University Computer Center Newsletter

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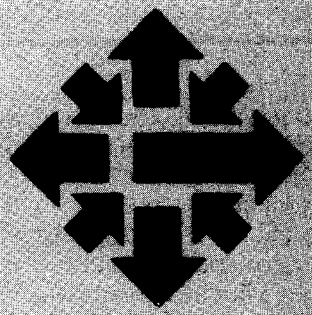

NOS 2.3 Conversion

The three Control Data computer systems operated by UCC are currently running the NOS 1.4 operating system. This version of the NOS operating system is now four years old and does not adequately support some of the latest hardware and software features available from Control Data. During 1985, we will convert all three machines to Control Data's 2.3 operating system. This is the latest offering in their CYBER 170-mode operating systems. The NOS 1.4 system we now use has many local modifications that have been added over the years to enhance our services. When we move to the NOS 2.3 operating system, we will abandon many of these local modifications and use instead the features now available in the standard CDC system.

The three UCC CYBER computers are identified by two-character machine IDs. They are MD, ME, and CA. The MD computer is a CYBER 825 operated by UCC for the Institute of Technology for specialized instructional computing. The ME computer is a CYBER 174 used for general instructional computing at the University. The MD and ME machines form UCC's instructional computing service, known as MERITSS. The CA computer is a CYBER 845. It provides research computing services and acts as a front-end to UCC's supercomputers. The CA provides both interactive and batch computing.

The three machines will convert to NOS 2.3 at different times, as shown in the following schedule:

- MD - Sunday, June 16 (the end of spring quarter)
- ME - Sunday, August 25 (the end of summer session II)
- CA - Sunday, December 15 (the end of fall quarter 1985)

According to this schedule, classes using MD this summer will be running under NOS 2.3, while summer classes using ME will be running NOS 1.4. Instructors who wish to prepare ME classes for fall quarter 1985 and beyond can obtain temporary user numbers on the MD machine this summer. In this way, they can get experience in the same NOS 2.3 environment that their students will be using during the fall.

The CA computer, which has a heavy research load, will have NOS 2.3 test times beginning Sunday, September 22. This test time will extend from noon until 3:30 p.m. each Sunday afternoon from September 22 until the actual conversion on December 15. You are encouraged to try running your programs during this period each week and to report problems to us. The UCC HELP-Line will be open for NOS 2.3 questions each Sunday during this period.

In future issues of the *UCC Newsletter* we will inform you of differences that you may encounter as we move our systems to NOS 2.3.

(K. C. Matthews)

Memorial Day Operating Hours

Operating hours for the Memorial Day holiday will be as follows:

	Down	Up
CRAY 1	Midnight Mon 5/27	6:00 pm Mon 5/27
CYBER CA	1:00 am Mon 5/27	6:00 pm Mon 5/27
CYBER ME	1:00 am Mon 5/27	6:00 pm Mon 5/27
CYBER MD	1:00 am Mon 5/27	6:00 pm Mon 5/27
VAX 11/780	1:00 am Mon 5/27	6:00 pm Mon 5/27
Experimental Engineering Station	2:00 pm Sat 5/25	6:00 pm Mon 5/27

Introducing DI-3000

DI-3000, a graphics software package based on the SIGGRAPH CORE standard, has been installed on three of UCC's mainframes—the CRAY, the CYBER 845 (CA), and the VAX. The package, which was developed by Precision Visuals, Inc., is a library of FORTRAN-callable routines in which two- and three-dimensional graphics are supported in both batch and interactive environments. DI-3000 is device-independent: users need only compile an application program once and may choose any supported output device at execution time. The package also supports input functions associated with a device such as cursors, light pens, and tablets.

DI-3000 has many impressive features including:

- Full 3D viewing. Orthographic, oblique, and perspective projections in 3D are supported.
- Graphic arts-quality text. Proportionally-spaced, publication-quality characters are stroke generated.
- Dynamic color lookup tables. As new color indices are defined or altered, raster devices will change the image dynamically on the display surface. Non-raster displays will change colors for subsequent primitives, not affecting those already displayed.
- Polygon fill and patterning. Color fills polygons on those devices with hardware or firmware polygon fill but otherwise simulates polygon fill by one of 48 polygon hatching patterns.

Several advanced features in the broader version of DI-3000 (DI-3000 Extended) also are supported:

- Retained segments. An integer name is assigned to a segment and stored for later manipulation, important in interactive applications.
- Visibility, highlighting, and segment priority control, allowing for creation of menu-driven applications.
- Segment storage data structure save and restore. Existing segment storage information can be written to an internal file and restored in subsequent DI-3000 sessions.
- Full 3D modeling interface. Objects may be scaled, translated, rotated, or sheared before viewing.

DI-3000's Metafile System is an important feature of the package. The package allows an application program to create metafiles and then post-process them on many different devices. "Metafile translators" are included for each supported device. Users may interactively manipulate pictures from up to five metafiles concurrently to create a desired result. The pictures may be positioned, scaled, and superimposed on a selected graphics device. The metafile translators employ a simple command language and allow the user to define multiple windows and viewports. Metafiles also may be read as input to other DI-3000 application programs and used to create new metafiles.

DI-3000 is available for installation on most mainframes, and the software will support a wide variety of output devices—plotters, terminals, and film recorders. Therefore, users may purchase DI-3000 for their own computers and be able to view and manipulate metafiles created on our supercomputer. These abilities—the higher level of support of the CORE standard and the improved metafile system—will contribute to making DI-3000 the major graphics focus of UCC's graphics services.

Use

DI-3000 application programs for the CRAY, CYBER, and VAX can be run according to the following procedures. An application program on the CRAY or the CYBER can create a metafile which may be stored on disk and viewed with a metafile translator program. Metafile translators are located on both the CYBER and the VAX. On the CYBER, device drivers can be linked directly with the application program and the resulting output will be displayed during execution on the specified terminal.

CRAY

Application programs are run on the CRAY by accessing the necessary libraries with the command GRAB,DI3000. The GRAB acquires two libraries (DI3000 and DI3ULIB), the segment storage subroutines (SSBIN), the metafile device subroutines (MFBIN), and the error message text and font data (ERRFONT). ERRFONT is assigned to logical unit number 17. Metafile output is put on logical unit number 92 and named METAFIL by DI-3000. Figure 1 shows a sample submit job of a DI-3000 application program to the CRAY. The resulting metafile is disposed to the CYBER for viewing or plotting on one of the supported output devices.

CYBER

DI-3000 application programs may be loaded and executed on the CYBER by using the procedure file DIGO, which allows users to optionally include DI-3000 Extended and the metafile device. The procedure loads either the real or dummy segment storage binaries (DI-3000 Extended), either the real or dummy metafile device driver, and either a real or dummy device driver binary. The procedure assumes the binary is on LGO. During execution of the program, the error/font data file is attached. Figure 2 shows the contents of the procedure DIGO. The procedure is called as follows:

DIGO,dev,mf,ss

where dev is

T4010:	Tektronix 4010 series terminals (default),
VT100:	VT100 with Retro-Graphics, or
DUMMY:	when only metafile output is desired.
mf is optional,	used when metafile output is desired.
ss is optional,	used when DI-3000 Extended subroutines are desired.

Figure 3 shows the use of the procedure to load and execute a program that will create a metafile. The metafile will be

```
/JOB
MFJOB(STMCR)
USER,0,0,0.
JOB,T=10.
/ACCOUNT
*.
*. ACQUIRE THE DI-3000 LIBRARIES.
*.
GRAB,DI3000.
*.
*. COMPILE
*.
CFT.
*.
*. LINK UP LIBRARIES.
*.
LDR,DN=$BLD,LIB=DI3000:MFBIN:SSBIN:DI3ULIB.
*.
DISPOSE,DN=METAFIL,DC=ST,DF=CB,MF=CA,WAIT,TEXT='CTASK.RETAIN,METAFIL.'.
/EOR
      PROGRAM DITEST
C INITIALIZE DI-3000
      CALL JBEGIN
C INITIALIZE METAFILE
      CALL JDINIT(0)
C ACTIVATE METAFILE
      CALL JDEVON(0)
C SET THE WINDOW, BORDERING THE OBJECTS TO BE VIEWED
      CALL JWINDO(-5.0,5.0,-5.0,5.0)
C SET THE VIEWPORT
      CALL JVPORT(-1.0,1.0,-1.0,1.0)
C OPEN A SEGMENT
      CALL JOPEN
C DRAW A RECTANGLE
      CALL JRECT(-4.5,2.0,-2.0,3.0)
C DRAW A CIRCLE
      CALL JCIRCL(2.0,1.0,0.0,3.0,0)
C DRAW A SECTOR
      CALL JSECTR(-3.0,-3.0,-3.0,2.0,0,315.0,45.0)
C CLOSE THE SEGMENT
      CALL JCLOSE
C TURN OFF METAFILE
      CALL JDEVOF(0)
C TERMINATE METAFILE
      CALL JDEND(0)
C TERMINATE DI-3000
      CALL JEND
      STOP
      END
```

Figure 1. Sample submit job of DI-3000 application package to the CRAY from the CYBER.

found on a local file called TAPE98 and must be rewound before viewing with a metafile translator. Metafiles may also be routed from the CYBER to the Calcomp plotter as follows:

```
ROUTE,filename,DC=PL,FC=CC,
  BIN=bin.
```

The metafile translator program on the CYBER is executed with the following command:

```
MFTRAN,dev
```

where dev is

```
T4010: Tektronix 4010 series
       terminals
```

or

```
VT100: VT100 with Retro-Graphics.
```

Figure 4 shows a sample session using the metafile translator for the Tektronix 4010 on the CYBER, viewing the metafile from Figure 1.

VAX

On the VAX the following commands will execute a metafile translator:

```
$ di3000
$ mtrdev
```

where dev is

```
lpr: lineprinter,
ptx: Printronix,
r11: Ramtek 6211,
r94: Ramtek 9460,
t10: Tektronix 4010 series,
t14: Tektronix 4014, or
vt1: VT100 with Retro-Graphics.
```

The metafile translator commands are the same for the CYBER and the VAX. See the writeups and the *Metafile System User's Guide* for further details on using the metafile translator. In addition, DI-3000 metafiles may be enqueued to the Calcomp plotter from the VAX as follows:

```
$ enqueue calcomp filename
```

Support

Documentation for the DI-3000 package will be available to users through a number of sources. The *DI-3000 User's Guide*, provided by the vendor, Precision Visuals, will be available at the Minnesota Bookcenter in Williamson Hall on the East Bank and at the H. D. Smith Bookstore on the West Bank. This manual describes both the underlying principles and functional capabilities of DI-3000. The *DI-3000 Quick Reference Guide* and the *Metafile System User's Guide* also will be available. Copies of the DI-3000 documentation will be located in the UCC Reference Room in 140 Experimental Engineering. In addition, WRITEUP,DI-3000 on the CYBER and MOREHELP WRITEUP GRAPHICS on the VAX provide the system-specific information needed to run an application program on UCC systems. These system documents include examples of DI-3000

```
   .PROC,DIGO,DEV=T4010,MF=MFDUMMY/MFNODE,EXTEND=SSDUMMY/SSNODE
*
* DEV THE DESIRED DEVICE DRIVER - DEFAULT T4010
*
* MF ABSENT - NO METAFILE DRIVER WILL BE USED
* PRESENT- METAFILE DRIVER MAY BE USED
*
* EXTEND ABSENT - NO DI-3000 EXTENDED WILL BE USED
* PRESENT- DI-3000 EXTENDED FEATURES MAY BE USED
*
ATTACH,DI3000,DIERFN,MF,EXTEND,DD=DD_DEV/UN=CALLPRG,PN=SPL.
LDSET,LIB=DI3000.
LOAD,MF,EXTEND,DD.
LGO.
REVERT. DI-3000 RUN COMPLETE
EXIT.
REVERT,ABORT. DI-3000 RUN FAILED
```

Figure 2. Procedure DIGO on the CYBER.

```
/ACQUIRE,DITEST - application program
/FTN5,I=DITEST
/DIGO,DUMMY,MF
```

Figure 3. Sample compilation, loading, and execution on the CYBER of a DI-3000 application program that creates a metafile. (Metafile output on local file TAPE98.)

programs and sample job runs on the three machines.

Output devices that have been previously supported with graphics packages will be supported with DI-3000. On the VAX, the Calcomp 4-pen plotter, Printronix printer, Ramtek 6211 and 9640 terminals, Tektronix 4010 and 4014 terminals, and the VT100 are supported. The Calcomp, the Tektronix 4010 series terminals, and the VT100 are supported on the CYBER. The DI-3000 package will be able to support new graphics devices that UCC acquires or that user interest indicates a need to support. When D48 software development is complete, DI-3000 will be able to produce movies on the Dicomed film recorder.

DI-3000 will provide UCC users with a graphics package that offers excellent vendor support, readable documentation with tutorials, and improved features over our present homegrown system, MNCORE. Although we will continue to offer MNCORE, we will reduce our support of it. We strongly recommend that all new graphics applications make use of DI-3000 subroutine libraries. The package is available for the hardware, both computers and output devices, that UCC supports and may support in the future. Current UCC software that relies on MNCORE subroutines will be converted to link with DI-3000. Future versions of Plotpac and Plotcal are available on the CRAY, creating DI-3000 metafiles instead of MNCORE metafiles. The graphics package DISSPLA will be converted in the future. DI-3000 will provide a new standard in the graphics packages available to UCC system users.

(Michele Lewis)

```
/ACQUIRE,METAFIL
/MFTRAN,T4010

The DI-3000 Metafile Translator
Version 4.03

M>
? SET METAFILE 1 METAFIL
          - assigns the file METAFIL
M>
? DRAW PICTURE 1
          - hit any key except <CR> to clear screen
M>
? QUIT
```

Figure 4. Sample run of the Tektronix 4010 Metafile Translator on the CYBER.

CYBER News

Seven-Track Tape Service Change

During the first part of June, one of the two seven-track tape drives on the CYBER CA system will be replaced by an additional nine-track tape drive. This will provide an improved turnaround for the majority of users and will require some changes for the seven-track tape users.

Seven-track tape users wishing to copy one seven-track tape to another will have to do the following:

1. Request a seven-track tape (the source).
2. Copy the source tape to a temporary disk file.
3. Return the source tape file.
4. Request the target seven-track tape.
5. Copy the temporary disk file to the target tape.

In addition, jobs requesting two seven-track tape drives with "RESOURC,MT = 2." control cards will have to change the "RESOURC" control card to "RESOURC,MT = 1." Failure to change the "RESOURC" control card will result in the following error message:

INSUFFICIENT RESOURCES ON SYSTEM.

(G. Rydberg)

Some Keypunches Removed

Because campus use of punched cards has continually declined, UCC recently reduced the number of keypunch machines and services. As of May 1, 1985:

- The 026 punch in Blegen 90 has been removed.
- The two 026 punches at Classroom Office Building 125F have been replaced by one 029 punch.
- The number of 029 punches in Experimental Engineering 140B has been reduced from six to three.
- Four of the five 026 punches in Elliott N640A and N640B have been removed, leaving one 026 and three 029 punches at that site.
- The number of punches at Lauderdale has been reduced from five to two.

Also, the interpreter in Room 140B of Experimental Engineering will be removed on June 1, 1985. The interpreter at Lauderdale will remain in service.

Any comments or questions regarding these changes should be directed to:

Jerry Larson
University Computer Center
170H Lauderdale Computer Facility
(638-0521)

(Jerry Larson)

CRAY Notes

PCGPAK Sparse Matrix Library

We recently installed the PCGPAK user library on the CRAY. It solves sparse systems of nonsymmetric linear equations by iterative methods. The only memory PCGPAK needs is for the nonzeros, some pointers for them and a relatively small amount of workspace. No external files are used.

PCGPAK has three iterative methods that can be used by themselves, or in conjunction with three preconditioning methods. (The PCG in the name PCGPAK stands for "preconditioned conjugate gradient," one of the combination of methods provided.) For block two-cyclic matrix problems, a preprocessing routine can perform partial elimination of some of the unknowns before it solves the rest of the problem.

PCGPAK is only available on the CRAY. It is accessed by the control statement LDR(LIB=PCGPAK). Our contract with the vendor, Scientific Computing Associates, limits use of PCGPAK solely for academic and educational purposes. Documentation for the library is WRITEUP(PCGPAK) and an 18-page *PCGPAK User's Guide*, which is on reserve in the UCC Reference Room, 140 Experimental Engineering Building, (612/373-7744). For the price of reproduction, Reference Room staff can make you a photocopy.

UCC regards PCGPAK as a better method for sparse nonsymmetric linear equation problems than the Yale Sparse Matrix Package, YSMPLIB. (It was designed by the authors of YSMPLIB.) It almost always takes much less storage and usually takes much less computer time. PCGPAK uses iterative methods rather than the direct nonpivoting methods used by YSMPLIB. However, the documentation for PCGPAK does not give many hints as to which of the iterative methods to use or when to use preconditioning.

Questions on PCGPAK can be directed to me in 235d Experimental Engineering, (612/376-1636).

(Mike Frisch)

EDUCOM Sponsors Academic Computing Seminars

EDUCOM, a non-profit consortium of 500 colleges and universities concerned with introducing, using, and managing information technology in higher education, will be sponsoring several seminars and workshops this summer.

The seminars, "Strategies for Integrating Computing throughout the Curriculum," and workshops, "Academic Software—Implementation within the Curriculum" are scheduled to be held at Stanford University July 11 through 13 and at Dartmouth College July 17 through 19. Both schools are members of the Apple University Consortium (AUC). Partial funding for the development of these events has been provided by Apple Computer, Inc.

The one-day seminars are for administrators and others responsible for planning computer-based education and research. Seminar topics will include:

- Student and faculty access to computers
- Faculty development
- Academic software
- User support services

The two-day workshops that follow each seminar will guide faculty members from varied disciplines in the effective use of academic software in teaching, learning, and research. The workshops will emphasize software developed for the Macintosh at AUC schools and by commercial developers.

The workshops will include demonstration and use of software in:

- The sciences, including engineering and computer science
- The humanities
- The social sciences
- Business

EDUCOM is offering reduced registration rates to groups and individuals registering for both the seminar and the workshop. For additional information, contact Kathy Schaible at

EDUCOM
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Princeton, NJ 08540
(609/734-1915)

PHONE NUMBERS

Access:
- CYBER(CA)—10, 30 cps 376-5730
- —120 cps 376-5706
- MERITSS(ME)—10, 30 cps 376-7730
- —120 cps 376-7120
- VAX/VMS(VA)—(autobaud) 376-9770

Budgets 373-2521
Computer-Aided Instruction 376-2975
Computer Hours (recorded message) 373-4927
Consulting
- HELP-line 376-5592
  7 a.m.-7 p.m., Monday-Friday
- Statistics Packages 376-1761
  1-2 p.m., Monday-Friday
- Data Bases 376-1761
  10-11 a.m., Monday-Friday
- Microcomputers 376-4276
  9:30 a.m.-noon and 1:30-4 p.m., Monday-Friday
- Text Processing 376-2944
  1-4 p.m., Monday-Friday

Contract Programming 376-1764
Data Base Applications 376-1764
EDUNET Liaison 373-7745
Engineering Services 376-1023, 376-8153
Equipment Purchase/Information 376-8153
Experimental Engineering I/O 373-4596
Graphics Software 638-0541
HELP-line 376-5592
7 a.m.-7 p.m., Monday-Friday
HOURS-line (recorded message) 373-4927
Information, Experimental Engineering 373-4360
Information, Lauderdale 373-4912
Instructional Labs 376-2703
Instructional Services 373-7745
Lauderdale Computer Room 373-4940
Lauderdale Services 638-0523
Lauderdale Services Manager 373-7538
Lauderdale Users' Room 373-4921
MERITSS 373-7745
Newsletter Subscription 376-1491
Permanent File Restoration 376-5605
Professional Services Division (PSD) 376-1764
Project Assistance 376-1764
Reference Room 373-7744
Remote Batch (RJE) Services 376-2703
Short Courses 376-8806
Shuttle Bus Service 376-3068
System Status (recorded message) 373-4927
Tape Librarian: see Lauderdale Services
Text Processing Services 376-2943
User Accounts 373-4548

OPERATING HOURS

	CYBER (CA)	Low rate	CRAY (CR)	MERITSS (ME)	VAX (VA)
M-F	7 a.m. - 4 a.m.	8 p.m. - 4 a.m.	7 a.m. - midnight	7:45 a.m. - 3:30 a.m.	8 a.m. - 6 a.m.
Sat	4 a.m. - 5:15 p.m.	4 a.m. - 5:15 p.m.	7 a.m. - 5 p.m.	7:45 a.m. - 3:30 a.m.	24 hours
Sun	4 p.m. - 1 a.m.	4 p.m. - 1 a.m.	4 p.m. - midnight	4 p.m. - 3:30 a.m.	24 hours

PUBLIC LABS—TWIN CITIES CAMPUS

Location	Batch	Interactive	Micro
East Bank			
Arch 148		X	X
CentH		X	
ComH		X	
DiehlH 270, 207		X	
EltH 121, 125		X	
EltH N640	X		
Exp Eng 130		*	
FolH 14, 14a	X	X*	X
LindH 26	X	X	
MechE 308		X	
Physics 69		*	
SanfH		X	
TerrH		X	
VincH 4		X	
WaLib B9		X	

Location	Batch	Interactive	Micro
West Bank			
BlegH 25		*	
BlegH 90	X		
BlegH 140		X	
MdbH		X	
OMWL 2		X	
SocSci 167			X
St. Paul			
BaH		X	
ClaOff 125	X	X	

* Research cluster; access to CYBER CA and VAX/VMS

X in interactive column indicates access to MERITSS

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Michael M. Skow, Acting Director

The *UCC Newsletter* is published monthly by the University Computer Center. Deadline for articles is the 10th of the month preceding publication; deadline for short announcements is the 15th. The *Newsletter* is edited and coded for typesetting at the Computer Center, then typeset on a Linotron 202 and printed at the University of Minnesota's Printing and Graphics Arts Department.

Comments, suggestions, articles, and announcements should be directed to the editor, 227 Experimental Engineering, (612) 376-1491.

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