

# Introduction to System Administration [1]

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This manual is a teaching and reference document for people who manage the operation of Cray Research computer systems running the UNICOS operating system. This chapter provides an introduction to the manual and includes sections covering the following topics:

- A chapter-by-chapter description of the contents of this manual
- A brief introduction to the UNICOS multilevel security (MLS) feature and *Cray ML-Safe* configuration of the UNICOS system
- A summary description of the user exits available in the UNICOS operating system

## 1.1 Overview of contents

This guide provides the following information:

- Descriptions of the general characteristics of UNICOS file systems.
- Descriptions of the startup and shutdown of a UNICOS system, including system initialization, system shutdown, run-level configuration, and multiuser startup.
- Information on the administration and maintenance of file systems, including mounting and unmounting file systems, file system backup and restoration, and file system checking and repair.
- Descriptions of tools and methods used in the daily administration of a UNICOS system. This includes information about executing commands at specified times (the `at` and `cron` commands), communicating with users, monitoring system security, and job and process recovery.
- Description of the user database (UDB). The UDB is the Cray Research enhancement of the traditional UNIX `/etc/passwd` and `/etc/group` files. The user database contains an entry for each user allowed to log in to and run jobs on your system; it provides faster access to this information than the traditional UNIX password and group files, and it allows safe use of multiple sources when user information is changed.

- Guidelines on crash and dump analysis for troubleshooting and debugging purposes. Although it does not address all potential problems, this guide describes general system crash analysis and recovery.
- Information on the UNICOS multilevel security (MLS) feature (also referred to as *security enhancements*) and on the Cray ML-Safe configuration of the UNICOS system. MLS provides mechanisms to protect both system integrity and sensitive information.
- The administrative procedures required for the online glossary and the online message system.
- Appendixes covering the following topics:
  - User-defined locales, which are collections of culture-dependent information used by an application to interact with a user
  - A description of the development and design of the UNICOS job and process recovery facility

This manual replaces neither experience nor other documents that more fully describe specific system areas. Familiarity with the references listed in the preface, combined with the full-time efforts of an individual, is necessary to effectively manage Cray Research computer systems running the UNICOS operating system.

## 1.2 UNICOS multilevel security (MLS) feature and the Cray ML-Safe configuration

The UNICOS multilevel security (MLS) feature provides specific mechanisms and assurances to protect both system integrity and sensitive information.

The *Cray ML-Safe configuration* refers to a configuration of the UNICOS system that supports processing at multiple security labels and system administration using only non-super user administrative roles. The Cray ML-Safe configuration consists of the subset of UNICOS software that offers these capabilities.



**Warning:** In the UNICOS 10.0 release, the term *Trusted UNICOS* has been replaced by the term *Cray ML-Safe*. Because of changes to available software, hardware, and system configurations since the UNICOS 8.0.2 system release, the term *Cray ML-Safe* does not imply an evaluated product, but refers to the currently available system configuration that closely resembles that of the evaluated *Trusted UNICOS 8.0.2* system.

The MLS feature and the Cray ML-Safe configuration are described in Chapter 8, page 145. It is assumed that before you read this chapter, you have read the

*UNICOS Multilevel Security (MLS) Feature User's Guide*, Cray Research publication SG-2111.

In addition, the MLS feature is referenced throughout this guide as appropriate.

## 1.3 User Exits

In the UNICOS operating system you can customize the programming environment in accordance with local needs by means of *user exits*. A user exit allows you to introduce local code at a defined point, even if you do not have access to the source code. User exits are compatible from release to release.

User exits are provided in the following areas:

- General Administration

At system startup, the `brc(8)` script, which invokes system initialization shell scripts, executes the `rc.pre`, `rc.mid`, and `rc.pst` scripts at specified points. These scripts allow for local startup initialization that cannot be accomplished through the existing `rc` script. These user exits are described in "System multiuser startup," Section 3.4, page 76, and on the `brc(8)` man page.

At system shutdown, the `shutdown(8)` script provides three user exits at specified points: the `shutdown.pre`, `shutdown.mid`, and the `shutdown.pst` scripts, which allow you to provide additional shutdown processing that is not provided by the `shutdown` script. These user exits are described in Section 3.2.1, page 65, and on the `shutdown(8)` man page.

- System Call

The `uesyscall` system call template allows you to write system calls specific to your site. This feature allows you to access kernel structures not otherwise available and to provide kernel support for local UNICOS functions. This feature is documented in Section 5.6, page 127.

- Accounting

Cray Research system accounting provides four user exits at specified times during the execution of the `csarun(8)` daily accounting shell script. For instructions for setting up the user exits scripts, see *UNICOS Resource Administration*, Cray Research publication SG-2302.

- Fair-share Scheduler

You can customize the fair-share scheduler's CPU scheduling policy at your site. This allows use of a different scheduling algorithm without modifying the UNICOS kernel. See *UNICOS Resource Administration*, Cray Research publication SG-2302, for information on this feature.

- Network Queuing Environment (NQE)

Through the NQS batch processing subsystem, user exits are provided to tailor various NQS functions to your site. NQS user exits allow you to customize queue destination selection, `qsub` option preprocessing, job startup and termination processing, and NQS startup and shutdown processing.

For more information, see *NQE Administration*, Cray Research publication SG-2150.

- MLS

The multilevel security (MLS) feature includes seven user exits as part of its centralized identification and authentication (I&A) mechanism. These user exits allow customers to control some aspects of user I&A, including I&A success and failure processing. Some examples are as follows:

- Support of a local password format
- Allowing validation information to be held on a remote (that is, front-end) host
- Disallowing multiple logins
- Bypassing password processing
- Limiting access to a selected group of users or selected network address
- Disabling `su` to `root`



**Warning:** The user exit feature does not meet the requirements of a Cray ML-Safe system.

For information on user exits in MLS, see Section 8.5.4, page 213.

- Tape subsystems

User exits are available that allow you to add special routines to communicate with the tape daemon. These user exits allow a system process to examine and modify a structure associated with a tape file. The specific

user exits available for the tape subsystem, and instructions for their implementations, are described in the *Tape Subsystem Administration*, Cray Research publication SG-2307.

- Unified Resource Manager (URM)

URM contains code that allows you to customize URM for the specific needs of your site by writing your own job selector. In URM, this locally-written selector code is executed last.

As shipped, the selector code is empty; it defaults to exiting without doing anything. However, you can write your selector based on any ranking algorithm you choose, and insert your code into the URM user exit.

URM user exits and their implementation are described in the description of URM in *UNICOS Resource Administration*, Cray Research publication SG-2302.

