Introduction [1]

This chapter discusses the system administrator's role, the log books you need to administer the system smoothly, and the characteristics of the UNICOS operating system. It provides a brief overview of the tasks explained in this manual and directs you to more information and documentation.

1.1 The role of a system administrator

A UNICOS system administrator provides, maintains, and ensures efficient and effective access to the Cray Research UNICOS computing environment. Users typically expect system administrators to have a broad base of skills and insight into many components of the UNICOS operating system. A system administrator of a Cray Research supercomputer running the UNICOS operating system may be responsible for some or all of the following tasks:

- Getting the system up and running and available for job submissions.

- Making the appropriate site-specific configuration changes.

- Resolving hardware and software problems.

- Taking care of the day-to-day administrative duties necessary to maintain a system and its users.

Daily administrative duties may consist of the following functions:

- Configuring and maintaining system accounting

- Backing up and restoring file systems (dumps and restores)

- Adding and deleting users

- Maintaining file systems and structures

- Tracking, analyzing, and resolving problems

- Configuring and administering the network

- Tuning the system and monitoring performance

- Upgrading and modifying the system

- Maintaining system security

1.2 Create and maintain a log book

To help you and your staff administer your system, it is essential that you create and maintain a log book, which should contain the following kinds of information:

- An incident report log, noting any problems that occurred and how the problem was resolved.

- Backup logs, including any scripts used to perform backups, the location of backup tapes, and any other pertinent details that relate to backups.

- System crash log and crash recovery procedures.

- Local documentation, detailing site-specific procedures, such as operator procedures, backup procedures, and so on.

- Listings and full path names for any essential scripts or files (especially the current configuration and parameter files).

- Emergency phone numbers, the names of any contact people, and any other emergency procedures that are relevant for the site.

Always keep the log book as current as possible; when you are trying to troubleshoot system problems, an up-to-date log book can be invaluable.

1.3 Major characteristics of the UNICOS operating system

Based on the UNIX System V operating system with Berkeley extensions, the UNICOS operating system is both an interactive and batch operating system that offers many advantages in performance, functionality, application portability, and connectivity.

The UNICOS operating system combines all of the inherent strengths of UNIX, such as its familiar user interface, with production-oriented features, including high-performance I/O, multiprocessing support, ANSI/IBM tape support, resource allocation and control, enhanced process scheduling, and an advanced batch processing subsystem called the Network Queuing System (NQS).

The following sections describe the major characteristics of the UNICOS operating system.

1.3.1 High-performance I/O

The UNICOS operating system can perform asynchronous I/O operations, used in multitasking applications, allowing an I/O request to proceed while the main processing continues to execute. *List I/O* permits a linked list of I/O requests by using either synchronous or asynchronous control. Another type, known as *raw I/O*, moves data directly into a user's process space, bypassing kernel system buffers.

1.3.2 File systems

The UNICOS operating system modifies the regular UNIX System V file system with an improved disk block allocation scheme and the ability to create file systems that can span multiple physical disk devices.

1.3.3 Disk devices

The UNICOS operating system permits the use of disk striping and banding techniques for improving file system performance and reliability. A unique language, called the *configuration specification language* (CSL), is used to define the physical and logical characteristics of your UNICOS disk devices.

1.3.4 File system quotas

File system quotas have been implemented under the UNICOS operating system to control the amount of file system space consumed. You may set quotas for three different ID classes (user, group, and account IDs). Two different types of quotas are supported (file and inode).

1.3.5 User database (UDB)

The UNICOS operating system uses a data file, called the *user database* (`/etc/udb`), that holds comprehensive resource allocation and control information about users. The UNIX equivalent, maintained automatically for compatibility, is the `/etc/passwd` file.

1.3.6 Resource control

Resource control was added to the UNICOS operating system to permit a system administrator to set limits on CPU, memory, tapes, and file allocation. User limits are applied to processes or jobs, and they establish the maximum

amount of a resource that can be consumed. You can specify limits for interactive and batch workloads, as well as for per process and per job. This lets a system provide restricted resources for interactive use, without limiting a user's batch resources to the same degree.

For more information on resource control, see *UNICOS Resource Administration*, Cray Research publication SG–2302.

1.3.7 Unified Resource Manager (URM)

The Unified Resource Manager (URM) is a job scheduler that balances the demands of both batch and interactive sessions. URM provides a high-level method of controlling the allocation of system resources to run jobs that originated either in batch mode or in an interactive session.

For more information on URM, see *UNICOS Source Manager (USM) User's Guide*, Cray Research publication SG–2097.

1.3.8 Fair-share scheduler

The fair-share scheduler is a process scheduler that works with the standard System V scheduler to distribute system CPU resources more equitably. The fair-share scheduler adjusts the scheduling priorities of all running processes on a regular interval, based on users' recent usage and their "share" of the available CPU resource.

1.3.9 System accounting

The UNICOS operating system supports two kinds of system accounting; the standard System V version and Cray Research system accounting (CSA). CSA is designed to meet the unique accounting requirements of Cray Research customers. Like the standard System V accounting package, CSA provides a method to collect per-process resource usage data, to record connect sessions, to monitor disk usage, and to charge fees to users. CSA also permits sites to perform per-job and device accounting, along with daemon accounting. Individual sites can select which accounting system they want to use simply by starting the appropriate shell scripts and programs.

1.3.10 TCP/IP

The Transmission Control Protocol/Internet Protocol (TCP/IP) suite provides network communications that use the TCP/IP family of protocols and

applications. It allows Cray Research systems to become a peer node of any established TCP/IP network and permits other users and networks to access the UNICOS environment.

1.3.11 Network Queuing Environment (NQE)

NQE is a software product that consists of a set of servers and clients that allows batch requests to be executed across a load-balanced network of hosts known as a batch complex. Batch requests are submitted from NQE clients and executed at NQE master and execution servers.

For more information on NQE, see *UNICOS NQS and NQE Administrator's Guide*, Cray Research publication SG–2305.

1.3.12 Network Queuing System (NQS)

The Cray Research NQS product lets users submit, terminate, monitor, and control jobs submitted to either the local system or another appropriately configured computer system within your network.

For more information on NQS, see *UNICOS NQS and NQE Administrator's Guide*, Cray Research publication SG–2305.

1.3.13 Menu system

The UNICOS operating system contains a set of shell scripts, parameter files, and a user interface written in menu specification language (MSL). You may use the menu system to perform configuration changes after you have installed the UNICOS operating system.

For more information on the menu system, see *UNICOS System Configuration Using ICMS*, Cray Research publication SG–2412.

1.3.14 Data migration

The optional UNICOS Data Migration Facility (DMF) tries to ensure the availability of file system space by moving selected files from online disks to an offline storage device. The files remain cataloged in their original directories and behave in most ways as though they were still disk resident. Online disk can be considered a cached copy of a larger virtual disk space. The UNICOS DMF is not included as part of the standard UNICOS operating system software package; it is available as an optional software package.

For more information on DMF, see the*Cray Data Migration Facility (DMF) Administrator's Guide*, Cray Research publication SG–2135.

1.3.15 System activity monitor (SAM)

The Cray Research system activity monitor, `sam`, collects and displays system activity data from selected Cray Research computer systems. It consists of a data acquisition daemon, `samdaemon`, and two display clients, `xsam` and `csam`.

For more information on the system activity monitor, see *UNICOS Resource Administration*, Cray Research publication SG–2302.

1.4 How this guide will help you

After you boot your IOS and UNICOS operating system software and bring it to multiuser mode by following your UNICOS operating system installation guide (*UNICOS Installation Guide for CRAY J90 Model V based Systems*, Cray Research publication SG–5271) or your *Open First* documentation, this guide will enable you to perform each of the following tasks:

- Establish and maintain basic system security; see Chapter 2, page 11.

- Start up and shut down the IOS and UNICOS operating system; see Chapter 3, page 19.

- Verify and change date and time of both the IOS and UNICOS operating system ; see Chapter 3, page 19.

- Start and stop UNICOS system daemons; see Chapter 4, page 45.

- Determine existing file systems; see Chapter 5, page 51.

- Plan and configure file systems; see Chapter 5, page 51.

- Create, label, mount, and check the integrity of a file system; see Chapter 5, page 51.

- Monitor disk usage; see Chapter 5, page 51.

- Back up and restore a file system; see Chapter 6, page 133.

- Create and maintain user accounts; see Chapter 7, page 171.

- Communicate with your system users; see Chapter 8, page 217.

- Interpret system logs and determine when to "clean up" logs; see Chapter 9, page 225.

- Set up Cray system accounting (CSA) and monitor accounting functions; see Chapter 10, page 241.

- Add your CRAY J90 system to an existing network; see Chapter 11, page 275.

- Configure NIS; see Chapter 12, page 289.

- Configure NFS; see Chapter 13, page 299.

This guide contains several appendixes that may be of interest to you.

This guide also refers you to other publications for additional information you may need to perform more advanced system administration tasks.

Although each topic described in this guide includes a list of documentation you can read to get a greater understanding of the topic, the following list identifies some additional topics not covered in this guide that you may want to learn about to determine whether you should use the functions to administer your CRAY J90 system.

For information about	Read
File system space monitoring	SG-2302; `df`(1) and `du`(1) man pages
File system quotas	SG-2302
System activity monitoring	SG-2302; `sag`(1), `sar`(8), `sdc`(8), `tsar`(8), and `timex`(1) man pages
Automated incident reporting (AIR)	SG-2302; `aird`(8), `airdet`(8), `airprconf`(8), `airsum`(8), and `airtsum`(8) man pages
Job and process recovery	SG-2301; `chkpnt`(1), `chkpnt`(2), and `crash`(8) man pages
Reinstalling your system software	SG-5271
Updating your system software	SG-5271
Using the `cron`(8) and `at`(8) utilities	SG-2301; `at`(1) and `cron`(8) man pages

Configuring network interfaces	SG-2304
Monitoring networks	SG-2304
Unified Resource Manager (URM) centralizes resource allocation with a formal method of communication	SG-2302
Fair-share scheduler	SG-2302; shradmin(8) and shrdist(8) man pages
Memory scheduling	SG-2302
Multilevel security (MLS)	SG-2301
UNICOS message system	explain(1) man page
Data migration facility (DMF)	dmmode(2), dmofrq(2), dm(4) and dmf_offline(3C) man pages
Tape subsystem	SG-2307

1.5 UNICOS online glossary

The define(1) command allows quick, online retrieval of Cray Research technical terms and their definitions, and terms added by your site that match a specified search term. See the following example for definitions retrieved for the word *stripe*:

```
$ define stripe
striped disk slice
   A logical disk device composed of two or more
   physical disk slices (also known as members).

striped group

   The set of disk devices that are written to
   as a single group with data blocks
   interleaved among the members for maximum
   throughput at very high bandwidth.
```

For more information, see the define(1) man page. For information on how to add your own terms and definitions to the glossary, see the builddefs(1) man page.