Sun HPC ClusterTools™ 4 Software Installation Guide

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Part No. 816-0648-10
August 2001, Revision A

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Contents

Preface

This document describes the procedure for installing Sun HPC ClusterTools™ 4 software.

These instructions are intended for an experienced system administrator. For example, to install the ClusterTools software on one or more nodes, you must be familiar with the following tasks in a Solaris™ 8 operating environment:

- Logging in as superuser
- Using the `df` command to check disk space
- Mounting a CD-ROM (using `volcheck` or `mount`)
- Starting and stopping daemons using entries in `/etc/init.d`
- Reading `/var/adm/messages` for possible error messages and debugging information
- Starting and stopping license daemons
- Exporting and mounting an NFS file system and using commands and scripts, such as `mount`, `share`, `/etc/init.d/nfs.server`
- Enabling superuser login access to a server
- Setting directory and file permissions to allow read and write access

Before You Read This Book

To follow the procedures described in this document, you should be familiar with the related topics discussed in the following documents:

- The *Sun HPC ClusterTools 4 Product Notes*
- Documentation that accompanied your Sun Enterprise™ or other Sun UltraSPARC™ based server

- Documentation for the Solaris operating environment
- Documentation for Platform Computing Corporation's LSF suite (if you are using LSF as the cluster resource manager)

Note – If you are using LSF as the cluster resource manager, the LSF software must be installed *before* you install Sun HPC ClusterTools software.

How This Book Is Organized

Chapter 1 describes the flow of tasks within the installation process.

Chapter 2 describes the installation requirements.

Chapter 3 describes preparations for using the configuration and installation tool.

Chapter 4 describes the use of the configuration and installation tool.

Chapter 5 describes additional tasks that conclude the installation process.

Appendix A catalogs installation error messages.

Appendix B summarizes file and directory settings.

Appendix C lists packages and their sizes.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or both of the following for this information:

- AnswerBook2™ online documentation for the Solaris Operating Environment
- Other software documentation that you received with your system

Typographic Conventions

TABLE P-1 Typographic Conventions

Typeface	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`% su` `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename*.

Shell Prompts

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	`%`
C shell superuser	#
Bourne shell and Korn shell	`$`
Bourne shell and Korn shell superuser	#

Related Documentation

TABLE P-3 Related Documentation

Application	Title	Part Number
Sun HPC ClusterTools software	*Sun HPC ClusterTools 4 Product Notes*	816-0647-10
Administering Sun HPC ClusterTools software	*Sun HPC ClusterTools 4 Administrator's Guide*	816-0649-10

For information about the LSF suite of resource management software, see the LSF documentation published by Platform Computing Corporation.

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CHAPTER 1

Overview

Installation Process

FIGURE 1-1 shows an overview of the installation process using the Sun HPC ClusterTools software configuration tool, `install_gui`.

The configuration tool allows you to perform the following tasks:

- Install the Sun HPC ClusterTools 4 software
- Remove a specified version of installed Sun HPC ClusterTools software, where both versions 3.1 and 4 can be present
- Specify one version of Sun HPC ClusterTools software to be active, where both versions 3.1 and 4 can be present

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Note – To install the Sun HPC ClusterTools software using a command-line script in place of `install_gui`, see Appendix B of the *Sun HPC ClusterTools 4 Administrator's Guide*.

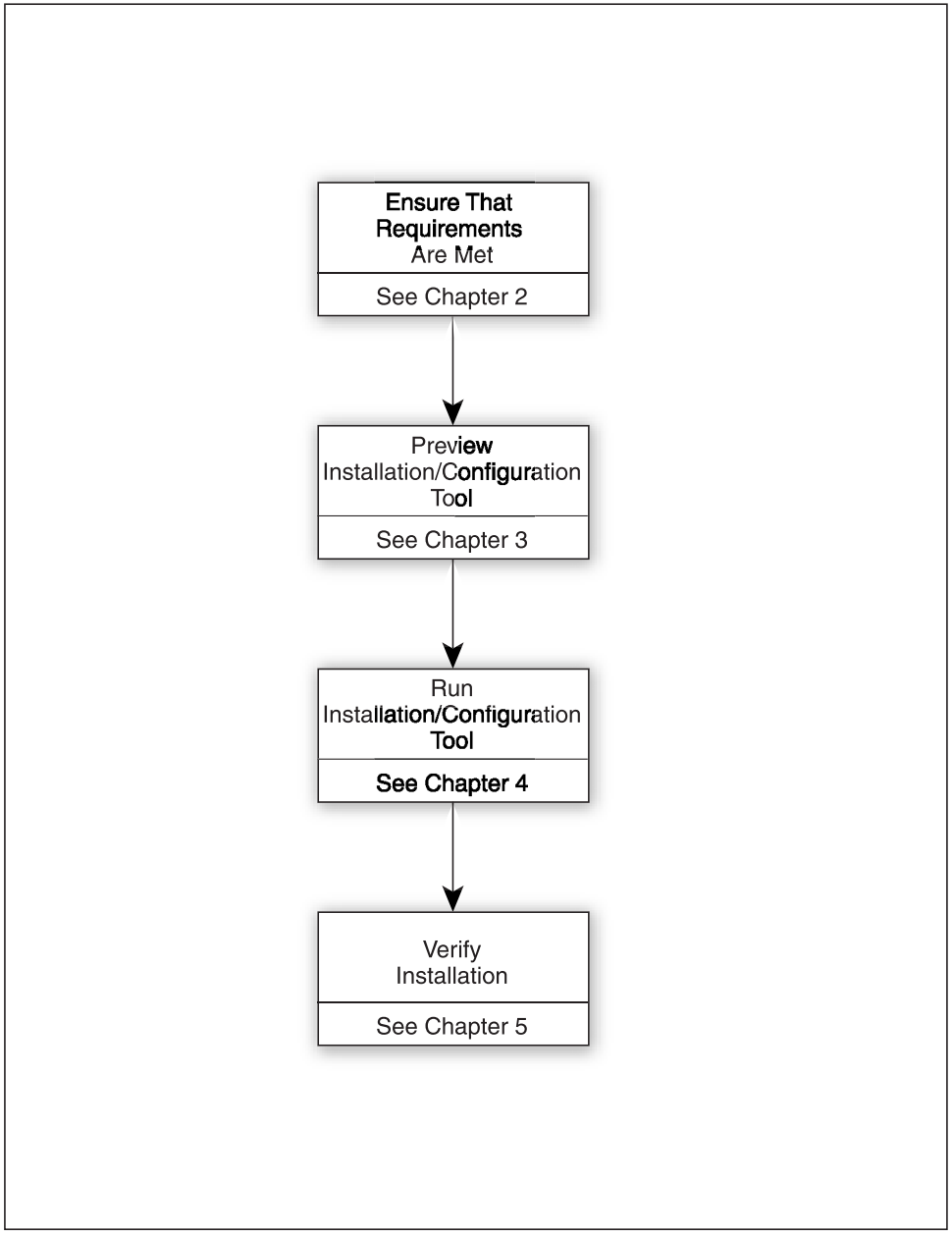

FIGURE 1-1 Stages of Sun HPC ClusterTools Software Installation

CHAPTER 2

Preparing for Installation

Before installing Sun HPC ClusterTools 4 software, you need to ensure that the hardware and software that make up your cluster meet certain requirements. These requirements are described in the following sections of this chapter:

Note – During installation, several files and directories require specific permissions, ownership, or other settings. For a quick summary of information about several important settings, see Appendix B.

Standard Requirements

Before installing Sun HPC ClusterTools software, be sure that all hardware is installed and configured on a network (such as Ethernet). Any other connections, such as ATM or a terminal concentrator, must also be fully installed and configured.

Note – For information about permissions and package sizes, see Appendix B and Appendix C.

TABLE 2-1 outlines additional prerequisites for installation.

TABLE 2-1 Standard Installation Prerequisites for Sun HPC ClusterTools 4 Software

Description	Requirement
Hardware	Sun UltraSPARC based systems.
Disk space[1]	Approximately 85 Mbytes per node.
Operating environment[2]	Solaris 8 4/01 (Solaris 8 update 4) release or another Solaris release that supports Sun HPC ClusterTools 4 software. The Solaris library `/usr/lib/libtnfprobe.so.1` is required by components of Sun HPC ClusterTools 4 software. This library is not included in standard Solaris operating environment installation if the Software Group chosen at Solaris installation is the Core group or End User System Support group. For more information about the installation of this library, see "To Display Information About Cluster Nodes" on page 26. Note that, while installing Sun HPC ClusterTools 4 software, the installation software detects whether the cluster is running Solaris 8 in 32-bit or 64-bit mode. To install both 32-bit and 64-bit binaries, the cluster must be running Solaris 8 in 64-bit mode. If the cluster is running Solaris 8 in 32-bit mode, only 32-bit binaries are installed.
Java™ Runtime Environment[3]	JRE 1.3.0 is required for using the installation tool's graphic user interface. It is not included in Sun HPC ClusterTools 4 software. JRE 1.3.0 is included in Solaris 8 update 4.
Resource manager	Your cluster must have as its resource manager either CRE 1.1 or LSF 4.0.1. CRE packages are installed with the rest of the Sun HPC ClusterTools 4 software. However, if you are using LSF, it must be installed on the cluster before you install the Sun HPC ClusterTools software.

TABLE 2-1 Standard Installation Prerequisites for Sun HPC ClusterTools 4 Software

Description	Requirement

`/etc/init.d/nfs.server` file settings	When using NFS to install the software on large clusters (as many as 64 nodes), increase the number of concurrent server requests from 16 to 256. To do this, change the relevant line in `/etc/init.d/nfs.server`:
	
	`if [$startnfsd -ne 0]; then`
	`  /usr/lib/nfs/mountd`
	`/usr/lib/nfs/nfsd -a 256`
	
	Then restart the NFS daemon.

`/etc/system` file settings	Edit the `/etc/system` file on every node in your cluster. Add the following entry to the file on each node: `set pt_cnt=1024` After making the change, reboot each node so that the change takes effect. See the applicable Solaris administration documentation for more information about `/etc/system`. The Sun HPC ClusterTools 4 installation process sets certain parameters in `/etc/system` to enable RSM communication. If you wish to change the default settings to meet other requirements of your site, please see the *Sun HPC ClusterTools Administrator's Guide* for detailed information.
Earlier versions of Sun HPC software	Sun HPC 2.0 software must be removed. Sun HPC ClusterTools 3.0 software does *not* need to be removed (although it is incompatible with Solaris 8 software). Sun HPC ClusterTools software versions 3.1 and 4 can coexist on a cluster running Solaris 8 software.

1. If the Sun HPC ClusterTools software is installed on an NFS server, this disk storage allowance is needed only on the NFS server. If the software is installed locally on each node, each node must have 85 Mbytes available for the Sun HPC ClusterTools installation.
2. If you previously installed Sun HPC ClusterTools 3.1 software locally on nodes that had the Solaris 2.6 operating environment, only 32-bit Sun HPC ClusterTools software would have been installed. If you later upgraded the nodes to Solaris 7 software or Solaris 8 software, you would have had to install the Sun HPC ClusterTools 3.1 software again for the 64-bit libraries to be installed. A second installation was not required when the Sun HPC ClusterTools 3.1 software was installed on an NFS server. NFS-mode installations always install support for both 32-bit and 64-bit libraries. However, since Sun HPC ClusterTools 4 software requires Solaris 8 software, you must ensure that Sun HPC ClusterTools 3.1 software has been installed under Solaris 8 software if you wish versions 3.1 and 4 to coexist.
3. If your version of Solaris software is earlier than Solaris 8, update 4 (which includes JRE 1.3.0), you can obtain Java software from `http://www.sun.com/solaris/java/download.html`. The `JAVA_HOME` environment variable must be set to the fully specified path of the JDK™. For example, set it to */path*`/jdk1.3.0`.

Custom Requirements

Choosing Resource Management Software

The Sun HPC ClusterTools 4 software distribution includes the Sun™ Cluster Runtime Environment (CRE) resource manager. No other resource management software is needed for interactively launching Sun MPI jobs. For launching jobs in batch mode, you can use the LSF 4.0.1 Suite in place of CRE.

If your cluster uses the LSF Suite for resource management, you must install and verify the LSF software must before the Sun HPC ClusterTools software is installed. Refer to the *LSF Batch Administrator's Guide* for guidance in setting up and verifying LSF clusters.

If you plan to use LSF, the requirements outlined in TABLE 2-2 apply.

TABLE 2-2 Requirements for Using LSF

Description	Requirement
Installing LSF	The LSF software must be installed before the Sun HPC ClusterTools software is installed.
Required LSF components	The following LSF components are required: • LSF Base • LSF Batch • LSF Parallel
Required LSF patch	Contact Platform Computing Corporation for the *sunhpc integration package*, an LSF patch that is required for compatibility with Sun HPC ClusterTools 4 software.
LSF cluster	Every node that will access Sun HPC ClusterTools software must also be in a corresponding LSF cluster. See the discussion of the `lsf.cluster.`*clustername* configuration file in the *LSF Batch Administrator's Guide* for additional information.

Sun PFS and Sun S3L

TABLE 2-3 outlines prerequisites for installing the Sun PFS and Sun S3L components of the Sun HPC ClusterTools software.

TABLE 2-3 Prerequisites for Installing Sun PFS and Sun S3L Software Components

Component	Requirement
Sun PFS	If you intend to use only part of a disk partition for PFS file systems, you should plan your file system before installing the software. See the *Sun HPC ClusterTools Administrator's Guide* for more information about PFS.
S3L	Sun S3L requires Forte™ Developer 6 to be installed.

Supported Compilers

Sun HPC ClusterTools 4 software supports the Forte Developer 6, Forte Developer 6 update 1, and Forte Developer 6 update 2 compilers for:

- C/C++
- Fortran 77/Fortran 90/Fortran 95

The compilers can be installed either before or after the Sun HPC ClusterTools software.

CHAPTER 3

Previewing the Installation Tool

While installing Sun HPC ClusterTools 4 software, you need to supply certain information and make several choices. These actions are described in the following sections of this chapter:

Configuration and Installation Tool

Sun HPC ClusterTools 4 software includes the configuration and installation tool `install_gui`, which simplifies the Sun HPC ClusterTools software installation process. This tool provides a graphical user interface (GUI) through which you enter information about the cluster configuration and how you want the Sun HPC ClusterTools software to be installed.

Note – The Java Runtime Environment (JRE) 1.3.0 is required for using the installation tool's graphic user interface. If your version of Solaris software is earlier than Solaris 8, update 4 (which includes JRE 1.3.0), you can obtain Java software from `http://www.sun.com/solaris/java/download.html`. The `JAVA_HOME` environment variable must be set to the fully specified path of the JDK™. For example, set it to */path*`/jdk1.3.0`.

The configuration tool saves the information you enter in a configuration file and then initiates the installation process. The installation is guided by the contents of the configuration file. You are asked to specify the name and location of the configuration file; the default file name is `hpc_config`.

The configuration file also is referenced any time you make subsequent changes to the Sun HPC ClusterTools installation status, such as adding or removing nodes from the cluster.

Sun HPC ClusterTools 4 software can coexist with Sun HPC ClusterTools 3.1 software. If Sun HPC ClusterTools 3.1 software is already installed on the target node(s), you can install Sun HPC ClusterTools 4 software without removing 3.1 software. However, when a cluster contains both versions of Sun HPC ClusterTools, you must explicitly deactivate one version and activate the other using controls provided by the `install_gui` tool. For information about activating coexisting versions of the software, see "Activating a Sun HPC ClusterTools Version" on page 23.

This chapter begins with a discussion of installation tool usage as a preview for the actual installation process. The chapter then discusses the various kinds of information the configuration tool asks you to supply. Knowing about these topics in advance is likely to speed up the installation process.

Note – If you choose not to use `install_gui` to perform the installation, you can set up the `hpc_config` file using a text editor and run the installation scripts from a shell prompt. See Appendix B of the *Sun HPC ClusterTools 4 Administrator's Guide* for instructions on how to install Sun HPC ClusterTools software without running `install_gui`.

Enabling Superuser Login

You must be logged in as superuser to run the configuration tool. Since the default for most systems is to allow logins by superuser only on their console devices, you may need to edit the `/etc/default/login` file on each node to permit login by superuser.

▼ To Enable Superuser Login

1. **On each node, find the following line in the `login` file:**

   ```
   CONSOLE=/dev/console
   ```

2. **Add a # at the beginning of the line to convert it to a comment:**

   ```
   #CONSOLE=/dev/console
   ```

3. **(Optional) If your site's security guidelines require it, disable superuser login access after installation by removing the comment character.**

Using the Installation Tool

The `install_gui` is supplied on the CD-ROM that contains the Sun HPC ClusterTools 4 software. The tool's path is `/cdrom/hpc_4_0_ct/Product/Install_Utilities/bin`

You may wish to examine the tool before you begin the actual installation so that you can prepare for the questions it asks.

▼ To Start the Installation Tool

- **You can use the `install_gui` command by itself—that is, without switches or command-line arguments, as follows:**

  ```
  # install_gui
  ```

  There are, however, five command-line options that can be used to achieve particular results. These are described in the following sections.

▼ To Specify a Configuration File

If you already have a configuration file, you can specify it at the command line. Otherwise, `install_gui` will create one during the installation process. For information about the composition of the default configuration file (`hpc_config`), see Appendix B in the *Sun HPC ClusterTools 4 Administrator's Guide*.

- **To load the default configuration file (`hpc_config`) automatically:**

  ```
  # install_gui -c directory
  ```

  where directory is the name of the directory that contains the `hpc_config` file.

- **To load a configuration file with another name:**

  ```
  # install_gui -c pathname
  ```

  where *pathname* is the file's full path name.

  You might assign a nondefault name to a configuration file so that you can have more than one such file, each tailored to configure a Sun HPC ClusterTools software installation in a particular way. Use the `-c` option with the fully specified pathname.

- **To load a configuration file after the installation GUI starts:**

  1. Select the Load option from the File menu.
  2. Specify the configuration file to be loaded.

  Specify either the directory containing `hpc_config` or the full path name of a configuration file that has a custom file name.

▼ To Specify Custom `rsh` and `telnet` Executables

1. **To access a nondefault `rsh` executable, use the `-rshPATH` option.**

   # **`install_gui -rshPath:`***directory*

   You might want to specify an `rsh` executable that is customized for Kerberos-based authentication. Supply the full path to the desired `rsh` executable as an argument to the `-rshPATH:` option.

2. **To access a nondefault `telnet` executable, use the `-telnetPATH` option.**

   # **`install_gui -telnetPath:`***directory*

▼ To Specify an Installation Stripe Size

- **To specify the maximum size of the installation stripe:**

  # **`install_gui -parallel:`***number*

  The installation stripe number is the maximum number of nodes that will be installed in parallel. The *number* argument must be <= 8. The parallel installation stripe defaults to 8.

Specifying the Resource Manager

Early in the installation process, the configuration tool asks you to specify a resource manager, CRE or LSF. If you choose LSF, the LSF Suite must already be installed before you can install the Sun HPC ClusterTools software.

Choosing the Type of Installation

The configuration tool also asks you to specify the type of installation to be performed:

- Install locally on a single node – A single copy of the Sun HPC ClusterTools software is installed on a single node.
- Install locally on a cluster of multiple nodes – A copy of the Sun HPC ClusterTools software is installed locally on each node in the cluster.
- Install on an NFS server and mount remotely on all of the nodes in the cluster – A single copy of the Sun HPC ClusterTools software is installed on an NFS server and remotely mounted on all the nodes in the cluster.

Note – Every installation type requires the creation of certain directories, described in the following section.

Directories Needed for Installation

The installation process requires the following directories:

- CD-ROM mount point – The CD-ROM must be mounted on all nodes, either locally or via NFS, on which the Sun HPC ClusterTools software is to be installed.
- Configuration file directory – The installation process creates a configuration file with the default name `hpc_config`. You are asked to specify where you want this file to be saved. You can also specify a file name other than `hpc_config`. All nodes involved in the Sun HPC ClusterTools installation must have read and write access (as superuser) to the saved configuration file and to the directory in which it resides. This directory must be accessible using the same path from all nodes.

  This directory also serves as a synchronization area during the installation.
- Installation target directory – You are asked to specify where you want the Sun HPC ClusterTools packages to be installed. For local installations, the default installation directory is `/opt`.

Note – If the software is installed on an NFS server, the NFS installation directory must be mounted on each NFS client in the cluster. Specify the installation directory as the NFS mount point on the NFS client.

Note that if you are installing Sun HPC ClusterTools 4 software on an NFS server, you must set up root-level access to the server's installation directory on every node in the cluster. To set up root-level access, use `share_nfs`. For example,

```
# share -F nfs -o root=nfs.client1:nfs.client2:...
```

For further information about `share_nfs`, see the `share_nfs(1M)` man page.

Choosing an Installation Method

If you are installing on more than one node (either locally or remotely from an NFS server), you must select between two methods for propagating the installation to all the nodes in the cluster. Your choices are

- `telnet` – If you choose the `telnet` option, you must supply the superuser password for every host in the cluster.
- `rsh` – If you choose the `rsh` option, all the nodes in the cluster must be made trusted hosts, at least during installation. You must also have permission to use `rsh` as superuser to all the nodes in the cluster and, in the case of an NFS installation, to the file server.

Supplying Host Names of Cluster Nodes

If installing locally on more than one node or via an NFS server, the configuration tool will ask you to supply the host names of the nodes on which the Sun HPC ClusterTools software is to be installed.

When you specify the host names of nodes anywhere in the `hpc_config` file (such as `MASTER_NODE`, `NODES`, `NFS_SERVER`, `ADD_NODES`, and `REMOVE_NODES`), use the short name (omit the domain name). The short name is the same as the output of the Solaris `hostname` command.

Sun HPC ClusterTools 4 software allows you to specify domain names. However, the domain names are not used during installation.

Sun HPC ClusterTools 4 software requires that all nodes reside in the same domain. Do not combine nodes from different domains in the same installation.

▼ To Supply Host Names Using the Installation Tool

1. **Start the installation tool.**
2. **Click on Edit Hostnames.**

   This opens the cluster nodes window of the installation tool.

3. **Specify the host names.**

▼ To Supply Host Names by Loading a File

1. **In a text editor, create a file containing a list of host names.**

   Each host name in the file must be on a separate line. See FIGURE 3-1 for examples of the four possible host-name formats. The format differences depend on two conditions:

   - Whether you specify `telnet` or `rsh` for the installation method. If `telnet`, supply the node's password (preceded by a colon).
   - Whether the nodes are connected to a terminal concentrator. If so, the host name must be followed by the host name of the terminal concentrator and the port ID to which that node is connected. Separate the node host name, terminal concentrator host name, and port ID by forward slashes. See FIGURE 3-1 for examples.

2. **Start the installation tool.**

3. **Click on Edit Hostnames.**

   This opens the cluster nodes window of the installation tool.

4. **Click the Add from file button in the installation tool.**

   This opens the Host List File dialog.

5. **Specify the file name in the Host List File dialog.**

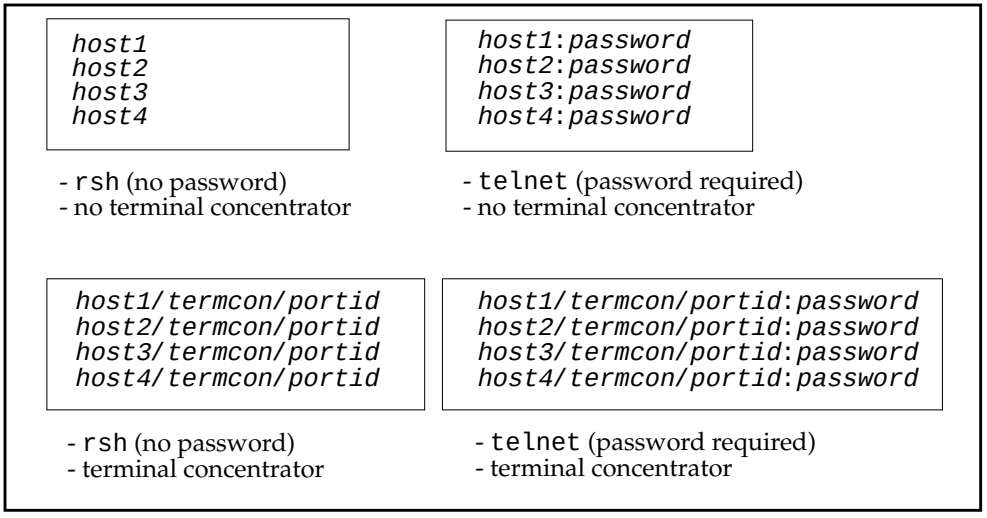

FIGURE 3-1 Examples of Host Name Files for Loading During Installation

Note – If you install the Sun HPC ClusterTools software locally on a single node, you must be logged in to the node on which the software will be installed. Consequently, you do not need to supply the node's host name.

Choosing an Authentication Method (CRE Only)

▼ To Choose an Authentication Option

1. **Start the installation tool.**
2. **Select an authentication method.**

   Authentication software provides increased levels of security, guarding against access by unauthorized users or programs. CRE supports three forms of authentication: Data Encryption Standard (DES), Kerberos version 5, and `none`.

   If you specify that you want `none`, continue with step 3.
3. **(Optional) Install the `sunhpc_rhosts` file.**

   The standard UNIX authentication method is the default. If you select `none`, you have the option of installing the file `sunhpc_rhosts`, which contains a list of the hosts that can access the cluster. If you decline to install `sunhpc_rhosts`, your `.rhosts` file (or `/etc/hosts_equiv`) is used for authentication instead. In this case all cluster nodes must be in the master node's `.rhosts` file.

Choosing a Master Node (CRE Only)

CRE consists of a set of daemons. A subset of these daemons—called the master daemons—run on a single node, which you specify to be the master node. If you are installing the Sun HPC ClusterTools software on a single node, it is automatically the master node.

Specifying the LSF Cluster Name (LSF Only)

If the LSF suite is your resource manager, the configuration tool asks for the LSF cluster name. This is the name assigned to the `LSF_CLUSTER_NAME` parameter in the `lsf_config` file. See the LSF installation documentation for information about this file.

Modifying LSF Parameters (LSF Only)

If the LSF Suite is your resource manager, the configuration tool asks if you want to modify certain LSF parameters that optimize HPC job launches. For more information about the LSF parameters that would be changed if you were to say yes, see Appendix C of the *Sun HPC ClusterTools 4 Administrator's Guide*.

CHAPTER 4

Installing, Removing, and Configuring the Software

This chapter shows how to use the configuration and installation tool to install, remove, and activate or deactivate coexisting versions (versions 3.1 and 4) of Sun HPC ClusterTools software.

These descriptions are preceded by instructions on how to start up `install_gui`.

Note – You must be logged in as superuser to run `install_gui`.

Starting the Configuration and Installation Tool

▼ To Start the Installation Tool

1. **If you have not previously loaded `install_gui` as part of the installation preview, do so now.**
2. **Make sure that you have superuser access to all nodes of the cluster.**
3. **Mount the CD-ROM path on all the nodes in the cluster.**

4. **Load the CD-ROM containing the Sun HPC ClusterTools 4 software in the CD-ROM drawer.**
5. **Log in to one of the nodes in the cluster as superuser.**
6. **Type the path for the `install_gui` command.**

```
# /cdrom/hpc_4_0_ct/Product/Install_Utilities/bin/install_gui
```

▼ To Load a Configuration File

1. **Start the installation tool.**

   The tool displays a panel with three options:

   - Install ClusterTools 4 software
   - Remove installed ClusterTools
   - Select Active Version

   If you loaded a configuration file when you launched `install_gui` (using, for example, the `-c` *config_file* option), all three tasks are active. However, if no configuration file has been loaded yet, you can select only the Install ClusterTools 4 task.

2. **Select Load from the File menu.**
3. **Specify the configuration file.**

Note – For detailed explanations of how to use `install_gui`, select the Help with Configuration Tool item from the Help menu or see the `install_gui(1M)` man page.

Installing Sun HPC ClusterTools 4 Software

▼ To Install the Software

1. **Start the installation tool**

   See "To Start the Installation Tool" on page 19.

2. **Select the Install ClusterTools 4 option.**

   The tool displays a sequence of panels. The first three panels ask for various kinds of information about the cluster configuration and the kind of installation to be performed.

3. **Supply the information requested by each panel.**

   Click on the Next button to advance to the next panel.

   The last panel provides a summary of the information you supplied on the previous panels as well as Install and Exit buttons.

4. **Start the installation process or exit the GUI.**

   - Click the Install button to start the installation process. An installation status window appears with a report on the installation progress.
   - Click Exit to leave the `install_gui` environment. If you choose this option, you are given the opportunity to save the information you entered in a configuration file of your choice. If you choose to exit and save your configuration, you can use that file to define the cluster configuration for subsequent operations on the Sun HPC ClusterTools software.

5. **When the installation is complete, display or save the installation log file.**

Note – If an error is detected during installation, the event is logged. Only certain serious errors stop the installation. See Appendix A "Installation Error Messages" for a list of error codes and recommended corrective action.

Removing Sun HPC ClusterTools 3.1 or 4 Software

▼ To Remove the Software

1. **Start the installation tool.**

   See "To Start the Installation Tool" on page 19.

2. **Load a configuration file.**

   If you did not load a configuration file when you started the installation tool, see "To Load a Configuration File" on page 20.

3. **Select the Remove Installed ClusterTools task.**

4. **Select one of the options**

   - Sun HPC ClusterTools software version to remove, 3.1 or 4.
   - The full path of the software removal script. The default path is `/opt/SUNWhpc/HPC4.0/bin/Install_Utilities/bin`.

5. **Click Remove to start the software removal process.**

   You are asked to specify which file should be used as the configuration definition for the removal.

6. **Choose a file and click Save.**

   This starts the removal process. A removal status window then appears with a report on the removal progress.

Note – If an error is detected during software removal, the event is logged. Only certain errors stop the removal process. See Appendix A "Installation Error Messages" for a list of error codes and recommended corrective action.

Activating a Sun HPC ClusterTools Version

When both Sun HPC ClusterTools software versions (3.1 and 4) are installed, you must specify which version is active and which is inactive. You do this using the `install_gui` Select Version panel.

Note – If you are installing Sun HPC ClusterTools 4 software, and have no other version installed, you must set version 4 as the active version using the Select Version panel described in this section. If you choose not to activate the software at the conclusion of the installation process, Sun HPC ClusterTools software will not be ready to run.

There are two ways that you encounter this panel:

- If Sun HPC ClusterTools 3.1 software is present on the nodes when Sun HPC ClusterTools 4 software is installed, the Select Version panel automatically appears right after installation of the Sun HPC ClusterTools 4 software completes.
- You can display the Select Version panel by highlighting Select Active Version on the initial panel of the configuration and installation tool.

▼ To Remove the Active Version

When both versions of Sun HPC ClusterTools software are resident on a cluster, you cannot remove the active version. You must first deactivate it and then activate the version that is to remain. If only one version of Sun HPC ClusterTools software is on a cluster, you can remove it without first deactivating it.

1. **Load a configuration file.**

   If you did not load a configuration file when you started the installation tool, see "To Load a Configuration File" on page 20.

2. **From the initial panel of the installation tool, select the Select Active Version task, and click on the Next button.**

   The Select Version panel appears.

3. **In the Deactivate section of the Select Version panel, specify the version to be deactivated.**

4. **Click the Deactivate button.**

5. **In the Activate section of the panel, specify the version to be activated.**

6. **Click the Activate button.**

   A warning appears indicating that daemons will be shut down; you are asked if you wish to continue. If you click on Yes, the version selection script starts.

   The select-version controls can also be used to switch back and forth between Sun HPC ClusterTools software versions even when you are not planning to remove a version.

CHAPTER 5

Additional Steps

This chapter describes the post-installation phase—the final steps needed to get your Sun HPC system ready for use. These steps are organized into two main categories:

Verifying Basic Functionality (CRE Only)

Use the procedures in this section to test the cluster's ability to perform basic operations.

Note – You need to have `/opt/SUNWhpc/bin` in your path for many of the following procedures. If you have an NFS installation, and if the actual path to the `SUNWhpc` directory in your installation is not `/opt/SUNWhpc`, you must issue Sun HPC ClusterTools commands from any directory other than `/opt/SUNWhpc.`

▼ To Display Information About Cluster Nodes

1. **Display information about the cluster nodes:**

   ```
   % mpinfo –N
   ```

   The following is an example of `mpinfo -N` output for a two-node system:

```
% mpinfo -N
NAME   UP  PARTITION  OS     OSREL  NCPU  FMEM  FSWP   LOAD1  LOAD5  LOAD15
host1  y   -          SunOS  5.8    1     7.17  74.76  0.03   0.04   0.05
host2  y   -          SunOS  5.8    1    34.70  38.09  0.06   0.02   0.02
```

2. **(Optional) Restart the node daemons.**

   If any nodes are missing from the list or do not have a `y` entry in the `UP` column, restart their node daemons. See the *Sun HPC ClusterTools 4 Administrator's Guide* for instructions on starting node daemons.

   If node daemons do not start, check `/var/adm/messages` for the following error message:

   ```
   libtnfprobe.so.1: open failed: No such file or directory
   ```

   To ensure that your installation of the Solaris operating environment has this library, you have two choices:

   1. Reinstall the Solaris operating environment, selecting one of the following Solaris software groups:

   - Entire Distribution Plus OEM Support
   - Entire Distribution
   - Developer System Support

     Note that neither the Core nor the End User System Support groups include the library.

   2. Install (using `pkgadd`) the following three packages (which reside on disk 2 of the *Solaris 8 Distribution CD*) to your existing installation of the Solaris operating environment:

   - `SUNWtnfc`
   - `SUNWtnfcx`
   - `SUNWtnfd`

▼ To Customize the Key Files

When executing programs, CRE checks the credentials passed in each remote procedure call against the contents of a key file stored on each node.

The installation procedure creates key files that contain a default password. For security reasons, you should customize these files with your choice of cluster password immediately after installation. The password should consist of 10-20 alphanumeric characters.

1. **As superuser, run the `set_key` script on each node of the cluster *and* on any nodes outside the cluster that may be accessed by a program running on the cluster.**

   # **`/opt/SUNWhpc/etc/set_key`**

   This script stores a password in `/etc/hpc_key.`*cluster_name*.

2. **Use the Cluster Console Tools to update the key files all at once.**

   This guarantees that identical passwords are in use across a cluster. See the *Sun HPC ClusterTools Administrator's Guide* for more information

▼ To Create a Partition

CRE's `mprun` command runs only within a CRE *partition*, which is a logical set of nodes.

1. **Log in as superuser on any node in the cluster.**
2. **Run the `part_initialize` script.**

   # **`/opt/SUNWhpc/bin/part_initialize`**

   This script creates a partition named `all`, consisting of all the nodes in the cluster. This partition can be used in subsequent verification tests.

   For more information about partitions, see the *Sun HPC ClusterTools Administrator's Guide*.

▼ To Verify CRE Setup

- **After you have created the partition `all`, run `mpinfo -N` again.**

  This time, the output of `mpinfo -N` should show the nodes are in the partition, `all`.

```
% mpinfo -N
NAME   UP  PARTITION  OS     OSREL  NCPU  FMEM  FSWP   LOAD1  LOAD5  LOAD15
host1  y   all        SunOS  5.8    1     8.26  74.68  0.00   0.01   0.03
host2  y   all        SunOS  5.8    1    34.69  38.08  0.00   0.00   0.01
```

▼ To Check Host Names

- **Start the `hostname` utility.**

  This should display all the host names in your cluster, printing them one per line. The following example illustrates this output in a cluster that has two nodes:

```
% mprun –Ns –np 0 hostname
host1
host2
```

▼ To Verify That CRE Executes Jobs

- **Run the following test:**

```
% mprun –np 0 uname –a
```

Verifying MPI Functionality (CRE and LSF)

This section explains how to verify that the appropriate network interfaces are available and how to test MPI communications.

If you will be using the Sun Parallel File System (PFS) software, refer to the *Sun HPC ClusterTools Administrator's Guide* for more information about configuring PFS file systems.

Verifying Network Interface

The communication protocol to be used must be listed in the configuration file `hpc.conf`, and, for internode communications, associated with the appropriate network interface(s).

The default `hpc.conf` file provided with Sun HPC ClusterTools software includes the most commonly used configurations.

Note – The `hpc.conf` file is distinct from the `hpc-config` file used during installation. `hpc.conf` defines certain system parameters, including communication protocols. The cluster administrator edits this file. See the man page `hpc.conf(4)`.

The `hpc.conf` file lists the three communication protocols supplied with the software: SHM (shared memory), RSM (remote shared memory), and TCP (Transport Control Protocol). The entry in the `LIBRARY` column, `()`, indicates that the protocol modules are installed in the default location.

```
# List the available Protocol Modules
# PMODULE LIBRARY
Begin PMODULES
shm       ()
rsm       ()
tcp       ()
End PMODULES
```

In addition, the `hpc.conf` file associates each protocol module with one or more types of network interface. The RSM protocol is associated, by default, with all interfaces to the Sun Fire high-performance interconnect (`wrsm`):

```
# RSM settings
# NAME  RANK    AVAIL
Begin PM=rsm
wrsm    20      1
End
```

The TCP protocol is associated with a large number of interface types. These are listed in the `hpc.conf` template:

```
idn – 16k   (StarFire Inter-Domain Network)
scid – 32K  (Dolphin SCI)
ba – 8K     (Sun ATM)
fa – 8K     (Fore ATM(SPANS))
acip – 8K   (Adaptec ATM)
anfc – 16K  (Ancor Fibre Channel)
bf – 4K     (Branch FDDI)
be – 4K     (SPARC Ethernet 100mbit)
hme – 4K    (SPARC Ethernet 100mbit)
le – 4K     (SPARC Ethernet 10mbit)
smc – 4K    (SMC Ethernet 10mbit)
```

Note – Inclusion of any network interface in this file does not imply that Sun Microsystems supports that network interface in a Sun environment.

If the network interface you use for TCP communication is not among those listed in `hpc.conf`, you must add it and then restart your resource manager (CRE or LSF).

▼ To Add a TCP Interface Type

1. **Decide upon a rank value.**

   The rank indicates the relative preference of that interface compared with others that are available, with the lowest rank most preferred.

2. **Add the interface name and rank value to `hpc.conf` in the `PM=tcp` section:**

```
TCP Settings
NAME    RANK    MTU     STRIPE LATENCY  BANDWIDTH
Begin PM=tcp
midn    0       16384   0      20       150
idn     10      16384   0      20       150
...
End PM
```

The MTU, STRIPE, LATENCY, and BANDWIDTH columns are placeholders whose values are not used at this time. Simply repeat the values shown for the other TCP-enabled interfaces (16384, 0, 20, and 150).

For example, you could add the following entry to the `hpc.conf` file to include an interface named `niki` with a preference ranking of 50:

```
niki     50   16384    0      20       150
```

3. **Restart the resource manager (CRE or LSF).**

Verifying MPI Communications

You can verify MPI communications by running a simple MPI program.

▼ To Verify MPI Communications

1. **Ensure that one of the supported compilers is installed on your system.**

   See *"Supported Compilers" on page 7* of this manual for more information.

   For information about running programs with LSF, see Platform Computing Corporation's LSF documentation. For information about running programs with CRE, see the *Sun HPC ClusterTools 4 User's Guide*.

2. **Run one of the sample MPI programs**

   Two simple Sun MPI sample programs are available in the directory `/opt/SUNWhpc/examples/mpi`:

   - `connectivity.c` – A C program that checks the connectivity among all processes and prints a message when it finishes.
   - `monte.f` – A Fortran program that involves each MPI process in calculating an estimate of π using a Monte-Carlo method.

See the `Readme` file in the same directory for instructions on how to use the examples. The directory also contains a make file, `Makefile`. The full text of both code examples is also included in Chapter 3 of the *Sun MPI Programming and Reference Guide*.

APPENDIX **A**

Installation Error Messages

During the installation process, output from `hpc_install` is written to a log file:

`/var/log/HPC-install.`*hostname*

TABLE A-1 shows each installation error message, a description, examples, and hints on how to resolve the error.

Many aspects of the Sun HPC ClusterTools software installation process are controlled by a configuration file called `hpc_config`. Some of these error messages refer to this file, which you can modify either with the installation tool (`install_gui`) or using a text editor. When you click on Install in the fourth panel of the installation tool, the tool runs a script, `hpc_install`. For more information about the `hpc_config` file and the `hpc_install` script, see the *Sun HPC ClusterTools Administrator's Guide*.

TABLE A-1 Error Messages

ErrorCode	Description
`ErrorCode 01:`	Unable to find the install scripts.
Hint:	Check the CD-ROM mount point.
`ErrorCode 02:`	A variable or entry has not been set in the `hpc_config` file.
Example:	`INSTALL_LOC is not set in the hpc_config file.`
Hint:	Open the `hpc_config` file with either the configuration tool or a text editor and examine it for an unset entry.
`ErrorCode 03:`	A variable or entry in the `hpc_config` file has an invalid or illegal value.
Example:	`Illegal value for MODIFY_LSF_PARAM (`*value*`).` `Illegal value for INSTALL_METHOD (`*install_method*`).`
Hint:	Examine the entry in the `hpc_config` file.
`ErrorCode 04:`	Wrong version of LSF is installed.

TABLE A-1 Error Messages *(Continued)*

ErrorCode	Description
Example:	`LSF version 4.0.1 or higher is needed for the HPC software to run correctly.`
Hint:	Run `/opt/SUNWlsf/bin/lsid -V` to verify that you have the correct version of LSF installed. If you have the correct version installed, the command should return something like this: `LSF 4.0.1,` *date*
`ErrorCode 05:`	Unable to access the given directory, no such directory.
Example:	`/opt: no such directory.` `/opt/SUNWhpc: not a directory.`
Hint:	Verify that the given directory exists.
`ErrorCode 06:`	Unable to find one of the install scripts.
Example:	`$0: Cannot find rdcfg script.`
Hint:	Check the CD-ROM mount point.
`ErrorCode 07:`	Unable to remove SYNC files.
`ErrorCode 08:`	Unable to write into `/opt`.
Example:	`/opt: not writable.`
Hint:	Check the permissions of the `/opt` directory.
`ErrorCode 09:`	Cannot have a space in a host name or cannot have multiple host names in this variable.
Example:	`Invalid NFS server name --` *servername*`.`
Hint:	Examine the `hpc_config` file. Verify that there is only one host name in the entry, and that the host name does not include a space.
`ErrorCode 10:`	You must be superuser to run the install scripts.
Example:	`You must be "root" to run hpc_install.`
Hint:	Execute `/usr/ucb/whoami`. If `whoami` does not return `root`, become `root`.
`ErrorCode 11:`	Invalid or unknown node.
Example:	*nodename*: `unknown node.`
Hint:	Verify that the node name is valid. `ping` the node.
`ErrorCode 12:`	Unable to access the node.
Example:	*nodename*: `unreachable.`
Hint:	Verify that *nodename* is up. Attempt logging in to *nodename*.

TABLE A-1 Error Messages *(Continued)*

ErrorCode	Description
ErrorCode 13:	`/opt/SUNWhpc` is already linked to another directory. A previous version of Sun HPC ClusterTools software may already be installed. Unable to install current version.
Example:	*target* `is linked to /opt/SUNWhpc.`
Hint:	Verify that there is no other version of Sun HPC ClusterTools software installed. If one does not exist, delete `/opt/SUNWhpc`.
ErrorCode 14:	The `/opt/SUNWhpc` directory already exists, possibly from previously installed Sun HPC software. Unable to install the current version of Sun HPC ClusterTools 4 software.
Example:	`/opt/SUNWhpc: directory already exists.`
ErrorCode 15:	Unable to find the installation scripts.
Example:	`Error parsing install script directory name.`
Hint:	Check the CD-ROM mount point.
ErrorCode 16:	An older version of Sun HPC ClusterTools software was installed, please remove it before installing the current version.
Example:	`Version` *version* `is installed; it does not match the version` *version* `from the CD-ROM: Please remove it.`
Hint:	To remove Sun HPC software 2.0 or earlier, see the documentation that came with the earlier version of the software. To remove Sun HPC ClusterTools 3.1 software, see Chapter 4 of this manual.
ErrorCode 17:	Insufficient amount of free disk space.
Example:	*Total–space–required* `free blocks of disk space necessary for installation;` *space_avail* `blocks available on` *directory–name*.
Hint:	Perform `df -k` on the directory specified in `INSTALL_LOC`. The owner should be the same as the user specified in `LSF_ADMIN`.
ErrorCode 18:	The path supplied as an installation location does not exist.
Example:	*Install–location* `does not exist.`
Hint:	Verify that the directory specified in *Install–location* exists.
ErrorCode 19:	A problem has occurred while trying to create a symbolic link from `/opt/SUNWhpc` to the path set in *pathname.*
Example:	`Unable to create link from /opt/SUNWhpc to` *pathname*.
Hint:	Verify that the *pathname* exists. Verify that `/opt` is writable.
ErrorCode 20:	Unable to create files in `/tmp`.
Example:	`Unable to write /opt/HPC_SKIP_POSTINSTALL.`

TABLE A-1 Error Messages *(Continued)*

ErrorCode	Description
Hint:	Verify the permissions on `/tmp`. The directory must be writable.
`ErrorCode 21:`	The package was not installed correctly. Install or reinstall it manually (as superuser).
Example:	`Unable to install` *package*. `Unable to reinstall` *package*.
Hint:	See the *Sun HPC ClusterTools 4 Administrator's Guide*.
`ErrorCode 22:`	Unable to execute the postinstall script.
Example:	`Error: Unable to execute` *filename.*
Hint:	Examine the CD-ROM mount point. Verify that the mount point is readable/accessible.
`ErrorCode 23:`	The package was not removed correctly. Remove it manually (as superuser).
Example:	`Unable to remove` *packagename*.
Hint:	See the *Sun HPC ClusterTools 4 Administrator's Guide*.
`ErrorCode 24:`	You have chosen the `smp-local` configuration, but you have listed more than one host name in the list of nodes.
Example:	`pathname/hpc_config: warning, more than one node for smp-local.`
Hint:	Either change the configuration type to `cluster-local` or remove all but one host name from the list of nodes.
`ErrorCode 25:`	The `preremove` script doesn't exist.
Example:	`Cannot find preremove script,` *filename*`.`
Hint:	Verify that `/opt/SUNWhpc/HPC4.0/etc` is accessible on that system.
`ErrorCode 26:`	Superuser is unable to write into the directory containing the `hpc_config` file.
Example:	`Unable to write into $CONFDIR. Please make it writable to superuser.`
Hint:	Verify that the directory containing the `hpc_config` file is writable by superuser.
`ErrorCode 27:`	The LSF software does not exist on the system.
Example:	`LSF is not installed, please install LSF version $LSF_RELEASE or greater before installing HPC4.0.`
Hint:	Verify that the LSF software is installed on the system.
`ErrorCode 28:`	The path set in the environment variable `LSF_ENVDIR` is invalid.

TABLE A-1 Error Messages *(Continued)*

ErrorCode	Description
Example:	`$CONFDIR/$CONF_FILE_NAME: illegal value for LSF_CONF_DIR ($LSF_CONF_DIR).`
Hint:	Verify in `/etc/lsf.conf` that the path set for `LSF_ENVDIR` is valid.
ErrorCode 29:	Sun HPC 2.0 software exists on the system.
Example:	`/opt/SUNWhpc/HPC2.0 exists. Please remove HPC2.0 before installing HPC4.0.`
Hint:	Use the `hpc2.0` removal scripts to remove Sun HPC 2.0 software.
ErrorCode 30:	Cannot set the node names in the `NODES` section of the `hpc_config` file.
Example:	`Unable to set the NODES entry. Please set the NODES variable in the hpc_config file.`
Hint:	Edit the `hpc_config` file and enter the node names in the `NODES` section.
ErrorCode 31:	Attempting to use the Sun HPC ClusterTools 4 software removal scripts to remove Sun HPC 2.0 software.
Example:	`Unable to use the HPC4.0 hpc_remove script to remove HPC2.0. Use the hpc 2.0 removal script to remove HPC2.0 from this system.`
Hint:	Use the applicable removal script. To remove Sun HPC software 2.0 or earlier, see the documentation that came with the earlier version of the software. To remove Sun HPC ClusterTools 3.1 software, see Chapter 4 of this manual.
ErrorCode 32:	Superuser is unable to write into the directory containing the HPC config file.
Example:	`Unable to write into $CONFDIR. Please make it writable to root.`
Hint:	Verify that the directory containing the `hpc_config` file is writable by superuser.
ErrorCode 33:	`INSTALL_CONFIG is set to nfs but NFS_SERVER is set to null.`
ErrorCode 34:	`INSTALL_CONFIG is set to $INSTALL_CONFIG but NFS_SERVER is also set.`
ErrorCode 35:	`An attempt was made to remove a release that is currently active. Please deactivate the release before trying to remove it.`

APPENDIX **B**

Required File and Directory Settings

Sun HPC ClusterTools software installation requires special settings on several files and file systems.

Installation Requirement Summary

TABLE B-1 Installation Requirements

Files or Directories	Owner	Permissions	Comments
`hpc.conf`	superuser (or LSF administrator)	644	Must be accessible by all nodes.
`hpc_config`	—	644	—
`/etc/sunhpc_rhosts`	—	600	—

TABLE B-1 Installation Requirements *(Continued)*

Files or Directories *(Continued)*	Owner	Permissions	Comments
CD-ROM *mount point*	—	—	Must be readable by superuser and accessible through a common path from all nodes.
HPC *config_dir* (This directory may be removed after installation. However, you should preserve configuration files.)	—	755	Must be readable and writable by superuser or shared using the `-o root = client...` NFS share option. (Note: NFS directories may require 777 permissions.) If you wish to avoid sharing the directory with direct superuser write permission, you can open the directory to be world writable, allowing a superuser to write to the directory as the user *nobody*. For example, `# chmod 777` *config_dir*
NFS client mount point (`INSTALL_LOC`)	—	—	Server mount point must exist on all client nodes.

APPENDIX **C**

Packages

Sun HPC ClusterTools software includes numerous packages. Their sizes are listed here.

Package Sizes

Package Name	Package Size (Kbytes)
`Install_Utilities`	490
`SUNWcre`	2958
`SUNWcremn`	91
`SUNWcrert`	103
`SUNWcrex`	2106
`SUNWhpamn`	39
`SUNWhpcat`	504
`SUNWhpctm`	93
`SUNWhpmmn`	27
`SUNWhpmsc`	21
`SUNWmpi`	8948
`SUNWmpimn`	1054
`SUNWmpirt`	43
`SUNWmpix`	9350
`SUNWpfs`	611

Package Name *(Continued)*	Package Size (Kbytes)
SUNWpfsmn	36
SUNWpfsrt	451
SUNWpfsx	451
SUNWprism	12799
SUNWprsmn	949
SUNWprsmx	15734
SUNWs3l	13584
SUNWs3lmn	794
SUNWs3lx	11204
SUNWtnfv	3491