

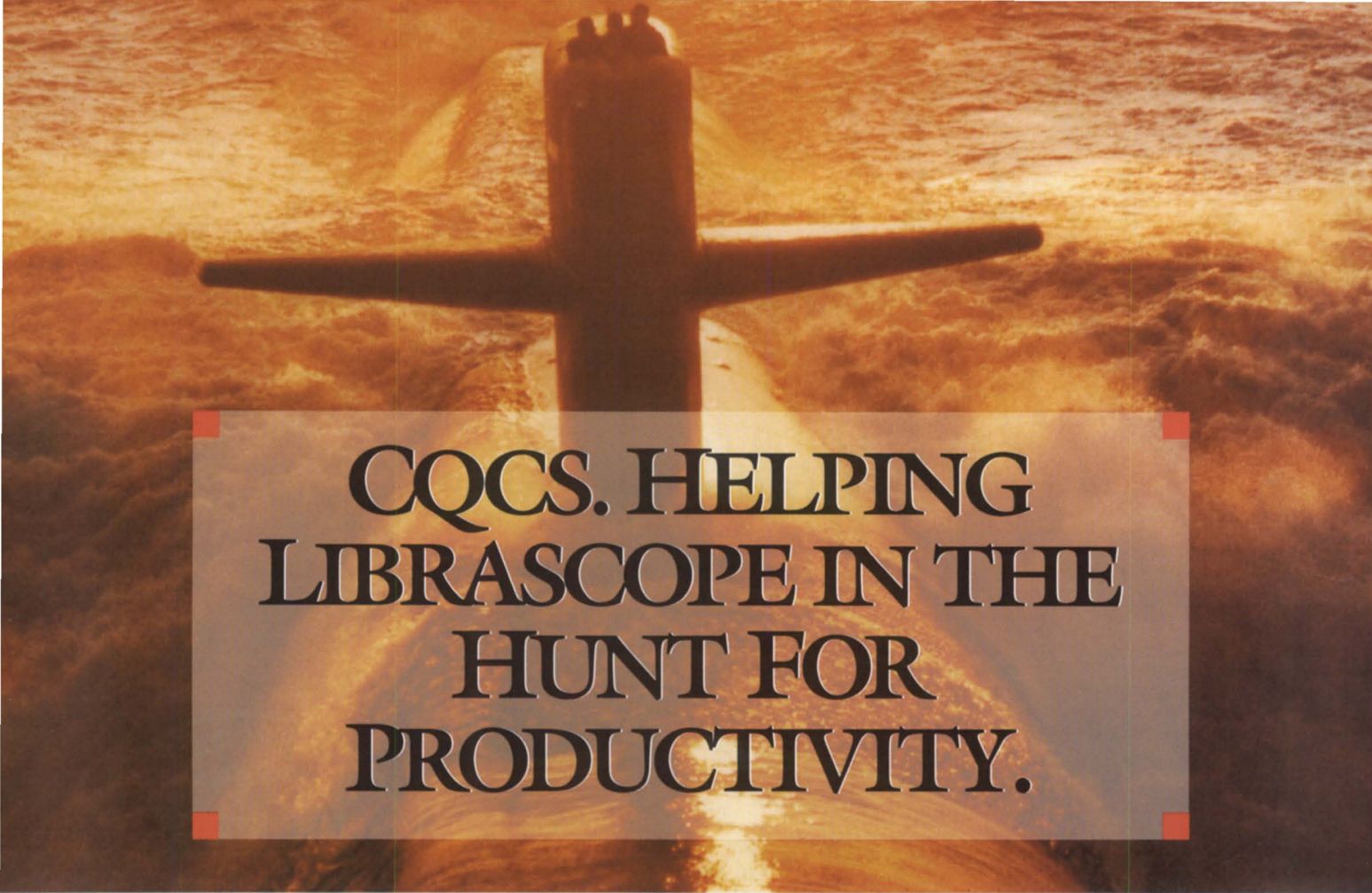
June 1991

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The Magazine of the North American Data General Users Group

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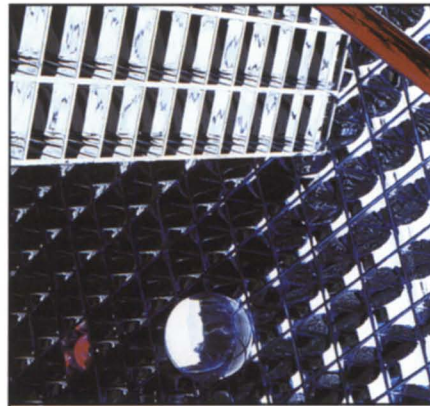
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Food for thought

Progress! That's what Data General has made on the backlog of STRs (software trouble reports) reported in this magazine two months ago. Earlier this year, Data General and NADGUG representatives met together to make a "hot list" of issues regarding STRs. The result will be fix-only releases of CEO and AOS/VS II sometime this summer. The next version of AOS/VS will reflect the fixes made in AOS/VS II. Data General is committed to making a significant reduction in the number of STRs by the end of this year. We commend the efforts of the individuals involved in bringing about a positive resolution to the STR backlog.

Installing Unix on your system? Thinking about buying an Aviiion computer, but wondering what you're going to do with it? Let us know the kinds of questions you have about using Unix. *Focus* is pleased to announce that longtime NADGUG member David Novy, technical computing specialist for 3M and a renowned "dabbler," is now a contributing editor. On a regular basis, he'll bring you information about using your Unix machine. This month in the Unix Notebook (page 34), for example, he describes a simple macro for doing Unix file system backups over a network. Because Unix is new to many people in the Data General community, and conversely, Data General is new to many people in the Unix community, David would like to hear your suggestions on what Unix topics you would like to see in *Focus*. You may call David, or write a note to him on one of the Reader Service cards between pages 6 and 7 of this magazine, and we'll see that he gets the information.

Zip over to our "Focus on:" section, beginning on page 6. Networking is one of those topics we revisit from time to time in these pages, because it is an area undergoing constant change. There are many facets of the topic to explore, and so this month we're presenting three very different yet appropriate articles. In a feature article, *Focus* contributor Doug Kaye sorts out the differences between "LANs, MANs & WANs." Russell K. Arakawa, a technician-turned-businessman with a love of communications, tells you how to connect to today's far-flung resources. Arlene Blouch gives us the nuts and bolts of making a local area network work in an Oracle environment.

Zoom! That describes the upward movement of DG stock since the reporting of two consecutive profitable quarters. DG stock, down to 4.5 points at the beginning of the year, has since risen 300 percent, to 18 as of this writing. The most frequently heard comment around our office is: "I wish I had bought DG stock in January!" Analysts who proclaimed DG's impending doom are now eating their words. On page 44 you'll find complete results of Data General's second quarter earnings.

All that good news stirred up some appetites at Data General. On March 23, the day DG's second quarter financial results were announced, Ron Skates treated all the Westboro employees to lunch. Eighteen-hundred pizzas were served up at "the commonwealth's biggest pizza party." Δ

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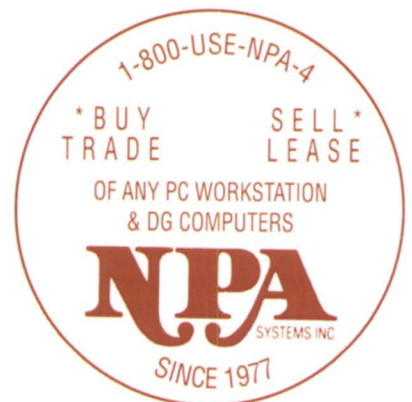
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Strung out macro

Why would anyone want to write something as complex and indecipherable as Mr. Hill's "CLOCK.CLI" (*Focus*, April 1991)? Talk about being "strung out" (pun definitely intended)!

Have you ever noticed that each attempt to improve upon those new powerhouse languages includes adding some new Cobol-like features, i.e., "The single most important addition to CL132 was the addition of named strings, and variables."

Enclosed is a Cobol clock that took approximately 15 minutes to code and practically anybody (including non-programmers) can understand.

Sincerely,
Vinson F. Nash
MIS director
Insurance Group Associates

```

000100 IDENTIFICATION DIVISION
000200 PROGRAM-ID. CLOCK
000400 DATE-WRITTEN. FEB 1988.
001500 ENVIRONMENT DIVISION.
001600 CONFIGURATION SECTION.
001700 SOURCE-COMPUTER. MV8000II.
001800 OBJECT-COMPUTER. MV8000II.
002700 INPUT-OUTPUT SECTION.
005100 DATA DIVISION.
013300 WORKING-STORAGE SECTION.
013900 01 TIME-NOW.
014000 03 HH PIC 99.
014100 03 MM PIC 99.
014200 03 SS PIC 99.
014300 01 TODAYS-DATE.
014400 03 IN-YR PIC 99.
014500 03 IN-MTH PIC 99.
014600 03 IN-DAY PIC 99.
015100 01 MTH-DESC-TABLE.
015200 03 DMTH PIC X(36) VALUE
        "JANFEBMARAPRMAYJUN-
        JULAUGSEPNOVDEC"
015300 01 MTH-INDIVID REDEFINES MTH-
        DESC-TABLE.
015400 03 MTH-DESC PIC X(3) OCCURS 12
        TIMES.
        01 ESC-VALUE PIC 99.
        01 SELECTION PIC 99.
021800 SCREEN SECTION.
021900 01 DATE-TIME.
        02 DATER.
022000 03 BLANK SCREEN.
022400 03 COLUMN 62 PIC XXX FROM
        MTH-DESC (IN-MTH).
        03 COLUMN 66 PIC 99 FROM IN-
        DAY.
        03 COLUMN 69 PIC 99 FROM IN-YR.
        02 TIMER.
022500 03 COLUMN 73 PIC 99 FROM HH.
022600 03 ":".
022700 03 PIC 99 FROM MM.
        03 ":".
        03 PIC 99 FROM SS.
025900 01 SELECT-OPTION.
026000 03 LINE 20 COLUMN 44 PIC 99 TO
        SELECTION AUTO.
033800 PROCEDURE DIVISION.
037200 MAIN SECTION.
037300 GET-DATE.
        ACCEPT TODAYS-DATE FROM DATE.
        GET-TIME.
        ACCEPT TIME-NOW FROM TIME.
054800 GET-SELECTION.
055000 DISPLAY DATE-TIME.
055100 ACCEPT SELECT-OPTION TIME-OUT
        AFTER 05 SECONDS.
055200 ACCEPT ESC-VALUE FROM ESCAPE
        KEY.
        IF ESC-VALUE = 99
            PERFORM GET-TIME
            GOT TO GET-SELECTION.
        STOP RUN.

```

Another view on "Gooeys"

I'd like to point out a few differences I have with Doug Kaye's March 1991 *Focus* article titled "Unix Gooeys":

1) The "standard" Unix workstation screen dimensions are 1280 x 1024. Sun has, in the past, shipped 1170 x 780, but has recently changed to the higher resolution. Some X-terminals use this lower resolution, but are moving up to the higher resolution. Super VGA (sometimes called XVGA) in the PC marketplace are using 1170 x 780. To my knowledge, all other workstation vendors provide 1280 x 1024 or higher.

2) The number of pixels per inch (dpi) is a function of resolution and screen size. Even on the larger monitors (e.g., 19-inch or 20-inch) with 1280 x 1024 resolution, it turns out to be about 92 dpi. On a 16-inch monitor, or NCD's 15-inch X-terminal display, the dots-per-inch is even higher. What is more relevant is that most (per-

haps all) Unix workstations have a 1:1 aspect ratio.

Data General's Aviion workstations with either the 19-inch or 20-inch monitors are 1280 x 1024 at about 92 dpi, with a 1:1 aspect ratio.

3) The Open Software Foundation's Motif, in its Application Environment Specification, has definitions for all three mouse buttons. All Motif applications that I have used on Aviion workstations have taken advantage of all three mouse buttons.

To my knowledge, only Apple's Macintosh defines and uses a single-button mouse. Microsoft's MS Windows 3.0 and Presentation Manager define a two-button mouse.

4) The Motif Reference listing, which I received from OSF in September 1990, lists no less than 224 applications, and that was six months ago. This is a far cry from the "two dozen major applications" you mentioned. Further, OSF has licensed Motif source code to over 900 companies in 25 countries representing 72 percent of

worldwide computer suppliers: 120 hardware platforms with 42 operating systems. The European Economic Community, 880pen Consortium, American Airlines, General Motors/EDS, The Marriott Corporation, McDonnell-Douglas, and the CAD Framework Initiative have all endorsed OSF/Motif as their GUI standard. In addition, several major government agencies have standardized on OSF/Motif, including the U.S. Air Force and the U.S. Navy.

Thanks for the opportunity to express another view.

Tim Reiter
GUI Product Manager,
Open System Marketing
Data General Corporation

Thanks for the corrections and rebuttal, Tim. Too bad I didn't think of calling you in the first place—you could have saved me all that reading!

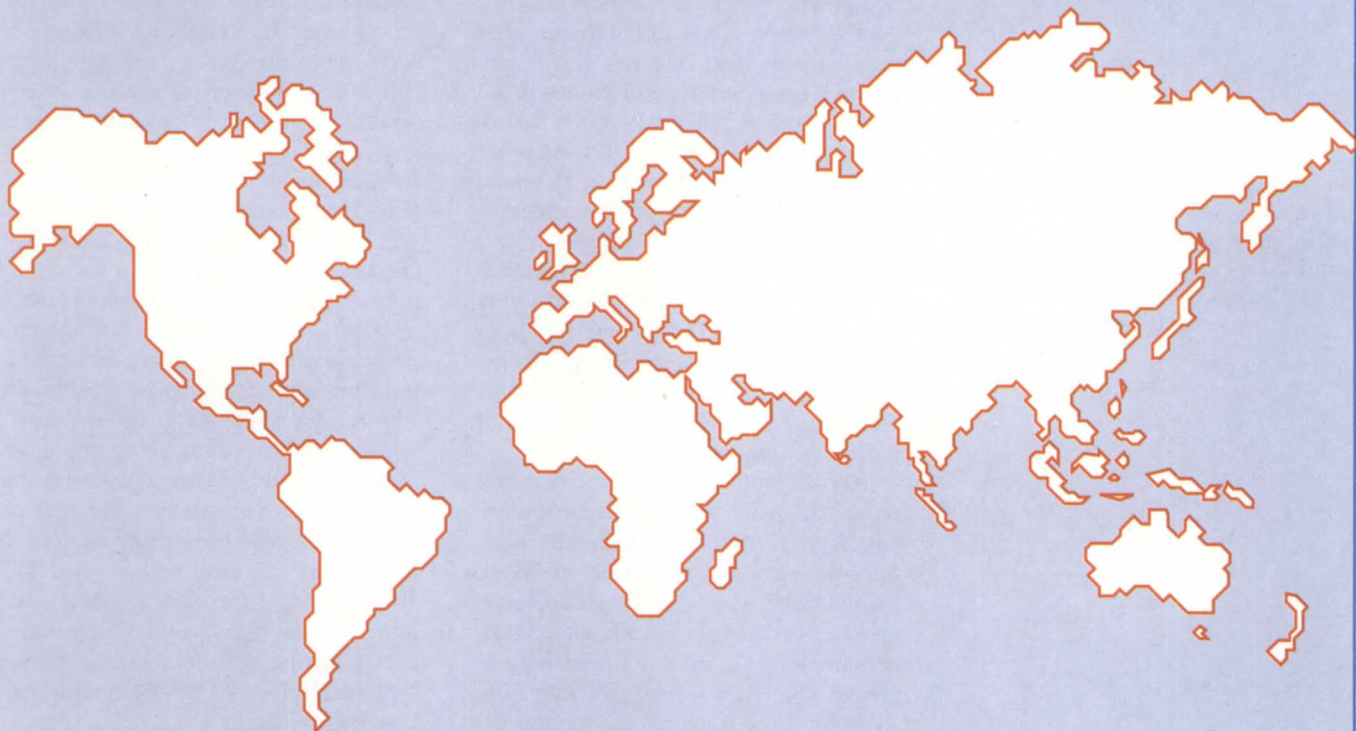
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Network attributes

by Doug Kaye
Contributing editor

SYNOPSIS

LANs, MANs, and WANs are separated by more than distance. Other properties to consider are ownership, data rate, propagation delay, and access delay. The trick is to balance these attributes with their costs.

Aren't there enough three-letter acronyms in this business? There are 17,576 of them possible—only 10,140 if you insist they have at least one vowel. I figure unused three-letter acronyms will be added to the endangered species list before the end of the century. On the other hand, I'm sure glad I don't have to write out things like "metropolitan area network" all day long. But I digress.

This section of *Focus* is all about these LAN (local area network), WAN (wide area network), and MAN (metropolitan area network) things, and I've got the job of trying to sort out the differences. LANs are "local," you might say. Ahhh . . . but it's just not that simple.

In addition to distance (we call it network "diameter"), there are four, more subtle properties of a data communications network that must be considered: ownership, data rate, propagation delay, and access delay. I've stuck some numbers in Figure 1, but don't take these as gospel—they're just examples. In reality, there can be a tremendous overlap between LAN, MAN, and WAN technologies. There's always a balance between these attributes and cost, for you can make distant systems communicate as though they were quite close, but it's going to cost you.

Diameter

Diameter is the most obvious attribute.

(What is the distance between the two farthest nodes on the network?) It is the most basic differentiating attribute for a number of reasons. First, the longer the wire, the more it's going to cost. Second, as we try to maintain the same data rate, it's going to cost more and more as the network diameter increases. If we try to maintain costs, the data rate will have to decrease as the diameter increases.

One way to cut costs as the data rates go up and the diameter grows is to share the network with others. There are some interesting implications to this. First is security. A LAN can be made quite secure. If you run optical fiber, for example, and make sure your LAN never passes through a wall or other obstruction (i.e., you can visually examine the entire length of the fiber), you can ensure that no data is "tapped" from the fiber itself. A MAN leased line is more vulnerable to intentional intrusion, but a public packet-switched network (WAN) is clearly the least secure of all.

Beyond security is another, less obvious issue related to ownership. What does it cost to actually *use* your network? A public data network (PDN) charges by the packet. What does this mean? It means you'll scrutinize your applications and protocols quite carefully in order to minimize your use of the network. In fact, when it comes time

Figure 1: Typical network attributes

Network	LAN	MAN	WAN
Diameter	100 m	10 km	10,000 km
Ownership	Private	Leased	Shared
Data rate	10 MB	1 MB	100 KB
Propagation delay	1 usec	1 msec	100 msec

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to keep costs down, you'll actually find yourself discouraging the use of most PDNs.

A LAN, on the other hand, costs you nothing to use. You pay for it once when you put it in, and that's it. You pick your protocols for speed and reliability, not efficiency, but you won't typically select one application over another just because it uses the medium more efficiently.

Data rate and propagation delay

These attributes are often confused with one another. Does a 10 MB ethernet imply you can move 10 million bits per second (MBPS) from one node to another? No. Most computers won't be able to pump data onto the wire at that rate, and certainly can't accept it and write it to disk that quickly.

Does a higher data rate mean the bits

get to the other end more quickly? No, that's a factor of the media velocity, or "propagation delay." An ethernet runs at 0.77 times the speed of light, for example. You can move 5 MBPS (data rate) through a satellite video link even though there's a one-quarter second propagation delay due to the distance travelled.

Specifically, the data rate tells you the time between the bits once it's your turn to transmit your data. That's all. What this *really* tells you is the total capacity of the network and, therefore, the number of people who can use it simultaneously.

Propagation delay, on the other hand, tells you how long it will take for a chunk of data to get from one end of a connection to the other. This may be important, for example, if a user is waiting for an echoed keystroke, or if an underlying transport protocol needs to receive an acknowledgement of each packet prior to transmitting the next one.

Those 1 MBPS Starlans didn't die just because their clock speed was one-tenth that of ethernet. They died because they could support only one-tenth as many users. Moving a file over a Starlan means you'll tie up 10 times the percentage of total available network bandwidth as you would moving the same file over an ethernet, and 100 times as long as if you used FDDI (100 MBPS fiber).

Access delay

This final attribute is also important when evaluating the total throughput of your network. What good is it to have a 10 MB ethernet, for example, if you have to wait 100 msec between transmission of each 1 KB frame? If you've used a multiplexor to connect remote terminals, you know exactly what I mean. A 56 KB line is shared by 100 users, sure—the data moves from one end to the other really fast. But how long does each character have to wait in a buffer until its turn to be transmitted?

It is this access delay, not the data rate, that will play a greater role in determining the "speed" of many networks. Δ

Doug Kaye is president of Rational Data Systems, Inc., and can be reached at 1050 Northgate Dr., San Rafael, CA 94903; 800/743-3054. This article is excerpted from the RDS "Report on PC Integration." For a free copy, contact RDS. Copyright 1991 Rational Data Systems.

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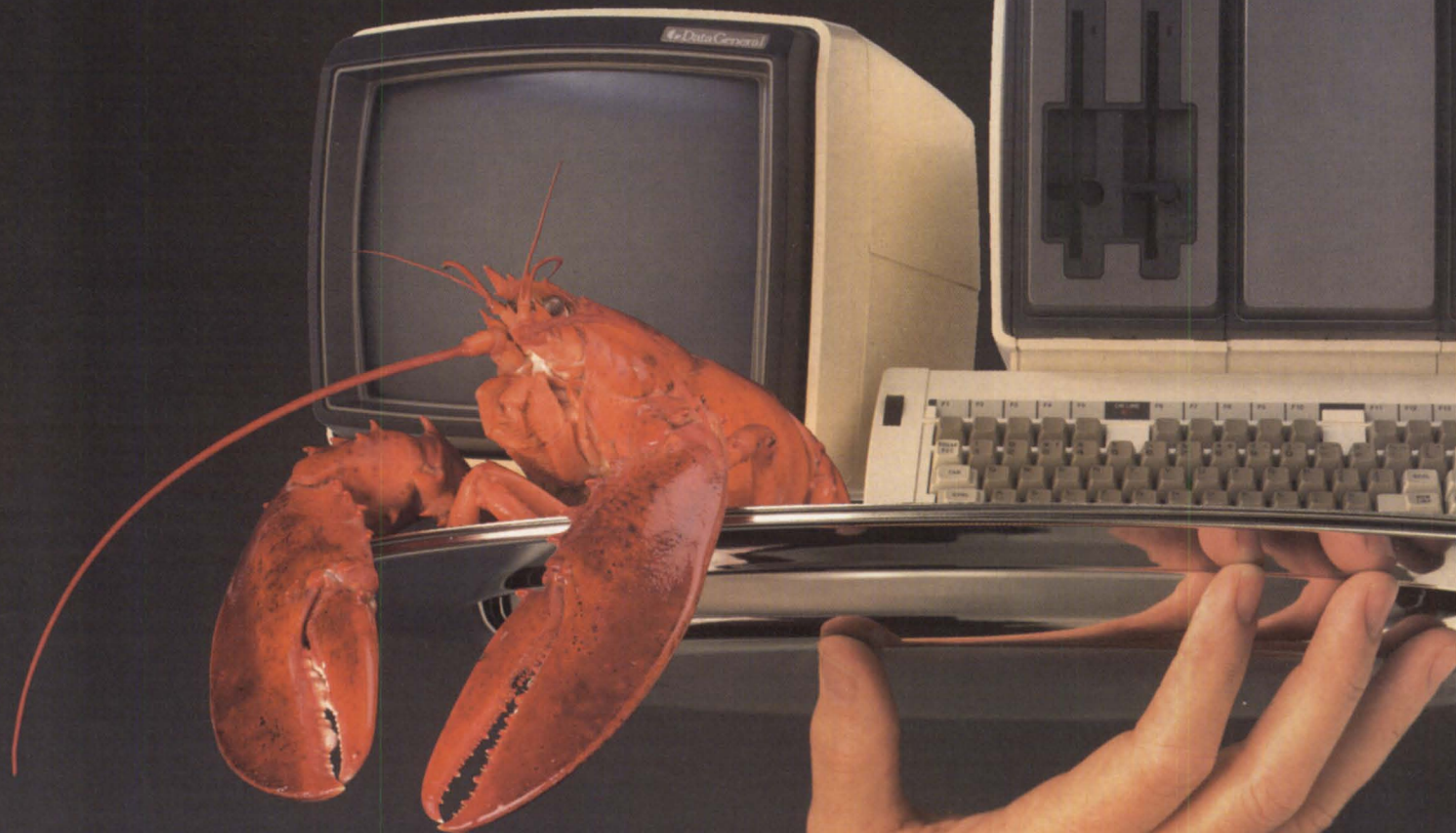


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Technology's arsenal

SYNOPSIS

This article covers the issues that face data processing managers implementing wide area networks in the fast-paced world of modern computing. The issues have not changed drastically, but the solutions have.

by Russell K. Arakawa
Special to Focus

Wide area communications is constantly changing as technology pushes forward. This is good for corporate America, but challenging for the person in charge of making three different topologies work on two different platforms across five different states. I tip my hat to those of you who hold these positions.

I have always been fascinated with data communications. My involvement with data communications began in 1979, when I took a position as a field service technician. At that time, 1,200 bps was high-speed communications, and a company by the name of Hayes was not even a player in the modem marketplace. In 1987, I started a company called DCD, Inc., which concentrates on the networking of people and their resources. One thing that has not changed over the years is that people need access to resources. Those resources are not always in the same building, or in the same state, for that matter.

Wide area networking

What has been accomplished in the last decade? The answer is "an awful lot!" The gap between remote users and their resources has narrowed significantly. Hundreds of applications that seem simple today were inconceivable in the late 1970s and early 1980s. Advances such as Trellis Coded Modulation make V.32 modems (9,600 bps true full duplex on a two-wire dial-up line) a reality. High-speed data

links (like T1 and DDS 56K) have become household words in the industry because of an increase in the need for speed. A number of different things have happened to make high-speed data communications more affordable. The AT&T divestiture paved the way for competitive pricing of high-speed digital data service. The cost to manufacture digital high-speed communications equipment is less because the devices have a simpler task and require less circuitry.

So where does this leave us? Well, things do not seem to be getting done any faster. The faster we make the computer equipment, the more taxing the software developers make the programs. Ten years ago, a 33-MHZ processor supporting 100 users could run a multi-million-dollar company. Today, a processor of comparable speed often resides on a single user's desktop (and the user releases an impatient sigh while waiting a whole five minutes for a job to finish). This is not to say that we are no better off than when we started. In reality, there is a large arsenal of technology and equipment available to the network manager responsible for providing resources to the users.

Keys to wide area networking

Managing a wide area network (WAN) can be equated sometimes to handling nuclear waste with an oven mitt. The task can be enormous. If you don't agree, then ask yourself a few questions. What happens if your existing operation is doubled or tripled? Will you be able to effectively

troubleshoot the system? Will it require you to raise the computer room floor another 24 inches to accommodate additional cabling? Are you ready to migrate to the next generation of technology? Clearly, successful network management depends on a well-thought-out plan. In fact, the plan forms the very rules by which the network will be managed to ensure that a positive direction can be achieved.

Adhering to standards set by governing committees is the only way to preserve the option of a multi-vendor environment. Standards have become more prevalent in the last five years, and we have 5,000 acronyms to prove it. Thank goodness for all the standards. Without them, we would be stuck in our own little worlds looking at each others' operations and saying, "That's a weird way of doing things." Communicating amongst each other would not be possible without reinventing the wheel. In addition to communicating with outside resources and users, there are internal reasons for sticking to standards. You never know what's going to show up in the computer room next, and it will be your job to make it talk to this or that. Companies' needs are constantly changing, and interfacing with that new device the CEO or sales manager heard or read about will make things a lot easier.

You would have to have a crystal ball to accurately plan for the future in this day and age. Unfortunately, the saying, "Failure to plan is planning to fail," is all too true. Implementing some kind of network control can aid in future direction, network management, and the troubleshooting of problems.

The network controller

The network controller that is well suited for the Data General environment is digital PBX, or Private Branch eXchange. A digital PBX allows the manager to control both local and remote devices. The PBX will "front-end" the DG computer and act as a traffic cop for the network. Additional benefits include the ability to share computer ports and the ability to switch between different DG computers.

The PBX is often referred to as a switch. Most of us have experienced using a telephone on a large voice PBX. The PBX controls all of the telephone handsets as well as the incoming and outgoing phone lines. A digital PBX works in the same

manner, providing a central control point for hundreds of local terminals and remote multiplexors.

Here are some of the important features a digital switch should provide:

Dual session—This feature allows users to access one resource, start a job, put that session on hold, and establish another one. At this point the user has the ability to hot key between the two sessions.

Character disconnect—This feature is very important when switching between DG computers. It ensures that whatever method the user uses to disconnect, the PBX will automatically log off the CPU port and make it available to the next user. From a security standpoint, you would not want a remote user to be disconnected unintentionally when the modem loses carrier. Otherwise, the next incoming user

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will connect to that port.

X.25 support—This is the most popular interface for the networking of unlike devices. This capability affords you versatility when future needs become a reality. Some PBXs can look like a PAD (Packet Assembler/Disassembler).

TCP/IP connectivity—This is the common denominator for different operating systems and computers to communicate

together. It is also key in communicating with a local area network (LAN).

Digital data service

Now I would like to go over some facts about digital data service. DDS has been available for quite some time. In the beginning, DDS rates were considered to be high, but they are steadily decreasing as more organizations choose digital data

lines over the old analog lines. The reliability of DDS is excellent. Because the digital system is automated, most common carriers will quote you an uptime of 99 percent or better.

T1—This is the description of a 1.544 mbps digital data line. It is made up of 24 x 64 kbps time slices. Bell uses 64 kbps for toll quality voice. Your voice would be sampled as any analog signal, eight times per second, which is 64 kbps for one voice circuit. Put 24 voice circuits together and you have a T1 circuit. To cost-justify a T1 circuit, many companies will use a voice/data multiplexor.

Here are a two more terms that are sometimes confusing: DSX-1 is the electrical specification of the T1 interface; DS-1 is the specification of how the data will be framed.

56 kbps—This popular digital offering is more affordable and conducive to a broader number of companies. There is a rule of thumb when more than two 9.6 kbps circuits are going to the same location: a 56 kbps line is a good cost alternative. Implementation of time division multiplexors can be used if two separate virtual circuits are required. Here are some helpful hints to remember. Always use the telco cables provided by the manufacturer of the DSU/CSU. Termination of the line from the common carrier is usually an RJ-48. If cables are not supplied, you can use an RJ-45 modular connector. The most common pin positions are 1, 2 and 7, 8.

When investigating the cost of your new data line, always get quotes from the various common carriers. If you are looking for an analog circuit to run high-speed modems, such as 14.4, 16.8, or 19.2 kbps, look into the price of a 56 kbps line. The price difference may surprise you, especially if it is inter-lata. Also, evaluate the higher-speed modems on your leased line to ensure that they run at the advertised top speed. Some modems will fall back to a lower speed when operating on noisy or unfavorable leased lines.

Good luck in your networking endeavors. Communications can be a very frustrating ordeal, and sometimes a little luck can be more effective than a good breakout box. Just kidding! Δ

Russell K. Arakawa is the owner of DCD (Data Communications Distributors, Inc.). He may be reached at 121 E. Commercial Ave., Suite A, Wood Dale, IL 60191; 708/766-INFO.

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Making it work: an Oracle solution

SYNOPSIS

For Oracle/PC to Oracle/MV connections, terminal emulation isn't enough if your network's PC users want to download "live" data. This article provides information you won't find in the user's guide: how to edit CLI macros, information about CONFIG files, logon and logoff sequences, and the DG host server process.

by Arlene H. Blouch
Special to Focus

When the City of Glendale purchased the Oracle data base product to network our PCs and MVs, I was given the task of sorting through what was needed and getting the link to work. Because we were already running PC*I with an evaluation group, we purchased Oracle intending to use Oracle's PC*I product when it becomes available. In the meantime, we are using the SQL*Net Asynchronous product.

Documentation for Oracle is written for general use on multiple platforms, so it is sometimes difficult (if not impossible) to locate information. The SQL*Net Users' Guide devotes only 10 pages to AOS/VS systems. The product ships with some dialogue files to get you started. Depending on the host you are using and how busy it is, however, you will find that several modifications are needed.

Our installation has five Data General hosts linked in a Xodiac/XTS network. CEO traffic from more than 600 users can be heavy at times, so any networking solution must be approached cautiously. I already had Oracle networking between

the main hosts running ORAXDC, the SQL*Net Xodiac product. Our site also has many PCs, and more PC users will be added in the future.

So what to do? Running terminal emulation on the PC for an Oracle application or query was not the solution. As more of our users became sophisticated in their Oracle queries, the need arose to allow them the capability of downloading "live" data to spreadsheets, user-defined reports, and trend analyses.

Connections are direct, with no modem dialing necessary. PCs replaced "dumb" terminals. I recommend that you have some kind of terminal emulation software on your PC (I have used both Smarterm and CEOConnection). The connection software is a good way to test your terminal connection and ensure that your disconnects are working properly. You can of course monitor what is happening with your port from another terminal, and terminate jobs or clear the connection. The manual explains the files it will use on the client PC and what will be needed on the host system. Unfortunately, the manual does not specify that CLI macros on the client *must* reside in the user's UDD directory to work with their supplied macros. These macros must also be edited for your application.

On the PC system will be a file called CONFIG.ORA or CONFIG.AOS—the name is not really important. This is the configuration file for the remote connection. Use a SET command to display your CONFIG, and change if necessary. One nice thing about this file: it is not used until the remote connection is tried. You may modify the file and try your connection again without restarting Oracle on the PC or the SQL*Net server. The Oracle

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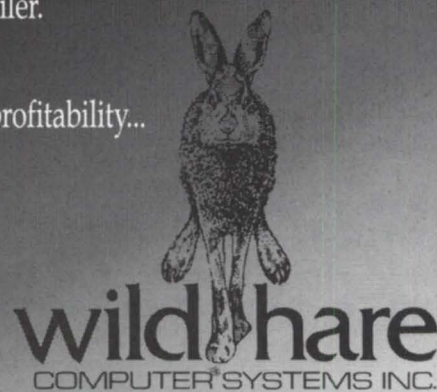
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PC software at this writing is still version 5, but you may connect to either a version 5 or version 6 data base without any changes to your PC setup.

CONFIG.ORA

An example may be:

LOCAL=S:

```
REMOTE=A:COM1,9600,N,8,0:,1,,3:ORACLE5
  \ASYNCAOS,aosusername/password,,1
ORACLE_HOME=C:\ORACLE5
MACHINE_TYPE=0
GDSIZ=20000
SQLPATH=C:\ORACLE5
ORACLE_TIO=VIDEO
```

Most of the information is generated when installing the software. The LOCAL

command is used if a data base will be running on the PC. The REMOTE command defines the connect string to the DG host. The first section of characters defines the communications for the local port. The "COM1,9600,N,8,0" specifies communications port 1, 9600 baud, no parity, 8 characters per bit, no modem control.

The second section defines the asynchronous parameters for the SQL*Net protocol. The ",1,,3" uses "," to define no change from the previous baud setting for data transmission, "1" for line mode (0 is used for "raw" mode), maximum data in a packet (no definition is used here to use the system default), "3" is the logging flag. The 3 enables logging to a log file and displays status messages to the screen. Use the 3 until you get clean connections, and change to 0 to disable when you give it to your users. The 3 entry displays everything to the screen, even the AOS username and password during the login sequence.

The last section is the autologon parameters. "\ORACLE5\ASYNCAOS" tells the location of the "stem" files. Oracle takes the stem designator and appends .CLI, .LGO, .LGF, .DIA for use in the autologon process. The "aosusername /password" is the Predator username and password for connection. The next position designated by "," in my example is for the telephone number and hang-up flag. Because I am doing a direct connect, these values are not applicable. The last value is used as a substitution variable in the .CLI dialog file. "VTM", an Oracle Virtual Terminal Manager, may be specified. This program makes the client behave as though it were running a terminal emulation package.

AOS.DIA

This file defines the dialing sequence. Because my direct connect does not require this, my file contains:

(-)

AOS.LGO

This file is used during the logon sequence. My file contains:

```
(-I05T05R05 -)
(-P05 -)
(r *Username:* (= =))
```

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093_0002	50191	Crunched	66%	17099	16-Sept-88	2:01 p	01C9
BILLING.LOG	532000	Crunched	94%	36087	31-May-89	11:41 p	3E91
EMPLOYMENT.AGR aka EMPLOYME_00	5793	Crunched	45%	3221	15-Jan-89	3:55 p	1D1C
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```
(#1\r *Password:*)
(#2\r -)
(~P05 -)
(~I02T02R10 -)
(~F03 -)
(\r *)\s*
```

This sequence supplies the AOS username and password as the variables for #1 and #2 from the CONFIG.ORA REMOTE command. It then sends the username and password, pauses 5 seconds with 5 retries. The \r designates carriage returns. The command after the pause (~P05 -) tells the system to timeout at 2 seconds with 10 retries. The (~F03 -) tells the system to flush all the logon messages for the next 3 seconds, and the last line sends a carriage return and expects the ")" prompt. At this point, the AOS.CLI command file will be executed.

AOS.CLI

This file is used to start the server process on the DG host.

```
(~I01T01R04 -)
(ASYSRV\r *)
(~P01 -)
```

The command assumes that you are sitting on the ")" prompt and the logon has been successful. It then tries to start the asynchronous server on the DG host in one-second increments, with four retries. The system then pauses one second before sending the first packet.

Note of caution: the ASYSRV.CLI macro must be in the UDD directory for the AOS user. Otherwise, the PROC for the server will fail. If you have the file moved and the ACL set correctly, try increasing the time in the first command string for both the I and T values. If the host is busy, 1 second may not be enough time to allow the server to start.

Make sure you edit the macro to include the searchlist for your application. Oracle determines which data base to connect to, based on the directory. On our host, we are in an upgrade transition and are running part of our applications under version 6 and part under version 5.

After things are going well, you may wish to consider using "raw" mode, which runs a little faster than line mode due to the error checking being minimized. To do this, use ASYSRV_RAW instead of

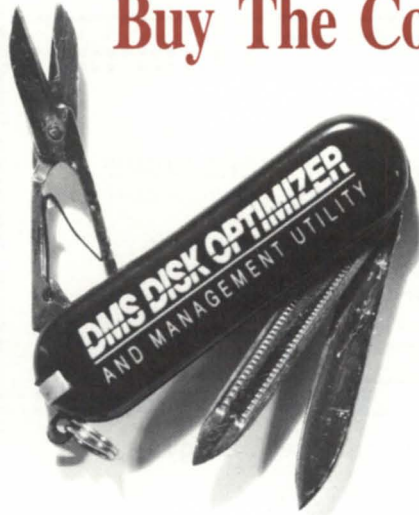
ASYSRV for the initial macro to run, and change the "1" in the CONFIG.ORA asynchronous parameters to "0".

At this point, the connection to the Oracle data base on your remote host from your PC has been made. If the access is granted, the user may run any forms or queries as though the data was local. The CONFIG.ORA file may be used to define the LOCAL data base with a remote con-

nection string if no data base will be active on the PC. In this case, the REMOTE designation is not needed.

If the user has an active local data base, the "@" may be used to designate tables on the remote system. Our data base administrator set up the cleanest way of doing a remote access. Data base links are defined on the user's local PC. This way, all tables look local to the user. The user

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does not have to designate the remote system. Another advantage of the second method is that the data base administrator can "hide" the username and password for the remote Oracle data base. Because all passwords are encrypted within Oracle, the user will never "see" the information needed to run Oracle programs or utilities directly on the remote systems data base.

AOS.LGF

This file is used for the logoff sequence at the DG system. At this point, the asynchronous server program is active. My logoff file contains:

```
(^C^A -)
(-P01 -)
(-I01T01R05 -)
```

```
(\rby\v\r *AOS/VS*CLI*Terminating* (= =))
```

This sequence sends a Control-C Control-A to kill the currently running process and sends CR bye CR until it receives the AOS logoff message.

Go to the directory containing the Oracle software (or include in your PATH command) and start the Oracle software. At the DOS prompt type:

ORACLE

If you are not running a local data base, you will not have to start Oracle. If you are running in protected mode with more than 640K system RAM, you will need to load the Oracle Protected Memory Executive. At the DOS prompt, type:

SQLPME

You now have to start the asynchronous server. At the DOS prompt, type:

SQLASync

Let's keep things simple and try a connect using SQL*Plus. On the PC, type:

SQLPLU username/password@A:

The @A: designates the remote data base that I defined in my CONFIG.ORA file. The username/password here are the Oracle connection username/password as defined by the data base administrator. It does not have to match the AOS/VS pair in the CONFIG.ORA file.

If your logging is set to "3" in the CONFIG.ORA, you will see all the connection information (or errors) as they occur. When the connection is completed, you may do any SQL commands. The commands will be processed by the SQL*Plus program on the PC, but against the connected remote data base. When you exit SQL*Plus, the AOS.LGF file is processed and the remote connection broken.

The previous example sequence is fine, except that the Oracle server process requires the AOS profile to give the user CLI and console access. In our environment, no users are allowed CLI access. Also, users who have remote access with RIA (DG's Remote Infos Agent) across the network do not have console access: (thereby stopping the user from logging on to an unauthorized host). This Oracle scenario

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assumes that the user is allowed these privileges. I decided to experiment with using an IPC file and still having the connection run from the PC.

I did not like having individual macros in user directories. This assumes that you want to manually edit or replace all macros when you make a change with the system—not my idea of how to pass my time. I moved the ASYSRV.CLI and ASYSRV.RAW.CLI macros to a :MACROS directory. Then I edited the macro to change the XEQ on the command line to CHAIN, because I don't want my user to interrupt and end up with a CLI. The next step was to use Predator and change the initial IPC file to :MACROS:ASYSRV_RAW.CLI. The asynchronous server is started as the last step in the macro.

I now edited my files for the autologon. My new ones:

AOS.LGO

```
(~I05T05R05 -)
(~P05 -)
(#1\r *Username:* (= =))
(#2\r *Password:*)
(~P05 -)
(~I02T02R10 -)
(~F03 -)
```

The last line from the previous example is not needed, because I will not be testing for the “)” prompt.

AOS.CLI

```
(~P05 -)
```

The server start is being done as part of the logon process. I increased the pause here to give the system time to start the server before issuing the first packet.

AOS.LGF

```
(^C^A -)
(~P01 -)
```

The remaining lines are not needed because I do not have to manually log off from the CLI process. Once the control

Arlene Blouch is information systems manager for the City of Glendale, Arizona. She worked as a system engineer in the Phoenix Data General office for seven years.

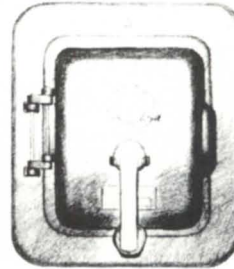
sequence is sent, the DG process terminates and the connection is broken.

Any problems? Well, now I know who is fooling around with the CONFIG.ORA file to figure out an AOS/VS username/password pair. If a user tries to use the pair found in the CONFIG.ORA file, a message appears on the terminal screen—SQL*Net V10109—and nothing happens. The

user must then call the computer room to be terminated and to clear the console line. The user will get a lecture from the computer operator. But now I don't have to worry about unauthorized access by users who load a connection product on their PCs.

It sure would have been a lot easier if I had said “N” to “Use Console” in the Predator profile . . . Δ

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Comparison shopping

SYNOPSIS

Technological advances—like scalability, high availability, and interoperability—made in the years between the MV/20000 and the MV/30000 are impressive. This article answers the questions “What do these advances mean for the user?”

by Gordon Haff
Special to Focus

With the announcement of the Eclipse MV/30000 last October in Seattle, Data General completed a major transformation of its product line. From the desktop Eclipse MV/3500 DC to the MV/30000, with its multiple processors and I/O channels, the majority of the current Eclipse product line is now based on modern CMOS microprocessor technology—the WASHI chip.

Much has been written and said about this chip—about the advanced simulation tools used to design it, about Hitachi's advanced manufacturing lines, about WASHI's more than half-a-million transistors.

For all the above, however, a customer can legitimately ask: “What does this advanced technology buy for me? Why should I buy a new MV/30000 when used MV/20000 systems are available for less?” These questions strike to the heart of an important point: technology by itself is not important. It may be nifty and interesting to talk about but, by itself, it does not help the customer.

What *are* important are the benefits that can be provided through the use of new technology. In this article, I hope to demonstrate that the benefits provided by the MV/30000 through new technology and advanced system design are real and tangible. Furthermore, I will show that much of the cost savings that can apparently be

gained by the purchase of used equipment are illusory when the total system cost of ownership is considered.

Benefits are meaningful only when compared to a reference point. This article will use the Eclipse MV/20000 as its reference point. The MV/20000 is an appropriate comparison because it was one of the most advanced minicomputers in the world when it was announced in November 1985. It anchored the top of Data General's Eclipse MV product line from the time of its announcement until the MV/40000 series was introduced in October 1988. Like the MV/30000, it has symmetrical multi-processing capability and multiple I/O channels. There are differences between the MV/20000 and the MV/30000 as well. Many of these differences reflect technological advances that have occurred in the past five years and relate directly to the benefits provided by MV/30000 systems.

Scalability: the more the merrier

One of the most obvious differences between the MV/30000 and the MV/20000 is that while the MV/30000 supports up to four processors and 256 MB of memory, the MV/20000 supports a maximum of only two processors and 64 MB.

The MV/30000 was designed to accommodate the sort of scalability required in modern systems—whether the need is memory for resident data bases or computing power for large user counts and MIPS-hungry applications. Such scalability doesn't just happen. A few years ago (before the introduction of the MV/40000), Data General investigated the possibility of making the MV/20000 a quad-processor, but concluded that little, if any, performance would be gained. Fundamental architectural limits on both memory size and system bus bandwidth severely constrained potential gains. The MV/20000 was a balanced system with two processors, but no more.

By contrast, the MV/30000 is balanced in a full multi-processor environment. Its 64-bit data bus (vs. 32-bit on the MV/20000) enables a quad 16-bit word transfer

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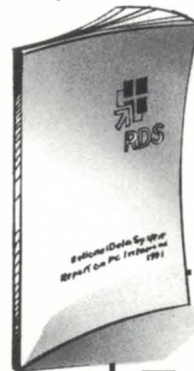
There's a bible on the subject.

We wrote it. It's called *Report on PC Integration*, and the 1991 edition is just out. Read its 116 pages, and you'll really understand the opportunities and priorities involved in getting the most

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every 67ns cycle with a two-level cache on each job processor (CPU), extensive pipelining within the WASHI CPU, and the option of three full (BMC and DCH) I/O busses. The result is that the processing units can operate at full speed, without waiting for other system components to catch up.

The data processing benchmark (DDP) used by Data General to test its systems

confirms the superior scalability of the MV/30000. While the MV/20000 Model 2 runs this benchmark only 53 percent faster than the MV/20000 Model 1, the MV/30000 Model 2 runs it 77 percent faster than the MV/30000 Model 1. Even the incremental performance going from a 3-processor MV/30000 system to a 4-processor system is 65 percent—higher than the MV/20000 Model 1 to Model 2 ratio. It

is important to note that the DDP benchmark simulates a worst-case I/O intensive commercial application; few "real world" applications will scale as poorly as DDP.

System balance means that a customer gets the benefits of the available resources. Fast CPUs are wasted if they sit waiting for paged blocks to be read from disk. They're wasted if they sit idle waiting for a time slice on the system bus.

Scalability also means longer growth paths. The ability of the MV/20000 to pop in one additional processor was impressive in its day, but with the MV/30000, three additional processors can be added. The MV/30000 can thus react more flexibly to user growth—whether the growth leads in the direction of requiring more processing power, memory, I/O, or a combination of all three.

Footprint: bigger is not better

The trend in computing technology is not only faster, but smaller. Except when carried to the extremes of calculators requiring fingers the size of toothpicks to operate, this trend is generally welcome given the price of commercial real estate in many urban areas, and the crowding common in many computer rooms.

Whereas the MV/20000, with its standard meter-high cabinet configuration, requires about 15 square feet of floor space, the rackmount MV/30000 in 59-inch or 71-inch Model 11000 cabinetry requires less than half as much (7 square feet) even with an expansion chassis and some mass storage configured. If service clearances and additional mass storage in matching peripheral cabinetry are taken into account, the difference is even greater.

High availability: maximizing uptime

Consultants and the trade press like to talk of the market for highly available and fault-tolerant systems, terminology that seems to imply that there is also a market for low-availability systems. Of course, what is really meant is that some applications are of such a mission-critical nature that customers are willing to move up the cost/availability curve, buying system components or accessories that are designed to enhance the uptime of already reliable systems.

In a high-availability system such as the MV/40000 HA, elements such as redundant power and cooling, instruction retry,

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and soft error thresholding significantly enhance the availability of the system, albeit at a higher cost.

The MV/30000 approaches the issue somewhat differently. In a nutshell, the MV/30000 design goal was to maximize system uptime without adding high availability features that would significantly increase system cost. When combined with additional hardware such as the MRC and RAMS disks, and software such as AOS/VS II and SQL or Infos Connection Server, the MV/30000 eliminates many of the possible single points of failure—one of the keys to maximizing uptime.

Data General has continually added diagnostic features to increase system reliability and to reduce the time needed to effect repairs. The MV/20000, for example, was the first Data General system to add machine-initiated calling, whereby a system failure automatically triggers a call to the Customer Support Center. As with many of the other technical advancements made since the MV/20000 was designed, however, the sophistication of diagnostics subsystems has also increased.

Like the MV/40000 HA, the MV/30000 has a separate diagnostics bus providing an alternate path to field replaceable units such as the Job Processor boards. Using this path, the diagnostic processor has the capability of disabling bus nodes (such as the path to a Job Processor) in the event of a failure, and returning the system, less the disabled component, into service. For the customer, what this feature means is that a system can be restarted (automatically, if desired) after many types of failure and can keep on working. The system can then be brought down for repair at a time convenient to computer operations. This auto-deconfigure/auto-restart feature is enhanced by a sophisticated array of diagnostic subsystem elements such as internal parity checks, diagnostic scan registers, non-volatile error logs, high-coverage power-up tests, and a chip on each field-replaceable unit that stores pertinent board history data. These elements are key to accurately detecting and localizing faults so that failures can be quickly identified and repaired.

AOS/VS II

The operating system supporting the MV/30000 is AOS/VS II, unlike smaller and older systems supported by AOS/VS "Classic." Why doesn't AOS/VS support

the MV/30000? What does this mean for the customer running AOS/VS wanting to move up to an MV/30000?

The answer to "Why?" is that only AOS/VS II can support certain features of the MV/30000. The MV/30000 offers scalability through modular processor and memory additions. Only AOS/VS II supports the full configuration (four processors and 256 MB of memory). The MV/

30000 also offers specific hardware features (e.g., auto-deconfig/restart), which are supported only by AOS/VS II.

The MV/30000 was designed to work together with AOS/VS II to provide a sophisticated commercial environment with modern data integrity features and computer center management tools. AOS/VS II provides key interoperability and PC connectivity features such as kernel-

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**Cost of ownership:
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As anyone who has ever looked inside an older Data General system knows, there are a lot of boards. The MV/10000 had 9 15-inch-by-15-inch boards for the CPU/FPU alone (plus up to 8 memory boards, IOCs, and a system control processor). Even the relatively modern MV/20000 has separate memory controller and floating point units.

Semiconductor failure rates are very much tied to the total number of components, so, statistically, more components almost inevitably lead to more failures—and consequently, higher maintenance costs and potentially greater downtime.

As the following example will show, although the difference in maintenance pricing may not totally eliminate the price gap between new and used equipment, it will significantly narrow the in-

Used MV/20 Model 1, 64 MB memory

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cremental dollars required to take advantage of modern system features.

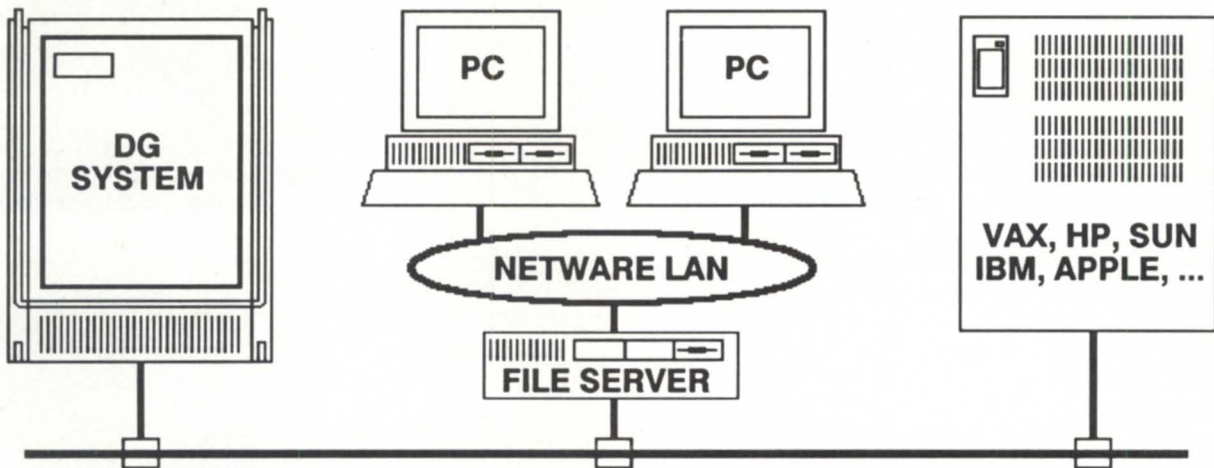
The 5-year cost is based on U.S. prices and standard list price Data General Field Engineering Maintenance pricing (Monday through Friday, 9 hours a day coverage with 4-hour response time) beginning after the 90-day warranty period. The gap between the relative

maintenance costs is further widened if extended Field Engineering coverage, such as Monday through Friday, 12 hours per day coverage (15 percent premium) or 7-day, 24-hour coverage (55 percent premium), is selected. For example, with 7-day, 24-hour coverage, the 5-year maintenance cost on the MV/20000 is \$133,988 vs. only \$44,175 for the MV/30000—a difference of almost \$90,000!

Plus, you can bring the total memory on the MV/30000 up to a full 256 MB without any additional maintenance charges under a Data General service contract.

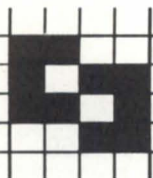
The above comparison also shows an MV/30000 Model 2 system that is between 25 percent and 50 percent faster than the MV/20000 system Model 1 shown based on a range of commercial and data processing benchmarks. A single processor MV/30000 would be much less expensive than the MV/20000 on a 5-year cost of ownership basis. Δ

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based communications (e.g., TCP/IP, SVTA, PC*I), full-screen Telnet, ONC/NFS, and IBM token ring support. Furthermore, AOS/VSII features such as data caching can significantly improve system performance. Using a reserved cache size of 10 percent of system memory (up to a maximum of 2 MB), reductions in CPU time of up to 15 percent and in I/O of up to 40 percent have been observed.

The move from AOS/VS to AOS/VS II is *not* a port. AOS/VS II is 100 percent upward compatible at the system call level. The AOS/VS II file system has been enhanced to ensure that the disks are always in a consistent state (no FIXUP!). As a result, the file system formats are different, and thus, the disks must be reformatted and reloaded. Data General provides migration tools and documentation as part of the standard AOS/VS release product and in addition, migration planning and services are available. With more than 4,000 licenses, AOS/VS II is the operating system of choice for all but the smallest MVs.

MV/20000 advantages?

Are there *any* circumstances under which an older system such as a used MV/20000 might be a more suitable system than an MV/30000? Really only one.

In this article, it is my hope that I have persuasively communicated my belief that an MV/20000 does not offer a cost-effective alternative to the MV/30000 for general-purpose computing. What cost advantages may, in some cases, exist on the basis of initial purchase price are more than compensated for by the MV/30000's superior functionality and scalability and the MV/20000's significantly higher maintenance costs.

There is one narrow class of applications in which the MV/20000 is superior to the MV/30000. If there is extensive use of double-precision floating point, an MV/20000 with floating-point unit offers stronger performance.

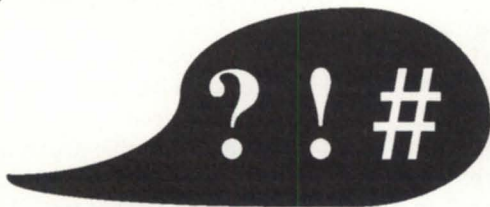
The MV/30000 is optimized as a commercial data processing system and the floating point unit integrated with the

WASHI CPU is intended primarily to assist single-precision floating point operations.

I hope that I have given you a sense of the capabilities that the MV/30000 provides relative to older systems such as the MV/20000. The technological advances that Data General engineers have made in the period between the MV/20000 and the MV/30000 are certainly impressive and, to those of a technical bent, interesting to hear described.

What is important about these advancements, however, is the benefits they can provide to the user. Technical advancements, such as those on the MV/30000, allow the data central to modern businesses to be processed more cost effectively than ever before, with greater integrity and system uptime. Δ

Gordon Haff is product manager for mid-range Eclipse MV systems. He may be reached at Data General Corporation, 4400 Computer Drive, Westboro, MA 01580; 508/366-8911.



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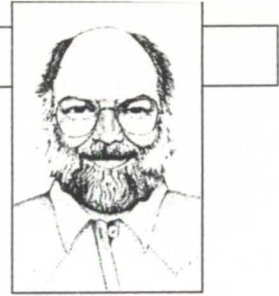
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Taming the data base beast

SYNOPSIS

Infos gives you a powerful whip to crack, but you also need good strategies to coax the best performance from your data base. Guard against unruly multiple volumes. Know your index design and how it can kill you. Probe your key efficiency. Have your toolbox handy. And be ready to whip out your SORT.

This is the second half of a topic that began in last month's issue.

I forgot to describe my terminology last month, so here it is. The term "data base" refers to both the index and data, "index" refers to the index portion alone, and "data" refers to the data portion alone.

Last month I covered some of the basics of creating an Infos data base design that is both efficient (i.e., fast) and practical. This month I'm going to wrap up the subject by considering the performance issues.

Here's a capsule review of what I recommended last month. A record should always contain enough information to re-create its indices; otherwise you forfeit the ability to recover the data records when the index becomes corrupted, and you have no way to verify that a record is indexed properly (i.e., not missing any alternate keys).

If you combine different record types in a data volume, then the first character of the record should be a record type indicator to facilitate record length checking and data recovery.

Subindices have significant space and performance costs and should be used only when alternative methods (usually select and sort) are more expensive.

Concatenated keys are much faster than

subindices when only a handful of keys are in the subindex. When the index volumes are more than 25 percent of the size of the data volumes, then you've probably overindexed. Duplicate keys should be avoided whenever there is a possibility of any duplicate key having more than just a handful of occurrences. The result of ignoring this advice can be truly appalling performance problems due to an Infos design quirk. OK, back to work.

:HOW_MANY_VOLS?

Most Infos data bases have more volumes than they need. Using multiple volumes is only advisable if: a) the index or data is larger than a single disk drive, or b) you have two disks whose speed differs by a factor of two or more (a very rare situation). Growth is not a factor, unless growth will eventually cause you to exceed the size of a single disk unit.

Contrast this with the standard advice offered by lots of DG and third-party consultants; they usually recommend a contiguous primary volume (i.e., a huge element size), and a second "overflow" volume with a default element size. This scheme is inadvisable for two reasons: the advantage of a contiguous volume over a volume with a single random index level is marginal at best, and as soon as you overflow into the second volume by more than 2 MB it will grow to a two-level random index. Each additional 2 MB in the overflow volume will generate yet another random index block, until eventually the increased cache misses will start to affect performance. Because most of the new activity in data bases is at the end of the last volume, performance will suffer

and you will be pressured into rebuilding the data base with a larger first volume. And you probably don't have a rebuild utility, so you may find yourself having to live with the lousy performance.

A much better scheme is to use only as many volumes as are needed to handle the number of disks involved, with the element size for each volume set to produce no more than a one-level index. For most data bases, this means a single volume each for the index and data.

So what happens when the index or data volumes grow enough to cause a two-level random index? Are you suddenly under pressure to rebuild the data base to regain performance? Not really. A one-level index has one index block, as the name implies. At the moment when you overflow into a two-level index, you will have three-index blocks. Clearly, three-index blocks will fit into your system cache just as easily as the one-index block did. Granted, you will generate twice as many cache searches because there are now two index levels, but none of them will be

Most designs are debugged using "toy" data bases consisting of a tiny subset of the eventual data base size, so the performance problems don't arise until the real data base is formed

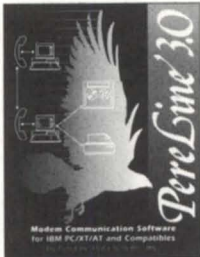
misses and successful searches are quite cheap (so cheap that it's difficult to measure on most systems). Performance won't really suffer until the number of random index blocks becomes more than a handful, and the volume would have to at least double again before that would even become a possibility. As a result, there's little, if any, performance motive to rebuild with a bigger volume element size.

And even if you decide to crank up the element size on the volume, do you need to do a time-consuming rebuild? Nope, just dump the volume to tape and do a LOAD_II/DELETE/ELEMENT= with the new element size (Warning: Don't use COPY!). Infos won't know the difference as long as you didn't specify a maximum volume size.

Moral: Don't use multiple volumes, except on very large data bases that span multiple disks, and choose an element size for the volume that is equal to the expected maximum volume size in bytes divided by 65,536. Then you don't have to bother cranking up the element size on an

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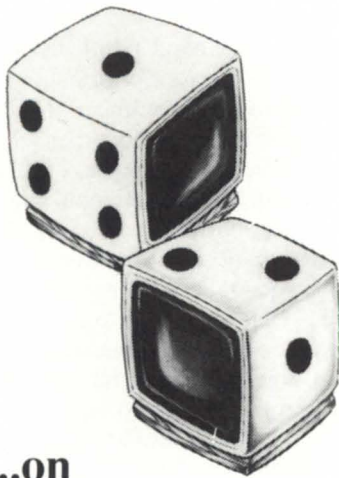
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SYSTEM MANAGER'S LOG

existing volume until the size is at least double what you originally estimated. The chance of that ever occurring is slight, unless you're a really bad estimator.

:PAGE_SIZE

The decision on whether to use 2,048- or 4,096-byte page sizes depends on: a) the maximum record size, and b) the index size. In general, stick with a 2,048-byte data volume page size unless your maximum record size is larger than about 256 bytes, and stick with a 2,048-byte index volume page size unless INDEXCALC shows a significant decrease (more than 1) in the number of tree levels with a 4,096-byte page size.

:ACCESS_AND_FEATURE_COSTS

Chances are good that if something like the following table was printed at the front of the Infos manual, a lot fewer overambitious index designs would result.

Infos operation	Typical costs	
	CPU ms.	I/O ms.
Read, per key	40	20-80
Read next	25	20
Down, Up, etc.	15	0
Retrieve key	15	0
Retrieve pos	15	0
Write, per key	60	20-40
Delete, per key	60	20-40
Key compression	+10	0
Data compression	+10	0
Space mgmt	negligible	
Multiple vols	negligible	
Optimize distr	rarely useful	

Before you run off and publish this list as gospel, bear in mind that: a) the numbers are approximately correct only for an MV/4000, b) the I/O times depend on the amount of LRU memory available and the recent access history, and c) the numbers can vary depending on the data size and the index size and complexity (the larger the data base, the slower the operations become, but not linearly).

The real point I'm trying to make here is, how could you have possibly arrived at an index design without knowing what these numbers are, even in order of magnitude terms? Compounding the problem is that most designs are debugged using "toy" data bases consisting of a tiny subset of the eventual data base size, so the performance problems don't arise until

the real data base is formed. By then it's way too late to undo the damage without rewriting most of the software.

One of the side effects of the above list is that most knowledgeable designers quickly reject the costly compressed key and compressed record features. Disk space is cheap, but CPU time is dear, especially with Infos.

So how do you get a general idea of what these numbers are for your own system? Easy, run a few simple tests using the SORT utility. SORT is kind enough to report both the number of operations and the CPU time involved. SORT is quite efficient, so you can safely assume that the bulk of the CPU time reported by SORT is Infos local server processing time in ring 4.

Here's a macro to run a simple test of the single key random write and sequential read timing on a small (about 6,500 records) data base. All you have to do is create an empty Infos data base named FOO/FOO.DB selecting defaults for everything except duplicate keys (specify Y) before you run the macro.

```
COMMENT Random write test. XEQ/M
SORT/C=@INPUT INPUT FILE IS "PARU.32.SR",
RECS ARE DATASENS UPTO 136 CHARS.
OUTPUT INFOS INDEX IS "FOO",
RECORD IS 1/LAST,
PATH IS *.
COPY.
END.
)
COMMENT Read next test.
XEQ/M SORT/C=@INPUT
INPUT INFOS INDEX IS "FOO",
PATH IS *, RECORD,
RECS ARE VARIABLE UPTO 136 CHARS.
OUTPUT FILE IS "@NULL",
RECS ARE DATASENS UPTO 136 CHARS.
COPY.
END.
)
```

Testing random reads, writes, deletes, and all the other stuff requires some small Cobol test programs. It doesn't take very long and I recommend the exercise highly because you'll want to rerun the tests when enhanced revs of Infos become available.

:KEY_EFFICIENCY

Another symptom of a poor index design is exorbitant key sizes. Assuming no duplicate keys, the minimum key sizes

required for various data sizes are:

Records	Key Size
1-255	1 byte
256-65,535	2 bytes
65,536-16.7M	3 bytes
16.8M-2.1G	4 bytes

So what can you conclude if a data base contains 100,000 records and has 50 byte keys? Using the table above, the key efficiency is 3/50, or about 6 percent. That means that up to 94 percent of the index size is redundant information.

Now, I'm not recommending binary values for keys as the solution to all of your problems; I'm simply using this example to get you to re-examine your key design decisions. You may think that a 50-byte key for 100,000 records is a bit crazy, but I can assure you that quite a few other readers are now asking themselves why they have 100-plus byte keys in their indices. The all-time record that I've seen so far was 178 byte keys. Can anybody beat that? And if you can, do you really want to admit it publicly?

A reasonable rule of thumb for designers is that keys should average no more than about 10 percent of the record size. Long keys are also usually quite amenable to key compression, making it tempting to enable that costly option in order to reduce the index size. If key compression is significant, chances are that your real problem is that your key design is inappropriate. Speaking of compression, if your data is largely sparse (mailing list data bases are the classic example), then it makes much more sense to (de)compress the sparse fields yourself using Cobol's STRING/UNSTRING verbs, or Cobol-callable, optimized compression subroutines. This is especially true when you consider that Infos can only compress the first 255 bytes of a record, and only repeated character sequences at that. If you do choose to adopt external compression, just remember to put the key fields at the front of the record. And remember: don't compress them so that you don't forfeit the ability to do recovery/rebuild using

SORT and IXLOAD.

Unlike ICobol's Minisam, Infos allows variable length keys. But generally speaking, variable length keys are only advisable if the trailing part of the key that's dropped is all the same character (typically spaces or NULs). For example, if mailing list records are indexed by surname, then trailing blanks should be removed from the surnames before they are used as keys. If that's not the case, then

you'll need to store both the key length and the key in the data record if you ever want to be able to recreate the index from the data records. SORT's key TRIM phrase won't be of any help when creating an index recovery procedure.

:HANDY_TOOLS

Infos is woefully lacking in useful tools.

Eagle Software seized on this many years ago and introduced the VS Toolbox product to fill in the gaps. The VS Toolbox includes several handy utilities, and some other take-it-or-leave-it stuff, but the REBUILDER program is probably worth the price by itself. It can produce a copy of any logically correct Infos data base, and do it fairly efficiently.

If what you've got is an Infos file with a corrupted index, there's a popular public domain tool available that goes by the name of POOH. It was written originally by Tom Eck, a systems engineer at DG, and published for several years as part of the AOS monthly newsletter. POOH reads the Infos data VOL01 file directly, bypassing Infos, and writes the records to a flat file that can then be fed into IXLOAD, SORT, or a Cobol program in order to produce a fresh data base. On an MV/4000, POOH can read about 400 records per second (150 per second if compressed), depending on the record size. Contrast that with Infos' typical performance of about 40 records per second on the same system.

Finally there's :WFSIO (World's Fastest Sequential I/O), which includes a set of Cobol callable assembly language subroutines that can read and rewrite Infos data records directly. Until recently,

Most knowledgeable designers quickly reject the costly compressed key and compressed record features. Disk space is cheap, but CPU time is dear, especially with Infos.

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:WFSIO was only available to my consulting clients, but recently I made it a product. :WFSIO reads up to about 4,000 records per second on an MV/4000, depending on the record size. That's 10 times faster than POOH and 100 times faster than Infos. The ease with which you can use POOH or :WFSIO to recreate your data base depends on whether there is enough information in the records to completely recreate the index. Sound familiar? Now you know why most experienced Infos designers follow the rule of including the index information in the record.

The fastest rebuild scheme is only possible if the flat file contains all the keys needed, and each record is fully keyed (i.e., no optional keys). In this case, you can use POOH or :WFSIO to produce the flat file and then feed the flat file to IXLOAD after creating the new empty data base. IXLOAD can write records at a rate of about 250 records per second on an MV/4000.

If you use optional keys, as in a traffic ticket data base (see example in last

month's article, *Focus*, May '91), then you need to use SORT instead of IXLOAD so that you can check for "NONE" and skip writing the key and/or record. This method is substantially slower (by about a factor of 10 compared to IXLOAD), but it's a relatively straightforward procedure.

If you have a more complex index structure, your only alternative is to write an index-specific program to recreate the data base from the flat file. In this case, the rebuild occurs at Infos write speeds, which is about 25 records a second. Depending on the size of your data base, the rebuild might take days. This fact alone is often enough to have a serious effect on your data base design.

Rebuilding an Infos data base is inevitable, and needs to be taken into account early in the design cycle. One of the most common failures I run across is the lack of a procedure to rebuild the data base to get rid of indirect records, tombstones, and the other inefficiencies that eventually pollute every data base. If your third-party supplier of application software

didn't provide a utility to rebuild the data base, I would seriously question the value of the package.

:DO_IT_URSELF

If you want to run a set of tests on your system to get an idea of your Infos performance numbers, you can download item SML9106X from the SMLOGS directory on the :SYSMGR BBS. Also, the official set of POOH source files is available on the BBS as item POOH in directory AOSVS16:Infos. Δ

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

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Bits and bytes from the bulletin board

Executable program names in CLI32



From: Thomas Carey

I ran across a new feature of CLI32 the other day. As you all know, the first argument of a CLI command line has to be a command or macro, i.e., the famous "not a command or macro" error message. Now, CLI32 gives the error message "not a command, macros, or program" error message. So, I tried just typing a program name—voila, it works! I can't find anything about it in 2.0, 2.01, or 2.02 Release (Update) Notes. Changes to CLI manual don't mention it. This *may* not be a trivial change. What if a program has the same name as a macro? What has precedence? What are priority and process type and all the other privileges—how and what is passed to son? Any effect on processing of switches and arguments?

From: Walter Mosscrop

It is documented in "Using the CLI (AOS/VS and AOS/VS II)", order #093-000646, on page 2-3. In case you don't have the manual, the explanation is

"CLI32 takes an additional step: if it cannot find the pathname, it searches for pathname with a .PR suffix; if CLI32 finds that file, it tries to execute it (as with XEQ pathname). So you can execute a program from CLI32 by typing the program name only, without an XEQ, EXECUTE, or PROCESS command."

Therefore, CLI32 will look for the macro first, then an executable program with the same name.

Learning to share: Mac, IBM, and MV



From: David Sutherland

At our office we're running an MV/4000 and have some PC equipment around hooked up as terminals. Is there a simple way to transfer programs from either the Mac or IBM to the MV with software that's already available as a utility? We have a program called Gate. The only protocol it supports is when it's talking to another MV. Is there an IBM (or Mac) program that will emulate this? I have downloaded a few utilities from here but have them on IBM disks and can't figure out how to transfer them over!

From Tim Boyer

Here's how I did it, using Crosstalk. First, log on through your PC as you normally would. Next, create the file on the MV for interactive use, i.e., CREATE/I AFILCO. Then, just tell your emulator to send the text file. On XTALK, that would be SEND PCFILE.CO. You'll see the text on the screen. You may see it all on one line—that's a CR/LF problem that can be easily fixed with any editor, once the file's over on the MV. Finally, when the transfer is completed, remember to put a close parenthesis on a blank line so the CREATE will be finished. Your file should be over on the MV, ready to use! Δ

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Unix network backups

SYNOPSIS

If instruction manuals still leave you in the dark about how to go about network backups with Unix, here's a brief tutorial covering a straightforward method, with explanations that should soothe the "What does all this mean?" worries. And by the way—always keep a loaded remote copy command on safety.

One of the strengths of Unix is its ability to do file system backups over a network. However, network backups are not well described in literature. After a week of hacking, I developed a method that works well. I hope it is valuable to you.

In order to back up the root file system of one Aviiion server (server1) to an exabyte drive on another (server2), use the following command sequence on server1:

```
cd/
find . -mount -depth -print | cpio -oc -C32768 | \
    remsh server2 dd bs=32768 of=/dev/rex/0
```

In order to retrieve files from the exabyte drive on server2 to a restore directory on server1, issue the following command:

```
cd /restore.directory
remsh server2 dd if=/dev/rex/0 bs=32768 | cpio
    -ivduck -C32768
```

What does all this mean?

The command *find* tells the system what files to back up. The "." is a switch that tells the *find* command to do a relative backup of the file system. It is generally better to do relative backups instead of absolute backups, because the restore of a relative backup can be relocated to another directory, while the restore of an absolute backup can only be restored at the same location from where it was begun.

The command *-mount* is a *find* switch that tells the system to back up only files in the designated file system. This is especially important in the root file system,

because all other file systems on a Unix machine are mounted subordinate to the root directory. Without this switch, the backup would back up the entire machine instead of just the / file system.

The command *-depth* is a *find* switch that tells *find* to search subdirectories from the bottom up. This helps avoid potential permission problems.

The command *-print* tells *find* to put its output to standard output. This allows the output of *find* to be used by another process.

The "|" is the pipe designator. In this case, it tells the system to use the standard output of the *find* command as the standard input of the *cpio* command.

The command *cpio* is the copy input/output command. It is one of the standard Unix backup commands. Another standard backup command is *tar*.

The commands *-oc* are *cpio* switches; *o* tells *cpio* that an outbound copy is required; *c* tells *cpio* that the headers should be in ASCII format. This allows the backup to be used on another Unix operating system if necessary.

The command *-C32768* tells *cpio* that its output should be blocked at a block size of 32,768 bytes. This was determined by trial and error on our systems. Not all systems have the *C* option. If a system does not have a *C* option, it may have a *B* option that yields a block size of 5,120 bytes. The standard block size is 512 bytes per block. This is not very efficient for network data transfers.

The command *remsh* is the remote shell command. This command opens a shell on the remote system to perform a command. The command on the remote system gets its standard input from the local system. The standard output of the remote command is returned to the local system.

The *server2* is the name of the system on which the remote command is to be executed.

The command *dd* is the copy and convert command. In this case, it is used to redirect the *cpio* output to the exabyte drive on server2. This command is ex-

ecuted on server2 as the result of the *remsh* command.

The command *bs=32768* tells server2 that the input and output block sizes are to be 32,768 bytes. The command *dd* is very useful for synchronizing the block sizes of input streams. We have done tests at 3M that indicate that 32,768 is a very efficient block size for an exabyte drive.

The command *of=/dev/rex/0* tells *dd* that it is to direct its output to */dev/rex/0*. This happens to be the device address of the exabyte drive.

For the restoration, *dd* and *remsh* information is similar. However, there are different *cpio* switches to contend with.

i = input stream

v = verify the data by copying to the standard output device. The default standard output device is the terminal screen.

d = create directories as needed.

u = unconditionally copy. The input file will unconditionally write over any existing files with the same name.

c = headers are in ASCII format.

k = resynchronize the data stream automatically if it should lose synchronization.

If you want further information on the commands used in this example, check the *man* pages under *find*, *cpio*, *remsh*, and *dd*. Network backups are a very powerful system management tool. Once you learn how to use them properly, you will wonder how you managed to work without this capability.

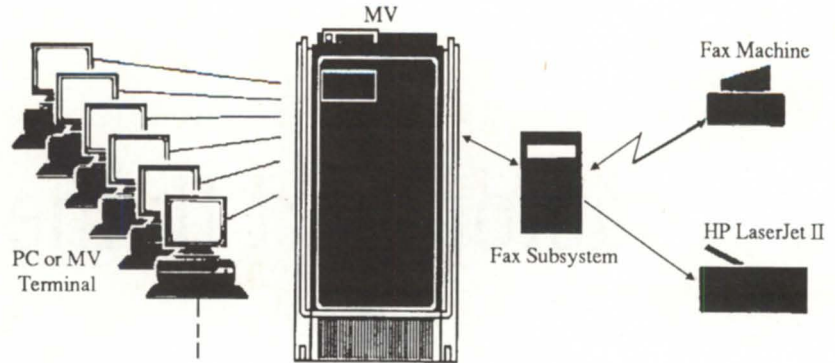
Burned fingers department

Be careful using the *rcp* (remote copy) command. Under DG/UX version 4.2, if you accidentally do a *rcp* to the same directory from where you began the *rcp*, you will erase the files in that directory with the exiting message—file size has been modified. The file size has been modified in an extreme manner. The file headers will still be there, but they will be empty files. Moral: never point a loaded *rcp* at yourself. Request: Dear DG Unix development, there must be a way to keep this from happening. Δ

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

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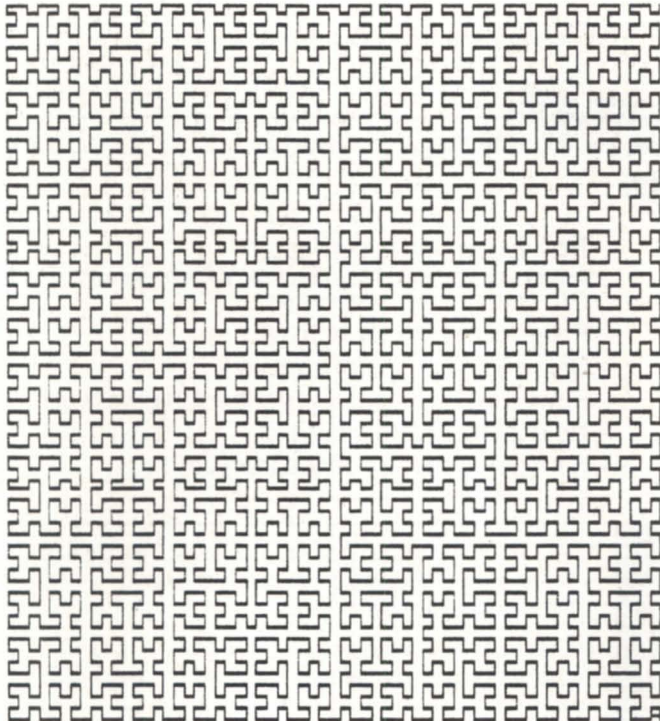
The X-factor, part II: the main event

SYNOPSIS

X-Windows on the Avion is a powerful tool for programmers. The following article illustrates some of the portability and network transparency features of X-Windows.

by Pete Szaban
Special to Focus

(Note: In his previous article, the author began to describe an application that generates a Hilbert curve, a recursively generated, space-filling curve that is used as a graphic performance benchmark. Please refer to "The X-Factor" (April 1991, Focus, page 35), to see how the program is set up, and for further explanation of X-Windows features.)



A Hilbert curve

Completing the curve

Most of the Xlib relevant calls in `Xhilbert.c` are made from inside "main" (see Figure 1, page 38). It is the responsibility of main to make the Xlib calls that connect to an X-Windows server, open a window, await input events, call the refresh function when appropriate, and shut down when a keystroke is received.

`Xhilbert.c` illustrates what is probably the minimal procedure required to open a window. The first step is to connect to the X-Windows server of the proper display with a call to the Xlib function "XOpenDisplay". Passing this function an empty string tells it to use the default display. The default display name is stored in the Unix shell environment variable "DISPLAY". Passing `XOpenDisplay` a (possibly) remote display specification string like "cape:0.0" connects to screen 0 on the first X-Windows server on the networked host named "cape". The call to `XOpenDisplay` is followed by a call to the C macro "DefaultScreen". `DefaultScreen` returns the screen number from the display structure. The screen number is passed as an input to several X-Windows functions later on in the program.

One of the difficulties in developing device-independent software under X-Windows involves the wide range of screen resolutions available. The macros "DisplayWidth" and "DisplayHeight" return the number of addressable rows and columns respectively on the screen. Programs concerned with aspect (height-to-width proportionality) might also call two related macros, "DisplayHeightMM" and "DisplayWidthMM," to get the dimensions of the screen in millimeters. `Xhilbert` does not care if it is stretched out of proportion.

The Xlib library routine "XCreateSimpleWindow" is provided as one of the functions used to create a window inside another window. In the case of `Xhilbert`, a window is to be created on the

root (background) window. The macro "RootWindow" returns an identifier for the background window. The background window is the parent window of the Xhilbert window. The remaining parameters passed to XCreateSimpleWindow specify the xy Cartesian coordinates of the upper-left corner of the window, the width and height of the window, the width and color of the window border, and finally, the window background color.

Before the Xhilbert window can be displayed, the window manager must be given "hints" (suggestions) describing the way the window should appear. These suggestions are passed along to the window manager with the Xlib function "XSetStandardProperties". The "size_hints" structure in Xhilbert is set up to indicate that Xhilbert is requesting a specific position on the screen, and would like a specific window size and a specific aspect ratio. These requests are represented as valid when the appropriate bits in the "flags" member of the size_hints structure are set. Xhilbert tells the window manager what it wants, but should not rely upon getting its way.

At this point, Xhilbert calls the Xlib routine "XSelectInput" to let the X-Windows server know which input events it is interested in hearing about. Xhilbert wants to know about several events. If there is a key press, Xhilbert will want to be notified so it can exit. If the window is resized, or if a portion of the window becomes exposed (if an overlapping window is removed), Xhilbert will also want to be notified so it can refresh the window.

The Xlib routines that draw lines require several "hints" describing how those lines should be drawn (line width, line style, etc.). The Xlib function "XCreateGC" returns a pointer to a structure that describes these things. When Xhilbert calls XCreateGC, it has the opportunity to request certain parameters by filling in fields in the "gc_values" structure. If specific fields in the gc_values structure were set, the third argument passed to XCreateGC would have flag bits set to indicate which fields are valid. Xhilbert takes the defaults, however. It does not set any fields in gc_values. In order to tell the server that Xhilbert wants to render graphics in black, the Xlib routine "XSetForeground" is called.

To this point, Xhilbert has connected to the X-Windows server and passed the window manager information on how and where it would like its window to appear. Nothing has yet appeared on the screen. The Xlib function "XMapWindow" instructs the X-Windows server finally to display the window on the screen. After calling XMapWindow, Xhilbert still should not draw anything on the screen. It must await an event saying that the window is ready for rendering.

Xhilbert implements its event waiting in the form of a C do-while loop. Inside the loop, the Xlib function "XNextEvent" is called. This function puts Xhilbert to "sleep" until one of the requested input events occur.

When a requested input event occurs, Xhilbert is "awakened," and a return made from the XNextEvent function. A C "switch" statement is then used to direct program flow based upon the input event that actually occurred. If an "Expose" event occurred, the C function "refresh" is called to redraw the window. If a "ConfigureNotify" event was received, the window was resized, and the values of "window_width" and "window_height" need updating. When a "KeyPress" event is found, Xhilbert proceeds to shut down.

Before exiting, X-Windows client programs should free the

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resources they allocated and disconnect from the X-Windows server. While this is not really required, it is good practice to have a program clean up after itself. Xhilbert frees the graphic context structure it allocated with a call to the Xlib routine "XFreeGC," and disconnects from the X-Windows server by invoking "XCloseDisplay". The only remaining Xlib routines used in Xhilbert are "XClearArea," which is used to clear the window before drawing into it, and "XDrawLine," which is used to draw a straight line between two specified Cartesian endpoints.

X-Windows on the Aviiion

Program development under X-Windows on the Aviiion consists of starting the X-Windows server, using a text editor (like vi) to key in the program, compiling that program, and linking it with

the Xlib library. To start the X-Windows system, Data General supplies the "xstart" program. The xstart program reads configuration files in the /usr/lib/app-defaults directory to start the X-Windows server (among other things). To start X-Windows on an Aviiion and set up the development environment, there are two basic steps:

1) Set up PATH (similar to AOS/VS searchlist) with the Cshell command:

```
% setenv PATH ./bin:/usr/bin:/usr/bin/X11:/include
```

(Note: Being a C programmer, I like to use the Cshell. People who use one of the other shells can either translate the commands or

Figure 1: Mainline code/entry point

```
int main( argc, argv )
int  argc;
char  *argv[];
{
char  *displayname = NULL;
static
XSizeHints size_hints =
{
    PPosition | PSize | PMinSize | PAspect,
    /* Flags */
    0, 0, /* x, y */
    0, 0, /* width & height */
    50, 50, /* min width & height */
    0, 0, /* max width & height */
    0, 0, /* resize increment */
    1, 1, 1, 1, /* 1:1 Aspect x & y */
};
XGCValues gc_values;
XEvent event;
/* Figure out the Hilbert curve order */
if( argc > 1 )
    order = atoi( argv[ 1 ] );
if( ( order < 1 ) || ( order > 20 ) )
    order = 5;
/* Connect to the server & handle errors */
if( !( displayptr = XOpenDisplay( displayname ) ) )
{
    fputs( "Unable To Connect To Server", stderr );
    puts( displayname );
    exit( -1 );
}
/* Get an identifier to the default screen */
screen = DefaultScreen( displayptr );
/* Get size of root window */
window_width = DisplayWidth( displayptr, screen ) / 2;
window_height = DisplayHeight( displayptr, screen ) / 2;
/* Open a window */
window = XCreateSimpleWindow( displayptr, RootWindow
( displayptr, screen ), 0, 0, window_width, window_height,
BORDER_WIDTH, BlackPixel( displayptr, screen ), WhitePixel
( displayptr, screen ) );
/* Set up suggested properties */
size_hints.width = window_width;
size_hints.height = window_height;
XSetStandardProperties( displayptr, window, WINDOW_NAME,
ICON_NAME, (Pixmap) 0, argv, argc, &size_hints );
/* Select input events desired */
XSelectInput( displayptr, window, INPUT_EVENTS );
/* Create any other resources here please */
/* Create the graphic context */
gc = XCreateGC( displayptr, window, 0, &gc_values );
/* Change foreground color to black */
XSetForeground( displayptr, gc, BlackPixel( displayptr, screen ) );
/* Display the window */
XMapWindow( displayptr, window );
/* Loop: await an input event & process it */
do
{
    /* Await next event */
    XNextEvent( displayptr, &event );
    switch( event.type )
    {
        case ConfigureNotify:
            /* Changed Size */
            window_width = event.xconfigure.width;
            window_height = event.xconfigure.height;
            break;
        case Expose: /* Uncovered part of window */
            refresh( );
            break;
    }
} while( event.type != KeyPress );
/* Exit on key press */
/* Release resources here */
XFreeGC( displayptr, gc );
/* Close the display */
XCloseDisplay( displayptr );
/* Return w/o error */
return( 0 );
/* End of main */
}
```


start the Cshell from another shell with the command “/bin/csh.”)

2) Start the X-Windows server with the shell command:

```
% xstart
```

If X-Windows is properly installed, and if there are no local configuration files to override the default ones, the root (background) screen will be displayed, the motif window manager will be started, xclock (a clock), and one or more xterm (shell) windows will appear.

When several windows are open simultaneously on a screen, a method of window selection (called focusing) is needed. When a key is pressed, X-Windows needs to know which window the key press is to be passed to. Under motif, input is passed to the window containing the pointer. Window selection, or focus, is performed by using the mouse to move the pointer inside a window. To enter a shell command, move the pointer inside one of the windows with a shell prompt, then key in a command.

On the Aviiion, the Xhilibert program can be compiled and linked with the following shell command:

```
% cc -o Xhilibert Xhilibert.c -lX11
```

This command invokes the C compiler on file Xhilibert.c and links

in the Xlib library to produce the executable file Xhilibert. The Xhilibert program can be started with the shell command:

```
% Xhilibert 6
```

When this command is issued from inside a shell window, an Xhilibert window should open on the screen, and a sixth-order (six levels of recursion) Hilbert curve should be displayed. The Xhilibert program accepts a single command line argument specifying the order of the curve. If the pointer is moved inside the Xhilibert window and a keyboard key pressed, the Xhilibert program should remove its window from the screen and exit.

To test the portability of Xhilibert.c, the source code was moved to an Apollo workstation and recompiled. The program compiled with no modifications, and behaved the same way there as it did on the Aviiion.

The network transparency of Xhilibert can be shown in a multitude of ways. To demonstrate the network features of X-Windows, TCP/IP must be up and running. X-Windows does not have to be running on the workstation containing the Xhilibert program, but it must be running on the workstation where the Xhilibert window is to be displayed. Assume there are two workstations on the network, called “hostA” and “hostB”. The executable Xhilibert program is on hostA. TCP/IP is up and running on hostA; it may be an Aviiion, Sun, Apollo, etc. HostB is an Aviiion with TCP/IP running.

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- 1) Go to hostB (the Aviion), log in, and start the X-Windows server as outlined above.
- 2) Focus on a shell (xterm) window by moving the pointer anywhere inside the window.
- 3) Give hostA access to the display at hostB with the xhost command:

```
% xhost +hostA
```

- 4) Go to hostA and log in. (Alternately, remsh, telnet, rlogin, etc. could be used to log in to hostA from hostB.) Use the "cd" shell command to get into the directory where the executable Xhilibert program is located.
- 5) While still at hostA, enter the following Cshell commands (the first command specifies that the display at hostB is to be used, and the second starts Xhilibert):

```
% setenv DISPLAY hostB:0.0
% ./Xhilibert 7
```

- 6) At this point, a seventh-order Hilbert curve should appear at hostB, but the Xhilibert program is actually running on hostA.

The two workstations, hostA and hostB, might be different architectures (Intel 80486 or Motorola 68020 versus the 88000 of the Aviion), but the Xhilibert program appears as though it is

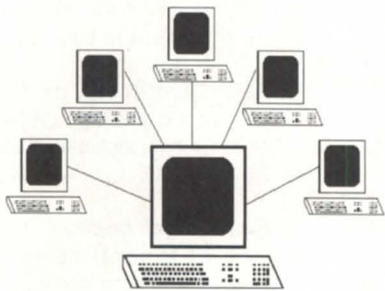
running on hostB.

There are more transparent ways of invoking X-Windows programs that do not require the gymnastics of bouncing back and forth between two workstations and changing shell environment variables. But these things would require modifications to Xhilibert.c that would make it more complex. Most X-Windows applications process command line arguments that specify (among other things) the name of the display. If Xhilibert was written to parse command line arguments (called properties), the display at hostB could be specified by executing it with the shell command "Xhilibert -order 7 -display hostB:0.0".

In terms of complexity, the Xhilibert program is about as simple of a client application program as is possible under X-Windows. Complexity is the price paid for the portability and network transparency features gained by using X-Windows. The Xlib routines are fairly primitive, but this is nothing new. Programmers are used to building powerful, reusable tools based upon primitive functions. Data General also supplies a higher level ISO motif toolkit with its release of X-Windows. X-Windows is such a vast product that an article of this size can do little more than scratch the surface. Quite a bit of additional information is available in the on-line help files ("man" command), and in the X-Windows header files. △

Pete Szaban is technical programmer at Western New England College in Springfield, Massachusetts. He may be reached at 413/782-1239.

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DG NEWS

Two in a row

by Robin Perry
Focus staff

Increased Aviion sales and stable revenue from the proprietary MV line, coupled with cost-cutting measures taken in previous quarters, resulted in net income of \$19.2 million for Data General's second quarter of fiscal year 1991. Revenues for the quarter were \$320 million, compared to revenues of \$314 million in the second quarter of 1990.

The results marked Data General's second consecutive profitable quarter, after five years of losses. Although the company is not yet out of the proverbial woods, the news was especially welcome in light of the fact that both minicomputer manufacturer Wang and industry giant IBM reported losses in their second quarters.

DG spokesperson Stephanie Bigusiak reported favorable market response to DG's new 117 MIPS AV 7000 and 8000 servers. Aviion sales account for approximately 20 percent of DG product sales. MV sales have held steady for three consecutive quarters, DG reported, accounting for 66 percent of DG's product revenue. "We're very pleased with the fact that they have remained unchanged," Bigusiak said. The balance of product sales, classified as "other," includes DG's line of personal computers.

The sale of Nippon-Data General (see page 48) early in the third quarter will reduce the company's revenues from Japan, but DG anticipates the impact on its operating statement to be minimal. The sale will add \$35 million in cash and reduce DG's total debt by \$42 million. Δ

Data General Corporation Condensed Consolidated Statements of Operations (In millions except per share amounts)

	Quarter Ended		Six Months Ended	
	Mar. 30, 1991	Mar. 31, 1990	Mar. 30, 1991	Mar. 31, 1990
Revenues:				
Product	\$207.8	\$205.5	\$407.1	\$391.9
Service	112.6	109.3	225.0	213.6
Total revenues	320.4	314.8	632.1	605.5
Costs and expenses:				
Cost of product revenues	106.6	107.3	211.4	204.3
Cost of service revenues	64.7	65.6	130.2	133.9
Research and development	26.1	35.7	51.1	70.1
Selling, general, and administrative	101.3	113.5	202.2	222.9
Total costs and expenses	298.7	322.1	594.9	631.2
Income (loss) from operations	21.7	(7.3)	37.2	(25.7)
Interest income	0.9	1.9	2.3	4.2
Interest expense	2.9	2.2	6.1	5.1
Income (loss) before income taxes	19.7	(7.6)	33.4	(26.6)
Income tax provision	0.5	1.0	1.8	2.5
Net income (loss)	\$19.2	\$(8.6)	\$31.6	\$(29.1)
Net income (loss) per share	\$.60	\$(.29)	\$1.01	\$(.98)
Weighted average shares outstanding	31.8	29.9	31.2	29.8

Faster disk subsystem

Minneapolis, MN—Zetaco, Inc., announces the availability of a 665 MB disk drive with an average seek time of 11.9 milliseconds, and an average rotational latency of 6.25 milliseconds. It is used in Zetaco's SKM disk/tape subsystems, which can yield 130 transactions per second.

SKM subsystems are compatible with Data General's MV series minicomputers and combine fast, high-capacity disks with 8 mm helical scan backup tape, housed in five-inch-high, rack-mountable enclosures. Zetaco offers a choice of four different disk drives to accommodate capacity and performance requirements. The formatted drive capacities in megabytes and average seek times in milliseconds are as follows: 330 MB (10.7 ms), 601 MB (16.5 ms), 665 MB (11.9 ms), and 1,037 MB (15 ms).

SKM subsystems are available from Zetaco 30 days ARO and carry a two-year factory warranty. Pricing depends on configuration, and starts at \$15,258.

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

Circle 56 on reader service card.

Hook-Bang-Crunch again with rev 2

Victoria, Australia—Shalless Software Pty. Ltd., who brought you ?!#Hook-Bang-Crunch, the definitive manual on CLI macros, now brings you the all-new Revision 2, enhanced to show you how to take advantage of all the whiz-bang features of CLI32. Perhaps it should be called Hook-

Bang-Crunch-32.

All of CLI32's new features—such as named strings and variables, input from files, numeric date/time pseudo macros, and substrings—are discussed along with practical examples to highlight the techniques.

Revision 2 also features some brand-new example macros:

- \$DSP—gives space used in non-CPD directories (CLI32 only)
- \$PURGE—purges least-recently created logfiles
- \$RESOLVE—resolves linkfiles (CLI32 only).

And user pseudo macros:

- \$\$CLI?—returns CLI32 or CLI16, depending on which is running
- \$VALUE—returns value of a decimal number in any radix
- \$TOMORROW—returns tomorrow's date (CLI32 only).

Revision 2 is priced at \$100 (plus \$15 shipping and handling), as is the companion magnetic tape containing all the examples used in the manual.

Shalless Software Pty. Ltd., P.O. Box 469, Malvern, Victoria 3144, Australia, 03/822-9157.

Circle 54 on reader service card.

SAS now on Aviiion

Cary, NC—Interactive software for graphic visualization and exploratory data discovery is now available from SAS Institute, Inc., for Data General's Aviiion family of workstations and servers under DG/UX.

The new release, certified by the 88open Consortium, allows users to explore data through a variety of graphic displays, including bar charts, scatter plots, and 3-D rotating plots. All observations are linked, so changes to one graph show immediately in all others. SAS/Insight software also offers distribution, regression, corre-

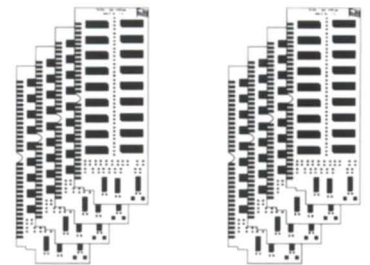
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lation, and principal component analysis, combining each type of analysis with appropriate graphs.

SAS software also supports Data General's computers running AOS/VS. The SAS system is licensed on an annual basis, with fees based on the number and classification of workstations licensed. The first-year license fee under DG/UX begins at \$825. Renewals are available at lower rates. Discounts for degree-granting customers are also available.

SAS Institute, Inc., SAS Campus Drive, Cary, NC 27513; 919/677-8000.

Circle 53 on reader service card.

D:drive and EMU emulate together

Ann Arbor, MI—Digital Dynamics and Rhintek announce the availability of a D:drive-compatible EMU/470 DG color graphics terminal emulator.

Digital Dynamics' D:drive software is an asynchronous Data General MV-to-PC communications product that makes the MV's disk drives available as an additional disk drive for IBM PCs and compatibles. The software is transparent to MS-DOS and PC applications. D:drive may be used to move files between the PC and the DG, as well as load DG files into PC applications. Any DG file is accessible to the PC.

EMU/470 from Rhintek emulates the D470C color terminal in both text and graphic modes. In text mode it supports up to 24 windows; 162 character lines are available through horizontal scrolling. In graphics mode it features line, polygon fill, bar, and arc. It has a straightforward, menu-driven user interface.

D:drive comes with a D200 emulator, DDTerm, which allows the D:drive user to switch between running the D:drive and the CLI through a simple menu choice. The special version of EMU/470 utilizes macro keys to switch between D:drive and CLI. This enhancement offers ease of

use for the D:drive user needing to emulate the D400 series of terminals.

Digital Dynamics, Inc., 3055 Plymouth Road, Ann Arbor, MI 48105; 313/995-2400.

Circle 51 on reader service card.

Litigation support from Textbase

Newport Beach, CA—Corporate law departments and law firms can look to a new litigation support application from Textbase Imaging Corp.

Textbase/LSA is a text, document, and information retrieval application designed to manage and maintain large volumes of names, dates, and other important events produced during complex litigation discovery. Legal research, facts, statements, key issues, discovery documents, and lawyer's comments can be more quickly organized and searched using several indexing techniques that offer flexibility and speed. Textbase/LSA's search techniques

The B52 is an aircraft well used to superlatives. Massively powerful, its versatility and adaptability have extended the B52's lifespan in an age when technology has outpaced most other weapons systems and has left them outdated almost as soon as they enter service.

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Fax (513) 791-6290

Synergistic Software Co. Ltd.,
Hughenden House, Main Street
Collingham LS22 4A
United Kingdom
Contact: Tony Deakin
Phone 44-937-73446 (24hr)
Fax 44-937-66903

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TextBase/IMG is the integration of a new technologically advanced management system designed to specifically manage free-form text in a relational database management system and a technologically advanced process for scanning, character recognizing, displaying and printing images in an image processing management system into custom text and imaging applications.

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TextBase Imaging Corp.

901 Dover Drive, Suite 242, Newport Beach, CA 92660
(714) 722-9648 FAX: (714) 722-6927



TextBase runs on the DG MV and DEC VMS series of computers.
TextBase is a trademark of TBI. Windows is a trademark of Microsoft Corporation.

Circle 43 on reader service card.

can include a thesaurus search process.

The new release was developed using TBI's relational data base management system, Textbase. The application is operable on the Data General line of minicomputers running AOS/VS.

Textbase Imaging Corp., 901 Dover Drive, Suite 242, Newport Beach, CA 92660; 714/722-9648.

Circle 55 on reader service card.

SAM disaster prevention

Jamaica, NY—Intra Computer, Inc., manufacturer of the SAM family of disaster prevention systems, announces support for the graceful shutdown of protected hosts running Unix in both stand-alone and networked configurations.

Through a cross-licensing agreement with Amarex Technology, Inc., of New York, which will support the "C" software, Intra will bundle Amarex's host and

network software for SAM, including DG/UX 4.3, with SAM hardware.

SAM is an environmental monitoring and disaster prevention system that records all conditions affecting computer reliability—temperature, humidity, airflow, AC power quality, UPS backup, Halon triggering, and personnel intrusion. SAM detects problems and alerts managers and users by using broadcast messages, audible alarms, and an auto-dialer with synthesized voice alert. Under dangerous conditions, SAM automatically closes files on protected host systems and powers them off.

Intra Computer, Inc., 87-46 Van Wyck Expressway, Jamaica, NY 11418; 718/297-5500.

Circle 52 on reader service card.

Fast backups

Newport News, VA—The Contemporary Cybernetics Group introduces two new QIC streamers to its tape backup

product line. The CY-3800 is a 1/4-inch cartridge streamer that can store up to 525 MB on a single tape. Fast transfer rates allow you to perform a complete backup in just 45 minutes. The 150 MB streamer, the CY-3600, can run a backup in under 30 minutes.

The streamers follow the 5.25-inch half-height form factor and offer both SCSI and QIC-02 interfaces. They are write-compatible with QIC 24, 120, and 150 formats, and read-compatible with the QIC 24 format.

Both the CY-3600 and the CY-3800 include the drive, any required hardware or software interfaces, documentation, and a 12-month warranty with support from in-house engineering and technical support groups. The drives can be internally or externally mounted.

Contemporary Cybernetics Group, Rock Landing Corporate Center, 11846 Rock Landing, Newport News, VA 23606; 804/873-0900.

△

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Processors:

MV40000 32MB	SAVE \$
MV20000 Model 1 16MB	SAVE \$
MV20000 Model 2 16MB	SAVE \$
MV20000 Model 1 to Model 2 upgrade	.....	SAVE \$
MV15000 Model 20 8MB	.....	\$25,000
MV15000 Model 8 to Model 20 upgrade	.....	SAVE \$
MV15000 Model 10 to Model 20 upgrade	.....	SAVE \$
MV10000 4MB Meter high cabinet	.....	\$4,500
MV8000-II 8MB Meter high cabinet	.....	2,500
MV9500 8MB AOS/VS II	.....	47,000
AViiON All Models	.....	SAVE \$
MV8000 Model 9300	.....	950
MV7800 4MB 16 slot chassis	.....	2,100
MV7800XP 4MB	.....	7,500
MV4000 2MB	.....	700
MV4000DC 2MB, 120MB, floppy	.....	2,250
MV2000 Enhanced 4MB 160 MB disk	.....	5,200
MPT100 Dual floppy	.....	350
MP100 8520-D	.....	350
S-140 256KB Floating point	.....	1,500
Desktop 10 Floppy, 15MB disk	.....	875
Desktop 20 Floppy, 15MB disk	.....	1,295
S-120 256K 16 slot	.....	550
S-280 2MB	.....	1,900

Processor Options:

8997 Expansion chassis MV15, 20	.....	\$5,500
8819 Second IOC for MV10000	.....	1,800
8762 Expansion chassis MV10, 8.4, S280	.....	3,500
8749 Battery backup for MV10000	.....	1,100
8746-B Battery backup for 8762	.....
EXP Chassis	.....	900
8704 Floating point unit MV8000	.....	500
4543-B MCP1 8 Async 2 Sync DCH Ptr	.....	1,900

4463-ZT USAM-4	.....	\$275
4380 ISC-2 (Synch)	.....	600
4370 IAC-16 RS232, 20MA, W TCB	.....	1,550
4623 IAC-24 w/TCB-24	.....	5,900
4367 IAC-8 RS232, 20MA Modem Cnt	.....	1,500
4532-A ILC	.....	2,900
4560 LAC-12	.....	1,100
4608 10 Port term. serv	.....	2,800

Disk Storage Units:

6161 147MB Disk subsystem	.....	\$900
6236 354MB Disk subsystem	.....	1,300
6239 592MB Disk subsystem	.....	3,200
6329 120MB MV2000/MV1400	.....	800
6363 160MB MV2000/MV1400	.....	1,200
6491 322MB for MV2500 or CSS	.....	2,900
6554 662MB for MV2500 or CSS	.....	3,900
6581 500MB R.A.M.S. Disk	.....	Call
6720 CSS2 1.0GB Disk subsystem	.....	12,000
6685 1.0GB Disk Drive A/O	.....	5,700
2351 Fujitsu w/BMX3	.....	3,200
6061/6122 Zebra Disks or Parts	.....	Offer
Zetaco ARZ and SKS subsystems	.....	Call
Zetaco Laser Disk subsystem	Call

Specials

D 411 Terminal	\$165
CSS (SCSI) Disk & Tape Subsystems	Call

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6165 D460 Monitor with keyboard	\$195
6166-X D410 Monitor with keyboard	165
6169-X D211 Monitor with keyboard	.....	165
6391-X D214 Monitor with keyboard	.....	200
6392-X D215 Monitor with keyboard	.....	225
6393-X D411 Monitor with keyboard	.....	175
6394-X D461 Monitor with keyboard	.....	375
6500 D216 Monitor with keyboard	.....	380
6682-A D217 Monitor with keyboard	.....	395
6567 D412 Monitor with keyboard	.....	475
6568 D462 Monitor with keyboard	.....	795

Tapes:

6021 800 BPI new style	.....	\$400
6026 800/1600 BPI Brown, FCC compliant	.....	1,250
6125 1600 BPI Streamer, FCC compliant	.....	500
6311 15MB Cartridge MV4 DC/7800DC	.....	650
6341-A 1600 BPI Streaming Tape	.....	3,500
6270 15MB Cartridge for Desktop	.....	650
6299/6300 1600/6250 BPI Subsystems	.....	3,500
6586-A Galaxy Tape	.....	5,200
6590M 2GB Tape Backup add-on for CSS	3,800
Megatape 2GB Subsystem	Call
Kenedy 9400 w/ BMX2 Subsystem	Call

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MV20000, All sizes	
MV15000, All sizes	
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MV8000, All sizes	
MV7800XP, All sizes	
MV7800, All sizes	
MV4000, All sizes	
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Data Specific

Sayonara, Nippon-DG

Data General has sold its Japanese subsidiary **Nippon-Data General** for approximately \$46 million to the electronics firm **Omron Corporation** of Kyoto, Japan. According to DG, cash proceeds from the sale were approximately \$30 million, with a gain on the sale of approximately \$13 million. As a part of Omron Corp., Nippon-Data General will retain its name. Nippon-Data General will be Data General's exclusive Japanese distributor.

DG Corporate Spokesperson **Jim Dunlap** said that the sale provides "an avenue for DG to get greater presence in the Japanese market." Nippon-Data General, which became a subsidiary of DG in 1979, will continue its current hardware and software product development activities. Omron Corp. had sales of approximately \$2.6 billion in fiscal year 1990.

Oops!

In the April issue of *Focus*, it was reported that **Data Assurance Corporation** of Englewood, Colorado opened a 1,700 square foot business continuity center. Actually, the facility is 17,500 square feet. Our apologies for the error.

Edson to Edsun

Edson D. de Castro, DG co-founder and former chairman of the board, has joined the board of directors of **Edsun Laboratories, Inc.** of Waltham, Massachusetts. Edsun Laboratories specializes in developing graphic technology and products for the personal computer environment.

Slice of life

Along with the new 117-MIPS Aviion computers, Data General rolled out a new "pizza box" advertising campaign targeting senior management of *Fortune* 1000 and smaller high-growth companies. To reach high- and mid-level managers, DG is using "Sunday Strategy" programming, that is, advertising on programs like "Sunday Morning with Charles Kuralt," "This Week with David Brinkley," and "Face the Nation," which consistently attract senior managers.

BL adds peripherals

BL Associates of Hanover, Massachusetts, established a Peripherals Division for the marketing and sales of DG-compatible hardware products. **Robert J. McGowan**, formerly of Zetaco, heads the new division which will market Dataram, SCIP, StorageTek, Seagate, Zetaco, and other manufacturers' compatible hardware in the DG marketplace.

Alliances

Serving up Apples

A licensing agreement with **Apple Computer Inc.** will allow Eclipse MVs to act as centralized servers in Macintosh environments. Data General is porting Apple's Data Access Language (DAL) Server to MV and Aviion systems. DAL Server offers access to data residing on host systems, and works cooperatively with Macintosh computer applications that support DAL.

DG's implementation of DAL has strategic benefits for both of its product lines. It will give Macintosh users transparent access to MV-based data in DG/SQL, Oracle, and Infos data bases, and access to Aviion-based Oracle, Ingres, Sybase, and Informix data bases when used with an Aviion server.

DG bundles Windows

Data General is bundling **Microsoft Windows 3.0** with its Dasher 386 and 486 desktop PCs. Windows brings "point and click" features and an icon-based interface to PCs running the MS-DOS operating system. Windows is available separately for \$129.95.

Zetaco and DMS

Zetaco and DMS Systems recently began a joint program whereby customers of Zetaco Disk Subsystems can purchase DMS Disk Optimizer and Management Utility (Diskopt) software at a substantial discount.

Diskopt reformats a magnetic disk by making fragmented files contiguous, consolidating free disk space, and optimizing file and directory locations to reduce disk head movement involved in reading and writing files. A DMS discount coupon is shipped with each Zetaco Disk Subsystem. **Gary Becker**, director of Product Marketing for Zetaco, explained the reasons behind the joint venture. "Zetaco has always strived to offer Data General users both performance and value that are higher than anything else on the market. By helping our customers with a discount on the DMS software, we feel we are further enhancing the value of Zetaco subsystems to users." Δ

RIG/SIG gigs

JUNE

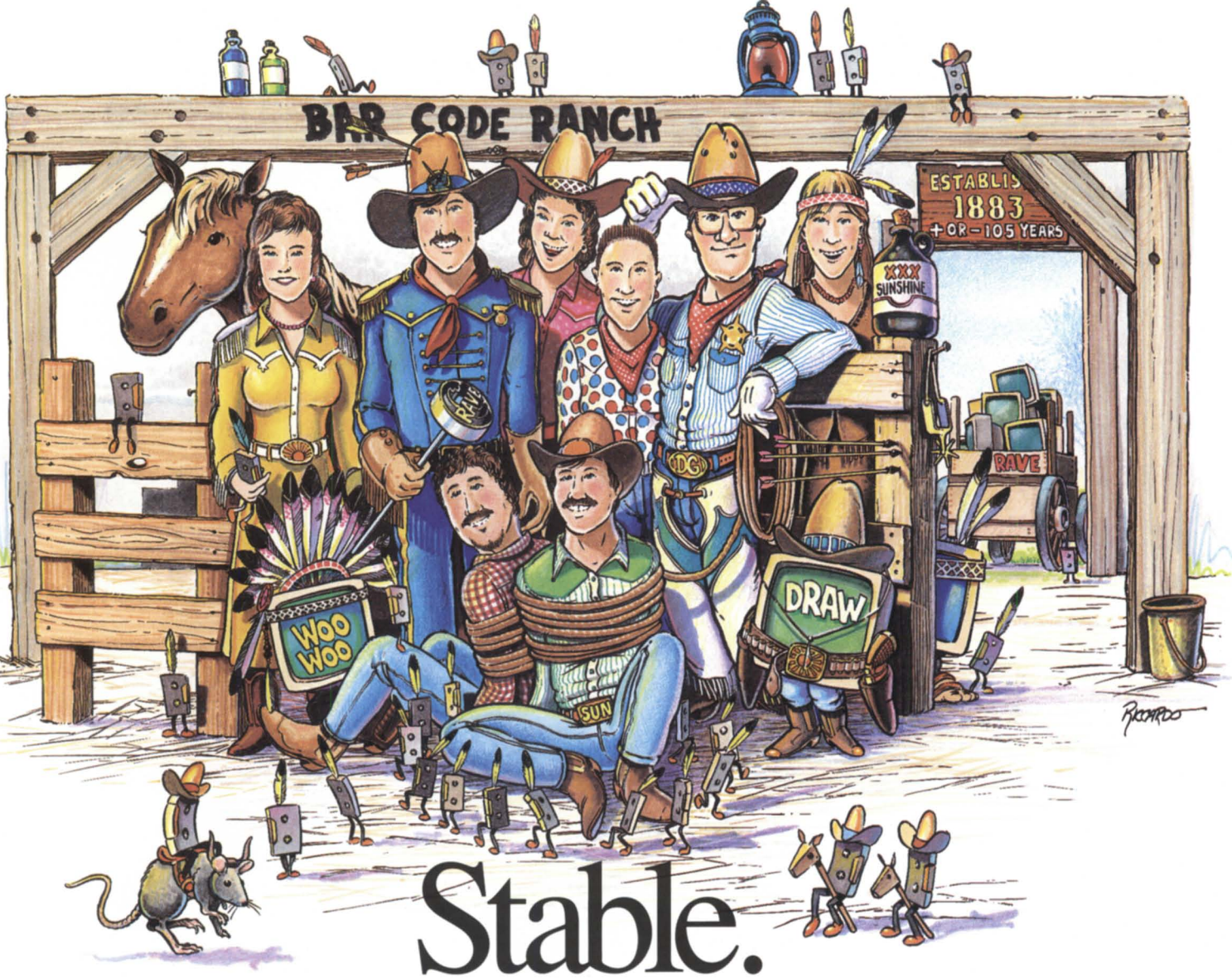
June 9-12, 1991

LEDGUG workshop
(Law enforcement DG users group)
Location: Inn in Aspen, Aspen, CO
Description: With an overall theme of high-tech policing, topics will cover word processing, digital photo imaging, E911 systems, and more.
Cost: \$125 (includes one-year membership to LEDGUG)
Contact: John Myers, 319/291-2557

June 18, 1991

LA EDGE hardware/software expo
(Los Angeles end-users of DG equipment)
Location: Brookside Country Club
Description: The annual hardware/software expo is one of LA EDGE's oldest traditions. It's a great opportunity to see all the things that could enhance your system.
Contact: Mark Speer, 818/897-7777

This calendar is for notices of regional interest groups (RIGs), special interest groups (SIGs), and NADGUG events. If you would like your group's meetings posted here, please send a notice to *Focus* magazine, Livingston Building, Suite 250, 3420 Executive Center Dr., Austin, TX 78731; fax 512/343-7633. We must receive your notice by the 5th of the month, two months prior to the actual event.



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Rave is in business for the long run. We've earned our steadily growing reputation as a leading Data General second source supplier - and our loyal client base - by personally satisfying the needs of our customers.

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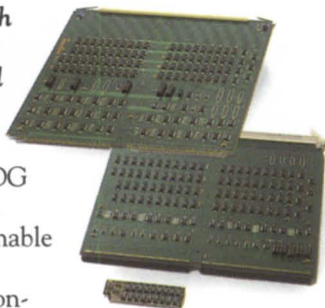
To Design Great Memory for Data General Systems, You Need a Team With Leading Edge Experience



The Clearpoint Team!

Clearpoint proudly introduces memory for Data General's MV and AViiON families, the first of our commitment to a comprehensive Data General product line. Our DG design team backs each product with over 100 years of Data General engineering design experience.

Our aim is to provide DG users with unparalleled performance at a reasonable cost. Commitment to new technologies and on-going product support have made Clearpoint the leading supplier of add-in memory for DEC, IBM, HP/Apollo, Sun, Compaq, Macintosh, and now Data General systems.



The Clearpoint Difference

Clearpoint's DG memory products are supported by

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- world-wide spares depots

Clearpoint's lifetime warranty is offered with confidence. To insure reliability, rigorous testing is done on each board throughout all stages of production. Clearpoint's Universal Memory Tester (UMT), a microprocessor-based computer, runs an individualized DG bus translator to access bit-specific diagnostic tests.

Call or write to receive information on Clearpoint products for Data General systems.

- Product Specification Sheets
- Clearpoint's 1990-91 Product and Services Catalog
- The Designer's Guide to Add-in Memory*, an 80-page text on issues of technology and reliability
- Commitment to Quality,



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