The illustration on the following pages highlights the major body of documentation available for Cray Research (CRI) customers. The illustration is organized into categories by audience designation:

<table>
<thead>
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<th>Audience</th>
<th>Description</th>
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<tr>
<td>General users</td>
<td>Those who use the UNICOS operating system, products, applications, or linking software</td>
</tr>
<tr>
<td>Application and system programmers</td>
<td>Those who write or modify program code on a CRI system for the purpose of solving computer system, scientific, or engineering problems</td>
</tr>
<tr>
<td>System administrators</td>
<td>Those who perform system administration tasks, such as installation, configuration, and basic troubleshooting</td>
</tr>
<tr>
<td>System analysts</td>
<td>Those who perform advanced troubleshooting, tuning, and customization</td>
</tr>
<tr>
<td>Operators</td>
<td>Those who perform operational functions, such as performing system dumps, and those who administer an operator workstation</td>
</tr>
</tbody>
</table>

To use the map, find the audience designation closest to your specific needs or role as a CRI system user. Note that manuals under other audiences may also be of interest to you; manuals are listed only once, underneath the audience to which they most directly apply. Some manual titles are abbreviated. The date in the footer tells you when the information was last revised.

For more information

In addition to the illustration, you can use the following publications to find documentation specific to your needs:

- *Software Documentation Ready Reference*, publication SQ-2122, serves as a general index to the CRI documentation set. The booklet lists documents and man pages according to topic.

- *Software Overview for Users*, publication SG-2052, introduces the UNICOS operating system, its features, and its related products. It directs you to documentation containing user-level information.

- *User Publications Catalog*, publication CP-0099, briefly describes all CRI manuals available to you, including some not shown on the map, such as release notices and training workbooks.

Ordering

To obtain CRI publications, order them by publication number from the Distribution Center:

Cray Research, Inc.  
Distribution Center  
2360 Pilot Knob Road  
Mendota Heights, MN 55120  
USA  

Order desk: (612) 681-5907  
Fax number: (612) 681-5920
Available on-line with Docview

Man pages available with the man command
APPLICATION AND SYSTEM PROGRAMMERS

**C**
- Cray Standard C Reference (SR-2074)*
- Cray Standard C Ready Reference (SQ-2076)

**Ada**
- Cray Ada Reference (SR-3014)
- Cray Ada Programming Guide (SR-3082)

**Pascal**
- Pascal Reference (SR-0060)*

**Fortran 77**
- CF77 Fortran Reference (SR-3071)*
- CF77 Compiler Message Manual (SR-3072)
- CF77 Vectorization Guide (SR-3073)*
- CF77 Parallel Processing Guide (SR-3074)*
- CF77 Ready Reference (SR-3070)

**UNICOS Libraries**
- System Calls (SR-2012)§
- Fortran Library (SR-2079)§
- C Library (SR-2080)§
- Math & Scientific Library (SR-2081)§
- Specialized Libraries (SR-2057)§
- I/O User's Guide (SR-3075)*
- Advanced I/O Guide (SR-3076)*

**CAL for CRAY X-MP and CRAY Y-MP C90**
- Macros and Opdefs Reference (SR-0012)
- Symbolic Machine Instructions (SR-0085)
- Ready Reference (SQ-0083)

**CAL for CRAY-2**
- CAL Ready Reference (SQ-2002)
- Macros and Opdefs Reference (SR-2082)§

**Linking Software**
- SUPERLINK MVS AAC Reference (SI-0197)
- VAX/VMS Station Common Access Facilities (SN-0362)
- SUPERLINK Programmer's Guide VAX/VMS (SV-3155)

**Source Control**
- USM User's Guide (SG-2097)*

**Networking**
- RPC Reference (SR-2089)

**System Administrators**

**General**
- UNICOS Installation Guide (SG-2112)
- UNICOS System Administration (SG-2113)*
- Administrator Commands Reference (SR-2022)§
- Defining and Compiling Terminal Definitions (SN-2067)
- Docview Writer's Guide (SG-2118)*
- C2 Functionality on MLS Systems (SN-2407)

**IOS Models B – D**
- IOS Guide (SG-0307)
- IOS Messages (SR-2240)

**MVS Link**
- Station Installation (SI-0078)
- SUPERLINK MVS Installation, Tuning, & Customization (SI-0188)
- RQS Administrator's Guide (SG-2406)

**VM Link**
- Station Installation & Maintenance (SI-0162)
- SUPERLINK Administrator's Guide (SI-0171)
- VAX/VMS Link Station Installation (SV-0100)
- Station Administration (SV-0363)
- RQS Administrator's Guide (SV-3152)

**SUPERLINK Installation** (SG-5091)
- SUPERLINK Administrator's Guide (SV-3154)
- UNIX Link RQS Administrator's Guide (SG-2120)
- CLS-UX Installation & Configuration (SU-3123)
- NOS/VE Link NOS/VE Operator and Administrator Guide (SC-0271)

* Available on-line with Docview
§ Man pages available with the man command
**SYSTEM ANALYSTS**

**General**
- File Formats and Special Files Reference (SR-2014)§
- Data Migration MSP Writer’s Guide (SN-2098)*
- UNICOS Tuning Guide (SR-2099)
- System-specific Differences in the User Interface (SN-2104)
- Installation Menu System Internals (SN-3090)

**CSIM**
- User’s Guide (SG-2059)
- Ready Reference (SQ-2031)

**IOS Models B – D**
- Table Descriptions (SM-0007)
- Internal Reference (SM-0046)

**USCP**
- Front-end Protocol Internals (SM-0042)*
- USCP Optimization (SN-2103)

**OPERATORS**

**Peripheral Expander**
- OWS-E Reference (SR-3077)§
- OWS-E Operator’s Guide (SG-3078)
- OWS-E Administrator’s Guide (SG-3079)

**OWS**
- OWS Reference (SR-3030)§
- OWS Operator’s Guide (SG-3042)
- OWS Administrator’s Guide (SG-3038)

**Linking Software**
- CLS-UX (SU-3122)
- SUPERLINK MVS (SI-0196)
- MVS Station (SI-0037)

* Available on-line with Docview
§ Man pages available with the man command
New Features

This rewrite of OWS-E Operator Workstation Administrator's Guide supports the 2.0 release of OWS-E. It contains the following changes:

- The new edump(8) file format is explained.
- The bootios, booteiop, bootmux, and bootall scripts have been deleted.
- You can now use /etc/lapfile to set line arbitration priorities.
- Many parameters have been added and deleted in /etc/configfile; additions are noted in the “System Configuration File” section. Other changes are noted.
- Various changes due to the new fy driver are noted. (The cy and cz drivers are no longer supported).
- Three new buttons have been added to the xsnmpmon(8) network monitor Setup window.
The date of printing or software version number is indicated in the footer. In reprints with revision, changes are noted by revision bars along the margin of the page.

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
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<tr>
<td>1.1</td>
<td>September 1991. Reprint with revision to include OWS-E release 1.1 changes.</td>
</tr>
<tr>
<td>2.0</td>
<td>May 1992. Reprint with revision to include OWS-E release 2.0 changes.</td>
</tr>
</tbody>
</table>
This guide provides an overview of the Cray Research, Inc. (CRI) OWS-E operator workstation software and tells you how to perform OWS-E administrative duties for a Cray Research computer system with an I/O subsystem model E (IOS-E).

Assumptions

This guide was written for administrators of the OWS-E operator workstation. Readers should have a minimum of 16 hours training in either the UNICOS or the UNIX operating system; if you have no experience with UNICOS or UNIX, you should complete the CRI UNICOS Command Language (UCL-I) course.

It is assumed that you are running UNICOS operating system release 6.0 or later.

Conventions

The following typographic conventions are used throughout this manual:

<table>
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<th>Convention</th>
<th>Description</th>
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<tbody>
<tr>
<td>[ ]</td>
<td>Brackets enclose optional elements in syntax lines.</td>
</tr>
<tr>
<td>typewriter font</td>
<td>Typewriter font denotes literal items such as command names, file names, routines, directory names, path names, signals, messages, and programming language structures.</td>
</tr>
<tr>
<td>italic font</td>
<td>Italic font denotes variable entries and words or concepts being defined.</td>
</tr>
</tbody>
</table>
### Convention

<table>
<thead>
<tr>
<th><strong>bold typewriter font</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>In screen drawings of interactive sessions, bold typewriter font denotes literal items entered by the user. Output is shown in nonbold typewriter font.</td>
<td></td>
</tr>
</tbody>
</table>

**KEY**

Boxed words indicate keys on the keyboard, such as DELETE.

---

### Note

In this publication, Cray Research, CRI, and Cray refer to Cray Research, Inc. and/or its products.

---

### Man page references

Throughout this document, reference is made to the on-line man pages available through the man command. A man page is a discussion of a particular element of the software.

Each man page includes a general description of one or more commands, routines, or other topics and provides details of their usage (command syntax, routine parameters, system call arguments, and so on). If more than one topic appears on a page, the entry will appear in the printed manual alphabetized only under its major name.

You can access a man page by entering the following:

```bash
man subject
```

For example, to access the ls man page, enter the following:

```bash
man ls
```

Man pages are grouped into numbered sections; each section contains entries of a particular type. Types of entries include user commands, administrator commands, system calls, library routines, file formats, and device descriptions.
The following table lists the type of entry associated with each section number shown and the manual in which the section is published.

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<tr>
<th>Section</th>
<th>Subject</th>
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<td>SunOS user commands</td>
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<td>UNICOS user commands</td>
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<td>OWS-E Operator Workstation Reference Manual (SR-3077)</td>
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<td></td>
<td>SunOS administrator commands</td>
<td>SunOS Reference Manual (Vol. III)</td>
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<td></td>
<td>UNICOS administrator commands</td>
<td>UNICOS Administrator Commands Reference Manual (SR-2022)</td>
</tr>
</tbody>
</table>

Section numbers appear in parentheses after man page names. Man pages are referenced in text by entry name and section number, as shown in the following example:

To take a system dump, enter the `dumpsys(8)` command in an OWS-E window.
For more information

The following table lists related publications by topic; assume that a manual is a CRI publication unless it is otherwise identified.

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<td>Cray Research Software Training Catalog for Customers (TR-CUSTCAT)</td>
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<td></td>
<td>OWS-E Operator Workstation Ready Reference (SQ-3080)</td>
</tr>
<tr>
<td>OWS-E installation</td>
<td>OWS-E 2.0 Release and Installation Notes (RN-5060)</td>
</tr>
<tr>
<td>SunOS user information</td>
<td>SunOS 4.1 User’s Guides, order number 851–1028–01 (Sun Microsystems, Inc.); also available on-line through AnswerBook.</td>
</tr>
<tr>
<td></td>
<td>SunOS Reference Manual (Vol. I), order number 825–1244–01 (Sun Microsystems, Inc.)</td>
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<td>Using AnswerBook, order number 800–6908–10 (Sun Microsystems, Inc.)</td>
</tr>
<tr>
<td>SunOS system administrator information</td>
<td>System Network Administration (Vols. II and III), order number 800–3805–10 (Sun Microsystems, Inc.); also available on-line through AnswerBook.</td>
</tr>
<tr>
<td></td>
<td>SunOS Reference Manual (Vols. II and III), order number 825–1244–01 (Sun Microsystems, Inc.)</td>
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<tr>
<td>SunOS system</td>
<td>Sun OpenWindows Version 3 End User’s Manuals, order number 851–1035–01 (Sun Microsystems, Inc.); also available on-line through AnswerBook.</td>
</tr>
<tr>
<td>UNICOS operating system, user information</td>
<td>UNICOS User Commands Reference Manual (SR-2011)</td>
</tr>
<tr>
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<td>UNICOS User Commands Ready Reference (SQ-2056)</td>
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<tr>
<td></td>
<td>UNICOS Message Reference Manual (SR-2200)</td>
</tr>
<tr>
<td>Topic</td>
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<td>UNICOS operating system, administrator</td>
<td><em>UNICOS System Administration</em> (SG-2113)</td>
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<tr>
<td>IOS-E administration</td>
<td><em>I/O Subsystem Model E (IOS-E) Guide, (SD-2107)</em>§</td>
</tr>
<tr>
<td></td>
<td><em>IOS-E 3.0 Release and Installation Notes</em> (RN-5045)</td>
</tr>
</tbody>
</table>

§ This document is CRAY RESEARCH PRIVATE. It can be distributed to non-CRI personnel only with approval of the appropriate Cray Research manager.

For a more detailed list of Sun Microsystems, Inc., documentation, see *OWS-E Release and Installation Notes*.

**Ordering publications**

The *User Publications Catalog*, publication CP-0099, lists all Cray Research hardware and software manuals that are available to customers.

To order a manual, either call the Distribution Center in Mendota Heights, Minnesota, at (612) 681-5907 or send a facsimile of your request to fax number (612) 681-5920. Cray Research employees may choose to send electronic mail to *order.desk* (UNIX system users) or *order.desk* (HPDesk users).
Reader comments

If you have comments about the technical accuracy, content, or organization of this manual, please tell us. You can contact us in any of the following ways:

- Send us electronic mail from a UNICOS or UNIX system, using the following UUCP address:
  
  uunet!cray!publications

- Send us electronic mail from any system connected to Internet, using the following Internet addresses:
  
  pubs3079@timbuk.cray.com(comments specific to this manual)
  
  publications@timbuk.cray.com(general comments)

- Contact your Cray Research representative and ask that a Software Problem Report (SPR) be filed. Use PUBLICATIONS for the group name, PUBS for the command, and NO-LICENSE for the release name.

- Call our Software Information Services department in Eagan, Minnesota, through the North American Support Center, using either of the following numbers:
  
  (800) 950-2729 (toll free from the United States and Canada)
  
  (612) 683-5600

- Send a facsimile of your comments to the attention of “Software Information Services” in Eagan, Minnesota, at fax number (612) 683-5599.

- Use the postage-paid Reader's Comment form at the back of this manual.

We value your comments and will respond to them promptly.
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   1 What tasks can be done with the OWS-E?
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<td>103</td>
</tr>
<tr>
<td>103</td>
</tr>
</tbody>
</table>

**Tables**

<table>
<thead>
<tr>
<th>Tables</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>35</td>
</tr>
</tbody>
</table>
What is the OWS-E?

1.1

The OWS-E is a workstation that enables you to operate, administrate, and monitor your CRAY Y-MP mainframe and I/O subsystem model E (IOS-E). It uses the SunOS operating system, the OpenWindows graphical user interface, and the OWS-E software provided by CRI.

If your site has a maintenance contract with CRI, you will also have an MWS-E maintenance workstation; this machine is owned by CRI and is used to maintain and monitor the CRI computer system. The MWS-E and OWS-E cabinets look similar, but they have different hardware components and serve different purposes.

What tasks can be done with the OWS-E?

1.2

You or the operator can perform the following tasks from the OWS-E:

- Boot the IOS-E and the mainframe
- Dump the IOS-E and the mainframe
- Back up and restore files on the OWS-E
- Use the CPU and network monitors
- Respond to messages

Details for performing these tasks are provided in OWS-E Operator Workstation Operator’s Guide.
What information is in this guide?

If you are a new administrator of the OWS-E, you will want to read through sections 2 through 5, which describe the following:

- Hardware and software environment
- Changes that CRI has made to the initialization files required for support of the OpenWindows environment (this is for your information only and may be of interest if you are familiar with OpenWindows)
- Contents of the system configuration file, which allows changes to machine dependencies to be set at execution rather than at compile time

Sections 6 through 13 discuss the administrative tasks specific to the OWS-E:

- Determining user access to sensitive commands, and other security issues
- Setting line arbitration priorities
- Customizing the template scripts and system configuration file provided by CRI
- Shutting down and halting the OWS-E
- Manually dumping the IOS-E and mainframe
- Using the CPU and network monitors

Where can I find more information?


Refer to *System and Network Administration*, provided by Sun Microsystems, Inc., for information about adding and deleting users, maintaining network files, and other tasks that you must perform as an administrator of a Sun system. For a detailed list of stock numbers, see *OWS-E 2.0 Release and Installation Notes*.

For information about OWS-E installation, see *OWS-E 2.0 Release and Installation Notes*. 
This section describes the OWS-E hardware environment.

The OWS-E contains the following hardware components:

- Sun-4/370 Workstation (SPARCstation) with 16-Mbyte memory
  - VME chassis
  - Color graphics monitor
  - Keyboard
  - Optical mouse and pad
  - CPU board that contains memory, Ethernet controller, SCSI controller, and serial ports
  - Removable 669-Mbyte hard disk drive (SCSI)
  - Compact-disk read-only memory (CD-ROM) reader (SCSI)
  - 150-Mbyte 1/4-in. streaming tape drive (SCSI)
  - 2 FEI-3 board sets
- Laser printer

Figure 1 and Figure 4 show the hardware components.

**Note**

If your site has a maintenance contract with CRI, you will also have an MWS-E maintenance workstation. The MWS-E and OWS-E cabinets look similar, but they have some different hardware components and serve different purposes. The MWS-E is owned by CRI and is used to maintain and monitor the CRI computer system; the OWS-E is owned by your site and is used to operate and administrate the CRI computer system.
Figure 1. Hardware components
**Tapes**

2.2

The OWS-E uses 1/4-in. streaming tapes. It writes QIC-150 format tapes and reads both QIC-150 and QIC-24 format tapes. The tape device is usually `/dev/rst0`.

**Compact disk (CD)**

2.3

The OWS-E is equipped with a compact-disk, read-only memory (CD-ROM) drive. The SunOS operating system, OpenWindows, NEWSprint, AnswerBook, and OWS-E software are released on CD.

---

**Note**

All CDs must be loaded by use of the CD caddy. For more information, see *OWS-E 2.0 Release and Installation Notes*.

---

**Hardware connections**

2.4

Each CRI mainframe has its own OWS-E. If there are several OWS-E machines and they are connected by Ethernet, you can view the messages from all of the systems and perform functions from any of the OWS-E machines by logging into the other machines. The OWS-E is connected to the I/O subsystem model E (IOS-E) through two front-end interfaces (FEIs) to the service workstation interface (SWI) and to the Cray channel adaptor (CCA). For example, if your site has three CRI computer systems, they might be connected as shown in Figure 2.
The IOS-E consists of up to 16 I/O clusters, each with up to five I/O processors: one MUXIOP and one to four EIOPs. A MUXIOP communicates with the mainframe by sending response packets across the low-speed channel after request packets have been received and processed by the IOS-E. The MUXIOP also controls the high-speed data transfer channels to mainframe central memory and the SSD-E. An EIOP supports peripheral devices through channel adapters.

For more information about the IOS-E, see *I/O Subsystem Model E (IOS-E) Guide* and *IOS-E 3.0 Release and Installation Notes*.

---

§ This document is CRAY RESEARCH PRIVATE. It can be distributed to non-CRI personnel only with approval of the appropriate Cray Research manager.
The OWS-E software communicates with the IOS-E software through the fy driver, the front-end interface (FEI), and the service workstation interface (SWI), which is composed of a workstation interface (WIN) for the OWS-E and a cluster interface (CIN) for each cluster. Figure 3 illustrates the interaction between the OWS-E software and the IOS-E.

Figure 3. OWS-E/IOS-E interaction

As shown in Figure 2, page 6, the second FEI connects to the CCA, in order to support TCP/IP.

Figure 4 shows the OWS-E backplane connections.
Figure 4. OWS-E backplane connections
This section provides an overview of the OWS-E software system.

Software components

3.1

The OWS-E runs the following software:

- SunOS, the Sun Microsystems, Inc., operating system based on the UNIX operating system
- OpenWindows, a graphical user interface based on the OPEN LOOK standard
- NeWSprint, Sun Microsystems, Inc., printer formatting software
- AnswerBook, the Sun Microsystems, Inc., on-line documentation
- OWS-E software provided by CRI

The following subsections describe the OWS-E disk partitions and directory structure.
Disk partitions

The OWS-E disk contains a total of 669 Mbytes. Figure 5 shows the partition names and sizes; it gives a graphic representation of size, although it is not drawn exactly to scale. The letters at the left correspond to the names of the various partitions, in the form /dev/sdOn; the whole disk is /dev/sd0c. There is no e partition.

Figure 5. Disk partitions
Figure 6 shows some of the important files and directories in the OWS-E software. Most OWS-E commands are located under cri. The .version file contains the version number of the OWS-E software loaded on your system.
The default graphical user interface for the OWS-E is OpenWindows from Sun Microsystems, Inc. The components of this software include an X11/NeWS merged server, the XView toolkit, and the OPEN LOOK window manager (olwm).

This section describes the initialization files required by the OpenWindows environment and changes that have been made by CRI to other files and variables in order to support the OpenWindows environment.

### Required files

The following files are required for support of the OpenWindows environment:

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.openwin-init</td>
<td>Provides the OpenWindows system with information about which windows should be displayed initially, where they are placed, and other window-specific details. If you do not have a .openwin-init file in your login directory, OpenWindows will use a generic one from its library.</td>
</tr>
<tr>
<td>.openwin-menu</td>
<td>Specifies session environment aspects, such as the entities that appear in the root menu. This file is read by the OPEN LOOK window manager (olwm).</td>
</tr>
</tbody>
</table>
### Changed files

#### 4.2

The following SunOS files have been changed to support the OpenWindows environment:

<table>
<thead>
<tr>
<th>File</th>
<th>Description of changes</th>
</tr>
</thead>
</table>
| .cshrc (C shell) | Sets the OPENWINHOME variable to the directory in which the OpenWindows software is installed and adds the following path names to the PATH variable:  
  
  $OPENWINHOME/bin  
  $OPENWINHOME/bin/xview |
| .login (C shell) | Executes openwin, which then proceeds to read the .xinitrc file in setting up the user session environment. |
| .profile (Bourne shell) | Performs the same actions as .login and .cshrc combined. |
| .xinitrc | Reads the .Xdefaults file to the resource database, starts the olwm window manager, and then calls and executes the .openwin-init file to start the user's default display configuration. Normally, the operator should have the following line set in the .xinitrc file:  
  
  craymon &  
  
  This specifies that craymon(8) will execute in the background for as long as the operator is logged in. |
| .Xdefaults | Specifies various environmental aspects for the window manager, such as how many lines should be saved when scrolling. Several items not required for a pure X11 environment have been added for the OpenWindows system environment. For example, the OpenWindows.Set Input attribute is set so that the cursor follows the mouse as it moves across the screen; the alternative would be a click to focus option. |
Environment variable settings

4.3

By default, the following environment variable is set to the value shown in .cshrc (for the C shell) or .profile (for the Bourne shell):

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANPATH</td>
<td>/usr/man:/usr/contrib/man:/usr/man/$OPENWINHOME/share/man:/home/$HOST/crl/man</td>
</tr>
</tbody>
</table>

For more information about these environment variables and settings, see the SunOS manual pages for openwin(1) and xnews(1) in *SunOS Reference Manual*. 
System Configuration File [5]
The system configuration file, /etc/configfile, contains the system parameter labels and their corresponding values used by the OWS-E software. This file was created to allow changing machine dependencies at the time of execution. This file also contains other volatile variables, such as path names to the various binary and log files.

Whenever the OWS-E system needs to know the value of a particular variable that is supplied in /etc/configfile (such as the default path name to the UNICOS kernel), it calls a library routine. The config routine searches /etc/configfile for the label and then returns the associated string value. The getconfig(8) command is the shell interface to the config routine.

For more information about these commands, see OWS-E Operator Workstation Reference Manual.
How can I make changes to /etc/configfile?

Before making changes to /etc/configfile permanent, you should test those changes. To do this, follow these steps:

1. Copy /etc/configfile to a temporary location, such as your home directory.
2. Edit the file in this new location.
3. Set the OWSECONFIG environment variable to be the full path name of this edited configuration file.

The config routine checks the environment variable and uses the new configuration file when answering system parameter requests; other users (who do not have the OWSECONFIG variable set) continue to get their defaults from the original /etc/configfile. When you are satisfied that your changes work properly, you can replace the original /etc/configfile with your edited version and unset OWSECONFIG.

Order of parameters in /etc/configfile

The system configuration file /etc/configfile is divided into two sections, as follows:

1. Configurable parameters set during the install process to site-specific values
2. Configurable parameters set at release time

The parameters are described here in Table 1, Table 2, and Table 3 in the order in which they are found in /etc/configfile.

The term IOP refers to either an EIOP or a MUXIOP.

Tokens

Many of the parameters contain tokens that are changed during the installation process to reflect the specific machine being installed. These tokens are designated by __token__ (that is, they are preceded and followed by underscores). If any of these tokens remain in /etc/configfile following completion of the installation, they should be changed as instructed in Table 1, which lists the tokens in the order in which they appear in the file.
Table 1. Tokens

<table>
<thead>
<tr>
<th>Token</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>HOSTNAME</em></td>
<td>Replace this token with the name of the OWS-E. For example, if the serial number of the mainframe were 1600, <em>HOSTNAME</em> could be ows1600.</td>
</tr>
<tr>
<td><em>SERIALNUMBER</em></td>
<td>Replace this token with the serial number of the CRI mainframe to which the OWS-E is attached. For example, if the mainframe serial number were 1600, <em>SERIALNUMBER</em> should be 1600.</td>
</tr>
<tr>
<td><em>DUMPTYPE</em></td>
<td>Replace this token with the number that specifies the type of the disk to which the mainframe memory will be dumped. The disk drives and their valid numbers are as follows:</td>
</tr>
<tr>
<td></td>
<td>Disk device</td>
</tr>
<tr>
<td></td>
<td>DD-40</td>
</tr>
<tr>
<td></td>
<td>DD-41</td>
</tr>
<tr>
<td></td>
<td>DD-42</td>
</tr>
<tr>
<td></td>
<td>DD-49</td>
</tr>
<tr>
<td></td>
<td>DD-50</td>
</tr>
<tr>
<td></td>
<td>DD-60</td>
</tr>
<tr>
<td></td>
<td>DD-61</td>
</tr>
<tr>
<td></td>
<td>DD-62</td>
</tr>
<tr>
<td><em>DUMPI0</em></td>
<td>Replace this token with a 4-digit octal number specifying the cluster, IOP, and channel path down which the memory will proceed to the disk. For example, 0130 specifies that the dump will be transferred to disk through cluster 0, IOP 1, and channel 30. The disk attached to the specified channel must be of the type specified in <em>DUMPTYPE</em>.</td>
</tr>
</tbody>
</table>
Table 1. Tokens
(continued)

<table>
<thead>
<tr>
<th>Token</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DUMPUNIT</strong></td>
<td>Replace this token with the default dump device unit number. DD-40s, DD-42s, DD-60s, and DD-62s have unit numbers; everything else uses 0.</td>
</tr>
<tr>
<td></td>
<td><strong>Disk drive</strong> <strong>Valid unit numbers</strong></td>
</tr>
<tr>
<td>DD-40</td>
<td>0, 1</td>
</tr>
<tr>
<td>DD-41</td>
<td>0, 1</td>
</tr>
<tr>
<td>DD-42</td>
<td>0, 1</td>
</tr>
<tr>
<td>DD-49</td>
<td>0</td>
</tr>
<tr>
<td>DD-50</td>
<td>0</td>
</tr>
<tr>
<td>DD-60</td>
<td>0, 1, 2, 3, 4, 5, 6, 7</td>
</tr>
<tr>
<td>DD-61</td>
<td>0, 1, 2, 3, 4, 5, 6, 7</td>
</tr>
<tr>
<td>DD-62</td>
<td>0, 1, 2, 3, 4, 5, 6, 7</td>
</tr>
<tr>
<td><strong>DSTARTBL</strong></td>
<td>Replace this token with the start of the slice on the disk to which the memory will be dumped. This value is designated in decimal blocks.</td>
</tr>
<tr>
<td><strong>DUMPLEN</strong></td>
<td>Replace this token with the length of the slice on the disk to which the memory will be dumped. This value is designated in decimal blocks.</td>
</tr>
<tr>
<td><strong>MAINFRAME</strong></td>
<td>Replace this token with the number that specifies the type of the mainframe to which the OWS-E is attached. The mainframe types and their respective numbers are as follows:</td>
</tr>
<tr>
<td><strong>Mainframe type</strong></td>
<td><strong>Number</strong></td>
</tr>
<tr>
<td>CRAY Y-MP C90 (1 to 16 CPUs)</td>
<td>100</td>
</tr>
<tr>
<td>CRAY Y-MP 8I (1 to 8 CPUs)</td>
<td>7</td>
</tr>
<tr>
<td>CRAY Y-MP 8E (1 to 8 CPUs)</td>
<td>8</td>
</tr>
<tr>
<td>CRAY Y-MP 4E (1 to 4 CPUs)</td>
<td>9</td>
</tr>
<tr>
<td>CRAY Y-MP 2E (1 or 2 CPUs)</td>
<td>6</td>
</tr>
<tr>
<td>CRAY Y-MP (8 CPUs) (only certain serial numbers)</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 1. Tokens
(continued)

<table>
<thead>
<tr>
<th>Token</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEMORY</strong></td>
<td>Replace this token with the number that specifies the memory size of the mainframe to which the OWS-E is attached. The numbers are as follows:</td>
</tr>
<tr>
<td>Memory size</td>
<td>Number</td>
</tr>
<tr>
<td>-----------</td>
<td>--------</td>
</tr>
<tr>
<td>4 Mwords</td>
<td>4</td>
</tr>
<tr>
<td>8 Mwords</td>
<td>8</td>
</tr>
<tr>
<td>16 Mwords</td>
<td>16</td>
</tr>
<tr>
<td>32 Mwords</td>
<td>32</td>
</tr>
<tr>
<td>64 Mwords</td>
<td>64</td>
</tr>
<tr>
<td>128 Mwords</td>
<td>128</td>
</tr>
<tr>
<td>256 Mwords</td>
<td>256</td>
</tr>
<tr>
<td>512 Mwords</td>
<td>512</td>
</tr>
<tr>
<td>1024 Mwords</td>
<td>1024</td>
</tr>
<tr>
<td>2048 Mwords</td>
<td>2048</td>
</tr>
<tr>
<td>4096 Mwords</td>
<td>4096</td>
</tr>
</tbody>
</table>
Table 1. Tokens  
(continued)

<table>
<thead>
<tr>
<th>Token</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong><em>SSD_MEMORY</em></strong></td>
<td>Replace this token with the number that specifies the memory size of the SSD-E solid-state storage device attached to the mainframe to which the OWS-E is attached. The numbers are as follows:</td>
</tr>
<tr>
<td>SSD memory</td>
<td>Number</td>
</tr>
<tr>
<td>No SSD</td>
<td>0</td>
</tr>
<tr>
<td>4 Mwords</td>
<td>4</td>
</tr>
<tr>
<td>8 Mwords</td>
<td>8</td>
</tr>
<tr>
<td>16 Mwords</td>
<td>16</td>
</tr>
<tr>
<td>32 Mwords</td>
<td>32</td>
</tr>
<tr>
<td>64 Mwords</td>
<td>64</td>
</tr>
<tr>
<td>128 Mwords</td>
<td>128</td>
</tr>
<tr>
<td>256 Mwords</td>
<td>256</td>
</tr>
<tr>
<td>512 Mwords</td>
<td>512</td>
</tr>
<tr>
<td>1024 Mwords</td>
<td>1024</td>
</tr>
<tr>
<td>2048 Mwords</td>
<td>2048</td>
</tr>
<tr>
<td>4096 Mwords</td>
<td>4096</td>
</tr>
</tbody>
</table>

| **_CPUDHOSTNAME_** | Replace this token with the name of the machine on which cpud(8) is running. This passive CPU monitor normally executes on the OWS-E. For example, if the serial number of the mainframe were 1600, _CPUDHOSTNAME_ could be replaced with ows1600. |
Configurable parameters set during installation

5.5

This subsection describes the parameters that are set during the installation process (see the OWS-E 2.0 Release and Installation Notes for more information). Parameters that you should not change are noted. Parameters are listed in the order in which they appear in the file.

Table 2. Configurable parameters set during the installation process

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROOTDIR</td>
<td>Defines the base directory that scripts use to find the CRI commands that they execute during processing. At release, this directory is the cri home directory:</td>
</tr>
<tr>
<td></td>
<td>/home/_<strong>HOSTNAME</strong>/cri</td>
</tr>
</tbody>
</table>

**Note**

Do not change this parameter. The location of the cri directory is used by many different pieces of the OWS-E software, and it should not be changed.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIL_CPUFAIL</td>
<td>Defines the login name to which mail is sent if a CPU panics. At release, this parameter is set to cri. To specify more than one user, use the SunOS aliases(5) file.</td>
</tr>
<tr>
<td>MAIL_IOPFAIL</td>
<td>Defines the login name to which mail is sent if an IOP halts. At release, this parameter is set to cri. To specify more than one user, use the SunOS aliases(5) file.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| DEFAULTUKERNFILE    | Defines the path name to the default UNICOS binary. This parameter is used by the system start utility, `bootsys(8)`, when the default UNICOS kernel is to be started on the mainframe. At release, this parameter is set to the name of the default UNICOS binary initially installed:  

```
/home/__HOSTNAME__/cri/os/uts/unicos
```

It is likely that you will change this parameter. Although the kernel file should reside under the cri home directory, it is likely that the actual name of the default kernel to be booted will change from site to site. For example, if `unicos.prod.day` were the name of the default kernel at your site, this parameter would be set to the following:  

```
/home/__HOSTNAME__/cri/os/uts/unicos.prod.day
```

| DEFAULTUPARAMFILE   | Defines the path name to the default UNICOS parameter file. This parameter is used by the `bootsys(8)` command when the default parameter file is requested. At release, this parameter is set to the name of the default UNICOS parameter file:  

```
/home/__HOSTNAME__/cri/os/uts/param
```

It is likely that you will change this parameter. Although the parameter file should reside under the cri home directory, the actual name of the default parameter file will change from site to site. For example, if `param.prod.day` were the name of the default parameter file at your site, this parameter would be set to the following:  

```
/home/__HOSTNAME__/cri/os/uts/param.prod.day
```
Table 2. Configurable parameters set during the installation process  
(continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| DEFAULTIKERNDIR   | Defines the path name to the directory in which all the IOS-E binary files are kept. This parameter is used by the bootsys(8) command upon a request that the default IOS-E binary files be started. At release, this parameter is set to the following:  
  `/home/`__HOSTNAME__/cri/os/ios  
  Note: Do not change this parameter. To ensure consistency and the availability of support, you should not change the directory structure underneath the cri home directory. |
| CPUPANIC          | Defines the path name of the cpupanic(8) script. The rcpud(8) command executes this script when it receives a panic packet. This script checks the dump lock file, described under the ADUMPPDIR and DUMP parameters (page 27); if the lock is set, the cpupanic script proceeds to boot the IOS-E and take a dump image of the mainframe, using mfdump(8). At release, this parameter is set to the following:  
  `/home/`__HOSTNAME__/cri/bin/cpupanic  
  You should change this parameter if you create a different panic script or if you change the name of the script. You should keep all scripts and commands in the following directory:  
  `/home/`__HOSTNAME__/cri/bin |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOPHALT</td>
<td>Defines the path name of the <code>iophalt(8)</code> script. This script is executed by the <code>hbeat(8)</code> command whenever it detects an IOP halt or failure. This script checks the dump lock file, described under the <code>ADUMPDIR</code> and <code>DUMP</code> parameters (page 27); if the lock is set, the <code>iophalt</code> script proceeds to get dumps of the IOPs. At release, this parameter is set to the following: <code>/home/</code>___HOSTNAME__/cri/bin/iophalt You should change this parameter if you create a different halt script or if you change the name of the script. You should keep all scripts and commands in the following directory: <code>/home/</code>___HOSTNAME__/cri/bin</td>
</tr>
<tr>
<td>SERIALNUMBER</td>
<td>Defines the serial number of the CRI mainframe to which the OWS-E is attached. This parameter is used by the shell scripts. At release, this parameter is set to the <code>__SERIALNUMBER__</code> token and is replaced during the installation. If this token has not been replaced after completion of the installation, proceed with the directions for replacing the <code>__SERIALNUMBER__</code> token (see page 19). Note You should change this parameter only if a change is made to the serial number of the mainframe to which the OWS-E is attached.</td>
</tr>
<tr>
<td>DEFAULTIOP</td>
<td>Defines the default IOP through which the IOS-E is booted. This parameter is used by the <code>bootsys(8)</code> command and shell scripts. At release, it is set to IOP 0. This parameter may be set to any of the configured IOPs within the cluster specified by <code>DEFAULTCLSTR</code>, as long as the specified IOP has the deadstart capability.</td>
</tr>
</tbody>
</table>
Table 2. Configurable parameters set during the installation process  
(continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| DEFAULTIDUMPDIR | Defines the default dump directory path in which the dump shell script is created. This parameter is used by the `bootsys(8)` command. At release, this parameter is set to the following:  
  `/var/dumps`  
  This parameter may be set to any existing directory desired; however, it is important to organize all dump information into a coherent directory structure. |
| ADUMPDIR        | Defines the path name of the directory holding the dump lock file mentioned in the descriptions of the `CPUPANIC` and `IOPHALT` parameters. The dump lock file indicates to the `cpupanic(8)` and `iophalt(8)` scripts whether or not they should automatically take dumps upon receipt of halts or panics. The `autodump(8)` command uses this parameter when setting the lock file on or off. At release, this parameter is set to the following:  
  `/home/__HOSTNAME__/cri/bin/adm` |
| DUMP            | Defines the name of the dump lock file mentioned in the descriptions of the `ADUMPDIR`, `CPUPANIC`, and `IOPHALT` parameters. The dump lock file indicates to the `cpupanic` and `iophalt` scripts whether or not they should automatically take dumps upon receipt of halts or panics. The `autodump(8)` command uses this parameter when setting the lock file on or off. At release, this parameter is set to the following:  
  `dump.on` |
| ERRLOGD         | Defines the path name of the error logging daemon. This daemon serves as the hardware error log program for the IOS-E. It opens up an error channel, sends the messages it reads to the console, and also logs them. At release, this parameter is set to the following:  
  `/home/__HOSTNAME__/cri/bin/errlogd` |
| SMDEMON         | Defines the path name of the daemon that monitors the OWS-E for SMARTE. At release, this parameter is set to the following:  
  `/home/__HOSTNAME__/cri/smarte/bin/smdemon` |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HBEAT</strong></td>
<td>Defines the path name of the IOP monitor. This monitor opens up a heartbeat channel to the IOS-E, polls for halted or hung IOPs, and invokes the iophalt script. Messages are logged and sent to the console for operator intervention. At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td><code>/home/__HOSTNAME__/cri/bin/hbeat</code></td>
</tr>
<tr>
<td><strong>RCPUD</strong></td>
<td>Defines the path name of the remote CPU request daemon. This daemon handles requests from the mainframe to perform workstation functions on behalf of the mainframe. It opens up a CPU channel and receives requests in the form of O packets. This command invokes the cpupanic(8) script. At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td><code>/home/__HOSTNAME__/cri/bin/rcpud</code></td>
</tr>
<tr>
<td><strong>CPUD</strong></td>
<td>Defines the path name of the command that gathers data and disperses CPU time statistics. At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td><code>/home/__HOSTNAME__/cri/bin/cpud</code></td>
</tr>
<tr>
<td><strong>EDIAG</strong></td>
<td>Defines the path name of the command that boots deadstart diagnostics into a specified IOP. At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td><code>/home/__HOSTNAME__/smart/bin/ediag</code></td>
</tr>
<tr>
<td><strong>EBOOT</strong></td>
<td>Defines the path name of the command that boots an IOP from the OWS-E. At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td><code>/home/__HOSTNAME__/cri/bin/eboot</code></td>
</tr>
<tr>
<td><strong>AUTODUMP</strong></td>
<td>Defines the path name of the command that controls automatic dumping of the mainframe and the IOS-E. At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td><code>/home/__HOSTNAME__/cri/bin/autodump</code></td>
</tr>
</tbody>
</table>
Table 2. Configurable parameters set during the installation process 
(continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECON</strong></td>
<td>Defines the path name of the command that configures a MUXIOP-to-EIOP low-speed channel up or down. At release, this parameter is set to the following: /home/<code>__HOSTNAME__</code>/cri/bin/econ</td>
</tr>
<tr>
<td><strong>HCON</strong></td>
<td>Defines the path name of the command that configures a MUXIOP high-speed channel up or down. At release, this parameter is set to the following: /home/<code>__HOSTNAME__</code>/cri/bin/hcon</td>
</tr>
<tr>
<td><strong>MFINIT</strong></td>
<td>Defines the path name of the command that runs a mainframe and IOS-E initialization and confidence test. At release, this parameter is set to the following: /home/<code>__HOSTNAME__</code>/cri/bin/mfinit</td>
</tr>
<tr>
<td><strong>MFSTART</strong></td>
<td>Defines the path name of the command that starts the mainframe CPU from the OWS-E. At release, this parameter is set to the following: /home/<code>__HOSTNAME__</code>/cri/bin/mfstart</td>
</tr>
<tr>
<td><strong>IOSDPATH</strong></td>
<td>Defines the path name of the IOP deadstart diagnostic. The edia(8) command uses this parameter when booting dsdiag into a specified IOP. At release, this parameter is set to the following: /home/<code>__HOSTNAME__</code>/cri/os/ios/dsdiag</td>
</tr>
<tr>
<td><strong>IOSCPATH</strong></td>
<td>Defines the path name of the I/O clear diagnostic. The edia(8) command uses this parameter when booting cleario into a specified IOP. At release, this parameter is set to the following: /home/<code>__HOSTNAME__</code>/cri/os/ios/cleario</td>
</tr>
</tbody>
</table>
Table 2. Configurable parameters set during the installation process

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOPDEBUG</td>
<td>Defines the path name of a temporary file that the ecrash(8) utility uses during its processing. At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td>/home/<strong>HOSTNAME</strong>/cri/os/ios/iopdebug</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>Do not change this parameter. To ensure consistency and the availability of support, you should not change the directory structure underneath the cri home directory. Also, this file is an internal holder that is visible here only because of its dependency on the specific host name of the OWS-E at each specific site.</td>
</tr>
<tr>
<td>IOPSAVE</td>
<td>Defines the path name of a temporary file used by the edump(8) utility during its processing. At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td>/home/<strong>HOSTNAME</strong>/cri/os/ios/iopsave</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>Do not change this parameter. To ensure consistency and the availability of support, you should not change the directory structure underneath the cri home directory. Also, this file is an internal holder that is visible here only because of its dependency on the specific host name of the OWS-E at each specific site.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| **MFSYSDMP** | Defines the path name of the CPU-resident program used by the `mfdump(8)` command. `mfdump` loads this program onto the mainframe to save the exchange package registers and any other requested memory types. At release, this parameter is set to the following:  

/home/__HOSTNAME__/cri/os/uts/mfsysdmp  

**Note**  
Do not change this parameter. To ensure consistency and the availability of support, you should not change the directory structure underneath the cri home directory. This program is placed in its directory during the installation process. |
| **MFBOOT** | Defines the path name of the bootstrap loader program used by the `mfdump(8)` command. At release, this parameter is set to the following:  

/home/__HOSTNAME__/cri/os/uts/mfboot  

**Note**  
Do not change this parameter. To ensure consistency and the availability of support, you should not change the directory structure underneath the cri home directory. This program is placed in its directory during the installation process. |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFIPATH</td>
<td>Defines the path name of the diagnostic program used by the mfinit(8) command. This diagnostic program loads data into registers and stores the results in memory; mfinit then validates the results. At release, this parameter is set to the following: <code>/home/__HOSTNAME__/cri/os/uts/mfchkye</code></td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>Do not change this parameter. To ensure consistency and the availability of support, you should not change the directory structure underneath the crj home directory. This program is placed in its directory during the installation process.</td>
</tr>
<tr>
<td>DEF_MFCHAN</td>
<td>Defines the mainframe channel number of the low-speed channel attached to the cluster that deadstarts the mainframe. It is used to route the time-and-date and terminal I/O packets until the parameter file is processed. At release, this parameter is set to the following: 020</td>
</tr>
<tr>
<td>DTYPE</td>
<td>Defines the type of the disk in which the mainframe memory will be dumped. The mfdump(8) command uses this parameter when dumping mainframe memory. At release, this parameter is set to the <strong>DUMPTYPE</strong> token and is replaced during the installation. If this token has not been replaced after completion of the installation, proceed with the directions above for replacing the <strong>DUMPTYPE</strong> token (see page 19).</td>
</tr>
<tr>
<td>DIOPATH</td>
<td>Defines the path that the memory dump will take from the mainframe to the disk. The mfdump(8) command uses this parameter when dumping mainframe memory. At release, this parameter is set to the <strong>DUMPIO</strong> token and is replaced during the installation. If this token has not been replaced after completion of the installation, proceed with the directions above for replacing the <strong>DUMPIO</strong> token (see page 19).</td>
</tr>
</tbody>
</table>
Table 2. Configurable parameters set during the installation process
(continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DUNIT</strong></td>
<td>Defines default dump device unit that the mfdump(8) command uses when routing the mfsysdmp binary to the mainframe prior to the dump. The value set for this parameter must match the hardware address. At release, this parameter is set to the <strong>DUMPUNIT</strong> token.</td>
</tr>
<tr>
<td><strong>DSTART</strong></td>
<td>Defines the starting sector of the slice on the disk to which the memory will be dumped. The mfdump(8) command uses this parameter when dumping mainframe memory. At release, this parameter is set to the <strong>DSTARTBL</strong> token and is replaced during the installation. If this token has not been replaced after completion of the installation, proceed with the directions for replacing the <strong>DSTARTBL</strong> token (see page 20).</td>
</tr>
<tr>
<td><strong>DLEN</strong></td>
<td>Defines the length, in sectors, of the slice on the disk where the memory will be dumped. The mfdump(8) command uses this parameter when dumping mainframe memory. At release, this parameter is set to the <strong>DUMPLEN</strong> token and is replaced during the installation. If this token has not been replaced after completion of the installation, proceed with the directions above for replacing the <strong>DUMPLEN</strong> token (see page 20).</td>
</tr>
<tr>
<td><strong>D0FWA</strong></td>
<td>These parameters define the actual mainframe memory ranges to be dumped. An error will not occur if these ranges overlap, but overlapping them will produce redundant results. Four ranges are available for specification. At release, only the first range is specified, and the other ranges are set to 0. This first range is set to start at word address 0 and end at word address 02000000 (4 million).</td>
</tr>
<tr>
<td><strong>D0LWA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>D1FWA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>D1LWA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>D2FWA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>D2LWA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>D3FWA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>D3LWA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>MAINFRAME</strong></td>
<td>Defines the type of mainframe to which the OWS-E is attached. It is used in conjunction with the machd.h header file to define the machine-specific characteristics of the mainframe. At release, this parameter is set to the <strong>MAINFRAME</strong> token and is replaced during the installation. If this token has not been replaced after completion of the installation, proceed with the directions for replacing the <strong>MAINFRAME</strong> token (see page 20).</td>
</tr>
</tbody>
</table>
Table 2. Configurable parameters set during the installation process  
(continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M_MEMORY</td>
<td>Defines the memory size of the mainframe to which the OWS-E is attached. It is used in conjunction with the machd.h header file to define the machine-specific characteristics of the mainframe. At release, this parameter is set to the <em>MEMORY</em> token and is replaced during the installation. If this token has not been replaced after completion of the installation, proceed with the directions for replacing the <em>MEMORY</em> token (see page 21).</td>
</tr>
<tr>
<td>SSD_MEMORY</td>
<td>Defines the memory size of the SSD attached to the mainframe to which the OWS-E is attached. It is used in conjunction with the machd.h header file to define the machine-specific characteristics of the SSD. At release, this parameter is set to the <em>SSD_MEMORY</em> token and is replaced during the installation. If this token has not been replaced after completion of the installation, proceed with the directions for replacing the <em>SSD_MEMORY</em> token (see on page 22).</td>
</tr>
<tr>
<td>CPUD_HOSTNAME</td>
<td>Denotes the name of the machine to which the CPU monitor, cpud(8), is running. The graphs(8) utility uses this parameter as a default host name when the -h option is not specified on the command line. At release, this parameter is set to the <em>CPUD_HOSTNAME</em> token and is replaced during the installation. If this token has not been replaced after completion of the installation, proceed with the directions for replacing the <em>CPUD_HOSTNAME</em> token (see page 22).</td>
</tr>
</tbody>
</table>

**Note**

Do not change this parameter. This parameter should always be the name of the OWS-E attached to the mainframe. cpud must execute on the OWS-E because it must use the low-speed channel (from the OWS-E to the IOS-E) for viewing mainframe memory when gathering statistics.
This subsection describes the parameters that are set at release time but are configurable if changed with caution. Parameters that you should not change are noted. Parameters are listed in the order in which they appear in the file.

Table 3. Configurable parameters set at release time

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPDATESECS</td>
<td>Defines (in seconds) the polling rate for the passive CPU monitors. Every UpdateSecs seconds, the pw kernel data structure is read from mainframe memory across the MUXIOP. At release, this rate is set to 5 seconds.</td>
</tr>
<tr>
<td>BASEPORT</td>
<td>Defines the starting port value used by the cpud(8) daemon, which adds 2 to the value for BASEPORT and uses that value as its port on which to listen. At release, BASEPORT is set to the following: 4370</td>
</tr>
<tr>
<td></td>
<td>This value would be changed if the particular range that the ports are using is already designated for a different use by the site. Changing BASEPORT to an acceptable starting port value will move all ports used into that range.</td>
</tr>
<tr>
<td>SSTBACKUP</td>
<td>Specifies the back-up hbeat(8) status table. At release, this parameter is set to the following: /var/logs/sstbackup</td>
</tr>
</tbody>
</table>
Table 3. Configurable parameters set at release time (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERRLOG</td>
<td>Defines the path name of the error log file. This log file is written to by errlogd(8), which is the hardware error log program for the IOS-E. At release, this parameter is set to the following: /var/logs/errlog</td>
</tr>
<tr>
<td>IOPLOG</td>
<td>Defines the path name of the IOP log file. This log file is used by all of the OWS-E commands for logging errors, warnings, and informational messages regarding the interaction of the commands with the IOS-E and CRI mainframe. At release, this parameter is set to the following: /var/logs/ioplog</td>
</tr>
<tr>
<td>IOP_DIAGNOSTICS</td>
<td>Controls whether diagnostics are run by boot.sys(8) before booting the IOS-E. Valid values are on, off, and only. CRI recommends that you run diagnostics before each boot. At release, this parameter is set to the following: on</td>
</tr>
</tbody>
</table>

**Note**

Do not change this parameter. The /var file system has been allocated the space necessary to serve as a log file location. This may not be true of other file systems; /home, for example, would be filled quickly if log files were being placed in that file system.
Table 3. Configurable parameters set at release time
(continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAPFILE</td>
<td>Specifies the location of the line-arbitration priority file used by lapdaemon(8). At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td>/etc/lapfile</td>
</tr>
<tr>
<td>CRAYMON</td>
<td>Defines the colors of the OWS-E that denote whether the mainframe is up (first color) or down (second color). At release, this parameter is set to the following:</td>
</tr>
<tr>
<td></td>
<td>SkyBlue, red</td>
</tr>
</tbody>
</table>

Note that the two colors must be separated by a comma (,); there cannot be an intervening space.
The following suggestions for passwords and user and group identification will help keep the OWS-E more secure. (For more details about security, see *System and Network Administration*, produced by Sun Microsystems, Inc.) The OWS-E permissions file (described in subsection 6.3, page 40) allows you to specify who can access particular commands.

**Passwords**

6.1

Each person who logs into the OWS-E should have a unique password. Passwords should be at least 6 characters long, and at least one of those characters must be nonalphabetic.

The following are general guidelines you can give your operators so that they can choose secure passwords:

- **DO NOT** use your login name, first name, or last name, in any form.
- **DO NOT** use easily obtained personal information (such as telephone number, type of automobile, child's name, license plate number, and so on).
- **DO NOT** use any words found in the dictionary or any proper names.
- **DO NOT** repeat the same letter or number as the entire password.

When choosing a password, please keep in mind that the object is to make it as difficult as possible for someone to guess what you have chosen or a password.

**User and group identification**

6.2

In general, a person's login name should be the same on the OWS-E as it is on the CRI systems. To simplify administration in a networked environment, group IDs should also be the same.
The OWS-E permissions file, /etc/owsepermfile, allows you to specify those who can access the following OWS-E commands:

- autodump
- bootsys
- cpuhalt
- craymon
- dumpsys
- eboot
- econ
- ecrash
- edump
- ehalt
- emon
- eping
- errlogd
- estat
- hbeat
- hcon
- mfdump
- mfinit
- mfstart
- peek
- poke
- rcpud
- zip

When a user logs in, the valid_user library routine examines the access list in /etc/owsepermfile to determine which commands the user may execute. If the user tries to execute a command for which he or she does not have access, the following error message is issued:

```
ERROR: progname: User username not validated for use
```

There must be an entry in /etc/owsepermfile for every account that wants to access these commands. The user ID must be the first item on a line, followed by the commands and scripts that the user is allowed to access. You can use space, tabs, or a colon to separate the user ID from the list, and you can separate items within the list by spaces, tabs, or commas. An asterisk (*) indicates that the user is permitted to access all commands and scripts. If you want to include comments, precede them by the pound sign (#).

When you assign permission, you must be aware of the hierarchy of commands; that is, you must know which commands call other commands. For this information, see the command man pages in OWS-E Operator Workstation Reference Manual.

---

**Note**

All users included in /etc/owsepermfile must also be included in the password file. If a specified user is not in the password file, errors will result.
The following is an example of an access list in
/etc/owsepermfile:

```
bgj   mfstart, edump, eboot
swj:mfstart, edump  eboot
emh mfstart  edump  eboot
elw   *        # do anything!
```

This file allows bgj, swj, and emh to access only the mfstart(8),
edump(8), and eboot(8) commands; elw can access all
commands.
The lapdaemon(8) program uses a priority file to determine the priority of users. The location of this file is specified by the LAPFILE ("line arbitration priority file") parameter in /etc/configfile; by default, LAPFILE is set to /etc/lapfile.

Users not listed in /etc/lapfile have a default priority of 0; that is, they have no priority and cannot usurp a tty line.

You can specify a priority higher than 0 for particular users by including their priority numbers and login IDs in /etc/lapfile, as follows:

```
prioritynumber login [, login ...]
```

The priority number must be separated from the login ID by white space, such as a tab or space. You can include comments in the file by beginning the comment with a pound sign (#); blank lines are ignored. You can specify a single priority level for multiple users by placing their logins on one line, separating the logins with commas, as follows:

```
5 john, mary, louise
```

Logins used in /etc/lapfile must begin with an alphabetic character. The priority can be any positive integer; the higher the number, the higher the priority. (Negative numbers are not allowed.)

To put changes to /etc/lapfile into effect, you must send the lapdaemon(8) program a HUP (hang up) signal. To do this, find the process identification (PID) number of lapdaemon with the SunOS ps(1) command and then kill the PID with the following command line (in which lpid is the lapdaemon PID number):

```
ows1600% kill -HUP lpid
```
For example, if you wanted chris and terry to have a priority greater than pat but less than cri, your /etc/lapfile file might contain the following:

```
# /etc/lapfile PRIORITY FILE
#
# Logins not listed have a default priority
# of 0.
1 root
4 chris, terry
20 cri
3 pat  # pat should be lower than chris
```
With OWS-E 2.0, the `edump(8)` file format has been changed so that one file can hold multiple clusters.

**Note**

If you have unprocessed dumps from previous OWS-E releases, you must convert them to the new `edump` file format with the `conv(8)` command before processing them with `ecrash(8)`.

Figure 7 on the following page shows the sections that constitute a dump file. The remaining sections show the C language structures for the file header, section header, and register section of the dump file.
Figure 7. edump file format
The following is the C code structure for the header of an edump(8) file:

```c
#define SERIAL_SIZE 8   /* Size of the serial # field*/
#define DUMP_REASON_SIZE 80 /* Size of the reason field */
/*
 * Definition of the header of an edump file.
 */
struct dump_header {
    int magic; /* Magic number for dumpfiles */
    char serial[SERIAL_SIZE]; /* serial # of machine dumped */
    int year:16;
    int month:8; /* Date stamp */
    int day:8;
    int hour:8; /* Time stamp */
    int min:8;
    int completed:8; /* Completed flag */
    int spare[4];
    char reason[DUMP_REASON_SIZE]; /* Reason for dump */
};
```
The following is the C code structure for the section header of an edump(8) file:

```c
#define NCB 4 /* Maximum number of CBs per IOP */

/*
 * Definition of memory section.
 */
struct memory {
    int offset;
    int size;
};

typedef struct memory mem_t;

/*
 * Definition of the section header of an edump file.
 *
 * There seems to be no sensible common denominator, so we just use
 * the most natural unit for that target.
 *
 * Note that the mem_t for local memory is referenced in parcels, the
 * mem_t for cb in words, and register_size is in bytes.
 *
 */
struct section_header {
    int ios:8; /* IOS # */
    int cluster:8; /* Cluster # */
    int iop:8; /* IOP # */
    int type:8; /* IOP type (currently unused) */
    mem_t local; /* details of local mem */
    int register_size; /* size of registers dumped */
    mem_t cb[NCB]; /* details of channel buffers */
    int spare[4];
};
```
Register section structure

The following is the C code structure for the register section of an edump(8) file:

```c
#define NESTAMP 32  /* Size of IOP exit stack */
#define NIOPCHAN 32  /* Number of channels on an IOP */
#define NIOPREGS 128 /* Number of registers in an IOP */
/*
 * Definition of the register section (if present)
 */
struct dump_register {
    parcel a;  /* A register */
    parcel c;  /* C register */
    parcel b;  /* B register */
    parcel e;  /* E register, also contains flags */
    parcel intr;  /* Interrupt enable flag */
    parcel base;  /* BASE register */
    parcel p;  /* P register */
    parcel unused;
    parcel es[NESTACK];  /* e[0] -> e[n] */
    parcel flags[NIOPCHAN/8];  /* channel flags (8 per parcel) */
    parcel padding[4];
    parcel r[NIOPREGS];  /* r[0] -> r[n] */
};
```
Customizing CRI Template Scripts [9]
Customizing CRI Template Scripts

If you use the scripts provided by CRI, you should customize them for your site by editing them and the system configuration file (/etc/configfile). You should also provide your operators with guidelines for using these scripts.

The following are the template scripts:

<table>
<thead>
<tr>
<th>Script</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cpupanic(8)</td>
<td>Takes a UNICOS panic dump image</td>
</tr>
<tr>
<td>dumpdly(8)</td>
<td>Performs an incremental (level-9) backup of the OWS-E file systems</td>
</tr>
<tr>
<td>dumpwkly(8)</td>
<td>Performs a full (level-0) backup of the OWS-E file systems</td>
</tr>
<tr>
<td>iophalt(8)</td>
<td>Dumps an IOP in the event of an IOP failure</td>
</tr>
</tbody>
</table>

Figure 8 shows the interrelationships of these scripts and the OWS-E commands. (Scripts are shown in boxes.)

![Diagram](image)

Figure 8. Interrelationships among scripts and commands
The subsections that follow describe the scripts you might want to modify and the modifications you should make to them and to /etc/configfile. You will have already made many changes to /etc/configfile when you install your OWS-E system; these changes are described in OWS-E 2.0 Release and Installation Notes.

For more information about these scripts and commands, see OWS-E Operator Workstation Reference Manual or enter the following at the system prompt:

```
man command (or script)
```

### cpupanic

The cpupanic(8) script takes a UNICOS panic dump image. The only modifications you will have to make for the cpupanic script are to set the MAIL_CPUFAIL parameter (in /etc/configfile) to the user ID of the person who should receive mail when a UNICOS panic occurs; to specify more than one person, you must use an alias (see the SunOS aliases(5) command). You might also want to reword the message sent.

### iophalt

The iophalt(8) script dumps an IOP in the event of an IOP failure. You will not have to modify the script for your site unless you want to change the message sent. You will want to set the DEFAULTIDUMPDIR and MAIL_IOPFAIL parameters in /etc/configfile to the appropriate site-specific values:

- **DEFAULTIDUMPDIR** specifies the default dump directory on the OWS-E.
- **MAIL_IOPFAIL** specifies the person who should get mail about IOP failures. To specify more than one person, you must use an alias. See the SunOS aliases(5) command.
**OWS-E backup scripts: dumpdly and dumpwkly**

The `dumpdly(8)` and `dumpwkly(8)` scripts perform daily and weekly backups of the OWS-E, respectively. These scripts use the SunOS `dump(8)` command.

The `dumpwkly` script creates level-0 (full) dumps for each file system on the workstation. The `dumpdly` script creates level-9 (incremental) dumps for each file system. This weekly/daily backup routine ensures that complete recovery is possible.

The `dumpdly(8)` and `dumpwkly(8)` scripts assume the following file structure:

<table>
<thead>
<tr>
<th>File system</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sd0a</td>
<td>/</td>
</tr>
<tr>
<td>/dev/sd0d</td>
<td>/usr</td>
</tr>
<tr>
<td>/dev/sd0g</td>
<td>/home</td>
</tr>
<tr>
<td>/dev/sd0h</td>
<td>/home/localhost/cri</td>
</tr>
<tr>
<td>/dev/sd0f</td>
<td>/var</td>
</tr>
</tbody>
</table>

If your site's configuration does not match this, you must modify the scripts to ensure valid backups. Also, if your site does not use `/export`, you may want to comment it out of the scripts.

You should determine when it will be most advantageous for your site to execute these scripts. For example, if most of the work on the computers is done between 8:00 A.M. and 5:00 P.M. Monday through Friday, you might want to execute `dumpdly` at 6:00 P.M. every day and `dumpwkly` at 6:00 P.M. every Friday.

You may want to create a `crontab(5)` entry to run these scripts automatically, which will serve as a reminder for your operator to perform backups; an operator must be present to load tapes when the scripts are run. Your `crontab` entries for a daily and weekly dump at midnight could be as follows:

```
0 0 * * * /bin/sh /home/localhost/cri/bin/dumpdly
0 0 * * 7 /bin/sh /home/localhost/cri/bin/dumpwkly
```

For more information, see the man pages for SunOS `dump(8)` and `crontab(5)`. 
Shutting Down and Halting the OWS-E [10]
Shutting Down and Halting the
OWS-E [10]

This section tells you how to perform shutdown and halt procedures for the OWS-E machine under normal circumstances and when the system is hung.

Under normal circumstances, you will shut down and halt the OWS-E before installing new software or removing power from the machine. Do the following:

1. Exit from OpenWindows by placing the mouse pointer on the workspace background, holding down the right button, and sliding down the menu to Exit. Confirm your decision to exit by clicking on Exit in the notice box that pops up.

2. Log out and log back in as the root user. You will be prompted to enter the root password. The password is not echoed.

3. Flush the disk buffers to disk by entering the following command:

   sync

4. Bring the machine into single-user mode by entering the following command:

   shutdown now

5. Enter the following command to halt the machine:

   halt

You will see the > prompt after you execute the halt command. When you see this prompt, you can safely power-off the machine. Figure 9 shows an example of steps 2 through 4. What you type is shown in boldface.
ows1600 login: root
Password: *(what you type is not echoed)*
Last login: Sun Aug 11 19:12:39 from console
SunOS Release 4.1.2 (CRI_FY) #1 Mon April 6 15:00:27 CDT 1992
Start OpenWindows now? [y] n

ows1600# sync
ows1600# shutdown now
***Final System Shutdown Message from root@ows1600 ***
. .

ows1600# halt
syncing file systems . . .
Halted
>

Figure 9. Shutting down and halting the OWS-E under normal circumstances

For more information, see halt(8) and shutdown(8) in SunOS Reference Manual.
When the system is hung
10.2

If the OWS-E system is hung, you may have to shut down and immediately reboot it. Do the following:

1. Exit from OpenWindows by placing the mouse pointer on the workspace background, holding down the right button, and sliding down the menu to Exit. Confirm your decision to exit by clicking on Exit in the notice box that pops up.

2. Log out and log back in as the root user. You will be prompted to enter the root password. The password is not echoed.

3. Flush the disk buffers to disk by entering the following command:

   \texttt{sync}

4. Bring the machine into single-user mode by entering the following command:

   \texttt{shutdown now}

5. Enter the following command to reboot the machine immediately:

   \texttt{fastboot}

The machine will now reboot. Figure 10, page 58, shows an example of steps 2 through 5. What you type is shown in boldface.
ows1600 login: root
Password: (what you type is not echoed)
Last login: Sun Aug 11 19:12:39 from console
SunOS Release 4.1.2 (CRI_FY) #1 Mon June 3 15:00:27 CDT 1992
Start OpenWindows now? [y] n

ows1600# sync
ows1600# shutdown now
***Final System Shutdown Message from root@ows1600 ***
.
.
.
ows1600# fastboot
syncing file systems . . .
rebooting . . .
Boot: sd(0,8,0)
.
.
.
ows1600 login:

Figure 10. Shutting down and rebooting the OWS-E when it is hung

For more information, see fastboot(8) and shutdown(8) in SunOS Reference Manual.

If the OWS-E system still does not respond, continue with the procedures outlined in section 10.3.
If all else fails: forcing a halt and reboot of the OWS-E

10.3

If the procedures outlined in section 10.2 are not successful or if the OWS-E is completely unresponsive, you can use the following procedures to force a halt and reboot of your OWS-E machine:

---

**Caution**

Reboot your OWS-E only as a last resort; this action does not sync the disks, which may cause damage to your file systems.

---

1. Press the [hl] and [a] keys simultaneously to clear the machine and bring up the > prompt.

2. Either press the [b] key to reboot the machine or ask the service engineer to perform diagnostics on the machine.

   If you accidentally press [b a] and do not want to reboot, press the [c] ("continue") key. This will return you to where you were when you pressed [hl a].
Manually Dumping the IOS-E and Mainframe [11]
Manually Dumping the IOS-E and Mainframe [11]

Your system may be set so that dump images of memory are taken automatically whenever UNICOS panics.

However, if autodump(8) is not set to on, the operator must take dumps manually by using the dumpsys(8) command.

To dump the entire system, the operator should first halt the CPUs with cpuhalt(8), then dump IOS-E memory with edump(8), and finally dump the mainframe with dumpsys(8). If the cpuhalt and edump commands are not executed, IOS-E memory information that may be useful in a postdump analysis will be lost.

The edump(8) command, without options, has the following format:

```
edump cluster:iop [:reason]
```

The operator must specify values for cluster and iop (the reason is optional). You should tell the operator which values should be used for cluster and iop to dump the entire IOS-E system. There is a place in OWS-E Operator Workstation Operator's Guide for the operator to write down this information.

If you want to specify something other than the defaults for dumpsys, you may want to verify your command line before you execute it. To do this, use the -n (no-execution) and -v (verbose) options. For example, suppose you have a parameter file named param.test that contains the following dumpinfo section:

```
dumpinfo {
    memory range is 0 to 2 Mwords;
    memory range is 30 to 32 Mwords;
    SSD range is 0 to 4 Mwords;
}
```
For example, if you want to specify cluster 1 rather than cluster 0, a parameter file named param.test, and verify your syntax, you can enter the following:

```plaintext
ows1600% dumpsys -c 1 -p param.test -nv
INFO: dumpsys: no-execute mode - mainframe will not be dumped.
INFO: dumpsys: Analyzing the parameter file 'param.test'.
Bootstrap binary : /home/ows1600/cri/os/uts/mfboot
Mfsysdump binary : /home/ows1600/cri/os/uts/mfsysdmp
Dump via cluster : 1
Boot cluster 1, iop 4 with /home/ows1600/cri/os/ios/iopmux
Boot cluster 1, iop 0 with /home/ows1600/cri/os/ios/eiop.dca2
Dump 2 CPUs, 3 cluster registers
Dump table memory, cluster registers, v, b, t registers - without force
Dump CPU from 00000000000 to 00010000000
Dump CPU from 00170000000 to 00200000000
Dump SSD from 00000000000 to 00020000000
Dump date: 03/02/92 time: 16:34:46
Dump device information: -
0: channel 022, iopath 00601034, type 10, unit 3, start 0, length 17250
```

If you want to include the dumpinfo section in the UNICOS parameter file, you must be running UNICOS 6.1.6 or later; if you are running UNICOS 6.0, you must use a separate parameter file that contains the dumpinfo section.
CPU Monitors [12]
What do the CPU monitors do?

The CPU monitors allow you to determine whether the CPUs are spending their time on user work, on system work, in system-wait mode, or in idle mode.

How can I use the CPU monitors?

To use the CPU monitors, execute the `graphs` client by using the `graphs(8)` command, which is described in *OWS-E Operator Workstation Reference Manual*.

The `graphs` display consists of a line graph (similar to an EKG); it starts at the right side of the window and is initialized to a zero value. As the `graphs` client reads data from the data server's socket (see `cpud(8)`), the graph shifts to the left, with the latest value drawn in at the right side of the display. Upon filling the entire length of the display window, the graph continues to shift left and be updated on the right.

Descriptive text is shown beneath each graph displayed. The title bar of the window contains a System Monitors header, and additional text if specified on the `graphs` command line.

**Note**

If the OPEN LOOK window manager (`olwm`) is being used, the resize corners will also appear on the base frame. At this time, you cannot resize the graphs.

Figure 11, page 64, shows an example graph.
Figure 11. Monitor output for idle, user, system-wait, and system time averages for all CPUs.
How do the CPU monitors work?

The CPU monitors that have been created for the IOS-E systems are unique in their implementation. Unlike other available monitors, such as crayperf(8), these monitors do not use CPU time themselves. This is because there is no monitoring process on the mainframe itself.

If the mainframe is down, the IOS-E is still able to peek (observe) mainframe memory. If the IOS-E is down, the monitors will fail with I/O errors when trying to peek through the IOP. Note that, as released, IOP 0 in cluster 0 is used as the peeking path in the monitor sources.

The monitor system consists of two main components:

- CPU daemon (cpud(8))
- graphs client (graphs(8))

The cpud(8) and graphs(8) commands run on the OWS-E. graphs(8) can be displayed on any X Window System, but can be run only from a node that supports OpenWindows or XView.

The CPU daemon interacts with an OWS-E library and the graphs client. First, the CPU daemon sets up a socket upon which it listens for client connections. Upon receiving a graphs client, it then searches through mainframe memory until it finds the PWS eyecatcher. With the address of the PWS thus found, cpud uses a library routine to peek at the element in the cpuw structure on which the number of configured CPUs is stored. This structure is used in determining the length in Cray words of the subsequent peeks (those that actually are gathering the desired statistics), which saves on the amount of data being channeled through the IOS-E. For example, if there were eight CPUs, the pw kernel data structure in question would have valid data of a length four times longer than if there were two CPUs.

The CPU daemon then proceeds to peek into mainframe memory every update seconds, as specified by the UPDATESECS parameter in /etc/configfile (see page 35 for more information about UPDATESECS). The default rate is 5 seconds. The cpuw is peeked and then dumped to a buffer consisting of a structure of unsigned integers. The elements in this structure are then converted from the 64-bit Cray word size to Sun 32-bit floating-point words. The current value is subtracted from the last value, and the result of the subtraction is divided by the time delta and then sent to the graphs client. As released, the graphs client multiplies these values by 100 in order to display them in percentage form.
The valid graphs are described by means of an array of graph structures. A single graph structure includes the name of the graph (used in the graphs client to determine which graph to display), the offset of its data into the unconverted data structure into which the mainframe peek is dumped, and the current data value for the graph in question.

The following graphs are supported:

<table>
<thead>
<tr>
<th>Graph</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>idle</td>
<td>Percentage of idle time over all CPUs</td>
</tr>
<tr>
<td>idlec-\textit{n}</td>
<td>Percentage of idle time per CPU specified</td>
</tr>
<tr>
<td>sysw</td>
<td>Percentage of system wait time over all CPUs</td>
</tr>
<tr>
<td>unix</td>
<td>Percentage of system time over all CPUs</td>
</tr>
<tr>
<td>unixc-\textit{n}</td>
<td>Percentage of system time per CPU specified</td>
</tr>
<tr>
<td>user</td>
<td>Percentage of user time over all CPUs</td>
</tr>
<tr>
<td>userc-\textit{n}</td>
<td>Percentage of user time per CPU specified</td>
</tr>
</tbody>
</table>

\textit{n} is the CPU number; the CPUs begin with number 0. If you had eight CPUs and you wanted to see graphs showing user time for the first CPU and the last CPU, you would enter userc-0 and userc-7.
Network Monitor [13]
This section tells you how to use the `xsnmpmon(8)` network monitor from the OWS-E.

**What is xsnmpmon?**

13.1

The `xsnmpmon(8)` monitor is a program that uses the Simple Network Management Protocol (SNMP) to monitor a network on Transmission Control Protocol / Internet Protocol (TCP/IP). The monitor uses an X Window System graphical user interface. This monitor allows you to obtain the status of any SNMP-compliant machine on your network. (The CRI mainframe is SNMP-compliant, but the OWS-E is not.)

**Background information on SNMP**

13.2

Simple Network Management Protocol (SNMP) is a protocol that has become a *de facto* standard for managing networks based on TCP/IP. In a heterogeneous network environment, it is very difficult to monitor and manage the network components manufactured by different vendors without having a standard mechanism for conversing with the different nodes. Just as the UNIX system has made it easier for users to log in to a wide variety of machines made by a wide variety of computer manufacturers and do their work using the same user interface, SNMP has made it much easier to monitor and manage a multivendor network.

SNMP is defined by three Request for Comment (RFC) documents: RFC 1157, which defines the protocol itself; RFC 1155, which describes the structure in which management information is represented to the protocol; and RFC 1156, which defines all of the variables that make up the Management Information Base (MIB). The original MIB (called MIB-I) has been extended and clarified; MIB-II is a superset of MIB-I, and is in the process of becoming a standard. Not all vendors have implemented MIB-II as of yet, but the `xsnmpmon` monitor does support both MIB-I and MIB-II.
In SNMP, there are entities referred to as clients and agents. The client makes requests of the agent; the agent performs the requested action (after any necessary authentication) and responds to the client. SNMP relies on some other transport protocol to deliver the request/response packets between the client and the agent. In most cases, the protocol used is User Datagram Protocol / Internet Protocol (UDP/IP). Using a protocol like UDP, which does not guarantee data delivery, actually makes for a more robust environment for SNMP, because network management is needed most when the network is having problems. If the network is having problems, packets are probably going to get lost and/or corrupted. (Therefore, a transport protocol that guarantees data delivery may, in fact, be more a hindrance than a help.) Network management must continue to function, if at all possible, when nothing else does. The transport for network management data must be the simplest possible pass-through service available on the network. Using UDP, the client can continue to issue the requests to the agent; probability says that at least one of the packets will make it successfully to the agent, and the management action will be performed.

In the case of \texttt{xsnmpmon(8)}, the client is implemented as a set of library routines (obtained from Carnegie-Mellon University) that are called by \texttt{xsnmpmon} to send and receive the SNMP requests and responses, respectively.
How can I invoke `xsnmpmon(8)`?

To invoke `xsnmpmon(8)`, use the following syntax:

```
```

- `-d display | -display display` Specifies the name of the terminal on which you want to display the network monitor. You can enter either `-d` or `-display`. The default is the current value of the `DISPLAY` environment variable.

- `-bd bordercolor` Specifies the border color of each window within `xsnmpmon`. This can also be set using the Colors button of the Setup window from within the monitor interface. The default is black.

- `-bg backgroundcolor` Specifies the background color of each window within `xsnmpmon`. This can also be set using the Colors button of the Setup window from within the monitor interface. The default is dimgray.

- `-fg foregroundcolor` Specifies the foreground color (that is, the color of the text) of each window within `xsnmpmon`. This can also be set using the Colors button of the Setup window from within the monitor interface. The default is black.

- `-fn font` Specifies the normal font; the default is 6-by-13 pixels.

- `-lfn largefont` Specifies the large font, which is used for highlighting text; the default is 6-by-13 pixels, bold.

- `-ib file` Specifies the icon bit-map file. This allows you to specify your own icon.

- `-iconic` Starts `xsnmpmon` as an icon.
What does the `xsnmpmon(8)` monitor look like?

When you enter the `xsnmpmon(8)` command, you will get the SNMP Network Monitor main window. Figure 12 shows an example of this window.

![SNMP Network Monitor Window](image)

Figure 12. SNMP Network Monitor window
The main window consists of a set of buttons and synopsis information; the buttons invoke other windows that allow you to set up your monitor environment, control the monitor's actions, and perform various functions. To invoke one of these windows, place the mouse pointer on top of the button (highlighting it) and click any mouse button. You can have several windows open at one time.

**Buttons**

13.4.1

At the top left corner of the main window is the **Setup** button, which invokes a tool that allows you to change the default settings of the program.

At the top right corner is the **Quit** button, which allows you to exit from **xsnmpmon**. Most subwindows contain a **Quit** button that allows you to exit that function.

The first 16 buttons in the block of buttons represent the 16 SNMP MIB-II variable groups; when you click on one of these buttons, you invoke a window that contains a number of variables that are maintained by all compliant SNMP agents. In this context, **compliant** refers to agents that support the variables as they are defined in the Request for Comment documents RFC 1156 and RFC 1158.

The eight remaining buttons allow you to perform the following functions: display the error log, trap log, and state change log; create a network; graphically show the status of the network and perform a route-trace function; run a performance monitor; start an operator notification window; and use the **telnet(1)** command to contact the selected SNMP agent.

**Entering text**

13.4.2

Whenever the program requires that you enter text, a dialog window containing a question appears at the top of your screen; the mouse pointer must be within the window when you enter text there. Answer the question and press **RETURN**; to exit from the dialog window without changing anything, press **RETURN** without entering text. If you enter inappropriate text, the window will exit without making any changes to the monitor and issue an error message.
**Synopsis information**

13.4.3

Beneath the block of buttons are lines of synopsis information. This information is useful when you want to determine the monitor’s current status. Clicking the left mouse button in the main window increases the sampling rate; clicking the middle mouse button decreases it. The minimum is 100 ms.

**Message line**

13.4.4

At the bottom of the window is a highlighted line used to display messages from the monitor. Any messages from the monitor will be echoed to this line, to standard error, and to a log file.

**Modifying the monitor environment with the Setup button**

13.5

The Setup button invokes a window containing several buttons, as shown in Figure 13. These buttons allow you to modify your monitor environment, either for this particular session (by clicking on the Done button) or permanently (by clicking on the Save button). The lines that follow the buttons show the current settings of all of the program’s options.
Typically you will want to specify the sampling rate with the Sampling button, the polling cycle time with the Polling button, the network directory (where network files are placed) with the Net Dir button, and the network file (the top "layer" file) with the Netfile button.

When you click on the Colors button, you will be asked whether you want to use a color palette program; by default, this program is hyperview xnewsdemo.hv. If you want to use another color palette program, set the SNMP_COLORPROG environment variable to the path name of the program.
Obtaining an overview with the System Info button

The System Info button gives you a quick overview of what is contained in a given agent. It provides enough information to determine the following for each agent:

• The kind of machine it is (manufacturer's information)
• The networks to which it is attached
• The number of network interfaces installed
• The status (up, down, and so on) of each interface
• The length of time the machine has been up since the last reinitialization

Using the statistics buttons

The statistics buttons display the contents of several MIB-II variables for a given agent. You can use these buttons to help determine where problems are. For example, if you notice that there are many input and output errors in the Interface Statistics display (accessed through the I/F Stats button), it may be an indication of a hardware problem.

The following subsections briefly describe each statistics button.

I/F Stats

The I/F Stats button dynamically shows the state of the variables associated with each interface within an agent. Click the left or middle mouse button to scan through each interface. Included here are counters and variables that show the activity of a given network interface.

Media Stats

This function has not yet been implemented. Statistics unique to different types of media, such as Ethernet and Fiber Distributed Data Interface (FDDI), will be provided here. The MIBs that define these media-specific variables are still in the experimental stage; when they are supported by a larger group of vendors, they will be supported by this program.
<table>
<thead>
<tr>
<th>Statistic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICMP Stats</td>
<td>The ICMP Stats button dynamically displays the state of variables (statistics) associated with Internet Control Message Protocol (ICMP) packets that enter and leave the agent. The Internet uses ICMP to perform tasks such as testing readability and route redirection.</td>
</tr>
<tr>
<td>IP Stats</td>
<td>The IP Stats button dynamically displays the state of variables (statistics) associated with Internet Protocol (IP) packets that enter and leave the agent. TCP and UDP use IP for routing packets between destinations.</td>
</tr>
<tr>
<td>TCP Stats</td>
<td>The TCP Stats button dynamically displays the state of variables (statistics) associated with Transmission Control Protocol (TCP) packets that enter and leave the agent. TCP is an end-to-end protocol; applications such as ftp and telnet use it to converse across a network.</td>
</tr>
<tr>
<td>UDP Stats</td>
<td>The UDP Stats button dynamically displays the state of variables (statistics) associated with User Datagram Protocol (UDP) packets that enter and leave the agent. UDP is similar to TCP except that it does not guarantee data delivery, as TCP does.</td>
</tr>
<tr>
<td>EGP Stats</td>
<td>The EGP Stats button dynamically displays the state of variables (statistics) associated with Exterior Gateway Protocol (EGP) packets that enter and leave the agent. Gateways and routers use EGP to discover routes to various destinations.</td>
</tr>
<tr>
<td>SNMP Stats</td>
<td>The SNMP Stats button dynamically displays the state of variables (statistics) associated with SNMP packets that enter and leave the agent. SNMP is used to manage networks.</td>
</tr>
</tbody>
</table>
Table buttons  
13.8

The table buttons display the contents of several MIB-II variables that are maintained in tabular form by an agent. You can use these buttons to help determine where problems are. For example, if you want to know the physical 48-bit IEEE address of a low-speed channel on an Ethernet, you could use the AT Table function to question any agent connected to that Ethernet.

The following subsections briefly describe each of the table buttons.

AT Table  
13.8.1

The AT Table button displays the Address Translation table, which gives the binding between each IP address, media address, and interface. Each agent, in order to map from IP addresses to physical addresses, uses some mechanism to perform the binding and discovery of these addresses. On media such as Ethernet and FDDI, a protocol called Address Resolution Protocol (ARP) is used along with the broadcast feature of the medium to derive physical media addresses from IP addresses. On CRI mainframes, for example, a static mechanism (hyroute) is used.

If the window displays more... in the bottom right hand corner, it indicates that there is more information than would fit on a single screen. To display the rest of the information, click any mouse button while the mouse pointer is in the window.

Net/Media Tbl  
13.8.2

The Net/Media Tbl button conveys the same information as the AT Table button if you are connected to an agent that supports MIB-II; if you are connected to an agent that supports only MIB-I, you will get an error message. (Therefore, you can use this button to determine whether or not an agent supports MIB-II.) In MIB-II, the Address Translation table is listed as deprecated; therefore, the Network Media table will replace the Address Translation table if a MIB-III is developed. However, because they are both part of MIB-II, both tables are supported.

IP Addr Tbl  
13.8.3

The IP Addr Tbl button displays each interface's IP address and subnet mask, and the polarity of the least significant bit of the broadcast address for the medium.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Route Tbl</td>
<td>The IP Route Tbl button displays the IP routing entries for the agent. The table is organized as follows: destination IP address; the interface through which the packets will be routed; the value of the metrics for each route hop; the next hop in the route; whether the route is a local or remote route; how the route was learned; and the age of the route entry.</td>
</tr>
<tr>
<td>TCP Connection</td>
<td>The TCP Connection button displays the state of all the TCP connections in the agent. The table is organized as follows: the state of the connection; the IP address within the agent to which the connection applies; the port within the agent to which the connection was made; the IP address of the connected entity; and the port number of the connected entity.</td>
</tr>
<tr>
<td>UDP Listeners</td>
<td>The UDP Listeners button displays all of the UDP applications listening within the agent. The table is organized as follows: the IP address that is listening and the port number on which it is listening.</td>
</tr>
<tr>
<td>EGP Neigh Tbl</td>
<td>The EGP Neigh Tbl button displays information about all of the agent's EGP neighbors.</td>
</tr>
<tr>
<td>FDDI SMT</td>
<td>The FDDI SMT button displays all of the station management parameters for a given station management (SMT) entity in an FDDI station.</td>
</tr>
<tr>
<td>FDDI MAC</td>
<td>The FDDI MAC button displays all of the media-access control (MAC) parameters for a given media-access control entity in an FDDI station.</td>
</tr>
<tr>
<td>FDDI PORT</td>
<td>The FDDI PORT button displays all of the port parameters for a given port entity in an FDDI station.</td>
</tr>
</tbody>
</table>
Using the Error Log button

The Error Log button displays errors that occur when xsnmpmon tries to issue SNMP requests to an agent. The message text includes the date and time a given message was received by the monitor; the latest message is indicated by the > symbol.

Displaying messages with the Trap Log button

The Trap Log button displays trap messages. A trap message is a message from an agent to the monitor, indicating that a significant event has occurred. The message text includes the date and time a given message was received by the monitor; the latest message is indicated by the > symbol. The message text also includes the name of the agent that sent the trap message, the message itself, and the length of time the machine has been up since the last event occurred.

For example, an agent may send a Coldstart message when it is rebooted, or an agent may send an Authentication Failure message if it suspects a security violation.

To acknowledge a trap message, first select the entry by clicking the left mouse button on it (highlight it); you can select multiple traps. When you have selected a trap, either acknowledge it by clicking the right mouse button or cancel the select on that entry by clicking the middle button. One click of the right mouse button acknowledges all selected traps. When the trap log fills up with unacknowledged traps, new traps are sent to the log file but are not placed into the trap log.
Displaying messages with the State Chg Log button

The State Chg Log button displays changes detected by the network scan process. For example, when the monitor detects that an agent has gone down, it logs the change here.

To acknowledge the message, first select an entry by clicking the left mouse button on it (highlight it); you can select multiple entries. When you have selected the state change entry, either acknowledge it by clicking the right mouse button or cancel the select on that entry by clicking the middle button. One click of the right mouse button acknowledges all selected entries. When the state change log fills up, the network scan is automatically stopped.

Note

This button does not work on monochrome displays.

Creating a network with the Create Net button

The Create Net button displays the Create Network Configuration window, which allows you to create a network that will be monitored by xsnmpmon(8). When you use the Create Net button, you are creating a graphic representation of the network you want xsnmpmon to monitor.

You can create layers as you go, starting with the top layer, the bottom layer, or some layer in between. Each picture is stored in a file that ends with the .net suffix and is stored in what is called the net directory. The top "layer" file is called the net file; that is, the monitor will recursively load files whose names begin with names of areas within the network file (that is, area.net).

Before you use this tool, you should know which hardware and networks you want to monitor. You will be asked to supply the names of the agents and their communities; community is the SNMP authentication term; it is something like a password.

The following subsections describe the buttons and discuss an example of a network.
Create Network Configuration window

13.12.1

Figure 14, page 80, shows the Create Network Configuration window; when you click on the Create Net button for the first time, the map area will be blank.

Figure 14. Create Network Configuration window
Create Network Configuration **buttons**

13.12.2

The buttons on the Create Network Configuration window and their functions are as follows:

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
<td>Creates and names a trapezoid that represents an area. An area is a box that represents any entity that is manageable by SNMP (such as a host or gateway). An area can be thought of as a room, building, city, network, and so on, that contains other areas and agents. You are asked to provide a name and description for the area. When you have moved the figure where you want it on the map, click the left mouse button to place it there.</td>
</tr>
<tr>
<td><strong>Agent</strong></td>
<td>Creates and names a box that represents an agent. An agent is a trapezoid that allows you to create a layered effect in the network map; an area implies that there is another map by the name area.net that contains more agents. An area can be thought of as a room, building, floor, city, network, etc., that contains other areas and agents. You can have several nested areas. You are asked to provide the name of the agent, its community, and a brief description. If the name does not appear in the /etc/hosts file, the program will also ask you to provide the agent's IP address. (The description is used for the summary utility in the network scan process.) When you have moved the figure where you want it on the map, click the left mouse button to place it there.</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>Creates and names a line or set of line segments that represents a physical network interface. (You must create an agent with the Agent button and a network with the Bus, Ring, or Link button before you can create an interface.) The line representing the interface must touch the agent and the network to which the agent is connected: to start the line, click the left mouse button; to change its direction, click the left mouse button; to complete the line, click the middle or right mouse button. When you have completed your drawing of the interface, the monitor attempts to contact the SNMP entity in the agent to which this interface is connected in order to obtain the interface number (index); if it is not successful, the monitor asks you</td>
</tr>
<tr>
<td>Button</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>to enter the number. You can find the number of the interface by connecting to the agent and displaying the system information; the leftmost column shows the interface numbers (or indexes).</td>
<td></td>
</tr>
</tbody>
</table>

| Bus    | Creates and names a line or set of line segments that represents a bus, which is a network topology in which all the nodes connect to a single wire. Examples of bus-type network media are Ethernet and HYPERchannel. To start the line, click the left mouse button; to change its direction, click the left mouse button; to complete the line, click the middle or right mouse button. If the name you entered does not appear in the /etc/networks file, the program will also ask you to provide the bus's IP address. When your drawing of the bus is complete, you will be prompted to place the name, IP address, and description of the bus on the map. |

| Ring   | Creates and names an oval that represents a ring, which is a network topology in which all the nodes connect together in a closed loop. Examples of ring networks are FDDI and TOKEN Ring. Click the left mouse button to place the center of the ring on the map. You can change the size of the ring by dragging the mouse in any direction. Click the left mouse button a second time to affix the ring to a certain spot on the map. If the name you entered does not appear in the /etc/networks file, the program will also ask you to provide the ring's IP address. When your drawing of the ring is complete, you will be prompted to place the name, IP address, and description of the ring on the map. |
### Button | Description
--- | ---
Link | Creates and names a jagged line (similar to a lightning bolt) that represents a link, which is a network topology that involves a local and remote side, usually point-to-point in nature (such as DS1 and DS3). T1, T3, and satellites are examples of link media. Click the left mouse button to start and end the link. If the name you entered does not appear in the `/etc/networks` file, the program will also ask you to provide the link's IP address. When your drawing of the link is complete, you will be prompted to place the name, IP address, and description of the link on the map.

Connector | Creates a dot that represents a physical connection point of an interface to a network when an interface crosses multiple networks. This is a graphical representation only. Click the left mouse button to affix the connector to the map.

Label | Creates a text string. You can use this function to place comments anywhere on the network map. Click the left mouse button to affix the label to the map.

Delete | Deletes objects on the map. Click on the Delete button, place the pencil cursor on the object, click the left mouse button to highlight the object, and click the left mouse button to delete the object; if you do not want to delete the object, click the right mouse button to cancel the operation.

Move | Moves objects on the map. To move an object, click on the Move button, place the pencil cursor on the object, click the left mouse button to highlight the object, move it where you want it to be, and click the left mouse button to affix the object to its new spot.

Load | Loads an existing file in order to modify it, delete it, or copy it to a different file name.

Save | Saves the map to a disk file for later retrieval.
### Example

13.12.3

The example in this subsection describes one way to create a network map and illustrates how the layering effect works.

### Scenario

13.12.3.1

Suppose your site is a building with two floors. On the first floor, you have a lab with three workstations and an office with one workstation. On the second floor, you have three workstations. The two floors are connected by a T3 link. You might want to create the following four net files:

- **bldg.net**, which represents the whole building, with areas for the first and second floors
- **firstfloor.net**, which represents the first floor, with a workstation and an area for the lab
- **lab.net**, which represents the lab on first floor, with three workstations
- **secondfloor.net**, which represents the second floor, with three workstations
Steps to create a network map
13.12.3.2

There are many ways to create network maps for this situation. One process you might follow is shown in the steps on the following pages.

1. Click on the Create Net button, as shown in Figure 15:

Figure 15. Displaying the Create Network Configuration window
2. Create a map for the building:
   
a. To select the area function, click the left mouse button on the Area button, as shown in Figure 16.

![Figure 16. Selecting the Area button](image-url)
b. To create the area trapezoid, move into the map area and click the left mouse button again. This invokes a dialog window, as shown in Figure 17; answer the questions.

<table>
<thead>
<tr>
<th>Area Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

![User Dialog](image)

Figure 17. Dialog box

c. Place the mouse pointer back in the map area, position the trapezoid, and click the left mouse button to affix it to the map.

d. To create a second area, click the left mouse button in the map area and repeat steps b and c

e. Create a link with the Link button.

f. Click on the Save button and name the file bldg.net.

When you are finished, your map may look like the one in Figure 18, page 88.
Figure 18. bldg.net map
3. Create a map for the first floor:
   a. Create an area with the Area button.
   b. Create an agent (for the workstation) with the Agent button.
   c. Create a network with the Bus button.
   d. Create an interface with the Interface button.
   e. Create a connector with the Connector button.
   f. Click on the Save button and name the file firstfloor.net.

When you are finished, your map may look like the one in Figure 19.
4. Create a map for the lab:
   a. Create an agent with the Agent button; repeat for each workstation in the lab.
   b. Create a network with the Bus button.
   c. Create an interface with the Interface button; repeat for each workstation.
   d. Create a connector with the Connector button; repeat for each workstation.
   e. Click on the Save button and name the file lab.net.

When you are finished, your map may look like the one in Figure 20.
Figure 20. lab.net map
5. Create a map for the second floor:
   a. Create an agent with the **Agent** button; repeat for each
      workstation on the second floor.
   b. Create a network with the **Bus** button.
   c. Create an interface with the **Interface** button; repeat
      for each workstation.
   d. Create a connector with the **Connector** button; repeat
      for each workstation.
   e. Click on the **Save** button and name the file
      `secondfloor.net`.

   When you are finished, your map may look like the one in
   Figure 21.
Create Network Configuration

The 3rd floor

corruption

merjpol

delay

Network Monitor [13]

Figure 21. secondfloor.net map
In this configuration, bldg.net loads three files: firstfloor.net, which loads lab.net, and secondfloor.net. Figure 22 shows the interrelationships among the files (maps) created in the steps described in the previous subsection.

Figure 22. Interrelationships among the files (maps)
When the monitor loads a file, it first searches for an area within the file; when it encounters one, it loads the file named area.net. It then searches through area.net for another area; when it finds one, it loads that file and searches it for an area, and so on. When the monitor finally encounters a file without an area, it moves back one layer, searches for more areas, and then continues this moving-back process.

If you assign bldg.net to be your net file, the loading process for the monitor is as follows:

1. Loads bldg.net, searches for an area, and finds firstfloor.
2. Loads firstfloor.net, searches for an area, and finds lab.
3. Loads lab.net and searches for an area. Finding none, it reads the information about the three agents, the network, and the interfaces.
4. Returns to firstfloor.net and searches for an area. Finding none, it reads the information about the agent, the network, and the interface.
5. Returns to bldg.net, searches for an area, and finds secondfloor.
6. Loads secondfloor.net and searches for an area. Finding none, it reads the information about the three agents, the network, and the interfaces.
7. Returns to bldg.net and reads the information about the link.

If you assigned firstfloor.net as your network file, the monitor would load only firstfloor.net and lab.net.
Scanning with the Net Status button

13.13

The Net Status button allows you to start and stop scanning the network and graphically displays the status of the network, based on what it finds during the scan.

During the network scan process, `xsnmpmon(8)` accesses two files: an action file (`xsnmpmon.act`) and an exception file (`xsnmpmon.xcp`). The action file is consulted whenever a trap is received or a state change event occurs during a network scan. If an event occurs that is registered in the action file, a shell script (named in the action file) will be executed. The triggering events can range from quite general to very specific (see examples within the `xsnmpmon.act` file). The shell scripts can be written by the user to perform any necessary action, such as calling a pager or sending an electronic mail message to a network administrator.

The exception file is accessed from the Network Status (scan phase) window and can be used to prevent the polling of agents or interfaces that are known to have problems or that do not support SNMP. This file can also be used to force the polling of agents that do not support SNMP; normally, when the network scan detects an agent that it can reach by using ICMP but not SNMP, it stops polling that agent until an SNMP trap is received from it.
Figure 23 shows the Network Status window.

![Network Status window](image-url)
The Network Status window contains the following buttons:

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
<td>Starts the scan sequence from the beginning. Any previous status is cleared.</td>
</tr>
<tr>
<td>Stop</td>
<td>Stops the scan sequence, but retains the previously obtained status.</td>
</tr>
<tr>
<td>Restart</td>
<td>Restarts the polling sequence from where it stopped (when you clicked on the Stop button), restoring the saved status.</td>
</tr>
<tr>
<td>Load</td>
<td>Loads a new network configuration.</td>
</tr>
<tr>
<td>Route</td>
<td>Performs a route trace. To show the route taken between a source agent and a destination agent and back again, first stop the scan (if it is running), then click the left mouse button on the source and the right mouse button on the destination. The scan status colors disappear and the route from the source agent to the destination will appear in cyan (by default); the route from the destination back to the source will appear in tan (by default). You can also use this facility to perform a route trace between two specific interfaces for agents with multiple interfaces. When you have performed all route traces desired, either click on Restart to resume the network scan from where you stopped (the same colors reappear) or click on Start to start from the beginning.</td>
</tr>
</tbody>
</table>

The Network Status window displays the map items in different colors according to their type and status. The colors are shown in a legend at the top of the window. The status for agents, interfaces, and areas are described in the following subsections.

If, during the scan, the state change log fills with unacknowledged state changes, the scan will stop automatically. You must acknowledge the state changes and manually restart the scan by clicking on the Restart button.
### Agent status

An agent can have one of the following statuses at any time:

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untested</td>
<td>The scanning process has not yet tried to reach the agent.</td>
</tr>
<tr>
<td>Scanning</td>
<td>The agent is being interrogated by the monitor.</td>
</tr>
<tr>
<td>Alive, SNMP Down</td>
<td>The agent has responded to an ICMP ECHO request but not to an SNMP request. Either the SNMP entity within the agent is down, or the agent is not an SNMP-compliant device. When the SNMP agent becomes active, it should send a trap message to the monitor, at which time the agent will be placed back on the polling list.</td>
</tr>
<tr>
<td>Unreachable or Down</td>
<td>The agent is not responding to either ICMP or SNMP requests. The agent or the network to that agent is down, the OWS-E has no route to get to the agent, or the agent has no route to the OWS-E. An agent that is set to Unreachable is not polled again.</td>
</tr>
<tr>
<td>Up</td>
<td>The agent has responded to an SNMP request. The agent and the network are up.</td>
</tr>
</tbody>
</table>

### Interface status

An interface can have one of the following statuses at any time:

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untested</td>
<td>The scanning process has not yet tried to reach the agent owning the interface.</td>
</tr>
<tr>
<td>Scanning</td>
<td>The interface is being interrogated by the monitor.</td>
</tr>
</tbody>
</table>
### Area status

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>An interface is Unknown if one of the following is true: if the state of an agent is Alive, SNMP Down or Unreachable, or if a garbled answer is received from the agent owning the interface.</td>
</tr>
<tr>
<td>Testing</td>
<td>The agent owning the interface received an SNMP request and has responded that it is in testing mode.</td>
</tr>
<tr>
<td>Misconfigured</td>
<td>The map's saved configuration for this interface does not match its current configuration.</td>
</tr>
<tr>
<td>Down</td>
<td>The agent owning the interface received an SNMP request and has responded that it is down.</td>
</tr>
<tr>
<td>Up</td>
<td>The agent owning the interface received an SNMP request and has responded that it is up.</td>
</tr>
</tbody>
</table>

The status of area is a summary of the agents and interfaces in that area. An area can have one of the following statuses at any time:

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untested</td>
<td>The scanning process has not yet tried to reach anything in the area.</td>
</tr>
<tr>
<td>Scanning</td>
<td>An agent or an interface in the area is being interrogated by the monitor.</td>
</tr>
<tr>
<td>Problem</td>
<td>The status of at least one agent is Alive, SNMP down or Unreachable or Down, or the status of at least one interface is Unknown, Testing, or Down.</td>
</tr>
<tr>
<td>OK</td>
<td>None of the underlying agents or areas are Misconfigured or Down.</td>
</tr>
</tbody>
</table>
**Mouse button functions**

13.13.4

The mouse buttons have particular functions in the Network Status window.

- When you are doing a route trace with the Route button, the mouse buttons have the following functions when clicked:

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>Specifies the source agent or the source interface.</td>
</tr>
<tr>
<td>Right</td>
<td>Specifies the destination agent or the destination interface.</td>
</tr>
</tbody>
</table>

- During all other operations in the window, the mouse buttons have the following functions when clicked:

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>Connects the monitor to the agent on which the mouse pointer is placed.</td>
</tr>
<tr>
<td>Middle</td>
<td>Moves up and down through the layers of the map. If you click the middle mouse button when the pointer is on an area, it will move down a layer. If you click the middle mouse button when the pointer is elsewhere on the map, it will move up a layer if possible.</td>
</tr>
<tr>
<td>Right</td>
<td>Pops up a window that contains summary information for the agent, interface, and network for the area or agent on which the mouse pointer is placed.</td>
</tr>
</tbody>
</table>
Displaying performance information with the Perf Monitor button

The Perf Monitor button displays a graphical representation of selected variables within the interface set of statistics and a separate graph of the ICMP turnaround time, which shows the time it takes to send an ICMP ECHO packet of minimum size from the OWS-E to the connected agent and receive a reply. This information can be helpful in solving problems related to network latency (such as TCP window size and other tuning issues).

The graphs start with a set of default limits, but the monitor dynamically adjusts the scale of the graphs based on the data it collects. The monitor allows the graphs to accumulate about 10% of the data before it first attempts to rescale the graphs. After this, the scale is readjusted, if necessary, during each sampling interval.

Using the Notification button

The Notification button displays visual symbols that indicate when human intervention is required. As trap messages are received from the network, the Event Notification window indicates that potential problems are occurring in the network by changing the color of the trap message light. Similarly, if an agent or an agent's interface changes states from one poll to the next, the state change light changes color. This is useful when the scan is started and the Network Status window is closed.

Figure 24 shows the Event Notification window with normal status, and Figure 25, page 103, shows the window with changed status.
Figure 24. Event Notification window showing normal status

Figure 25. Event Notification window showing a change in status
Using the Telnet button
13.16

The Telnet button executes the shell command defined in the .rc file as the telnet string. Typically, clicking on this button causes a telnet session to be started with the specified agent.

Log files
13.17

The monitor is capable of keeping a log file of all activity that occurs on a daily basis. By default, the log file is named xsnmpmon.log.mmddyy, in which mmddyy is the month, day, and year. At midnight each day, xsnmpmon(8) closes the current day's log file and automatically opens a new log file for the new day. You can change the file name by setting the SNMP_LOGFILE environment variable.

If you do not want a log file, set the SNMP_LOGFILE environment variable to the following:

/dev/null
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OWS-E Operator Workstation Administrator's Guide

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