It's easy to learn and difficult to master, but it's a giant step forward for productivity, reliability, and portability. *Kim Medlin*, Ahead With RAD. Jul 93, pg. 31.

SERVICE

You get what you pay for. Fast and reliable service is an absolute necessity for a modern computer center. *David Novy*. Feb 93, pg. 6.

Enterprisewide network service. In network integration as in other aspects of the computer industry, it's service after the installation that counts. *Paula Jacobs*. Feb 93, pg. 9.

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Can-do service. You might be emotionally dedicated to providing superior customer service. But if you don't have a method, all you have is good intentions. *Michael E. Marotta*. Feb 93, pg. 14.

New Year, new structure. You may not need a program to know the DG players these days, but a diagram could help. *Stephen Nikitas*. Feb 93, pg. 16.

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A quick tour of the SQL language. Though you've probably heard of SQL (structured query language), perhaps you've never used it. It's easy to learn and difficult to master, but it's a giant step forward for productivity, reliability, and portability. *Kim Medlin*, Ahead With RAD. Jul 93, pg. 31.

SYSTEM MANAGEMENT

WASHing machines. BJ explains some inside history of the celebrated WASHI chip, and offers a solution to one performance quirk. *Brian Johnson*, System Manager's Log. Jan 93, pg. 10.

Waiting for @Godot. BJ grapples with tricky system startup macros, and returns to an earlier topic: making use of memory for small to moderate size data bases. Also, a bit of grousing about software support for low-budget types. *Brian Johnson*, System Manager's Log. Feb 93, pg. 21.

Staying memory resident. BJ walks you through the procedures and pitfalls of writing an example Cobol program to handle a read-only, memory resident data base. *Brian Johnson*, System Manager's Log. Mar 93, pg. 20.

World's Fastest MOVE. Because of the way that the CLI MOVE command is written, it's faster to move files from one LDU to another by DUMPing to a pipe file and LOADING from the pipe at another terminal. So roll up your sleeves, because BJ begins a several-art series aimed at writing and benchmarking a utility to do just that. *Brian Johnson*, System Manager's Log. Apr 93, pg. 21.

World's Fastest MOVE, Part II. BJ continues building and explaining an alternative to CLI's MOVE command. *Brian Johnson*, System Manager's Log. May 93, pg. 14.

CALLing all programs . . . How many programs do you have that contain files that are infrequently used? That's how many candidates you have for a CALL. *Tim Boyer*, Screen Test. May 93, pg. 20.

The evolution of the system manager. Constant change, both in technology and in the needs of users, now demand a new level of flexibility from system managers. *R. King Ables*. Jun 93, pg. 10.

Adventures in PC Land. Almost anyone can manage a single PC. But managing a PC network is another matter. It requires the kind of manager who's willing to work at

the trial-and-error learning process needed to master the fast-changing technology. *David Novy*. Jun 93, pg. 14.

:WFMOVE continued. :WFMOVE, the "World's Fastest MOVE," continues taking shape in part 3 of BJ's ongoing informational series. Read on, and be amazed. *Brian Johnson*, System Manager's Log. Jun 93, pg. 18.

:WFMOVE wrap-up. With endurance that awes us lesser folks, BJ pushes inexorably onward toward the light at the end of the :WFMOVE tunnel. *Brian Johnson*, System Manager's Log. Jul 93, pg. 26.

Gone fishin'. It was a busy weekend for our columnist—catching a new disk drive, decommissioning some venerable MVs, and wrestling with adapters and an uncooperative RAID 7 box. *David Novy*, Unix Notebook. Aug 93, pg. 14.

Time problems. BJ ponders time and how, despite the direst of warnings, the turn of the millennium just a few years hence will break most of the computer systems in the world. But you can do something about it. *Brian Johnson*, System Manager's Log. Aug 93, pg. 16.

More time tricks. BJ offers a pair of functions for getting current calendar time and converting a calendar time to local time. *Brian Johnson*, System Manager's Log. Sep 93, pg. 24.

SYSTEM SECURITY

Users, privileges, and permissions. In the switch from AOS/VS to Unix, system managers must get familiar with differences and terminology. The author takes a look at the mechanisms used by DG/UX to restrict access to files, devices, and other resources. *Brad Clements*. Jan 93, pg. 4.

Guarding the gates. If system security is easy and manageable, you stand a better chance of keeping intruders out of yours. Guardian offers a wealth of features to shore up your password defenses and shut out hacking miscreants. *Tim Boyer*, Screen Test. Mar 93, pg. 26.

Don't settle for vanilla! New AOS/VS features allow system managers much more flexibility in handling security. *Tom Gutnick*. May 93, pg. 6.

How safe is your system? Take a day to find out. You'll never make your system totally secure—at least not if any productive work is to get done—but you can certainly improve your odds for guarding against hackers, cyberpunks, and other malicious types. *Tom Gutnick*. Nov 93, pg. 35.

50+ ways to participate in Computer Security Day. Sidebar to "How safe is your system? Take a day to find out." *Tom Gutnick*. Nov 93, pg. 36.

UPGRADES

The latest and greatest. Too many customers have been sold systems based on the promise of milk and honey, only to awake shortly after installation and realize that maybe their old systems weren't so bad after all. *Rick Havourd*. Apr 93, pg. 6.

The disk-upgrade muddle. It might be just what you need, but disk-upgrade options are varied and often confusing. *Dick Mooney*. Apr 93, pg. 9.

Thanks for the memory. Suffering with slow processing? Remember a simple adage: Add memory. *Dan Gallagher*. Apr 93, pg. 17.

1993: The year of the upgrade. Blazing-fast CPU chips combined with symmetric multiprocessing. Here's another way to think of upgrades: change platforms. *David Novy*, Unix Notebook. Apr 93, pg. 19.

USER GROUP

Changing times. *Jan Grossman*, President's Page. Jan 93, pg. 2.

NADGUG: as good as you make it. *Tim Boyer*, Executive Message. Feb 93, pg. 4.

NADGUG is for YOU! *Frank Perry*, Executive Message. Mar 93, pg. 4.

Springing forward. *Jan Grossman*, President's Page. Apr 93, pg. 4.

NADGUG 93: The right investment. *Steve Pounds*, Executive Message. May 93, pg. 4.

Sweating the details. NADGUG's board of governors consists of a dedicated core group of professionals who are willing to put the time and energy into making the user group successful. *Doug Johnson*, Editor's Note. Jun 93, pg. 4.

Black ink again! *Dennis Doyle*, Executive Message. Jun 93, pg. 4.

A UK welcome. *Jan Grossman*, President's Page. Jul 93, pg. 4.

Members, members, members! *Frank Perry*, Executive Message. Sep 93, pg. 4.

Atlanta: the sweetest peach in the South. High tech meets Southern hospitality for those attending NADGUG 93. *Doug Johnson*. Sep 93, pg. 18.

Training, networking, & technology. It's the largest gathering of Data General stuff in the world. NADGUG 93 features a full slate of events. Included here is a preliminary agenda to whet your appetite. Sep 93, pg. 20.

Something for everyone. *Calvin Durden*, Executive Message. Oct 93, pg. 4.

TNT—Training, Networking, and Technology. *Brad Friedlander*. Nov 93, pg. 8.

Conference reminiscing. It's been a good year, and a good 20 years. *Jan Grossman*. Nov 93, pg. 22.

Looking waaaayyyy back. *Jan Grossman*. Nov 93, pg. 22.

I (don't) miss my CS-40. *Tim Boyer*. Nov 93, pg. 22.

X-WINDOWS

The heart of the GUI. Second of two parts (part 1 appeared in November 1992)—The author continues a demonstration of helpful X-Windows utilities. *Pete Szaban*. Feb 93, pg. 31.

A bit more comfortable. In the wonderful world of X-Windows you have the power to customize your operating environment. *Joe Cannata*. Aug 93, pg. 24. Δ

The latest products for DG systems

Reverse engineering for Infos

Baton Rouge, LA—Chen & Associates, maker of the ER-Modeler package, announced release of the MS-DOS version of its Reverse Engineering tool for Data General Infos (ISAM and DBAM). The MS Windows version is under development.

The Chen ER-Modeler is a CASE workbench for optimal data base design. Data and process modeling, schema generation, and reverse engineering for more than 30 data base management systems (DBMS) are supported. Migration/conversion and normalization are supported. Entity-relationship notations, Gane-Sarson and Yourdon-DeMarco notation are used. A full suite of dictionary reports is produced.

The Reverse Engineering tool for DG Infos captures structure definitions from input data definition schemas, and generates an ER diagram representing users' information requirements. The diagram can be normalized and used to generate schemas for design, prototyping, and conversion. The system is priced starting at \$895.

Chen & Associates, Inc., 4884 Constitution Avenue, Suite 1-E, Baton Rouge, LA 70808; 504/928-5765.

Automated tape libraries

Boulder, CO—The Alexandria Backup Librarian Software from Spectra Logic will support Exabyte's EXB-10e and EXB-60 8 mm cartridge handling subsystems, in addition to the EXB-10j and EXB-120. Together, they automate tape operations, reducing labor costs and eliminating human error.

Alexandria is a comprehensive Unix software package designed to manage data on automated media changers. It automates the Exabyte tape libraries, supervising every facet of backup and archival storage from automatically starting scheduled store operations to managing data, media, and device maintenance across an entire network.

A client/server application, Alexandria allows clients to back up to any server on the network; allows file catalog information be centralized or distributed; allows stores to be launched locally or remotely; and manages data and media in libraries across a network. Alexandria automates backup



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PRODUCTS AND SERVICES

across heterogeneous Unix networks, including Data General's Aviiion.

Designed for workstations, networks, and midrange environments, Exabyte's SCSI-2 library products combine 8 mm tape drives, Exatape 8 mm data cartridges, and sophisticated robotics architecture in compact enclosures. Product capacities range from 50 GB to 580 GB (up to

1,160 GB with compression).

Spectra Logic, 1700 North 55th Street, Boulder, CO 80301; 800/833-1132.

High-end conferencing with new features



Troy, NY—Caucus 2.5 is a high-end BBS, e-mail, and conferencing system

including a number of new features.

Individual responses to Caucus discussions may be selected by date, numbered range, or "newness" to the user. Files of any type (spreadsheets, graphics, etc.) may be attached to Caucus discussions; the system automatically determines how to display attached files. A "SHOW SINCE" feature allows users to show information entered since a given date.

Add-on program, "Wigwam," provides a Microsoft Windows-based off-line reader. Caucus supports file libraries, parallel to conference structure with a special menu interface. File-transfer protocols supported include Kermit, Xmodem, Ymodem, and Zmodem.

Internet mail may automatically be imported into Caucus mailboxes at any time. Users can check new conference activity before joining any conference. Inactive users can be expired.

Camber-Roth, a division of Aule-Tek, Inc., 1223 Peoples Avenue, Troy, NY 12180; 518/273-0983.

Faster, cheaper meetings in The Meeting Room



Indianapolis, IN—"The Meeting Room" from Eden Systems Corporation enables users to hold meetings electronically on PCs and networks that a company already has in place.

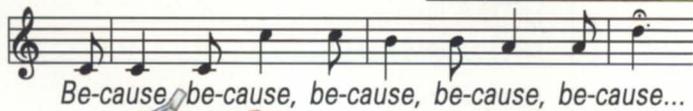
Meetings can be conducted in The Meeting Room from start to finish—from setting an agenda ad inviting participants; through discussing issues, making decisions, and assigning tasks; to distributing meeting minutes, communicating results, and thanking participants for their contributions.

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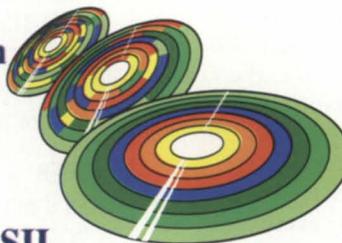
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How's your memory?

NADGUG trivia from the Atlanta conference

CATEGORY: Data General Corporation

1. Who was the founder of Data General?
a) Herb Richman;
b) John Akers; or
c) Edson de Castro
2. In what year was Data General founded?
a) 1970; b) 1968; or c) 1965
3. Who was the Data General Engineering Manager that led the team that developed the Eclipse, a high-speed 32-bit computer described in The Soul of a New Machine?
a) Tom West;
b) Edson de Castro; or
c) Tim Boyer

4. For what company did the founder work before founding Data General?
a) IBM;
b) Control Data; or
c) Digital Equipment
5. Who was CEO of Data General in 1991 when Clariion was announced?
a) Tom West;
b) Steve Baxter; or
c) Ron Skates

CATEGORY: Techno Winners

1. What became the official name of AOS/VS, Rev. 8?
a) Unix;
b) AOS/VS Classic; or
c) AOS/VS II
2. In what year was the first Eclipse computer introduced?

- a) 1974; b) 1972; or c) 1968
3. In what year did Data General introduce its first 32-bit computer?
a) 1978; b) 1980; or c) 1985
4. In 1976, Data General went outside the company and purchased a programming language to sell. What was that language?
a) C;
b) Business BASIC; or
c) Progress
5. In what year did Data General introduce the AViiON?
a) 1986; b) 1990; or c) 1989
6. In what year did Data General introduce DATA GENERAL/One Personal System?
a) 1984; b) 1985; or c) 1980
7. What does CEO mean (first introduced in 1981)?
a) Chief Executive Officer;
b) Comprehensive Easy Open; or
c) Comprehensive Electronic Office

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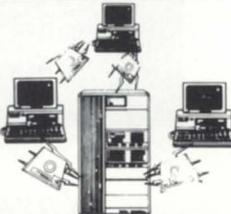
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CATEGORY: NADGUG History

1. *What two names has the User Group had?*
a) BRADGUG and UG;
b) NADGUG and BDGUG; or
c) NADGUG and DGUG.
2. *Who was the first elected President of NADGUG?*
a) D.B. Simmons;
b) Lee Jones; or
c) Brad Friedlander
3. *Who was the first woman NADGUG President?*
a) Jan Grossman;
b) Pat Schultz; or
c) Joyce Carter
4. *In what city was the 5th Annual Conference?*
a) Chicago;
b) Boston; or
c) Lake Geneva
5. *In what city was the 10th Annual Conference?*
a) San Diego;
b) Minneapolis; or
c) Toronto
6. *What Conference site had the first NADGUG Conference Theme?*
a) Orlando;
b) Philadelphia; or
c) Las Vegas
7. *What Conference marked the first Combo Meeting (DG Sales, DG VARs, and NADGUG)?*
a) 1989 New Orleans;
b) 1987 Las Vegas; or
c) 1990 Seattle
8. *What Special Interest Group Roundtable has had the most controversies at Conferences?*
a) RDOS;
b) OASIS; or
c) AOS and AOS/VS
9. *Who always wears a red blazer at NADGUG Conferences?*
a) Frank Perry;
b) Ed Lindberg; or
c) Dave Novy

CATEGORY: NADGUG Exhibitors

1. *In what year and where did*

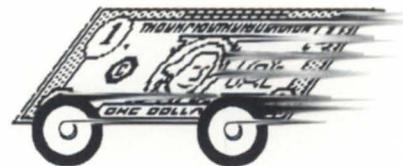
Exhibits with third-party vendors begin?

- a) 1981 San Francisco;
 - b) 1982 Washington, DC; or
 - c) 1979 New Orleans
2. *In what year and where did the Exhibits move to a Convention Center?*
a) 1985 Boston;
b) 1987 Las Vegas; or
c) 1989 New Orleans
 3. *What Exhibitor has been present at every Conference?*
a) Eagle Software;
b) Data General; or
c) Gerry Manning & Associates
 4. *What doorprize (now illegal to buy) was given away by Wild Hare in 1983?*
a) DG/One;
b) Krügerand; or
c) Silver Dollar

CATEGORY: Focus Magazine

1. *In what year was the first user group newsletter published?*
a) 1968; b) 1974; or c) 1985
2. *In what year was the first Focus newsletter published?*
a) 1986; b) 1970; or c) 1977
3. *In what year was the first Focus Magazine published?*
a) 1985; b) 1987; or c) 1990
4. *Who was the editor for the first Focus Magazine?*
a) Brian Johnson;
b) Tim Boyer; or
c) Greg Farman
5. *Who is the current editor of Focus Magazine?*
a) Steve Baxter;
b) Doug Johnson; or
c) Maggie Morris
6. *What other publications were also dedicated to Data General Users prior to 1992?*
a) PC WORLD and COMPUTERWORLD
b) DG REVIEW and DATABASE MONTHLY
c) DG REVIEW and UNIX WORLD

See answers listed on page 18



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ON-LINE HELP

Who to call for answers about NADGUG and FOCUS

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

FOCUS Magazine address:
 c/o Turnkey Publishing, Inc.
 P.O. Box 200549
 Austin, TX 78720
FAX: 512/335-3083

NADGUG

Membership, RIGs, SIGs

NADGUG staff **800/253-3902**
 (Outside the U.S and Canada.) **508/443-3330**

Electronic bulletin boards

(300,1200, 2400, or 9600 baud modem)
 Rational Data Systems **415/499-7628**
 DASH bulletin board (2400 bps modem) **800/DASH-CSC**
 Data General Customer Support Center **800/344-3577**

FOCUS Magazine

512/335-2286

Editorial comments, article suggestions Doug Johnson
 (please send product announcements to the address listed above)

Information about advertising Susan de Blanc

FOCUS back issues Turnkey Publishing staff

Continued from page 24

been fully debugged before putting them into production.

Summary

Although performance monitoring and tuning are not an exact science, Data General includes numerous utilities to assist in analyzing performance data and for taking corrective action when necessary. Often the task may be too complicated and time-consuming for customers or value-added resellers (VARs) to solve on their own. In these cases Data General's System Evaluation and Performance Analysis Center (SEPAC) can assist with additional performance expertise. △

Thomas E. Soukup is a member of the Technical Services Group at Data General Corporation in Atlanta, Georgia. He serves currently as the worldwide benchmark coordinator. Copyright © 1993 by Data General Corporation. All rights reserved.

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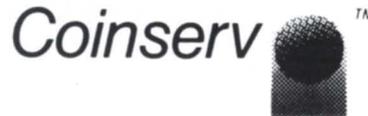
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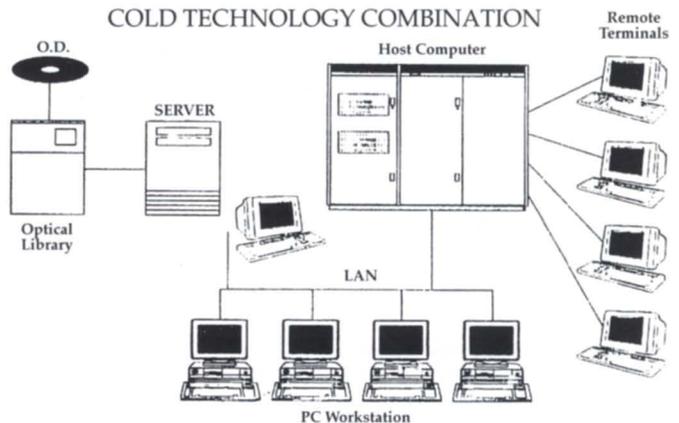
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DASH Items...



Category: DG/UX

Author: **BRUCE ANDERSON**
 Subject: *lp* and *lpstat*

I am not happy with the information provided by the *lpstat* command. What I would like would be information on priorities and forms needed by each request. Is this info available, and could anyone direct me toward it? Thanks!

Reply by: **WILEY N. JOHNSON**

Try doing an *apropos lp* command or an *apropos printer* command to the shell. This will give you several commands that can be used directly. *Sysadm* is only a shell script and builds command lines.

Or print out the *sysadm* scripts and see what is done when you do a status display from *sysadm* of a printer.

Author: **WENDELL DINGUS**
 Subject: *Remote printer*

Does DG/UX directly support a remote dialup modem-attached printer? I've got a customer wanting to have a couple of printers with modems around town and have an Aviion (via proper software, of course) call up the printers and print out important messages throughout the day.

Could it be as simple as having the software do a *cu printername* with that set up to dial the printer, and just dump the contents of the file to print? Any ideas of specifics on how to do this? Do I need to use a different device name for a modem to use *cu* with it? (doing *cu -m -l tty?* for that port would not work).

Does the *lp* spooler in any way sup-

port this type of printer, or will it totally be a custom script that just copies the data to the port eventually making it to the printer?

Category: NADGUG

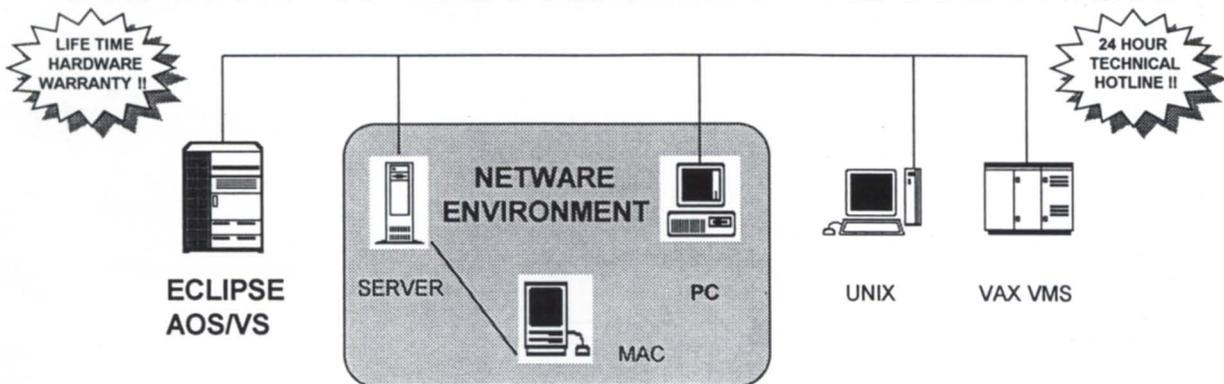
Author: **DAVID KRUSEMARK**
 Subject: *Quest game*

Just curious, but does anyone know the origin of the Quest game that is on the NADGUG tape?

I would love to see the source code for it. Δ

DASH runs on an Aviion 5200 server located at the Customer Support Center in Norcross, Georgia. The bulletin board is available 24 hours per day, 7 days per week, free of charge. Call 1-800-DASH-CSC (1-800/327-4272) for the modem rotary.

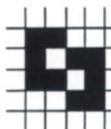
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