



The ACSS

# Newsletter

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Instructional Computing

## Instructional Services on the VAX VX

*Marisa Riviere*

ACSS now offers instructional services on the VMS VAX 8600 (the VX). We believe that VMS is ideal for all types of student users and strongly recommend that faculty consider utilizing this new system for some computer-related classes.

VMS is an environment that can easily suit a very diverse population of computer students at different levels. Beginners, in particular, can profit from a well-structured Help facility, on-line self training courses on elementary system commands, and the full screen editor, EDT. Intermediate users are able to utilize the VAX Symbolic Debugger and the Language Sensitive Editor, LSE, for program development in Pascal, FORTRAN, COBOL, and Macro languages. Advanced users have the CMS and MMS software library tools available for structured maintenance of sources, procedures, and images. There are, in addition, self-training courses, mixed media of manuals, on-line instruction, and examples on the utilization of system services from high level languages

and general VMS utilities. We believe that the opportunity for students to become familiar with as many operating systems as possible should also be a good incentive to promote educational usage on this system.

During the summer, the VMS programming group worked on designing software that, in conjunction with existing VMS features, can provide administrators of instructional user names with tools for what we believe are the most immediate managerial needs. We designed a hierarchy of user names that easily allows identification of administrators and students within each department. We analyzed system features, access, privileges, accounting mechanisms, job processing, resource allocation, etc., in order to implement validations and an administrative scheme for classroom use. The scheme allows administrators to maintain reasonable control over the utilization of resources and system access. This scheme is modeled after our CYBER system, while

maintaining as much as possible of the original VMS environment for the student. A description of the administrative tools is included in this issue.

*Continued on page 166*

### Optical Scanning Service Begins

ACSS is very pleased to announce the opening of a Kurzweil 4000 Intelligent Scanning System service for our user community. Combining an optical scanning system with intelligent character recognition software, the Kurzweil 4000 converts printed material into digital or computer-manipulatable form. Kurzweil scanning is a much faster and more precise method of data entry than keyboarding, processing up to one page per minute with an error rate of one in 10,000 characters. For more information on this service see page 171.

Continued from page 165

Some initial validation limits for instructional user names have been established. The validation is, in a sense, experimental, but based on our past experiences and observations on the CYBER systems, we believe it is adequate for general needs. Special advanced courses requiring additional resources will be accommodated as we analyze the software to be used for each class, after arrangements are made by the instructors.

As the instructional usage on the VX increases, the ACSS VMS group will be able to recognize further validation and administration needs and make additions to the initial set of tools. Utilities to control ceiling values for utilization of resources and for distribution of disk space may be implemented if it is considered useful. Temporary validation for classes using packages that need additional resources will be granted during the time of the course. We will be more than glad to work with administrators and faculty, provide information on the system, search

for the solution of particular problems, and assist in the design or conversion of programs and procedures.

For additional copies of the *Administrator's Tools Brief*, please call 626-1093.

For help with VMS software please contact the ACSS HELP-Line at 626-5592. They will refer your call to us. To request classroom user names, the department contact person should call the ACSS accounting office at 625-1511.

## Tools for Administrators of VX Instructional Users

*Alan Kaufman and Marisa Riviere*

The allocation of classroom user names is based on the structure of VMS which divides users into unique groups. These groups allow selected users to be entitled to group control privileges and, in the ACSS hierarchy, assignment of user and group names for each department. Thus, each student user name can easily be assigned within a class group and a department, and each group or department administrator can be easily identified. The existing VMS feature of group privilege validation and other system designed mechanisms in conjunction with some locally developed ACSS utilities are available to provide department and group master users with administrative tools.

All classroom user names for a department are managed on the VX by a contact person designated by the department. Departments are given one or more master department user names. Access to those user names allows control over passwords and login environment for all the department's classroom users. Within each department, student user names can be divided into individual groups, or one group for

each class, if desired. In addition to the departmental administrator user, each class or group is given one or more master group user names, which allows control over passwords, files and login environment for the individual users in the particular group.

Department master users are identified by being in the 00 group of the department. Within other groups, group or class master users are identified by being a member of each group whose user name ends below 20 octal in the group.

For example:

- 1) Department master users of the department identified as DP are in group DP00. Members of that group have names of the form DP00nn, where DP is a unique identification code used for each department. Thus, [DP00,DP00nn], is the full VMS name of a department administrator.
- 2) Student users of the department identified as DP

have names of the form DPXXnnn, within group names of the form DPXX. Thus, [DPXX,DPXXnnn] is the full VMS name for a student user, where XX is any alphabetic combination with the exclusion of 00 and nnn is any number greater than 20 octal.

- 3) [DPXX,DPXX001] is a group master administrator of the group or class XX of the DP department.

Please note that most users do not need to be concerned with their full name, group and user name, but only with the user name itself, such as DPXXnnn. We described the full names here to clarify the user name hierarchy designed for administrative purposes.

Department administrators are able to control passwords and login environment for all users in the department. In addition, group administrators can control file utilization for their groups. Both types of administrators have group control privileges entitled on their user names.

### To control system access:

```
$ Set Password Username Newpassword
```

changes the password of a specified user name.

```
$ Set Password Username Newpassword dd-mmm-yyyy
```

changes the password of a specified user name and sets an expiration time to a specified date.

### To control login environment:

All user names within each department execute the departments' DPLgin.com file at login time. Each department can use this file to control system access and to create login environments for all the department users. The DPLgin.com file is owned by the [DP00,DP00000] user. For example, [MT00,MT00000]MTLogin.com file is executed at login time for every user name within the Math Department. Examples of a department DPLgin.com file are given in the EXAMPLES section.

### To obtain information on users' files:

```
$ Directory [UserName...]*.*;*
```

Lists the permanent file directory information of the user name, including all sub-directories. Examples of the `Directory` command are given in the EXAMPLES section.

```
$ Set Protection=(S:xxx,O:xxx,G:xxx,W:xxx) [UserName]Filename
```

Sets the UIC-based file protection of *Username*'s file to enable the master group or class administrator permission to the object. Examples of the `Set Protection` command are given in the EXAMPLES section. This instruction can be executed only by master group administrators, since it implies control within the VMS group. A user with group privileges as the class or group administrator has, within the group, the same type of control on files that is granted to the system.

### To clean up permanent file space:

```
$ Delete [Directory]filename.Type;Number
```

Deletes the file *filename* on the specified directory. This instruction is restricted to master group administrators. Examples of the `Delete` command are given in the EXAMPLES section. (Note: master users will need to use the `Set Protection` command before deleting user name files.)

### To monitor system usage:

```
$ Show Users
```

Shows the user name, Process name, Process Identification (PID), and terminal (TID) of all users on the system.

```
$ Stop/Identification=PID
```

Logs off the User name with the selected PID.

```
$ Show Process/Identification=PID
```

Continued on page 168

Continued from page 167

Shows the current process of the specified PID.

```
$ Show Process/Identification=PID/continuous
```

Shows a continuous display of the process.

The last three instructions can be executed only by the master group administrator.

#### To communicate with other users:

```
$ Reply/Terminal=TID Message text
```

Sends a message to a user currently in the system on terminal TID.

```
$ Mail
```

Sends interactive mail to a user or users.

```
$ Mail text.lis list.dat
```

Mails file text.lis to all users in file list.dat.

#### To control resources:

Utilities to control resources such as cumulative CPU time, connect time and administration of permanent file space can be made available for the winter quarter if there is enough interest among administrators for their availability.

#### Examples

Example of department administrator DpLogin.Com file:

```
$! This file "traps" the user for an interactive SPSS session
$! if the user is in the DP1A group. If the user is in the
$! DP1B group, the procedure displays a message informing
$! that class about a lecture cancellation. Each "non-trapped"
$! user would then execute a procedure selected by the
$! instructor if available. The trap and the message could also be
$! done in each group administrator's DpXXlog.com file.
$!
$ On Control_Y Then Goto Logout
$ IF F$MODE().EQS."BATCH" Then Exit
$ SET TERM /VT100/INSERT/LINE ! Set terminal type to VT100
$ uic = F$User()
$ group = F$Extract(1,4,uic)
$ log_file = group + "LOG.COM"
$ If group .EQS. "DP1A" then goto SPSS
$ If group .EQS. "DP1B" then goto MESSAGE
$ CLASS:
$ if (F$search("['group']'log_file'") .NES. "") then
  @['group']'log_file'
$ Exit
$ SPSS:
```

```

$ Deassign sys$input
$ SPSS ! EXECUTE STATISTICS PACKAGE
$ goto LOGOUT
$ Message:
$ Type Sys$input
  Class for Dp1B 9:00am. 25-Sep-1985 has been canceled
  for today. Further notices will be available.
$ goto CLASS
$ LOGOUT:
$ set nocontrol=y
$ Logout

```

Example of group administrator DpXXlog.com file:

```

$! Allow students to access current homework assignment by
$! typing Type homework.
$!
$ Define Homework [dpla]homework1.lis

```

Examples of the **Directory** command:

```
$ Directory
```

The **Directory** command lists all versions of all files in the current disk and directory in the brief format. The heading identifies the disk and directory, and the trailing gives the total number of files.

```
$ Directory/Full [Std23.Pascal]HMWK3.Pas
```

The **Directory/Full** command gives full information on a particular file. If the information is not available to the administrator, the system responds with: (-RMS-E-PRIV, insufficient privilege or file protection violation). In order to obtain the information, the protection of the file has to be altered using the **Set Protection** command.

```
$ Directory/Total/Size=All [STD123...]
```

The **Directory** command outputs only the header and a trailing line that identifies the total number of files and the blocks used and allocated for all versions of all files for student STD123.

```
$ Set Protection=(s:rwd,o:rwd,g:re,w:re) Readme.txt
```

The **Set Protection** command gives the System and the Owner of the file read, write, execute, and delete permission, while giving the Group and World read and execute permission only.

```
$ Set Protection=(s:re,o:re,g,w) mystuff.dir
```

The **Set Protection** command gives permission to read and execute only to the System and Owner of the directory. Note: The file protection will have to be changed before it can be deleted.

Examples of the **Delete** and **Purge** commands:

```
$ Delete Hmwk3.Pas
```

The **Delete** command deletes the file Hmwk3.Pas from the current default disk and directory.

```

$ Delete/confirm/since=today [Std23.Pascal]*.obj
USERF:[STD23.PASCAL]TEST.OBJ;1, delete? [N]: Y
USERF:[STD23.PASCAL]HMWK3.OBJ;3, delete? [N]: N

```

*Continued on page 170*

Continued from page 169

```
USERF: [STD23.PASCAL]HMWK3.OBJ;2, delete? [N]: N  
USERF: [STD23.PASCAL]HMWK3.OBJ;1, delete? [N]: Y
```

The **Delete** command examines all versions of files with file type `obj` in the subdirectory [Std23.Pascal], and locates those that were created or modified today. Before deleting each file, it requests confirmation that the file should be deleted. The default response -N- is given in square brackets.

```
$ Purge/keep=2 [STD12]*.obj
```

The **Purge** command deletes all but the last two versions of files with file type `obj` from the directory of student user STD12.

## Limits for Instructional Users on VX

*Marisa Riviere*

Instructional users on VMS, in general, are entitled to the same default validation as all VMS users. The exceptions that ACSS considers to be necessary at this time that apply further limitations are:

1. Mounting tapes and disk packs is not allowed.
2. The maximum number of processes on the system for each user is 2.
3. File space on disk is limited to 1000 blocks per user.
4. The CPU time limit is set to 10 minutes for each session.

Exceptions to these validation restrictions will be made if special arrangements are made for each specific class.

## Project Assist Faculty Workshops

*Kit Eastman*

Project Assist, the campus-based group that was established to help faculty who want to use computers for instruction, will be offering a variety of workshops during fall quarter on the instructional uses of computers and related topics. The workshops are free to University of Minnesota faculty.

The University recently acquired a PLATO system, and Project Assist will introduce faculty to the powerful instructional computing resources available to them on this system through a workshop called **Introduction to PLATO**. The workshop will be offered each Thursday during fall quarter.

Other workshops offered this fall will include:

- Evaluating Instructional Software
- Design Considerations for Computer-Based Instruction
- An Instructional Design Model
- A Programmer's Guide to Instructional Software
- Pilot
- Evaluating Authoring Systems

Please call Project Assist at 625-1323 to request a complete list of workshop offerings and registration information.

# Kurzweil Optical Scanner Service Begins

*Elaine Collins*

The Kurzweil 4000 can read both typed and typeset copy, including proportionally spaced text, and it identifies and codes font changes within typeset material. The system recognizes mathematical and scientific symbols, accented and other non-English European language characters, typesetting conventions such as ligatures, right and left quotation marks, and em and en dashes. The Kurzweil 4000 can create either an ASCII or EBCDIC file from the scanned text.

We envision three broad categories of use for the Kurzweil scanning service on campus, in both academic and administrative settings:

Creating computerized text files from printed materials for further processing (such as editing, formatting, merging with existing text files) and/or publication onto paper or electronic media.

Creating computerized text files from printed materials for library-type storage, reference, and retrieval.

Creating textual data bases from printed materials for research and analysis.

Actual Kurzweil projects in the academic area on this and other campuses include:

Scanning modern books and dictionaries and medieval texts for producing concordances and doing other analytic studies.

Scanning articles submitted for journals to be edited and/or published from disk or tape.

Scanning already published text for word-processing revision, from many-thousand page textbooks to book chapters and lab manuals.

Scanning journal articles in a particular field on an ongoing basis to build a computerized reference library.

Scanning hard copies of computer files to restore lost electronic files.

A scanning job involves three activities:

Development of a machine training set, in which the Kurzweil is "trained" to recognize most of the letterforms in a document and which takes 15 to 20 minutes for most documents.

Processing, in which unidentified characters can either be passed over, flagged, or presented for correction. In the fastest mode the scanner can handle 40 to 60 pages per hour.

Communication of the scanned text to the user's media. Options at ACSS will be a Zenith 150 (IBM-PC compatible) disk or a VAX/VMS or CYBER account.

ACSS's Kurzweil 4000 scanning service is located in 128B Lind Hall, under the direction of Carol Winther. Users can either do their own scanning after a two-hour personal training session, or have ACSS perform all the work. Initially scheduling will be by appointment. Contact Ms. Winther at 625-9525 between 10:00 a.m. and 12:00 noon, Monday through Friday.

Currently rates are set at \$15 per hour for University and non-profit accounts and \$30 per hour for other accounts when users do the scanning, plus \$30 for personal training for both groups. With ACSS doing the scanning, charges are \$30 per hour for University and non-profit accounts and \$45 for other accounts. ACSS grants can be used to pay for the service.

# MacTEX: Text Formatting for the Macintosh

Elaine Collins

TEX, a powerful and elegant technical text formatting system, has been ported onto the Apple Macintosh. The "MacTEX Personal Typesetting System" is available from Addison-Wesley Publishing Company. *The TEXbook* by Donald E. Knuth, also published by Addison-Wesley, 1984, "precisely and completely describes the input language of MacTEX," according to the MacTEX *Preliminary User Guide*.

MacTEX is a "mark-up" type formatting system, in which commands typed into a document file control its formatting. Its typesetting capabilities include mathematical formulas such as:

$$\binom{n}{k} \equiv \binom{\lfloor n/p \rfloor}{\lfloor k/p \rfloor} \binom{n \bmod p}{k \bmod p} \pmod{p}$$

and other special effects:

I  
turn  
in the fol-  
lowing trea-  
tises, to various  
uses of those trian-  
gles whose generator is  
unity. But I leave out many  
more than I include; it is extraor-  
dinary how fertile in properties this  
triangle is. Everyone can try his hand.

MacTex requires a full 512KB of memory and either one 800K disk drive or two 400K drives. It comes with the Computer Modern Fonts described in *The TEXbook*, and can also use the Postscript fonts (Helvetica and Times Roman) on LaserWriter systems. MacTEX has a built-in editor with basic Macintosh-like operations, and it can exchange "text-only" files with other applications. MacTEX uses the "Apple," "File," "Typeset," "View," and "Windows" menus. "Typeset" creates a "TEX log" file and starts the formatting process. The log file allows interactive error-checking. The typeset document can be viewed on-screen at different magnifications before being printed on either an ImageWriter or LaserWriter.

ACSS has a copy of MacTEX available for inspection and demonstration. Call Text Processing Services at 625-1391 for an appointment. If there is enough interest in MacTEX among on-campus users, we will investigate a site license from Addison-Wesley for this program.



# New Serif Font Family for Scribe, Xerox 8700 Users

Elaine Collins

ACSS has acquired a new serif font family for Scribe, Xerox 8700 users. The Times Meta 10 fonts are much cleaner and more suitable for publication than the Times Roman 10 fonts available up to now. The family also presents a fuller array of fonts, with all four type faces—regular, bold, italic, and bold italic—in point sizes 8, 9, 10, 12, 14, 18, and 24. All fonts except the 24-point size contain the full ASCII character set. The font family also includes Greek 10 and 8-point fonts, a "typewriter" style font, and a 14-character-inch font. The last four fonts have fixed characters; the other fonts all contain proportional-width characters. The mathematics library can also be used with this font library.

A *Xerox 8700 Font Brief*, with listings of all the characters in the new fonts, is available in the ACSS Reference Room, 128A Lind Hall. The new font family is accessed with the beginning Scribe command `@Style (FontFamily=TimesMeta10)`. The `@Style (FontFamily=Helvetica10)` and `@Style (FontFamily=TimesRoman10)` commands are still valid, though the Times Roman 10 fonts have been removed from the *Font Brief*.

ACSS has also ordered symbol fonts, in 10-point regular and italic face initially, to complement the Times Meta family. These fonts will contain accents, accented vowels, and other characters in non-English European languages. Character listings for these fonts will be added to the *ACSS Font Brief* as soon as the fonts are installed.

All the Times Meta 10 fonts are available for formatting use at any point in a document through Scribe's command and environment structure. However, the Xerox 8700 has memory limits to the number of fonts that can print on one page. Scribe and the 8700 must also have matching listings of all fonts that may appear together on every page of each document processed. With the large number of fonts in the new family, Scribe and the 8700 do not have all possible font combinations stored in their data bases. The *ACSS Font Brief* contains information on resolving Scribe font set error messages. Call Text Processing Services at 625-1391 for help in setting up new font combinations for printing.

*Math and Statistics Packages*

## COFAMM, SINDSCL, and HICLUS to be Removed

Bruce Center

COFAMM, a factor analysis package and SINDSCL, for individual differences, will be removed from the CYBER CA at the beginning of fall quarter (around October 1, 1986). These programs are no longer maintained, little used, and do not work properly under NOS2.

Both of these packages have been surpassed by other packages. For COFAMM users, this would include JFACTOR in SPSS and LISREL for a more general model. SINDSCAL users might try ALSCAL in SPSSX.

HICLUS, a cluster analysis program, has been succeeded by the several cluster analysis programs available in SPSSX and BMDP, and therefore will be taken down winter quarter unless a request is made to retain it.

If the removal of these packages will cause you any inconvenience, please contact Bruce Center at 625-2538.

## ACCSTAT on the VAX VX

*Michael Hedman*

ACCSTAT is a new utility on the VAX VX that supplies a user with information about accounting charges to their VAX account. To use this utility, type:

§ ACCSTAT

You will receive an item-by-item report detailing usage on the VAX from the previous day, a month-to-date summary, and a year-to-date summary. Items that a user is billed for will show the unit rate that they are charged along with the dollar amount charged for the previous day, and monthly and yearly cumulative totals. Items currently in the report include printer usage (the Spinwriter, Calcomp, etc.), permanent file storage, connect time, and SBU (Simple Billing Unit) totals. Note that the report on the first day of each month will show the final totals for the previous month. The year to date summary starts from July 1, the start of the University's fiscal year.

CYBER News

## File Protection Parameter No Longer Supported

*Steven Siirila*

ACSS no longer supports the FP parameter on NOS permanent file commands like RETAIN and SAVE.

The parameter was helpful to users of multiple-user accounts. With the FP parameter, a user could turn file protection on and off. When protection was on, users of a multiple-user account had to provide a password to access a protected file.

Users of multiple-user accounts who need to keep files secure should contact ACSS Accounting about opening a private account.

Graphics

## Calcomp File Name Limit Improved

*Michele Lewis*

Some VAX VX users were encountering a 30-character file name limit when enqueueing metafiles created from Precision Visuals Inc.'s products to the Calcomp. This limit made the use of descriptive file names extremely difficult. Through substantial changes to the DI-3000 and Metafile System source code, the limit has been increased to allow up to 128-character length file names. If any further problems occur, please call Michele Lewis at 626-0314.

# INGRES on the VAX 8600

Pete Oberg

Last month ACSS announced that INGRES, a DBMS from Relational Technologies Inc., was installed on the VAX 8600. INGRES is a relational data base structure based on the mathematical concept of a relation. In the relational model of data, the data is represented in rows called tuples and columns called domains. These data structures are called tables and are manipulated through data manipulation language operations. Access to INGRES data bases is either through the Quel natural language, EQUOL programming language using PASCAL or FORTRAN, or the Menu driven forms facility.

To access INGRES:

- Call the HELP-Line, 626-5592, to be placed on the INGRES data base to be able to access the package. Please be prepared to give the consultant your user name. Otherwise send mail to PJO to be validated.
- Set up your terminal to run INGRES. INGRES accepts a wide range of terminals. If a VT100 with function keys is being used, the VMS command:

```
$ DEFINE TERM VT100K
```

will allow you to communicate with INGRES.

- Access the INGRES commands by typing:

```
$ INGRESDEF
```

This command sets up all the logical name entries of INGRES.

- A demonstration data base is set up to create, retrieve, and update data. To access the data base, type the following commands at the \$ symbol of the VMS operating system:

```
$ ingdemo
$ createdb dbname      {choose a unique data base name}
$ INGRES dbname
```

INGRES lists information about the INGRES version number, system date, and time. When INGRES says "go" or "continue" and you see the INGRES prompt character (\*), you are ready to begin.

To create your first table, the script called "first" will need to be executed as follows:

```
continue
*\i first
continue
*
```

*Continued on page 176*

The `\i` stands for "include" and it tells INGRES to read the contents of the directory file called "first" into your workspace. To see the commands that are written in the workspace type the command `\print` or `\p`:

```
*\p
create employee (name = c20, age = i2, salary = f8,
  dname = c10, manager = c20)
create dept (dname = c10, floor = i1, sales = i2)

copy employee (name = c0, age = c0, salary = c0,
  dname = c0, manager = c0) from
  "sys_ingres:[ingres.files.ingdemo]employee.sig"
copy dept (dname=c0,floor=c0,sales=c0) from
  "sys_ingres:[ingres.files.ingdemo]dept.sig"
continue
```

The **Create** commands set up the tables with columns, but the tables contain no rows. The two statements that begin with the word **Copy** load data into the tables, "employee" and "dept" from data files.

To execute the **Create** and **Copy** commands in the workspace, type the execute command:

```
*\go
```

To receive information regarding the data base that was created type:

```
*help \g
```

name	owner	type	name	owner	type
employee	jcc	table	dept	jcc	table

For more specific help about a particular table, type:

```
*help employee \g
```

To see the "employee" and "dept" tables, tell INGRES to Print them with the following command:

```
*print employee, dept \g
```

employee table

name	age	salary	dname	manager
mike	29	1500.000	shoe	edna
sally	42	877.500	toy	ted
georgia	22	0.000		
ted	0	2615.730	toy	malcolm
edna	35	2000.000	shoe	malcolm
malcolm	50	2750.000	admin	

dept table

dname	floor	sales
admin	6	0
shoe	1	20000
toy	2	15000

continue

The retrieve and update capabilities of INGRES maybe seen in scripts "second" and "third." Again the commands are the same as before:

```
\i "file"    include file second or third
\p          to print contents of the workspace
\g          to execute the commands in the workspace
```

INGRES may also be accessed through the Menu facility which is a forms-driven interface. Within the Menu facility, data manipulation, table manipulation, data reporting, form design, and application development are all possible. To use the INGRES/Menu facility type the command:

```
$ rtingres dbname
```

to receive the first screen shown in Figure 1.

There are full help facilities for the utilities and they include a history mechanism to allow you to review and/or repeat any previous commands issued.

There will be a short course offered during fall quarter to teach the basics of INGRES. If you have questions regarding INGRES, please call the Data Base HELP-Line Monday through Friday from 10:00 to 11:00 a.m. at 376-1761 or 626-1887.

*Continued on page 178*

INGRES/MENU

Database: jcc

To run a highlighted command, place the cursor over it and select the "Go" menu item.

Commands	Description
QUERY REPORT	RUN simple or saved QUERY to retrieve, modify, or append data RUN default or saved REPORT
QBF RBF ABF	Use QUERY-BY-FORMS to develop and test query definitions Use REPORT-BY-FORMS to design or modify reports Use APPLICATIONS-BY-FORMS to design and test applications
TABLES VIFRED QUEL SREPORT	CREATE, MANIPULATE, or LOOKUP tables in the database EDIT forms by using the VISUAL-FORMS-EDITOR ENTER interactive QUEL statements SAVE REPORT-WRITER commands in the reports catalog

Go    History    CommandMode    DBswitch    Shell    Help    Quit

**Figure 1: INGRES/MENU Screen**

**New Statistics HELP-Line  
Number, Hours**

Beginning October 1, the number of the Statistics HELP-Line is 626-1893. The new hours are 11:00 am to 2:00 pm, Monday through Friday.

## MIPS/Dollar: The VLSI Revolution

Lawrence Liddiard

Many years ago, economy of scale in computers led computer buyers to purchase the largest affordable system for their computation needs. In fact, in the late 40's Herbert Grosch made an intuitive assertion that was given his name: "Grosch's law states that the capacity of a computer is related to its cost, which we denote by  $D$  (dollars) through the following equation:

$$C = JD^2$$

where  $J$  is a constant."<sup>1</sup> Grosch and others published articles from 1953 through 1975 showing the law held for all computers. A 1979 study showed Grosch's law held if systems were divided into two classes: small systems and general purpose.<sup>2</sup>

A more recent study was based on 1981 *Computerworld* market data for 95 mini- to supercomputers, while other sources were used for 11 micros. In that study, MIPS (Millions of Instructions per Second) were found to have a high correlation with relative performance data and CPU (Central Processing Unit) price. Grosch's law was found to hold only if the various computers were divided into five classes. In these classes, according to the study, microcomputers provide on the average about 8 MIPS per \$100K of purchase price, minicomputers about 0.5, small mainframes about 0.25, large mainframes about 0.22 and supercomputers about 0.25.<sup>3</sup>

In 1981 ACSS (then the University Computer Center) purchased a new 1.0 MIP VAX-11/780 for about \$165,000, a used 40 MIP CRAY-1A for \$5,000,000 and new .5 MIP Xerox 820's for \$2,500 apiece.

While our 1981 data differs in the MIPS per \$100K because universities always must have a discount, there was still a 32 times ratio for micros over mainframes in MIPS/\$. The previous large scale CDC systems had dual processors and the latest IBM large mainframe will have four processors, but these processors use many expensive integrated circuits rather than VLSI (Very Large Scale Integration) commodity chips. The conditions for the VLSI revolution were set, as Leonard Kleinrock has observed:

Currently we are experiencing the effects of the confluence of powerful forces in information technology. By far the most significant effect is the host of revolutionary changes that have been brought about by the integrated chip — especially in the form of VLSI and the resulting enormous improvements in processing, storage, and communications.<sup>4</sup>

Several companies such as Masscomp, Sequent, and Encore combined these relatively inexpensive VLSI chips into multiprocessors that produced significant improvements in the ratio of MIPS to dollars, compared with competing mainframes.

C. Gordon Bell, then Vice Chairman of Technology at Encore Computer Corporation, provided a good description of a VLSI multi:

Multis are a new class of computers based on multiple microprocessors. The small size, low cost, and high performance of microprocessors allow the design and construction of computer structures that offer significant advantages in manufacture, price-performance ratio, and reliability over traditional computer families. Currently, commercial multis consist of 4 to 28 modules, which include microprocessors, common memories, and input-output devices, all of which communicate through a single set of wires called a bus. Adding microprocessors together increases the performance of multis in direct proportion to their price and allows multis to offer a performance range that spans that of small minicomputers to mainframe computers. Multis are commercially available for applications ranging from

*Continued on page 180*

real-time industrial control to transaction processing. Traditional batch, time-sharing, and transaction systems process a number of independent jobs that can be distributed among the microprocessors of a multi with a resulting increased throughput (number of jobs completed per unit of time). Many scientific applications (such as the solving of partial differential equations) and engineering applications (such as the checking of integrated circuit designs) are speeded up by this parallel computation; thus, multis produce results at supercomputer speed but at a fraction of the cost. Multis are likely to be the basis for the next, the fifth, generation of computers — a generation based on parallel processing.<sup>5</sup>

Three years ago when ACSS went out on a UNIX system bid, the responses were either too expensive or too limited in the number of ports available. A joint bid request this spring from the Duluth and ACSS computer centers yielded several acceptable replies. As you have probably guessed by now, ACSS has ordered an ENCORE system with 8 processors (6 MIPS total), 16 megabytes of memory, 80 ports on ANNEX ethernet controllers, and 2.8 gigabytes of disk storage. We were pleased that ENCORE was the low bidder. This cost-effective system will be running UNIX BSD 4.2 with Pascal, FORTRAN, and LISP for both Duluth and ACSS instructional and research users this fall.

### Notes

<sup>1</sup> Leonard Kleinrock, "Distributed Systems," *Computer*, Vol. 18 (November 1985), pp. 90-103. See p. 97 for a discussion of the formula.

<sup>2</sup> For references, see Phillip Ein-Dor, "Grosch's Law Re-revisited: CPU Power and the Cost of Computation," *Communications of the ACM*, Vol. 28 (February 1985), pp. 142-151.

<sup>3</sup> Ein-Dor, p. 149.

<sup>4</sup> C. Gordon Bell, "Multis: A New Class of Multiprocessor Computers," *Science*, Vol. 228 (April 26, 1985), pp. 462-467.

<sup>5</sup> Bell, p. 463.

*Artificial Intelligence*

## Low-Cost LISP

Ron Zacharski

We have looked at a number of public domain LISP and Prolog interpreters including XLISP and Franz LISP for the IBM-PC. A case certainly can be made that these programs offer a very inexpensive way to learn LISP or Prolog. However, we have often found these programs frustrating to use.

In comparison to other LISPs, these interpreters run very slowly. This difference in execution times is illustrated in Figure 1. There are many bugs in XLISP and as a consequence, correct programs may "lock up" the system forcing you to shut the computer off.

Although we haven't completely tested Franz LISP, it appears to be more error-free. We ran several programs originally written for Franz LISP under UNIX and they all ran under the IBM-PC version without any problems. However, neither XLISP or IBM-PC Franz LISP have a built-in editor or a good debugger. In many commercial products, the program not only includes an interpreter, but a range of other tools including editors and debuggers, that make programming an easier and more enjoyable experience.

For example, with XLISP or PC-Franz LISP you must use your own word processor to create a program file. So development of even a simple program is a multistep process. First you load in your word processing program. Then you write the LISP program. You exit the word processing program and load in the LISP interpreter. Then you load in the program you wrote and execute it. If you discover an error



you must exit LISP, and repeat the process. Even for a small program, it is not unlikely that you would repeat the above process at least five times. With a built-in editor, you could make the necessary changes within LISP. You load the LISP interpreter once and that's it. Although XLISP and other public domain languages have their limitations, they provide a point to start learning about LISP. However, a small sum of money can greatly improve your resources.

Researchers can get a grant on the ACSS VAX 8600 for \$50.00. A very good implementation of Common LISP is available on the VAX (see the July *Newsletter* for details) and Quintus Prolog will soon be available. For those with IBM-PC's we recommend Texas Instruments' PC Scheme. TI Scheme is highly regarded and is used at a number of universities. It includes object-oriented programming support. PC Scheme is available at Williamson Bookstore for around \$60.00. LISP for the Macintosh is more expensive. MacScheme is available for \$125.00 from Semantic Microsystems, 4470 S.W. Hall St. Suite 340, Beaverton, OR 97005, (503) 643-4539. We have found it to be quite good. It supports windows and graphics and is very easy to use. VAX LISP, TI PC Scheme, and Mac Scheme are lexically scoped.

Provident individuals may obtain copies of XLISP, PC-Franz LISP, and PD Prolog from us at no cost other than providing a blank formatted disk. If you would like further information about VAX Common LISP, TI PC Scheme, or MacScheme please feel free to contact us.

Ron Zacharski  
Tom Rindflesch  
124 Shepherd Laboratories  
625-8332

		Tak	Takl	Iterative Div2	Recursive Div2	Derivative
MacScheme		1:09.33	9:58.11	1:03.13	2:25.83	4:03.22
XLISP on the Mac*		10:50.00	1:34:20.00	-	19:15.00	19:10.00
XLISP on PC		45:24.81	5:32.37.79	1:25:29.69	1:56:21.98	58:59.29
PC-Franz Lisp on PC		43:58.68	2:06:23.51	1:40:38.93	37:04.98	29:11.08
TI Scheme on PC		54.98	5:30.50	1:57.21	4:19.14	6:24.87
TI Scheme on AT		19.38	1:55.51	39.60	1:29.59	2:10.83
VAX LISP Compiled	run	1.41	10.24	2.90	4.26	15.90
	real	1.46	11.20	3.35	4.57	20.70

Figure 1: Execution times of benchmark tests (hours:minutes:seconds)

\* XLISP Macintosh benchmarks supplied by Semantic Microsystems.

The Tak and Takl functions (variants of the Takeuchi function) as well as the division by two and the derivative benchmarks are often used LISP benchmarks. A discussion of these tests as well as Common LISP code for the benchmarks can be found in *Performance and Evaluation of LISP Systems* by Richard P. Gabriel. All timings include time used in "garbage collection."

# The ACSS Reference Room: Recent Acquisitions

Michael Dunham

Publications received in the Reference Room from July 1, 1986 - August 8, 1986:

## BOOKS

- Sewell, Granville, *Analysis of a Finite Element Method: PDE/PROTRAN*. Springer-Verlag, New York, 1985.

## JOURNALS

- *ACM Transactions on Graphics*, October 1985
- *Business Computer Systems*, July 1986
- *Byte*, August 1986
- *Datamation*, April 15, 1986
- *Datamation*, July 15, 1986
- *Dr. Dobb's Journal of Software Tools*, August 1986
- *Infoworld*, July 21, 1986
- *Infoworld*, August 4, 1986
- *MacWorld*, August 1986
- *PC Magazine*, August 1986
- *PC Tech Journal*, August 1986
- *Personal Computing*, August 1986
- *Personal Publishing*, July 1986
- *SIGPLAN Notices*, July 1986 (This issue contains the Proceedings of the SIGPLAN '86 Symposium on Compiler Construction, June 25-27, Palo Alto, CA.)
- *SIGPLAN Notices*, August 1986
- *UNIX Review*, July 1986

## TECHNICAL REPORTS

- Kennedy, A.D. Deconfining Transition in Lattice QCD. Supercomputer Computations Research Institute, Florida State Univ., Tallahassee, 16 June 1986 (FSU-SCRI-86-46).
- Bitar, Khalil M. MCRG Study of SU(2) Lattice Gauge Theory. Supercomputer Computations Research Institute, Florida State Univ., Tallahassee, 11 May 1986 (FSU-SCRI-86-39).
- Billoire, A. and David, F. Scaling Properties of Randomly Triangulated Planar Random Surfaces: A Numerical Study. Supercomputer Computations Research Institute, Florida State Univ., Tallahassee, 2 June 1986 (FSU-SCRI-86-44).

## NEW NEWSLETTERS

- *Computing News*, University Computing, University of Oregon, Eugene, OR.
- *CSLetter*, Computer Services Centre, Energy, Mines and Resources Canada, Ottawa, Ontario.
- *OCS Computing Update*, Office of Computing Services, Georgia Institute of Technology, Atlanta, GA.
- *PSC News*, Pittsburgh Supercomputing Center, Advanced Computing for Engineering and the Sciences, Mellon Institute, Pittsburgh, PA.

## MANUALS

- *ALL-IN-1 Office Menu: Getting Started*. DEC, February 1985.
- *ALL-IN-1 Office Menu User's Reference, Volume 1*. DEC, February 1985.

- *ALL-IN-1 Office Menu User's Reference, Volume 2.* DEC, February 1985.
- *Programming in VAX FORTRAN.* DEC, September 1984.
- *Programming in VAX Pascal.* DEC, March 1985.
- *VAX ADA Language Reference Manual.* DEC, February 1985.
- *VAX COBOL Language Reference Manual.* DEC, February 1986.
- *VAX COBOL User's Guide.* DEC, April 1985.
- *VAX Datatrieve User's Guide.* DEC, December 1985.
- *VAX Datatrieve Reference Manual.* DEC, December 1985.
- *VAX FORTRAN User's Guide.* DEC, September 1985.
- *VAX LISP/VMS User's Guide.* DEC, May 1986.
- *VAX Pascal User's Guide.* DEC, March 1985.

#### MISC.

- *Collected Algorithms from ACM, Supplement #96.* (This supplement contains the algorithms #636, 637, 638 and the 1985 Index by Subject to Algorithms.)
- *Directory of Applications Software.* Cray Research, Inc., December 1985.

## 20 Minute Time Out on VX: September 10

Starting September 10, terminals that have been inactive on the VAX VX for 20 minutes will be logged off automatically. No increases in the CPU time of the process as well as of the existing sub-processes determine the lack of activity that causes the log-off.

Documentation News

## Ordering Vendor Documentation

*Steven Brehe*

The process of ordering vendor documentation (documents from computer hardware and software manufacturers) has recently changed.

Previously you ordered vendor documentation at the Electronics Desk in the Minnesota Book Center at Williamson Hall. Now you can go to the Book Center's Information Desk and ask to place a special order for computer documentation. You must pay for the document at the time you order it.

If you do not have all the information you need to place the order (e.g., the exact title of the document, its publication number, the name of the vendor, and the price of the document), staff at the Trade and Reference Desk (also in the Book Center) can help you get this information.

Staff at the ACSS Technical Information Reference Room (128A Lind Hall) can also help you get correct ordering information. The Reference Room has reference copies of vendor documentation for ACSS hardware and software, so you can examine a copy of the document there to make sure you are ordering the correct manual.

# Free Documentation from ACSS

Paula Goblirsch

ACSS publishes several one- to-four page documents called *Briefs*. They are free to all users at the ACSS Reference Room, 128A Lind Hall. Multiple copies for classes can be obtained by calling Paula Goblirsch at 626-1093. Among the *Briefs* available this quarter are:

**Getting Started at ACSS:** Basic information for research and instructional computing.

**VAX/VMS Access:** Basic information for VMS users.

**Documentation Directory:** Lists basic documentation available from ACSS.

**Short Course Schedule:** Lists topics, time, and fees for short courses available during the current quarter.

**WRITEUP and EXPLAIN Information:** Information about on-line documentation utilities available on the CYBER CA.

**Reference Room and Documentation Services:** Lists information and services available from the ACSS Reference Room.

**Software:** Lists many of the software packages available on ACSS's CYBER and VAX machines.

**Liberal Arts Computing:** A summary of relevant software and services.

**Using MAIL on the CYBER:** Explains how to send and receive messages on the CYBER CA.

**Math and Statistics Routines:** A list of all math and statistics packages available on ACSS's machines.

**Full Screen Editor (FSE):** Explains how to use the CYBER full-screen editor.

**A Short Guide to LISP Facilities at the University of Minnesota:** Tells how to access LISP on the ACSS CYBER CA.

**Phone Numbers:** A list of important and frequently used phone numbers at ACSS.

**XEDIT 3.1 Reference Summary:** Lists all important XEDIT commands and parameters.

**Consulting Schedule:** Lists hours, locations, and phone numbers for ACSS consulting.

**Computing Facilities Map, Twin Cities Campus:** Indicates locations of campus computing facilities.

**ACSS Central Configuration Diagram:** Describes ACSS's mainframe computers with their attached storage and communications devices.

## Fall Quarter Short Courses 1986

### INTRODUCTORY COURSES

(Introductory Courses are FREE. To register call 625-7397.)  
(Classrooms listed *may* only be for the first day of class.)

Introduction to Computers	(JLM)	Oct 6-17	(MWF)	2:15-4 pm	Physics 210
FSE (CYBER Screen Editor)	(TEK)	Oct 1-3	(WF)	2:15-4 pm	SciCB 125
Beginning NOS 2	(SAK)	Oct 16-30	(TTh)	2:15-4 pm	SciCB 125
Beginning UNIX	(JLM/TEK)	Oct 22-Nov 7	(WF)	2:15-4 pm	SciCB 125
Introduction to VAX/VMS	(JHS)	Nov 10-21	(MWF)	2:15-4 pm	Physics 210
Graphics Packages at ACSS	(JLM)	Nov 24-Dec 3	(MW)	2:15-4 pm	Physics 210

### ELECTIVE COURSES

FEES: 1) U of MN Students, 2) Staff/Faculty, 3) Non-University persons

Beginning FORTRAN	(JLM/TEK)	Sept 30-Oct 16	(TTh)	2:15-4 pm	\$15,\$15,\$40
Math and Engineering Software	(MJF)	Oct 27-31	(MWF)	2:15-4 pm	\$10,\$10,\$20
Beginning Pascal	(KCB)	Nov 4-25	(TTh)	2:15-4 pm	\$15,\$15,\$40
SPSSX (Statistics Package)	(BAC)	Nov 3-7	(MWF)	2:15-4 pm	\$10,\$10,\$20
Introduction to Ingres (VAX DBMS)	(PJO)	Dec 2-4	(TTh)	2:15-4 pm	\$10,\$10,\$20

### MICROCOMPUTER APPLICATIONS

(Absolutely limited to 10 per class.)

FEES: 1) U. Students, 2) U. Staff/Faculty, 3) Non-University persons

Introduction to Micros: MS-DOS	section 1	Oct 6-8	(MW)	1:30-4 pm	\$25,\$35,\$60
	section 2	Oct 21-23	(TTh)	9:30-noon	\$25,\$35,\$60
	section 3	Nov 4-6	(TTh)	9:30-noon	\$25,\$35,\$60
	section 4	Nov 17-19	(MW)	1:30-4 pm	\$25,\$35,\$60

(Introduction to Micros or "equivalent knowledge" is required for courses below.)

Introduction to Word Perfect	section 1	Oct 9	(Th)	1:30-4 pm	\$25,\$35,\$60
	section 2	Nov 5	(W)	9:30-noon	\$25,\$35,\$60
	section 3	Dec. 2	(T)	9:30-noon	\$25,\$35,\$60
Microsoft Word in DOS		Nov 10-12	(MW)	1:30-4 pm	\$40,\$50,\$80
Beginning Lotus 1-2-3	section 1	Oct 13	(M)	1:30-4 pm	\$25,\$35,\$60
	section 2	Nov 26	(W)	1:30-4 pm	\$25,\$35,\$60
Intermediate Lotus 1-2-3		Nov 20	(Th)	1:30-4 pm	\$25,\$35,\$60
Introduction to dBase 3	section 1	Oct 27-31	(MWF)	1:30-3:30 pm	\$45,\$60,\$90
	section 2	Dec 1-5	(MWF)	1:30-4 pm	\$45,\$60,\$90
Programming with dBase III		Oct 20-22	(MW)	1:30-4 pm	\$40,\$50,\$80
Intermediate WordPerfect for Secretaries		Nov 7	(F)	9:30-noon	\$25,\$35,\$60

Continued on page 186

Intermediate Word Perfect for Authors	Dec 4	(Th)	1:30-4 pm	\$25,\$35,\$60
Managing Your Hard Disk in DOS	Nov 13	(Th)	1:30-4 pm	\$25,\$35,\$60
IBM Graphics (Demo, Limit 12)	Nov 14	(F)	9:30-noon	\$15,\$25,\$40

(These courses are OVERVIEWS ONLY for the Apple Macintosh. Limited to 12.)

Beginning Excel (Spreadsheet)	Oct 24	(F)	9:30-noon	\$15,\$25,\$40
Desktop Publishing	Oct 28	(Tu)	1:30-4 pm	\$15,\$25,\$40
Microsoft Word for the Macintosh	Oct 30	(Th)	1:30-4 pm	\$15,\$25,\$40
Developing Mac Software in TML Pascal	Nov 3-7	(MWF)	1:30-4 pm	\$25,\$35,\$60
Omnis 3	Nov 11	(Tu)	1:30-4p m	\$15,\$25,\$40
Intermediate Excel (Hands-On course)	Nov 17-19	(MW)	9:30-noon	\$40,\$50,\$80
Preparing Dissertations Using a Macintosh	Dec 3	(W)	9:30-noon	\$15,\$25,\$40

## Registration Information

**REGISTRATION:** Registration is located at the ACSS Reference Room, 128A Lind Hall. (Hours: 8:00 am to 4:30 pm, Monday through Friday). Mail registrations will be accepted. Deadline for registering is 4:15 pm on the last working day *before* the class begins. Please call and give us your name if you plan to attend a free class, so we know how many to expect. For registration information call 625-7397.

**FEES:** Fees are listed in order for the following groups: 1) university students, 2) faculty and staff, and 3) non-University persons. Course fees may be paid by cash or check or with a signed University journal voucher. **No** refunds will be made after the class has begun.

**NOTE:** Thursday and Friday, November 27-28 are University holidays. No classes will be held.

**CAUTION:** Classrooms listed here *may* be only for the first day of class.

For more information on short courses call Jerry Stearns, 625-1543.

*The Classifieds*

### For Sale

Available to any U of M department: An Apple III with 256K, 2 floppy disk drives, Profile 5 meg hard disk, green monitor. Software includes Apple Pascal, Apple II emulation, advanced Visicalc, DSS/F Financial Modeling system, Graphpower version 6. \$1,500. Contact Randy Margolis, Hospital Financial Accounting at 626-4079.

## PHONE NUMBERS

<p><b>Access:</b></p> <p>CYBER (CA)— ..... 626-1620</p> <p>CYBER (MD)— ..... 626-1622</p> <p>CYBER (ME)— ..... 626-1627</p> <p>VAX (VX)— ..... 626-1641</p> <p>RJE (2400 baud) ..... 626-1656</p> <p>RJE (4800 baud) ..... 626-1663</p> <p><b>Accounts:</b></p> <p>CYBER, MERITSS, VAX ..... 625-1511</p> <p>Computer Hours (recorded message) ..... 626-1819</p> <p><b>Consulting:</b></p> <p>HELP-Line ..... 626-5592</p> <p style="padding-left: 20px;">8 a.m.—5 p.m., Monday-Friday</p> <p>Artificial Intelligence ..... 625-8332</p> <p style="padding-left: 20px;">3-4 p.m., Monday-Friday</p> <p>Data Bases ..... 626-1887</p> <p style="padding-left: 20px;">10—11 a.m., Monday-Friday</p> <p>Microcomputers ..... 626-4276</p> <p style="padding-left: 20px;">9:00 a.m.—noon and 1:30—4 p.m., Monday, Tuesday, Friday</p> <p style="padding-left: 20px;">9:00 a.m.—4 p.m., Wednesday, Thursday</p> <p>Statistics Packages ..... 626-1887</p> <p style="padding-left: 20px;">1—2 p.m., Monday-Friday</p> <p>Text Analysis ..... 625-8332</p> <p style="padding-left: 20px;">3-4 p.m., Monday-Friday</p> <p>Text Processing ..... 625-1391</p> <p style="padding-left: 20px;">9—11 a.m., Monday, Tuesday</p> <p style="padding-left: 20px;">1—3 p.m., Wednesday, Friday</p> <p>Contract Services ..... 625-2303</p>	<p>Data Base Applications ..... 625-2303</p> <p>East Bank I/O, 128B Lind Hall ..... 625-5082</p> <p>Engineering Services ..... 627-4357, 627-4180</p> <p>Equipment Maintenance/Information ..... 627-4357, 627-4180</p> <p>Graphics Software ..... 626-5592</p> <p>HELP-Line ..... 626-5592</p> <p style="padding-left: 20px;">8 a.m.—5 p.m., Monday-Friday</p> <p>HOURS-line (recorded message) ..... 626-1819</p> <p>Information, Wulling Hall ..... 625-6665</p> <p>Information, Lauderdale ..... 626-1600</p> <p>Instructional Labs ..... 625-7850</p> <p>Lauderdale Computer Room ..... 626-0550</p> <p>Lauderdale Services ..... 626-1838</p> <p>Magnetic Tape Librarian ..... 626-1838</p> <p>Newsletter Subscription ..... 625-7397</p> <p>Permanent File Restoration ..... 626-0595</p> <p>Professional Services Division ..... 625-2303</p> <p>Project Assistance ..... 625-2303</p> <p>Public Labs</p> <p style="padding-left: 20px;">14 Folwell Hall ..... 625-4896</p> <p style="padding-left: 20px;">306B Lind Hall ..... 625-9032</p> <p style="padding-left: 20px;">9 Walter Library ..... 626-1899</p> <p>Publications Information ..... 626-1093</p> <p>Reference Room/Information Center ..... 625-7397</p> <p>Remote Batch (RJE) Services ..... 625-7850</p> <p>Short Course Information ..... 625-1543</p> <p>Short Course Registration ..... 625-7397</p> <p>Shuttle Bus Service ..... 625-9525</p> <p>System Status (recorded message) ..... 626-1819</p>
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## OPERATING HOURS

	CYBER (CA) and VAX (VX)	CA & VX Low Rate	MERITSS (MD)
M-F	7 a.m. - 4 a.m.	8 p.m. - 4 a.m./7 a.m. - 8 a.m.	7 a.m. - 1 a.m.
Sat	4 a.m. - 7 p.m.	all operating hours	7 a.m. - 10 p.m.
Sun	6 p.m. - 4 a.m.	all operating hours	6 p.m. - 1 a.m.

## PUBLIC LABS-TWIN CITIES CAMPUS

Location	Batch	Interactive	Micro	Location	Batch	Interactive	Micro
<i>East Bank</i>				<i>VinH 4</i>			
Arch 160			X	Walib 9		X	X
CentH		X		<i>West Bank</i>			
ComH		X		AndH 170			X
DiehH 207		X		BlegH 90	X		
EtH 121, 124		X		BlegH 140		X	
EtH N640	X			MdbH		X	
FolH 14, 14a	P	X	X	OMWL 2	P	X	
FronH		X		<i>St. Paul</i>			
LindH 26		X		BaH		X	
LindH 128B	X	X		CentLib B50			X
LindH 306B			X	ClaOff 125	X	X	
MechE 308		X		P means Printer only.			
Physics 69		X		For more information see WRITEUP, LABS.			
PIH		X					
SafH		X					
TerrH		X					

# Contents

165	<b>Instructional Computing</b>	174	Calcomp File Name Limit Improved
165	Instructional Services on the VAX VX	175	<b>Data Base Update</b>
166	Tools for Administrators of VX Instructional Users	175	INGRES on the VAX VX
170	Limits for Instructional Users on the VX	178	<b>New Statistics HELP-Line Number, Hours</b>
170	Project Assist Faculty Workshops	179	<b>Computing Reflections</b>
171	<b>Text Processing</b>	179	MIPS/Dollar: The VLSI Revolution
171	Kurzweil Optical Scanning Service Begins	180	<b>Artificial Intelligence</b>
172	MacTEX: Text Formatting for the Macintosh	180	Low-Cost LISP
173	New Serif Font Family for Scribe, Xerox 8700 Users	182	<b>Technical Information</b>
173	<b>Math and Statistics Packages</b>	182	The ACSS Reference Room: Recent Acquisitions
173	COFAMM, SINDSCL, and HICLUS to be Removed	183	<b>20 Minute Time out on VX: September 10</b>
174	<b>VAX News</b>	183	<b>Documentation News</b>
174	ACCSTAT on the VAX VX	183	Ordering Vendor Documentation
174	<b>CYBER News</b>	184	Free Documentation from ACSS
174	File Protection Parameter No Longer Supported	185	<b>Fall Quarter Short Courses</b>
174	<b>Graphics</b>	186	<b>Classifieds</b>

**The ACSS Newsletter**  
September 1986  
Volume 20, Number 9

**Acting Director:** *Michael M. Skow*  
**Editors:** *Steven Brehe, Paula Goblirsch*

The *ACSS Newsletter* is published monthly by Academic Computing Services and Systems (formerly the University Computing Center) of the University of Minnesota, Twin Cities. Deadline for articles is the 10th of the month preceding publication; deadline for short announcements is the 15th. The *Newsletter* is produced with an Apple Macintosh running Microsoft Word, MacPaint, MacDraw, and Aldus Pagemaker software, with camera-ready copy produced on the Apple LaserWriter.

Direct comments, suggestions, articles, and announcements to the editors at the address below, or call (612) 626-1093. For a free subscription call (612) 625-7397, or send your name and address to the Reference Room, 128A Lind Hall. On-campus address changes *must* include your department's name and your *departmental* address.

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

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## **The ACSS Newsletter**

**Academic  
Computing  
Services and  
Systems**

Technical Publications  
5 Wulling Hall  
University of Minnesota  
86 Pleasant Street SE  
Minneapolis, Minnesota 55455

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September 1986