1 CONVEX C3880 Overview

Chapter Overview

The CONVEX C3880 is designed for projects that require large memory, multi-tasking, large amounts of time, and good vector performance. Projects that require a dedicated system are encouraged.

This chapter provides detailed information about the CONVEX C3880 high performance system. Included is information about the hardware, software, policies, and specific resources available on the CONVEX C3880. Information regarding training, consulting, and printed and online documentation is also included in this chapter.

Introduction to the C3880

Operating Environment

The CONVEX machine at NCSA runs the Convex UNIX operating system based on Berkeley UNIX.

The UNIX operating environment includes the full-screen editors vi and GNU EMACS as well as electronic mail capability. You have a limited amount of permanent file space available to keep command scripts and other often-used files. Other space available for users will be subject to purging when files are not used for a period of time. See the section on Policies and Guidelines for further details.

You have default `.cshrc` and `.login` files that are provided by NCSA. One setting in the `.cshrc` sets the hostname UNIX option on. This means that the C3880 system prompt includes the name of the machine:

```
c3 [5] %
```

In this manual, only the `%` prompt is included in examples.

Applications Software

NCSA will work with the CONVEX C3880 user community to provide applications software. You are encouraged to contact the software coordinator to discuss your applications software needs. Please address general applications comments to the Associate Director of Applications. Software coordinator names may be obtained from NCSA's Gopher server or by contacting the Associate Director of Applications.

Detailed information about individual NCSA applications is available in the form of online man pages.

Hardware and Its Functionality

CONVEX C3880

The CONVEX C3880 series vector multiprocessor high performance system has eight processors. The system has total memory of 4 Gigabytes (Gbytes) and a total disk space of 60 Gbytes. Processor cycle time is 16.67 nanoseconds. The peak speed is 1920 Mflops (32 bit) and 960 Mflops (64 bit). A single process may not exceed 2 Gbytes in size.

UniTree

The UniTree mass storage system is a UNIX-like environment that is used at NCSA for all user data. UniTree manages the file system by automatically migrating files off local disk space onto tape when disk space becomes low or files have not been accessed in a certain length of time. Files that have previously been migrated to tape and purged off disk are automatically cached back to disk when you request access. There are no UniTree quotas.

See “UniTree” on page 4–1 for more information.

Policies and Guidelines

This section details the policies and guidelines for working on the CONVEX C3880 system at NCSA.

The user community on NCSA machines is large, and each user may have enormous programs and data files. These factors demand extensive file storage systems, larger than are practically possible using online disks. Some large jobs may require temporary access to large amounts of local disk. For this reason, online disks must be considered as temporary storage. When a job completes, the files should be stored on UniTree. Files left on an online disk are lost in the event of a disk failure. The file systems are not backed up on tape.

The NCSA systems have limited resources that must be shared among a large number of users. Management objectives are to provide a uniform level of service during normal hours of operation, but to allow for times when users with large resource demands may run their programs. Policies to meet these goals are evolving and are reevaluated periodically. As policies are set or changed, you are notified through mail, login banners, or news. When it is anticipated that these policies may affect user programs or resource availability, advance notice will be given.

If any of the limitations listed here will affect your work, please contact the NCSA Consulting Office (see “Consulting Office” on page 1–6). The consultants can provide information about various tools that may help you work within the constraints. They can also help you schedule times when programs that do not fit within the constraints may be run. Resource limits are not meant to impact a scientific project and are subject to change. Special exceptions may be made based upon user needs.

Memory Limits

The memory limit for the CONVEX C3880 is 512 Mwords per job or 256 Mwords per job at 32-bit or 64-bit accuracy respectively. A job run at 32-bit accuracy has twice the maximum memory and peak performance (512 Mwords and 1.92 Gflops) as a job run at 64-bit accuracy (256 Mwords and 0.96 Gflops).

The CONVEX C3880 is available in three modes (interactive, batch, and dedicated), which are fully explained in “Access Modes” on page 3–1. The memory available varies with the mode. Refer to “CXbatch Queueing System” on page 5–1 for information on the batch schedules.

CPU Limits

The CPU and memory limits established for the C3880 are based on historical usage data. The CONVEX C3880 is available in three modes (interactive, batch, and dedicated), which are fully explained in “Access Modes” on page 3–1. As with the memory limits, CPU limits are in place for each of the three access modes. For more information about the batch system and the queues see “CXbatch Queueing System” on page 5–1.

Disk Space Allocation

The C3880 disk system has over 30 Gbytes of disk space for user files. This space is divided into four file systems (in terms of longevity): permanent, interactive scratch, CXbatch scratch, and dedicated scratch. The scratch areas are for temporary files and should be considered volatile. This space is not backed up.

You are encouraged to keep files on the local disks only while in use. While the files are not in use, store them on UniTree. Your daily disk requirements may vary greatly. Monitor space usage periodically during interactive sessions, as well as during production runs, because files quickly accumulate when you are compiling and debugging. Many production jobs require sizable amounts of disk storage during execution.

You can check your home directory, interactive scratch, and batch scratch usage by entering:

```
% dquota
```

Even modest sustained disk utilization levels by a significant fraction of the total user population can seriously degrade system performance, if not deadlock the system. Files should not be left in the local (scratch) disk space awaiting a job’s execution at some later time; rather, the job should bring those files in from UniTree as needed from a shell script or by invoking UniTree via the Fortran library call SYSTEM. When no longer needed, output files must also be written to UniTree and deleted from the local disks, again under program control.

Permanent Files

Permanent files exist for the life of the account (subject to certain quotas detailed below). These are files in your home directory and its subtrees. Enter:

```
% echo $HOME
```

to display the pathname of your home directory. You can change to your home directory at any time by entering:

```
% cd
```

Certain files that are used by the UNIX shells and utilities must reside in your home directory. Examples include `.login`, `.cshrc`, `.profile`, `.mailrc`, and `.forward`. You may also find it convenient to keep shell scripts in your private permanent directory so that you can automate common tasks such as bringing in needed files from UniTree and storing results there.

The cumulative size of files in your home directory must be at most 18 Mbytes (allocated size, not data size). If your home directory reaches the 18-Mbyte limit, your files remain on disk, but you are unable to modify existing files or write new files in your home directory until you make disk space available by moving some files out of your home directory. For more information on disk quotas, enter `man quota`. Use the `dquota` command to check periodically on the size of your home directory. Use `ls -ls` to show the file size and the number of blocks reserved for each file. The cumulative file sizes as reported by entering `ls` may be less because some files may not completely fill each allocated block.

Subject to the 18-Mbyte limit, files in your home directory are considered permanent and remain until you remove them.

Interactive Scratch Files

In addition to permanent file space, you will have short-term space in the interactive scratch file system. The general interactive scratch directory is named `/scr-int`.

Files created in the interactive scratch area are purged if it has been more that 48 hours since they were last accessed. This automatic purge is not run on Sundays, so files created on a Friday should normally still be available until noon on the following Monday.

NCSA reserves the right to remove scratch files at any time should disk space become critically low. Please do not attempt to circumvent this removal scheme (e.g., with `touch`). Such attempts may result in the loss of access to the scratch file systems.

NOTE: The interactive limit for scratch space is 4 Gbytes. Space is not guaranteed on interactive scratch and may not be available when your jobs are run interactively. To ensure adequate space for your job, use the batch system, described below.

CXbatch Scratch Files

The batch scratch file system has been set up for use with jobs that have been submitted to the CXbatch system.

The name of the batch scratch file system is `/scr-bat`. At the end of your job you can preserve your files by using scripts that save them to the mass storage system, UniTree. Examples of these commands are included in the chapter titled “UniTree” on page 4–1.

Files created in the batch scratch file system are purged if it has been more than 24 hours since they were last accessed. *Files owned by users with running jobs are not purged.* Each user is limited to 2 Gbytes for the batch scratch file system.

Dedicated Scratch Files

`/scr-ded` is a 10-Gbyte file system that is available to a single project. Access is provided on a weekly basis from Wednesday to Wednesday. First priority is given to projects that have requested dedicated time (see “Access Modes” on page 3–1). To apply for dedicated time or to use the dedicated file system, send electronic mail to Radha Nandkumar, NCSA research scientist, at radha@ncsa.uiuc.edu.

Interactive Limits

The C3880 is available in interactive mode from 8 a.m.–6 p.m. (Central Time), Monday through Friday. The interactive limits are 30 CPU minutes per process with no memory limit. During batch mode (6 p.m.–8 a.m.), interactive jobs may be run but the batch jobs are permitted to dominate the CPU. Preapproved interactive users have no CPU or memory limits during batch mode. Other interactive users are limited to 30 CPU minutes and 512 Mbytes of memory.

The purpose of the interactive mode is to provide a productive software development environment. The tasks that are appropriate in this environment are compiling, debugging, editing, and file management. Long-running production jobs can be scheduled via the batch system (see “CXbatch Queueing System” on page 5-1 for more detailed information).

Allocation Status

Your account (or project) is specified by a name when you log on. Each account is assigned a specific number of service units of CONVEX C3880 time. This is referred to as the allocation for the account. The allocation is decremented as resources are used on the CONVEX C3880.

NCSA policy is to deactivate projects either at 100% use or at the expiration date, whichever comes first. In order to prevent a possible disruption of your research, NCSA has implemented an automatic process to let you know when your project is approaching 100% use or when the expiration date is within 3 months to give you time to submit a renewal proposal.

All valid users receive electronic notification on the affected system when 80% of the allocation has been used or when three months remain before the project expiration date, whichever comes first. A second notification occurs at 90% or one month before project expiration. The project is automatically deactivated when either the expiration date or 100% usage occurs.

You should be aware that accounting is added to the database on a daily basis but is collected only after a job is complete. Although unlikely, it is possible for you to go from under 80% use to 100% or more use in a single day and thus not receive any notification before deactivation.

Verifying Your Account Balance

You can monitor usage of your allocation using the `usage` utility. Invoking `usage` with no options displays cumulative information about the usage of an allocation for the current user on all allocated NCSA machines. For example:

```
% usage
 Proj      Mach    Login   Usage  Status P_alloc P_usage P_expire Name
  cra        uy   u65794    0.67  Active       2    0.67 12/31/99 Left, Sue
  rho        c3   u65794   10.50  Active   99999    2.34 12/31/99 Left, Sue
```

If an account or project name is specified using the `-p` option, information is returned for all users of that account or project on all applicable machines. The database is normally updated once each day.

For a more complete description of the usage options, enter **`man usage`**.

Changing Accounts for Charging

If you have more than one account, you can charge to various accounts within a logon session. To begin charging to a different account, use the `newacct` command. The syntax is:

% **`newacct`** *account*

where *account* is another valid account for your userid. *account* is then charged until you log off or reissue the newacct command with a different account number. To report your currently active account, enter:

```
% newacct -l
```

To find your valid account names, enter:

```
% newacct -a
```

The `defacct` command lets you define a default account to be charged during the login process. Enter `defacct` at the prompt to set your default.

```
% defacct
You currently do not have a default account.
Enter new default account (or none): your_default_account
Default account set to your_default_account.
```

Where *your_default_account* is the account or project name.

NOTE: Most C3880 users have only one account. You do not need to define a default account unless you have multiple accounts.

Charging Algorithm

The charge against an allocation for CONVEX C3880 usage as calculated in service units is:

1 SU = 1 CPU hour

where *CPU* is the time measured in hours and refers to the sum of user and system CPU time. The dedicated charge is `5 * wall clock`.

Project Extensions

The extension policy is the same for all NCSA systems. No extensions are granted without a written request received in advance of the expiration. At least 75 percent of your account must have been used by the termination date. A maximum of one three-month extension period can be requested.

To request an extension of your account, submit a written request to the Small Allocation Committee at least two weeks before your expiration so that it can be reviewed before your account is deactivated. The request should include a report of progress to date, justification for the extension, and a plan for completing the project. The request can be submitted by electronic mail to allocations@ncsa.uiuc.edu.

Information Resources

This section gives information about the resources you have to understand and use the NCSA CONVEX C3880.

Consulting Office

For assistance with an NCSA system, call the staff of the NCSA National Consulting Office (NCO) at (217) 244-1144. The NCO is located in room 5307 of the Beckman Institute on the University of Illinois campus and is open from 8:30 a.m. to 5:00 p.m. (Central Time) Monday through Friday for phone calls, electronic mail, and walk-ins. An answering machine records messages at other times. You can also contact the consulting staff by sending electronic mail to consult@ncsa.uiuc.edu. For assistance at other times (with operational problems only), contact the NCSA Operations staff at (217) 244-0710.

Online Resources

Online resources are available to assist you in using the CONVEX C3880. The following are available: banners, news, man pages, CONVEX INFO, a Gopher server, and a World Wide Web server.

Banners

Banners are displayed each time you logon to the system. Banners are generally short announcements or pointers to more detailed information in one of the other online resources. You should read the banner messages to see what has been added.

news

The system news utility keeps you informed about the changes taking place in the CONVEX C3880 environment. Specific news items are located in the `/usr/news` directory. The syntax is:

`news [`*options*`] |less`

where the options are:

- `-a` displays all news items
- `-n` lists the names of current news items not read yet
- `-s` reports the number of news items not read yet

Entering `news` without any options displays the items that were posted since you last read news. The entry `|less` displays the news items a page at a time. Press the space bar to see the next page. Enter `q` to quit.

You can view a specific news item by entering:

`%` **`news`** *topic* **`|less`**

Enter `man news` for additional information about this option.

man Pages

All of the commands referenced in this document are included online in the `man` (short for manual) pages. To access information on a command, enter **`man`** *command*. For more information on `man` itself, enter **`man man`**.

The `man` utility displays online documentation regarding commands, libraries, and file formats. These entries are primarily from vendor manuals although they may be locally-produced pages that describe local software and utilities.

The syntax of the `man` command is as follows:

`%` **`man`** `[`*section*`]` *topic*

where *section*, which is optional, identifies a particular manual section and *topic* is the exact name of the topic on which information is requested.

`man` entries reside in a subdirectory of the directories `/usr/man` and `/usr/local/man`. The appropriate subdirectory is determined by the manual section in which the topic occurs.

A particularly useful option of the `man` command is `-k`, which enables a keyword search of man entries. If you are unfamiliar with the exact name of a command, you can query the available entries. For example, enter:

`%` **`man -k archive`**

to display all `man` entries that contain the word *archive* in their one-line description. If one of these entries is of interest, you may enter the `man` command again (supplying the appropriate topic) to view the `man` page.

CONVEX INFO

INFO on the CONVEX provides descriptions of UNIX commands and examples. INFO is an interactive system that is designed to help beginning users but the examples sections may be of help to any UNIX user. When INFO is first invoked, an introduction to the system is provided; this introduction is bypassed on subsequent uses of INFO.

Enter:

`% info [command] [topic]`

Without an argument, INFO displays the main menus. With a topic name included as an argument, INFO displays the menu or command description related to the topic. INFO displays the command description when a command name is included as an argument. Entering the ESC key stops INFO from processing your request and brings up the main menu.

The following options may be entered at either the main menu, submenus, or command description screens:

q (quit)	exits the INFO system
ESC (escape)	displays the main menu
n (next)	moves forward one screen
b (back)	moves back one screen
? (help)	displays a context-sensitive help screen

For more information about CONVEX INFO, enter **man info**.

Gopher

Gopher is a client-server system on the Internet. To download the workstation client software, connect to the anonymous FTP site boombox.micro.umn.edu (134.84.132.2).

NCSA's Gopher server (gopher.ncsa.uiuc.edu) offers NCSA-produced information as well as information on the national Metacenter. The server is scheduled to be reorganized in fall 1994. The structure will be similar to the organization of the NCSA World Wide Web server. Therefore most user information will likely be under the *NCSA Computational Resources* folder.

World Wide Web

You can access the NCSA WWW server (www.ncsa.uiuc.edu) from the CM-5 using one of two browsers: NCSA Mosaic™ or lynx.

NCSA Mosaic is client software that provides a unified interface to WWW, Gopher, WAIS, and anonymous FTP servers. NCSA Mosaic's interface is hypertext-based with richly formatted documents that can include color images and can provide links to full-motion video and sound. NCSA Mosaic for the X Window System can be accessed from the C3880 by entering:

`% xmosaic &`

lynx is a general hypertext browser that allows you to browse through Web files displayed in ASCII (plain) text. Instructions for using lynx are found at the bottom of the lynx screen. Enter the following to begin a lynx session:

`% lynx`

Printed Resources

A list of NCSA user documentation, videotapes, software, and newsletters is published in the *NCSA Technical Resources Catalog*. Also included are instructions for ordering manuals from CONVEX. If you do not have a recent copy, contact NCSA at orders@ncsa.uiuc.edu or call (217) 244-4130 to request a new copy.