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# University Computer Center Newsletter

UNIVERSITY COMPUTER CENTER

UNIVERSITY OF MINNESOTA-TWIN CITIES

MINNEAPOLIS, MINNESOTA 55455

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## bulletins

On September 5, 1980 we began billing direct access files either for a minimum length of 500 PRU's or for the actual length if greater than 500 PRU's. The previous method was to charge by the length of the file (227 PRU's for 844's and 640 PRU's for 885's). For example, a user with a direct access file of 658 PRU's would be charged for  $3 \times 227 = 681$  PRU's on the 844's, and  $2 \times 640 = 1280$  PRU's on the 885's. When all of the disk drives had identical track size, this method was fair. However, since the user does not control assignment of the file to a disk drive, this method is "unfair" for users storing files on the 885's.

In general this means a cost reduction and equalization for most of our users, with only those using less than three tracks on an 844 having a cost increase.

L. A. Liddiard, 373-5239

## UCC newsletter

Volume 14

Number 9

September, 1980

Director: Peter C. Patton

Editor : Naomi Miner

Comments about the content of this newsletter, or suggestions for changes may be directed to the editor, 235a Experimental Engineering, or call 612/376-4668.

The University of Minnesota adheres to the principle that all persons shall have equal opportunity and access to facilities in any phase of University activity without regard to race, creed, color, sex, national origin or handicap.

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# SUBMIT dayfile change

On September 11, 1980, dayfile processing for SUBMIT jobs was changed to use an algorithm which we feel is more reliable and helpful to our users. This article explains the change and the reasons behind it.

Under the stock CDC NOS operating system, a job created by SUBMIT has the option of either discarding all output, or of printing it at the central site. Since most of our users are at a variety of remote sites (not at Lauderdale), the option of printing output at the central site was removed. Unfortunately, this also meant that users submitting jobs had no record of the job's execution (or indeed, whether it executed at all). The user was required to do his own processing of the job dayfile if he wanted it saved. However, when the Cyber 172 was installed and multi-mainframe operation was added to our version of NOS, we decided to introduce an automatic dayfile return feature to SUBMIT (which had previously been available to XMIT users on MERITSS).

This feature, as it is currently implemented at UCC, works as follows: at the completion of a job entered via SUBMIT, the job dayfile is copied and returned to the originating user number on the machine from which the job was submitted. The job dayfile is appended to the indirect access permanent file DAYFILE if it exists; if the permanent file DAYFILE does not exist, it is created with the job dayfile as its contents.

Unfortunately, there are several problems with the present algorithm.

- 1) In order to get the dayfile from the most recently completed job, a rather complicated sequence of steps must be followed (e.g., from timesharing):

```
GET, DAYFILE
X, SKIPEI, DAYFILE
X, BKSP, DAYFILE
LNH, F=DAYFILE
```

- 2) In certain cases a job dayfile is lost. The maximum size allowed for the permanent file DAYFILE is currently 192 PRUs. If any single job dayfile exceeds this size or if the sum of the sizes of the permanent file DAYFILE and the job dayfile exceeds 192 PRUs, the job dayfile is not returned.

To solve these problems, we have decided to implement a new algorithm for processing dayfiles. To avoid losing dayfiles because they are too large, individual job dayfiles over 64 PRUs in length will be truncated to that size with the message "DAYFILE TRUNCATED - SEE WRITEUP(SUBMIT)." It should be emphasized that this truncation applies only to dayfiles returned through the automatic dayfile return mechanism of SUBMIT. It does not apply to jobs which do their own dayfile processing, or to normal batch and interactive jobs. In addition, dayfiles on the permanent file DAYFILE will appear with the most recent dayfile

first and the least recent one last. This reverses the current procedure in which the most recent dayfile appears last. Therefore, the steps needed to list the dayfile from the most recently completed job will be much simpler:

```
OLD, DAYFILE
LNH
```

Finally, as the permanent file DAYFILE grows in size, it will be truncated at 192 PRUs with the message "PERMANENT FILE DAYFILE TRUNCATED - SEE WRITEUP(SUBMIT)." Older dayfiles will thus disappear first when truncation occurs.

A new SUBMIT writeup (documenting this and other features of SUBMIT) is available. Any questions? Call,

A. B. Hastings, 376-5604

## writeupdate

Lest it be said that summer slows the creative juices, peruse the following list of WRITEUP additions and changes. Lots of activity for so warm a climate!

CALLS (ALL) - Computer Assisted Language Learning System Programming Manual (63 pp.).

CATALOG (MERITSS) - Description of the CATALOG utility (which lists information about binary records) updated to conform to the present system (3 pp.).

CCL (ALL) - Description of Cyber Control Language, which allows limited programming capabilities within a control card deck (27 pp.).

EXAMINE (74/172) - Description of the tape handling utility EXAMINE (14 pp.).

MIL (ALL) - Minnesota Instructional Language Reference Manual (125 pp.).

PFILES (MERITSS) - Description of updates to the permanent file request processor (11 pp.).

SEND (ALL) - Description of updates to the SEND utility, which places files in the intermachine queue for processing (3 pp.).

TDUMP (MERITSS) - Description of updates to the TDUMP utility for listing files in octal, alphanumeric, and hexadecimal formats (1 p.).

TERAK (ALL) - Replacement for the previous version. This new document describes the "A" system, CAI's new release of our Terak Pascal operating system, editor, peripheral utilities, and CAI capabilities (200 pp.).

J. Jaynes, 376-5262

# cartography

WORLD is a program for creating maps of the world (or any other spherical object). It was written by Phil Voxland, of the Social Science Research Facilities Center, University of Minnesota. It combines in one package several special features.

You may select from over 100 different map projections, ranging from the novel to the familiar, such as Mercator's (in which the meridians and parallels of latitude appear as lines crossing at right angles and in which areas appear greater farther from the equator).

You may choose among several methods of rotating spherical coordinates so that any point on the sphere can become the center of the map, thereby making any oblique or transverse map with the set of projections.

You may interrupt several of the large families of maps so that distortions of shape or area can be reduced. (An interrupted map might resemble an "orange peel" or perhaps a "star.")

You may window the map to display only a portion of the entire map.

You may draw a grid of lines for latitude and longitude either with continuously smooth lines or with a network of tick marks.

You may draw supplementary graphic details such as great circle routes, range rings, special symbols at specific locations, and also titles and labels.

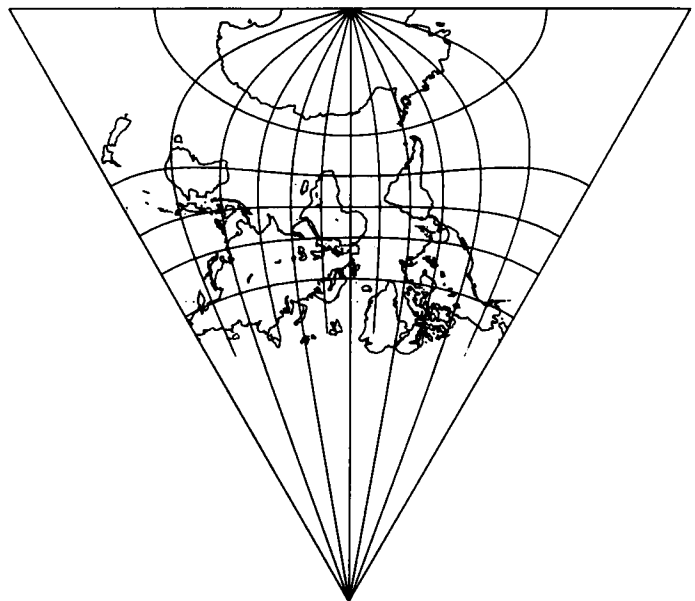
Of significance to professional cartographers, you can get a visual and numerical analysis of the distortion patterns of any projection.

You may give free-format commands either interactively or through batch.

The program is written in standard FORTRAN, and has been installed on both very large and small scale systems. A sixty page machine-retrievable manual describing the program as well as several coastline boundary data files are available. If you are interested in using the WORLD program, or seeing the documentation, call

P. Voxland, 373-5599  
SSRFC

SCHWARZ CONFORMAL MAP IN AN EQUILATERAL TRIANGLE



Sample map drawn with a coastline boundary file of about 8000 points.

# MERITSS statistics

MERITSS began 1979-80 with a CDC 6400 running under the control of the KRONOS 2.1 operating system. MERITSS finished the year with a CDC Cyber 170-720 running NOS 1.3.

We upgraded the hardware to accommodate the expected increase in use over the next few years. In addition, we added a PDP 11/34 to the communications equipment to support 120 character per second terminal transmission rates.

After months of preparatory work, we began the switchover August 18, 1979. We finished in only 36 hours. We had scheduled system downtime for one Saturday and Sunday, but we came back up before Sunday's operations. The end result was a central processor 15% faster than that of the CDC 6400, with 32K more memory (98K total), and 10 peripheral processors, each twice as fast as those of the CDC 6400. We estimate this system will support 75% more simultaneous users, assuming the complexity of the work per user remains the same.

The switch to NOS 1.3 occurred on December 16, after several Sunday test days. We changed operating systems to achieve consistency with the Cyber 74/172 systems and to use software which better utilizes the hardware features of the 170-720.

We have compiled yearly statistics for the 170-720, as were presented last month for the Cyber 74/172.

## Central Processor Hours

We experienced a 10% increase in logged central processor hours. The increase would have been even greater, had we continued with the slower CDC 6400. If this trend continues we will experience an even larger percentage increase next year.

## Connect Time, Number of Sessions, Number of Runs

The figures for connect time and number of sessions show increases of approximately 10%, while the number of runs increased only 3%. These figures suggest users are either interacting longer with working programs, or spending more time editing programs and data files.

## Maximum Number of Simultaneous Users

This average of the monthly maximums increased 10% over the previous year. Although we would prefer the additional usage to spread out over the day, this figure is consistent with the nearly identical connect time increase.

## Average File Storage

Permanent file storage increased 25%. Increased instructional use of System 2000 was the culprit here. With the complete changeover to double density from single density disks, we should be able to withstand next year's increase as well.

## Availability and

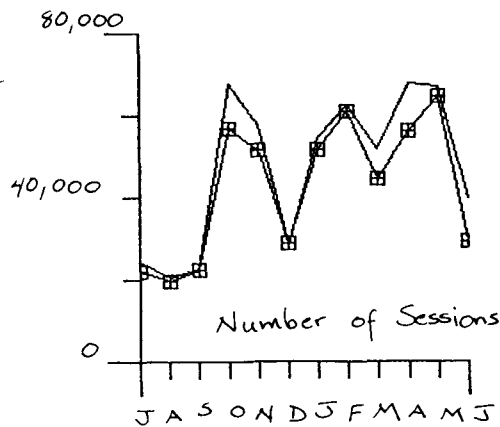
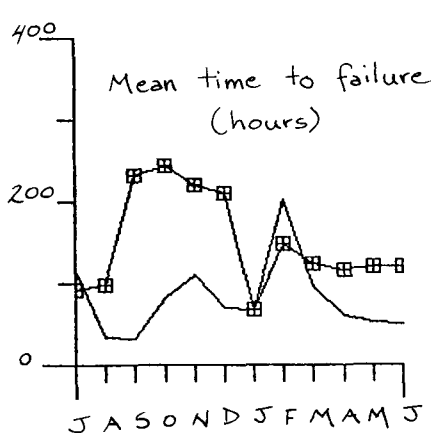
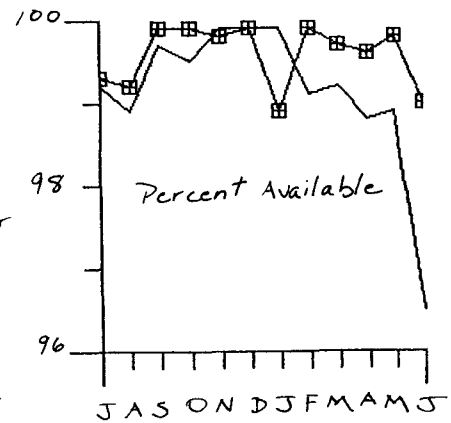
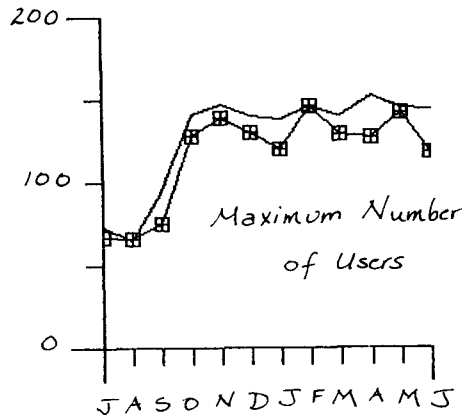
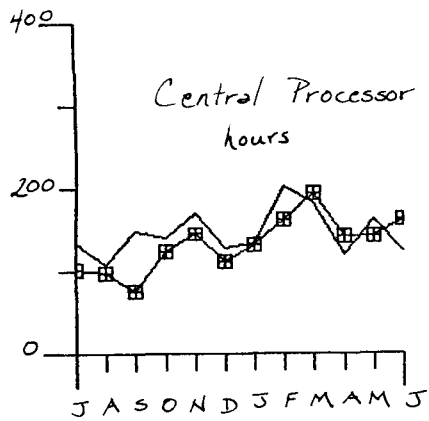
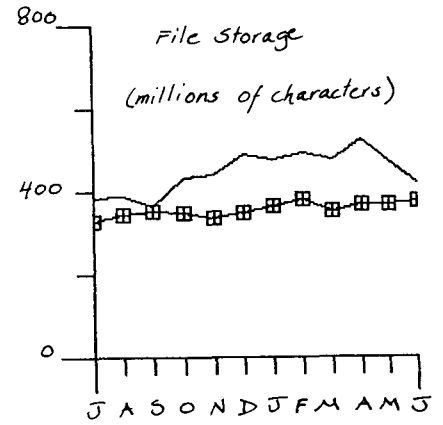
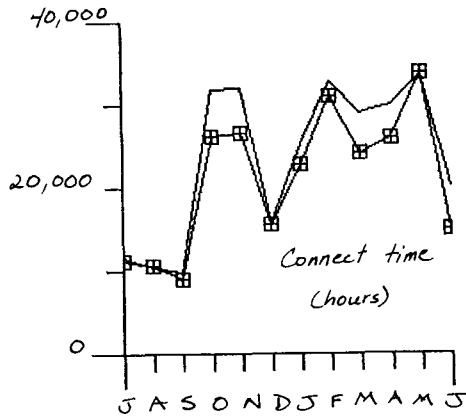
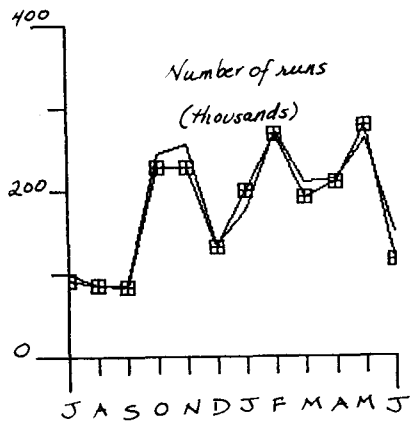
### Mean Time to Failure

Although the availability figure changed by a slight amount, the mean time to failure dropped a whopping 46%. Some of these failures are expected when installing a large computer system, and when making a major operating system change, but power related problems exacerbated the problem.

M. M. Skow, 373-7745

see accompanying table ↗

# annual statistical review - MERITSS



□ — □ 1978-1979

— 1979-1980

## musical apple

Students in Professor Dorothy Gross's Ear Training class this summer had an unusual drill partner -- the Apple II computer! The class, offered through the School of Music, is an intensive course in learning to recognize melodic and harmonic intervals, melodies, and chord progressions.

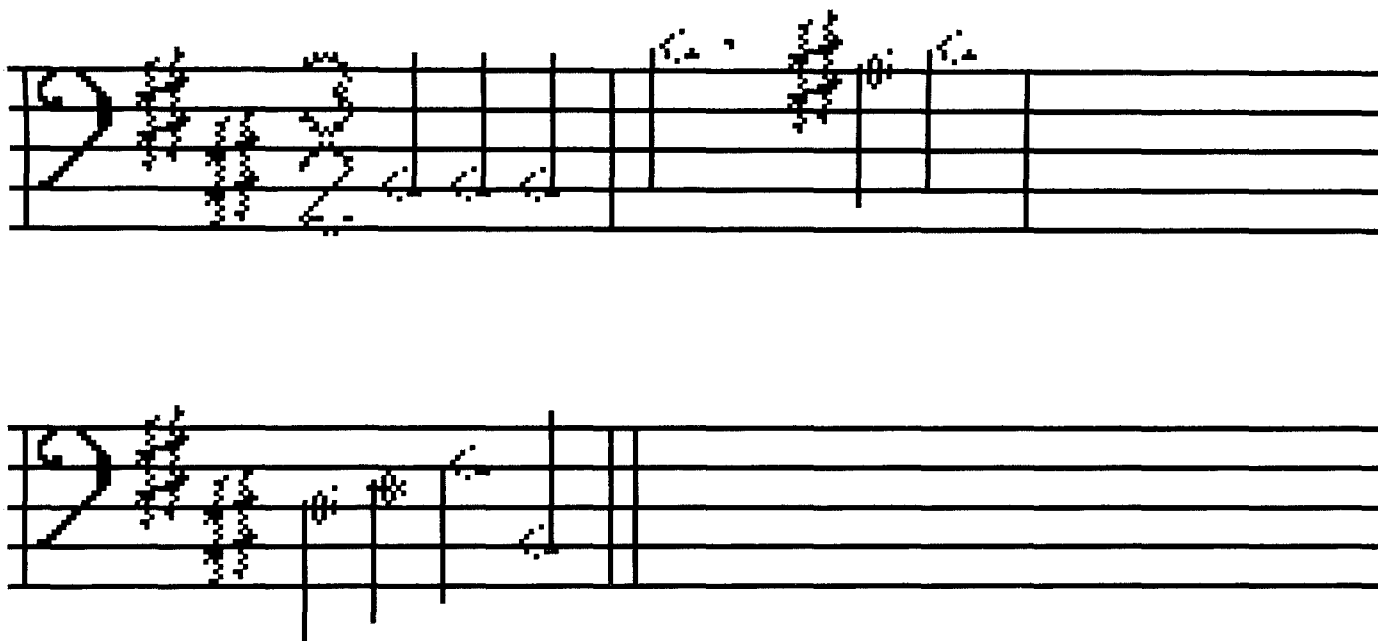
Merely reading about how intervals sound doesn't help students learn to recognize them. Instead students must listen to intervals played repeatedly and randomly. Students need a partner to play intervals, but arranging convenient times and places is difficult, and a partner can get tired of constant repetition. This summer, the Apple II offered a solution to the problem.

The Apple II with its tone generator, can actually play intervals and melodies when appropriately programmed. Several sets of programs, written by Professor Gross, Charles Boody, and Linda Borry, offered students practice in recognizing melodies and intervals. With the addition of an ALF board, capable of producing three simultaneous tones, the Apple could also be used for harmonic practice. Professor Gross's melodic dictation program played a melody, and then the student entered it on the screen, with the Apple II correcting errors. (See accompanying figure.)

The Apple II proved to be an excellent drill partner. Never tired or bored, it was consistently and predictably available. Computer time was allotted in twenty minute segments; after twenty minutes the student, not the Apple, got tired! Each student was assigned two sessions a week, with extra sessions available if desired. During the five week session, the Apple II was used almost continuously.

Student response was largely favorable. The most common complaints were that more computer time, more programs, and more Apples were needed!

D. Gross, 373-3546



Sample display reproduced on the electrostatic plotter by M. Timmerman and D. Gross.

## suggestion box

The recent security breach points out the necessity for a convenience offered by other computer centers: when one job (or terminal session) submits a second job which does not have a user card, the system should supply a user card which is identical to that of the submitting job. This removes the need to store user cards on disk.

B.M.D.

Currently, users' passwords are not stored anywhere in the system except in a hashed (encoded) form. Theoretically, these hashed passwords cannot be unhashed without using an unreasonable amount of computer time. The suggestion which you propose is, in itself, a security risk. In order to supply the password for a submitted job we would have to store the real, unhashed password somewhere. Our policy is that users of our computer facility are responsible for the security of their own passwords and that we will provide secure computer systems. The recent security breach which you mentioned was not the fault of any shortcoming in the system; it was the result of poor use of the computer system. By using the reformatting capabilities of SUBMIT, preceding a submit job with a /JOB directive and replacing the USER command with a /USER directive, you can easily avoid keeping passwords on disk files. You should also be extremely careful about the accessibility of permanent files. In general permanent files should not be public. When you want a file to be accessed by another person, use the PERMIT command rather than changing the file to public.

T. W. Lanzatella, 376-5606

## SIR manual

The SIR Manual Supplement (Revision B July, 1980) is available from our Computer Cupboard. This supplement covers all new features, changes to existing features, corrections to the manual, and SIR programming hints that have been assembled since the release of the SIR Manual.

S. P. Yen, 373-4886

## microfiche service

We have contracted with a local service bureau to provide microfiche for our users. Turnaround for fiche output will generally be 24 hours or less. A default (general purpose) 42x reduction ratio format will be available and special purpose formats will be arranged as needed. Complete details on this service will be available on WRITEUP(FICHE) on September 12, 1980. Questions or comments regarding this new service should be directed to

J. Larson, 373-7538

## statistics applications

The Minnesota Department of Finance has developed an interactive data analysis package which may be useful to anyone doing regression or time series analysis. One strong point of this package is the ability to do complex data transformations in a

single statement. The package also has extensive capabilities for multiple regression, and makes use of the X-11 seasonal adjustment method. You may access the program by attaching and executing a file called DAP on user number ZZZ6564 on the Cyber 172. You may find information on parameters on the file DAPHELP on that same user number. This program has been used extensively, but this of course does not mean that it is bug-free. Questions and comments about this program may be directed to

J. Gervais, 296-0747

D. Healy, 296-7400

Minnesota Dept. of Finance

## TERAK-Pascal users

The new Terak-Pascal system at the University of Minnesota is now available. The new version, called Pascal A, will replace the older 1.4j version of the UCSD Pascal system. Copies of the system disks are available for University users at the Micro HELP-line. Please call for an appointment. Documentation is on WRITEUP(TERAK).

M. Timmerman, 376-8806

## BLOCKER and REBLOCK

Beginning September 25th, the BLOCKER and REBLOCK utilities will no longer be directly control statement callable. This is part of a continuing effort to phase out these routines in favor of the newer BLOCK and UNBLOCK utilities. BLOCKER and REBLOCK will remain available for at least a year as FETCH type packages.

BLOCK and UNBLOCK were developed over a year ago as eventual replacements for BLOCKER and REBLOCK. They provide all of the capabilities of BLOCKER and REBLOCK with some additional features. You are again encouraged to convert from BLOCKER/REBLOCK to BLOCK/UNBLOCK. Additional information on the BLOCK and UNBLOCK utilities can be obtained with the WRITEUP(BLOCK) control statement.

If you have any questions, please call

J. Drummond, 376-5603

## appletizers

Instructors: Michael Collins, Michael Timmerman  
Information: DR MICRO (376-4276)  
Microcomputer HELP-line  
210 Experimental Engineering

Location: 193 Experimental Engineering

Time: 2:15 pm - 4:00 pm

Each lecture is designed to be a complete self-contained unit of information. We feel it is beneficial to attend all sessions, but it is not necessary. Knowledge of a higher-level language is required. These course descriptions are subject to change.

10/13/80 Introduction to Microcomputers  
Offers a general introduction to the history, development, and capabilities of microcomputers and common peripheral devices.

10/20/80 Introduction to the APPLE II Microcomputer  
Gives a general introduction to the Apple II: capabilities, features, purchase, and support.

10/27/80 Applesoft II and DOS 3.2.1  
Describes Applesoft extensions to standard BASIC; graphics, peeks and pokes, sound and game controls. Covers use of the disk operating system (DOS 3.2.1), highlighting use of random access files.

11/03/80 Introduction to the Terak Microcomputer  
Gives a general introduction to the Terak: capabilities, features, purchase, and support.

11/10/80 Introduction to the UCSD Pascal Operating System  
Introduces the UCSD Pascal operating system on the Terak and Apple II microcomputers. The course will offer a general overview of the UCSD system.

11/17/80 UCSD Pascal Editor  
Covers use of the UCSD Pascal editor as text editor and as a word processing system. Presents other packages currently available for the Apple and Terak, such as Prose, Spruce, and COM.

11/24/80 UCSD Pascal Filer  
Covers use of the UCSD Pascal filer system. Various techniques for implementing random access files will be discussed.

12/01/80 UCSD Pascal Compiler, Linker and Libraries  
Covers use of the UCSD Pascal compiler and compiler options, the linker, and the use of libraries.

12/08/80 UCSD Pascal Special Features  
Topics include special features of the UCSD system on microcomputers, primarily graphics, real time programming, and equipment interfacing.

M. Collins, 373-5754  
M. Timmerman, 376-8806

## short courses

^Computing: What is it?; 3:15-5pm, 6-9 Oct (mtwth), Arch 30  
^Introduction to UCC; 3:15-5pm, 10 Oct (f), Arch 55  
Microcomputing; 2:15-4pm, 13 Oct-8 Dec (m), Ex 193  
^NOS (system configuration); 3:15-5pm, 13 Oct (m), Arch 55  
^NOS (files/jobs); 3:15-5pm, 14-15 Oct (tw), Arch 55  
^NOS (permanent files); 3:15-5pm, 16 Oct (th), Arch 55  
^NOS (program execution); 3:15-5pm, 17 Oct (f), Arch 55  
NOS (intro to tapes); 3:15-5pm, 20 Oct (m), Arch 55  
NOS (misc statements); 3:15-5pm, 22 Oct (w), Arch 55  
NOS (control language); 3:15-5pm, 24 Oct (f), Arch 55  
Comparing DBMS's; 3:15-5pm, 20 Oct (m), Arch 15  
^Interactive Systems Commands; 3:15-5pm, 21-23 Oct (tth), Arch 35  
Introduction to System 2000; 3:15-5pm, 22 Oct-7 Nov (mwf), Arch 30  
^Batch Introduction; 2:15-4pm, 23 Oct (th), MinMet 116  
^XEDIT; 2:15-4pm, 27-31 Oct (mwf), LindH 229  
SPSS (SPSS basics); 3:15-5pm, 27 Oct (m), Arch 45  
SPSS (data manipulation); 3:15-5pm, 28 Oct (t), Arch 45  
SPSS (SPSS files); 3:15-5pm, 29 Oct (w), Arch 45  
SPSS (On-Line); 3:15-5pm, 31 Oct (f), Arch 45  
Introduction to Programming; 3:15-5pm, 28 Oct-20 Nov (tth), Arch 10  
Beginning FORTRAN; 3:15-5pm, 3-21 Nov (mwf), Arch 5  
COBOL; 3:15-5pm, 3-26 Nov (mw), Arch 10  
System 2000/RW; 3:15-5pm, 10-14 Nov (mwf), Arch 60  
System 2000/PLI; 3:15-5pm, 17-21 Nov (mwf), Arch 55  
Graphics; 3:15-5pm, 17-21 Nov (mtwf), MinMet 116  
Graphics Workshop; 7:30-9:30pm, 20 Nov (th), Laud# (see note)  
SIR; 3:15-5pm, 24 Nov-3 Dec (mw), Arch 15  
^: up-arrow (^) indicates this course is a basic prerequisite for other, unmarked courses.  
#: Class held at Lauderdale conference room, Lauderdale computer site, 2520 Broadway Drive, Lauderdale, MN.



# statistics

## \*\*\*PRODUCTION USAGE SUMMARIES: Cyber 74/172

	July, 1980	July, 1979
System resource units (SRU)	1,486,778 (1,964,444)	1,063,467 (1,379,539)
Batch jobs and MIRJE sessions	119,406 ( 130,662)	99,551 ( 111,275)
Total central processor (CP hours)	186/204 ( 238/305)	144/149 ( 159/246)
DELAY queue CP hours	40/23 ( 44/32 )	34/21 ( 39/41 )
NO FRILLS queue CP hours	26/27 ( 32/38 )	--/-- ( --/-- )
Mass storage transfers (KPR)	455,667 ( 575,188)	339,992 ( 437,337)
Magnetic tape transfers (KPR)	13,518 ( 20,101)	6,770 ( 11,574)
Pages printed, charged from UCC	999,995 (1,148,529)	922,143 (1,049,529)
Cards punched	357,781 ( 367,557)	325,704 ( 385,305)
Microfilm frames produced	101,858 ( 601,601)	18,313 ( 377,849)
MIRJE terminal hours	18,797 ( 21,394)	13,741 ( 15,971)
Number of terminal sessions	41,164	31,023
Status plotting production (feet)	8,704	9,899
Tapes mounted	13,068	12,000
Average file storage (char)	3,138.7 million	1,951.4 million
Mean time between failures	52.3/87.2 hours	46.6/102.6
Available during scheduled hours	98.9/99.0 percent	99.1/98.9 percent

(totals in parentheses include staff development, accounting, and maintenance runs)

## \*\*\*DOWNTIME SUMMARY: August, 1980 (Column 1, Cyber 74 : Column 2, Cyber 172)

	0800-1800 M-F		other		total	
Total possible scheduled uptime hours	210.0	210.0	312.3	312.3	522.3	522.3
Total downtime hours (see Schedule A)	0.1	0.0	5.3	1.3	5.4	1.3
Total uptime hours	209.9	210.0	307.0	311.0	516.9	521.0
Uptime (percent)	99.9	100.0	98.3	99.6	99.0	99.8
Average downtime per occurrence (min)	3.0	0.0	79.8	39.5	64.4	39.5
Mean time between failures (hours)	105.0	0.0	78.1	156.2	104.5	262.2
Subsystem failures						
SUPIO	9	-	4	-	13	-
TELEX	0	0	0	0	0	0
EXPORT	0	-	0	-	0	-

### Schedule A: downtime hours

	Number		Total hours		Average minutes	
(1) Preventive maintenance over-runs	0	0	0.0	0.0	0.0	0.0
(2) Software related problems	1	0	0.1	0.0	3.0	0.0
(3) Hardware related problems	2	0	4.0	0.0	121.0	0.0
(4) Indeterminate problems	0	0	0.0	0.0	0.0	0.0
(5) External Problems	2	2	1.3	1.3	38.5	39.5

## \*\*\*PRODUCTION USAGE SUMMARIES: Cyber 170-720 (MERITSS)

	July, 1980	July, 1979
Number of jobs run	121,640	99,700
Central processor hours	101.6	134.2
MERITSS terminal hours	14,112	11,648
Number of terminal sessions	31,518	24,514
Maximum number of simultaneous users	88	73
Average file storage (char)	439.4 million	383.3 million
Mean time between failures	31.2 hours	116.2 hours
Available during scheduled hours	96.8 percent	99.2 percent

## extension classes

These classes are offered through University of Minnesota Continuing Education and Extension (CEE). You may obtain more information and registration materials by calling (612) 373-3195 or by going to 101 Wesbrook Hall, U of M Minneapolis campus.

quarter

<u>f</u>	<u>w</u>	<u>s</u>	<u>class; cost</u> <u>CEE course number</u>	<u>dates (days), times, location</u>
*	*		Computing: What is it?; \$24.. PIC 0811	30 Sep - 9 Oct (tth), 7:15-9pm, Arch 15. 6 Jan - 15 Jan (tth), 7:15-9pm, Arch 15.
*			Intro. to Computers; \$12..... PIC 0812	26 Jan - 2 Feb (m), 6:30-8:30pm, Ramsey HS 253 Roseville
*	*	*	Introduction to UCC; \$6..... PIC 0821	8 Oct (w), 6:15-8pm, Arch 15. 14 Jan (w), 6:15-8pm, Arch 15. 8 Apr (w), 6:15-8pm, Arch 15.
*	*	*	Intro to Microcomputers; \$12. PIC 0818	20 Oct - 22 Oct (mw), 7:15-9pm, Arch 15. 26 Jan - 29 Jan (mth), 7:15-9pm, Arch 15. 11 May - 14 May (mth), 7:15-9pm, Arch 15.
*	*		NOS (for beginners); \$24..... PIC 0822	13 Oct - 22 Oct (mw), 6:15-8pm, Aero 225. 14 Apr - 23 Apr (tth), 6:15-8pm, Aero 225.
*	*		Interactive System Commdns; \$6 PIC 0824	30 Oct (th), 6:15-8pm, Aero 225. 21 Jan (w), 6:15-8pm, Aero 211.
*	*		Batch Introduction; \$6..... PIC 0825	28 Oct (t), 6:15-8pm, Aero 225. 20 Jan (t), 6:15-8pm, Aero 225.
*	*		Programming: It's all in how you do it; \$48..... PIC 0813	27 Oct - 19 Nov (mw), 7:15-9pm, Arch 15. 20 Jan - 12 Feb (tth), 7:15-9pm, Arch 20.
*	*		COBOL; \$48..... PIC 0815	4 Nov - 2 Dec (tth), 7:15-9pm, Arch 20. 26 Jan - 23 Feb (mw), 7:15-9pm, Arch 20.
*			NOS (specialized topics); \$18 PIC 0823	12 Jan - 23 Jan (mth), 6:15-8pm, Aero 225.
*	*		Using Micros (AppleII); \$24.. PIC 0820	2 Feb - 2 Mar (m), 7:15-9pm, Arch 15. 19 May - 9 Jun (t), 7:15-9pm, Arch 20.
*	*		Using Micros (TERAK); \$24.... PIC 0819	5 Feb - 26 Feb (th), 7:15-9pm, Arch 30. 21 May - 11 Jun (th), 7:15-9pm, Arch 30.
*			Beginning FORTRAN; \$48..... PIC 0817	20 Jan - 12 Feb (tth), 6:15-8pm, Aero 211.
*			Pascal for Programmers; \$48.. PIC 0814	13 Apr - 6 May (mw), 7:15-9pm, Arch 20.
*			Advanced COBOL \$48..... PIC 0816	27 Apr - 20 May (mw), 7:15-9pm, Aero 211.

Note: No classes held on 27 and 28 November 1980 (thf) or 16 February 1981 (m) because of University holidays.



# phone numbers

Accounting .....	373-4548, 373-2521	Information, Lauderdale .....	373-4912
Computer-Aided Instruction .....	376-2975	Information Systems .....	373-7878
Computer Hours (recorded message) .....	373-4927	Instructional Labs .....	373-5754
Computer Store .....	373-4877	Job Status, ExpEng (recorded message) ...	373-4994
Consulting		Lauderdale Operations .....	373-4920
HELP-line .....	376-5592	Lauderdale Services .....	373-7538
9 AM - 5 PM, Monday - Friday		Lauderdale Users' Room .....	373-4921
Business Data Products .....	376-1761	MECC, University .....	373-4573
10-11 AM and 1-3 PM, Monday - Friday		Microcomputers .....	376-4276
COBOL Language .....	376-1761	Microfilm Operator .....	373-4995
11-12 PM, Monday - Friday		Newsletter Subscription .....	376-4668
Statistics Packages .....	376-5062	Permanent File Restoration .....	376-5605
1-2 PM, Monday - Friday		Professional Services Division (PSD) ....	376-1764
Data Bases .....	376-1761	Project Assistance .....	376-1764
10-11 AM and 1-2 PM, Monday - Friday		Program Librarian .....	376-1636
Microcomputers .....	376-4276	Programming Languages .....	376-7290
10-12 AM and 2-4 PM, Monday - Friday		Reference Room .....	373-7744
Contract Programming .....	376-1764	Remote Batch (RJE) Services .....	373-5754
Data Base Applications .....	373-7878	Short Courses .....	376-1637
Educational Services .....	376-3963	Shuttle Bus Service .....	376-3068
EDUNET Interface .....	373-7745	System Status (recorded message) .....	373-4927
Equipment Purchase or Lease .....	376-8153	Tape Librarian and EBR Operator .....	373-4995
Experimental Engineering I/O .....	373-4596	Technical Writing .....	373-2522
Field Engineering .....	376-7584	User Numbers	
Graphics Software .....	376-1636	Instructional Batch .....	373-2521
HELP-line .....	376-5592	Instructional Timesharing .....	373-7745
9 AM - 5 PM, Monday - Friday		Research Batch .....	373-2521
HOURS-line (recorded message) .....	373-4927	Research Timesharing .....	373-2521
Image Processing Center .....	373-7878	User Services .....	373-4599
Information, Experimental Engineering ....	373-4360		

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