Sun HPC ClusterTools™ 7.1 Software Installation Guide

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Preface

This document describes the procedure for installing Sun HPC ClusterTools™ 7.1 software.

These instructions are intended for an experienced system administrator. For example, to install the cluster tools software on one or more nodes, you must be familiar with the following tasks in the Solaris™ 10 Operating System (Solaris 10 OS):

- Logging in as superuser
- Using the `df` command to check disk space
- Reading `/var/adm/messages` for possible error messages and debugging information
- 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 7.1 Software Release Notes*
- Documentation that accompanied your server hardware
- Documentation for the Solaris 10 OS
- If you are using one of the Distributed Resource Manager (DRM) applications, see the related documentation. One example of a DRM is Sun N1™ Grid Engine software.

How This Book Is Organized

Chapter 1 provides an overview of the Sun HPC ClusterTools software installation utilities.

Chapter 2 describes various installation dependencies.

Chapter 3 explains how to use the Sun HPC ClusterTools software command-line interface (CLI) tools to install, activate, deactivate, and remove the software in a non-NFS configuration.

Chapter 4 explains how to use the CLI to install and set up the Sun HPC ClusterTools software using an NFS server.

Chapter 5 describes a set of post-installation procedures you can perform to verify basic functionality of the cluster.

Appendix A lists the Sun HPC ClusterTools software installation packages.

Using UNIX Commands

This document might not contain information about basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to the following for this information:

- Software documentation that you received with your system
- Solaris™ Operating System documentation, which is at:

  http://www.sun.com/documentation

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. Replace command-line variables with real names or values.	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this. To delete a file, type rm *filename*.

* The settings on your browser might differ from these settings.

Shell Prompts

Shell	Prompt
C shell	*machine-name*%
C shell superuser	*machine-name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

Application	Title	Part Number
Sun HPC ClusterTools Documentation	*Read Me First: Guide to Sun HPC ClusterTools Software Documentation*	819-7477-10
Sun HPC ClusterTools Software	*Sun HPC ClusterTools 7.1 Software Release Notes*	819-7478-10
	Sun HPC ClusterTools 7.1 Software User's Guide	819-7480-10
	Sun HPC ClusterTools 7.1 Migration Guide	819-7484-10

The Sun HPC ClusterTools documentation is available online at:

http://www.sun.com/documentation

For more information about Open MPI and its components, see the Open MPI web site at:

http://www.open-mpi.org

For more information about Sun Grid Engine software, see the Sun Grid Engine web site at:

http://www.sun.com/software/gridware

Documentation, Support, and Training

Sun Function	URL
Documentation	http://www.sun.com/documentation/
Support	http://www.sun.com/support/
Training	http://www.sun.com/training/

Third-Party Web Sites

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Please include the title and part number of your document with your feedback:

Sun HPC ClusterTools 7.1 Software Installation Guide, part number 819-7479-12

Introduction to Sun HPC ClusterTools 7.1 Software

This chapter provides an overview of the software installation utilities. It contains the following topics:

Overview

This manual explains how to use the Sun HPC ClusterTools software installation utilities to install, activate, deactivate, and remove Sun HPC ClusterTools software on one or more cluster nodes. See TABLE 1-1 for a summary of these interfaces.

TABLE 1-1   Sun HPC ClusterTools Software Installation Utilities

Utility	Description
ctinstall	Installs software on cluster nodes.
ctremove	Removes software from cluster nodes.
ctnfssvr	Sets up Sun HPC ClusterTools software on an NFS server.
ctact	Activates software.
ctdeact	Deactivates software.

The tools install a complete copy of the Sun HPC ClusterTools software, locally on each node in the cluster.

Non-NFS and NFS Configurations

You can install Sun HPC ClusterTools software locally on the cluster nodes, or in an NFS client/server configuration.

Non-NFS Configuration

In a non-NFS cluster configuration, the tools install a complete copy of the Sun HPC ClusterTools software locally on each node in the cluster. Chapter 3 explains how to install the software on the local nodes.

NFS Configuration

In an NFS-based cluster, the tools install the packages on the NFS server using the CLI `ctnfssvr` command. The tools also mount the exported directory and create version-specific links. Chapter 4 explains how to set up the software in an NFS configuration.

The NFS server can, but need not be, one of the NFS client nodes in the cluster. When a Sun HPC ClusterTools software NFS server is also a cluster node, the packages are installed on the NFS server with `ctnfssvr`.

Centralized and Local Command Initiation

You can choose between two methods of initiating operations on the cluster nodes:

- Local – Initiate commands directly on the node you are logged in to. The effects of the command are restricted to the local node.
- Centralized – Initiate commands from a central host, specifying the nodes on which the command is to take effect. The initiating host establishes remote connections to the target nodes and broadcasts the commands to them over an `rsh`, `ssh`, or telnet connection. The central (initiating) host can be part of the cluster or it can be an administrative system external to the cluster.

Note – Centralized operations are performed on the specified nodes in parallel. That is, when a command is specified on the central host, the operation is initiated on all the specified nodes at the same time.

Support for centralized command initiation is built into the Sun HPC ClusterTools software installation utilities. Issuing these commands from a central host has the equivalent effect as invoking the commands locally using one of the Cluster Console tools, `cconsole`, `ctelnet`, or `crlogin`.

The Sun HPC ClusterTools software CLI utilities provide several options that are specific to the centralized command initiation mode and are intended to simplify management of parallel installation of the software from a central host. These options support:

- Creating corresponding versions of local log files on the central host for easier access
- Generating a list of nodes that had successful operations and another list of nodes that were unsuccessful. These pass/fail node lists can then be used in subsequent operations, such as software activation, deactivation, and removal.

The initiating system can be one of the cluster nodes or it can be external to the cluster. It must be a Sun system running the Solaris 9 or Solaris 10 Operating System (Solaris OS). Compute nodes must run the Solaris 10 OS.

Support for Other Installation Contexts

The Sun HPC ClusterTools software installation utilities are completely self-contained and are fully capable of scaling from single node installations to installing very large clusters. However, if you customarily use Custom JumpStart™ and/or Solaris™ Web Start Flash methods for installing software on your servers, you can easily integrate the CLI installation tool ctinstall into those contexts.

The following variations on a basic Sun HPC ClusterTools software installation are described briefly below. More detailed descriptions are provided later in the manual.

- Custom JumpStart installation
- Custom JumpStart installation, using Web Start Flash archives

Custom JumpStart Installation

For this context, you must set up a Custom JumpStart environment in advance of the installation. Next, you invoke local installation of Sun HPC ClusterTools software on the cluster nodes by integrating the ctinstall command in the Custom JumpStart finish script, using the -l and -R switches.

Custom JumpStart installations are initiated from the console of each Custom JumpStart client. The cconsole tool that is included in the Cluster Console software allows you to access multiple consoles through a single common window.

Web Start Flash Installation

The first step for this type of installation is to perform a local installation of the Sun HPC ClusterTools software on a node that will serve as the flash master. You can use `ctinstall -l` for this step. Once the flash master is fully installed and activated, you create a flash archive and apply it to the target nodes, usually in a Custom JumpStart environment.

This flash archive-based approach creates clones of the flash master, which includes reinstalling the Solaris operating environment on each clone.

Note – Web Start Flash installations are restricted to cluster environments where all the systems have identical hardware and software configurations.

Sun HPC ClusterTools 7.1 Installation Log Files

The Sun HPC ClusterTools 7.1 installation tools log information about installation-related tasks locally on the nodes where installation tasks are performed. The default location for the log files is `/var/sadm/system/logs/hpc`. If installation tasks are initiated from a central host, a summary log file is also created on the central host.

Local, Node-Specific Log Files

Two types of log files are created locally on each cluster node where installation operations take place.

- Task-specific logs – Separate log files are created for each installation-related task. They are:
  - `ct_install.log`
  - `ct_remove.log`
  - `ct_act.log`
  - `ct_deact.log`
  - `ct_startd.log`
  - `ct_stopd.log`

  These log files contain detailed logging information for the most recent associated task. Each time a task is repeated, its log file is overwritten.

- History log – A `ct_history.log` file is created to store all installation-related tasks performed on the local node. This provides a convenient record of the Sun HPC ClusterTools 7.1 software installation history on the local node. Each time a new installation task is performed on the node, a new log entry is appended to the history log.

These node specific installation log files are created regardless of the installation method used, local or centralized.

Central Node Summary Log

When installation tasks are initiated from a central host, a summary log file named `ct_summary.log` is created on the central host. This log file records the final summary report that is generated by the CLI. The `ct_summary.log` is not overwritten when a new task is performed. As with the `ct_history.log` file, new entries are appended to the summary log file.

Summary of Tasks Performed by Sun HPC ClusterTools Software Utilities

FIGURE 1-1 shows an overview of the installation-related tasks you can perform.

Note – The CLI tools require superuser privileges to execute.
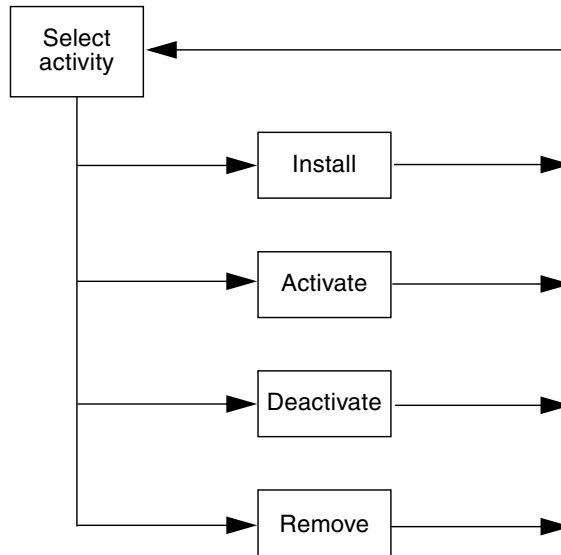
FIGURE 1-1   Sun HPC ClusterTools Software Installation Tasks

Select an Activity

The various installation-related operations are independent of each other. With the CLI, you simply start the applicable utility: ctinstall, ctact, ctdeact, or ctremove. The operations these tools control are described below.

Install the Software

The installation activity loads the Sun HPC ClusterTools software onto cluster nodes.

With the CLI command ctinstall, you can install individual Sun HPC ClusterTools 7.1 software packages as well as install the entire software suite.

A complete copy of the Sun HPC ClusterTools software is installed locally on each node in the cluster.

The next sections describe the installation and activation choices you can make when you install Sun HPC ClusterTools software.

NFS Installation

In an NFS installation, all Sun HPC ClusterTools software packages are installed on a Sun NFS server and remotely mounted on the NFS client nodes in the cluster. The NFS server can be one of the NFS client nodes in the cluster, but need not be.

Non-NFS Installation

In non-NFS configurations, a complete copy of the Sun HPC ClusterTools software is installed locally on each node in the cluster.

Install With Automatic Activation

When you initiate a software installation operation, you can specify to have the nodes activated automatically as soon as the installation process completes. The activation process sets up symbolic links on the nodes.

Install Without Activating

As stated above, Sun HPC ClusterTools 7.1 software does not need to be activated after installation. If it is not activated, then you can run all commands from the `/opt/SUNWhpc/HPC7.1/bin` directory.

Running Sun HPC ClusterTools 6 and Sun HPC ClusterTools 7.1 Software Together

If you have Sun HPC ClusterTools 6 software already installed on your system and you want to continue running it alongside Sun HPC ClusterTools 7.1, then do the following:

1. **Leave the Sun HPC ClusterTools 6 software as is.**

   Do not deactivate or remove it.

2. **Install the Sun HPC ClusterTools 7.1 software, but do not activate it.**

   In this way, if you want to use Sun HPC ClusterTools 6, you continue to run commands from `/opt/SUNWhpc/bin`. If you want to use Sun HPC ClusterTools 7.1 software, you use commands from `/opt/SUNWhpc/HPC7.1/bin`.

Activate the Sun HPC ClusterTools Software

Sun HPC ClusterTools 7.1 software does not need to be activated; once it is installed, it is ready for use. However, if you are also running Sun HPC ClusterTools 6 software, that software still must be activated. Refer to the Sun HPC ClusterTools 6 Software documentation for more information.

The node activation step prepares the cluster nodes so that the installed Sun HPC ClusterTools software can be used. Specifically, node activation sets up symbolic links that point to the Sun HPC ClusterTools software.

Deactivate the Sun HPC ClusterTools Software

Node deactivation removes the symbolic links that point to the Sun HPC ClusterTools software. Note that you can still run the software from `/opt/SUNWhpc/HPC7.1/bin` (or the directory in which you installed it) after the software has been deactivated.

Remove the Sun HPC ClusterTools Software

This operation deletes Sun HPC ClusterTools software packages from the cluster nodes on which it is executed. If a node is active at the time you initiate the removal operation, it will be deactivated automatically before the software is removed.

With the CLI command `ctremove`, you can remove individual Sun HPC ClusterTools software packages as well as remove the entire software suite.

Recommendations for Installing Sun HPC ClusterTools 7.1 Software on Large Cluster Installations

The following are tips for installing Sun HPC ClusterTools 7.1 software on clusters containing hundreds of nodes using the centralized method:

- Minimize other system activity during installation – Invoking installation of Sun HPC ClusterTools 7.1 software on hundreds of nodes from a central host imposes high demands on system resources. Avoid system resource exhaustion by keeping the cluster nodes as quiescent as possible during the installation.

- Use a node list file – For various centralized installation tasks, you specify the nodes on which the task is to be invoked. You have the choice of specifying the nodes either on the command line, using the −n option or by referencing a node list file using the −N option. If you reference a node list file, you only enter the node names once when you create the file.

- Reduce system resource consumption on the central host – You can avoid overtaxing system resources on a single central host by using more than one central host. Simply divide the total list of nodes to be installed on into separate node lists, and initiate the installation commands on the various central hosts, with each host using a different node list.

- Use the −g option with CLI-initiated tasks – Use the −g option with CLI commands to obtain a list of nodes that successfully executed the command and a separate list of nodes that failed. You can then reference the list of failed nodes with the −N option in a later retry of the command.

- Use the −k option with CLI-initiated tasks – Use the −k option with CLI commands to have all logs saved on the central node where the command was initiated. This option makes it unnecessary to go to each node to examine local logs.

Note – When using the telnet connection method, all nodes specified in a given centralized invocation must share the same password. If you have more than one password for the nodes in the cluster, separate the nodes into installation groups in which all nodes share the same password, and perform separate command invocations for each node group.

Preparing for Installation

Before installing Sun HPC ClusterTools 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:

General Prerequisites

Before installing Sun HPC ClusterTools software, be sure that all hardware is installed and configured. The system from which the installation is to be initiated must have rsh, ssh, or telnet network connections to the target nodes.

TABLE 2-1 outlines additional prerequisites for installation.

TABLE 2-1 General Prerequisites for Installing Sun HPC ClusterTools Software

Description	Requirement
Hardware	Sun UltraSPARC or x64-based systems. For Sun UltraSPARC systems, the minimum compatible processor is the UltraSPARC III.
Disk space	Approximately 22 Mbytes per node.
Operating system	Solaris 10 3/05 or any subsequent Solaris release that supports Sun HPC ClusterTools 7.1 software. **Note:** If you want to use Infiniband connectivity, you must install Solaris 10 11/06 or a compatible version. Refer to the *Sun HPC ClusterTools 7.1 Software Release Notes* for more information.
Resource management	Sun HPC ClusterTools 7.1 software includes Open MPI Runtime Environment (ORTE) for launching and control of parallel jobs. One example of a distributed resource management framework operating under integration with ORTE is Sun Grid Engine (SGE) Version 6.
`/etc/init.d/nfs.server` file settings	For installations from an NFS server, you need to increase the number of concurrent server requests from 16 to 256. See "Adjusting Server Requests for NFS Installations" on page 32.

Using Sun HPC ClusterTools Software in Solaris OS Non-Global Zones

Non-global zones set up in the Solaris 10 OS do not inherit the links that were created when Sun HPC ClusterTools 7.1 software was installed in the global zone. This means that you must either type out the full path to the Sun HPC ClusterTools executables on the command line (for example, you would type `/opt/SUNWhpc/HPC7.1/bin/mpirun` instead of `/opt/SUNWhpc/bin/mpirun`), or run the `ctact` utility in the non-global zone to set up the links.

For more information about the `ctact` utility, see "Activating Sun HPC ClusterTools Software" on page 22. For more information about Sun HPC ClusterTools 7.1 software and Solaris zones, refer to the *Sun HPC ClusterTools 7.1 Software User's Guide*.

Supported Compilers

Sun HPC ClusterTools software supports Sun™ Studio 10 and 11 C, C++, and Fortran compilers.

Cluster Console Tools

The Cluster Console tools, `cconsole`, `ctelnet`, and `crlogin`, are available in the package SUNWcconf, which is bundled with the Solaris Cluster software. Solaris Cluster software can be downloaded from the following URL:

http://www.sun.com/download/products.xml?id=4581ab9e

Although you do not need Cluster Console for centralized installation of Sun HPC ClusterTools software, it can be a convenient tool for various administrative operations, such as booting cluster nodes in a Custom JumpStart installation.

Centralized command initiation provides a command execution summary for each initiated activity. This summary reports the results of the operation, identifying the nodes on which the operation was successful and the nodes on which it failed. Such reports are not available when using the Cluster Console tools.

Setting Up a `known_hosts` File

If you are using `ssh` to connect to your remote nodes, you must set up your `~/.ssh/known_hosts` file to contain the remote nodes' host key, especially if you try to run on a cluster with many nodes for the first time.

Setting up the known_hosts file avoids having to respond to the following prompts when running mpirun to the remote nodes:

```
% /opt/SUNWhpc/HPC7.1/bin/mpirun -host host04,host05,host06
hostname

The authenticity of host 'host04 (129.148.9.88)' can't be
established.
RSA key fingerprint is
ff:73:0e:91:7b:19:e6:a3:9a:f8:6c:07:0a:ce:1a:f2.
Are you sure you want to continue connecting (yes/no)?
The authenticity of host 'host05 (129.148.9.84)' can't be
established.
RSA key fingerprint is
11:f6:bd:f7:a9:5b:05:ab:73:ee:81:0f:c8:2f:ac:cb.
Are you sure you want to continue connecting (yes/no)?
The authenticity
of host 'host06 (129.148.9.86)' can't be established.
RSA key fingerprint is
c1:24:c4:9c:86:33:25:3b:08:59:12:b5:1b:9d:b2:c6.
Are you sure you want to continue connecting (yes/no)?
Host key verification failed.
yes
Please type 'yes' or 'no': yes
Please type 'yes' or 'no': yes
Please type 'yes' or 'no': yes
Please type 'yes' or 'no': yes
Please type 'yes' or 'no': yes
Please type 'yes' or 'no': yes
...
```

Installing the Software in a Non-NFS Configuration

This chapter explains how to install and configure Sun HPC ClusterTools software on a non-NFS configuration using the installation utilities. For information about how to install the software in an NFS configuration, see Chapter 4.

The Sun HPC ClusterTools software CLI utilities are:

- `ctinstall` – Install the software on the cluster nodes.
- `ctact` – Activate the software on the cluster nodes.
- `ctdeact` – Deactivate the software on the cluster nodes.
- `ctremove` – Remove the software from the cluster nodes.

Note – If you use rsh connections for centralized operations on hundreds of nodes at a time, the operations may encounter system resource limitations that prevent the connections from being established to all the nodes. For clusters with hundreds of nodes, it is best to perform these operations on subsets of nodes, one subset at a time, with no more than 200 nodes in a subset.

This chapter contains the following topics:

- "Installing Sun HPC ClusterTools Software" on page 16
- "Activating Sun HPC ClusterTools Software" on page 22
- "Deactivating Sun HPC ClusterTools Software" on page 24
- "Removing Sun HPC ClusterTools Software" on page 26

Installing Sun HPC ClusterTools Software

> **Note –** You must log in as root to install and configure the Sun HPC ClusterTools 7.1 software. This is because `ctinstall` and the other commands use the Solaris OS `pkg*` commands; the `pkg*` commands must be executed as root.

Before you can install and configure the software, you must make sure you have downloaded the correct software archive for your hardware platform. Once you have downloaded the software, you need to extract it to the correct directory. If you have installed a previous version of the software, there are additional steps you need to do to prepare for installation. The following procedure explains these steps.

▼ To Download and Extract the Software

> **Note –** If you have previously installed Sun HPC ClusterTools 7.1 software on your cluster nodes, you must remove it before you can reinstall the software.

1. **Boot the cluster nodes.**

2. **Download and extract the archive file containing the Sun HPC ClusterTools software to a location (such as a shared file system) that is visible to all the nodes in the cluster.**

   a. **Make sure that all the compute and administrative nodes have access to the shared file system.**

   b. **Make sure that the file system is readable by superuser and accessible through a common path from all nodes.**

   For centralized installations, do this on the central host as well.

   You can obtain the correct HPC ClusterTools archive file for your platform from the following location:

   `http://www.sun.com/software/products/clustertools/index.xml`

3. **Log in as superuser on the system from which you will be initiating the command: the central host or, if initiating the command locally, directly on a cluster node.**

4. **If the Sun HPC ClusterTools software has not been installed yet, change directory to one of the following:**

   a. **If you are installing the software on a SPARC-based system, change directory to** `/sun-hpc-ct7-sparc/Product/Install_Utilities/bin`

   b. **If you are installing on an x64-based system**, **change directory to** `/sun-hpc-ct-i386/Product/Install_Utilities/bin`

   If the software has already been installed, go to Step 5.

5. **If the software was previously installed and you intend to perform such tasks as activation, deactivation, or removal of the software, change directory to** `$INSTALL_LOC/SUNWhpc/HPC7.1/bin/Install_Utilities/bin`.

   `$INSTALL_LOC` is the location where the software was installed.

   You can now start using the CLI commands. They are described separately below, with examples of common applications given for each.

   For usage information on any command, either enter the command without options or with the –h option.

   ```
   #  ./command
   or
   #  ./command –h
   ```

ctinstall Options

Use the `ctinstall` command to install Sun HPC ClusterTools software on cluster nodes. See TABLE 3-1 for a summary of the `ctinstall` options.

TABLE 3-1   ctinstall Options

Options	Description
General	
–h	Command help.
–l	Execute the command on the local node only.
–R	Specify the full path to be used as the root path.
–x	Turn on command debug at the specified nodes.
Command Specific	
–a	Activate automatically after installation completes.

TABLE 3-1 `ctinstall` Options *(Continued)*

Options	Description
-c	Specify the server and mount path for the software if you are performing an NFS installation.
-d	Specify a non-default *install from* location. The default is *distribution*/`Product`, relative to the directory where `ctinstall` is invoked.
-p	List of packages to be installed. Separate names by comma.
-t	Specify a nondefault *install to* location. The default is /`opt`.
Centralized Operations Only	
-g	Generate node lists of successful and unsuccessful installations.
-k	Specify a central location for storing log files of all specified nodes.
-n	List of nodes targeted for installation. Separate names by comma.
-N	File containing list of nodes targeted for installation. One node per line.
-r	Remote connection method: rsh, ssh, or telnet.
-S	Specify full path to an alternate ssh executable.

Note – The options –g, –k, –n, –N, –r, and –S are incompatible with local (non-centralized) installations. If the –l option is used with any of these options, an error message is displayed.

Installing the Software From a Central Host in a Non-NFS Configuration

This section discusses the following options for installing the software from a central host:

▼ To Install From a Central Host Using `rsh`

This section shows examples of software installations in which the `ctinstall` command is initiated from a central host.

CODE EXAMPLE 3-1

```
# ./ctinstall -n node1,node2 -r rsh
```

▼ To Install From a Central Host Using `ssh`

CODE EXAMPLE 3-1 installs the full Sun HPC ClusterTools software suite on `node1` and `node2` from a central host. The node list is specified on the command line. The remote connection method is rsh. This requires a trusted hosts setup.

The software will be ready for use when the installation process completes.

CODE EXAMPLE 3-2

```
# ./ctinstall -n node1,node2 -r ssh
```

CODE EXAMPLE 3-2 is the same as CODE EXAMPLE 3-1, except that the remote connection method is ssh. This method requires that the initiating node be able to log in as superuser to the target nodes without being prompted for any interaction, such as a password.

▼ To Install From a Central Host Using `telnet`

CODE EXAMPLE 3-3

```
# ./ctinstall -N /tmp/nodelist -r telnet
```

CODE EXAMPLE 3-3 installs the full Sun HPC ClusterTools software suite on the set of nodes listed in the file `/tmp/nodelist` from a central host. A node list file is particularly useful when you have a large set of nodes or you want to run operations on the same set of nodes repeatedly.

The node list file has the following contents:

```
# Node list for CODE EXAMPLE 3-2

node1
node2
```

The remote connection method is telnet. All cluster nodes must share the same password. If some nodes do not use the same password as others, install the software in groups, each group consisting of nodes that use a common password.

The software will be ready for use when the installation process completes.

▼ To Install the Software and Save the Log Files

CODE EXAMPLE 3-4

```
# ./ctinstall –N /tmp/nodelist –r telnet –k /tmp/cluster-logs –g
```

CODE EXAMPLE 3-4 is the same as CODE EXAMPLE 3-3, except it includes the –k and –g options.

In this example, the –k option causes the local log files of all specified nodes to be saved in /tmp/cluster-logs on the central host.

The –g option causes a pair of node list files to be created on the central host in /var/sadm/system/logs/hpc/nodelists. One file, ctinstall.pass$$, contains a list of the nodes on which the installation was successful. The other file, ctinstall.fail$$, lists the nodes on which the installation was unsuccessful. The $$ symbol is replaced by the process number associated with the installation.

These generated node list files can then be used for command retries or in subsequent operations using the –N switch.

Note – Specify a directory that is local to the central host rather than an NFS-mounted directory. This will avoid unnecessary network traffic in the transfer of log files and will result in faster execution of the operation.

▼ To Install Specified Software Packages

The following command installs only the specified software packages.

CODE EXAMPLE 3-5

```
# ./ctinstall –N /tmp/nodelist –r telnet –p SUNWompi,SUNWompimn
```

CODE EXAMPLE 3-5 installs the packages SUNWompi and SUNWompimn on the set of nodes listed in the file /tmp/nodelist. No other packages are installed. The remote connection method is telnet.

Appendix A lists the packages in the Sun HPC ClusterTools 7.1 installation.

The –p option can be useful if individual packages were not installed on the nodes by ctinstall.

CODE EXAMPLE 3-6

```
# ./ctinstall –N /tmp/nodelist –r rsh
```

CODE EXAMPLE 3-6 installs and activates the full Sun HPC ClusterTools software suite on the nodes listed in the file /tmp/nodelist. The remote connection method is rsh.

Installing Software Locally in a Non-NFS Configuration

This section shows examples of software installations in which the ctinstall command is initiated on the local node. The installation options shown in this example include:

- "To Install the Complete Software Suite" on page 21
- "To Install Specified Software Packages" on page 21

Note – The options –g, –k, –n, –N, –r, and –S are incompatible with local (non-centralized) installations. If the –l option is used with any of these options, an error message is displayed.

▼ To Install the Complete Software Suite

CODE EXAMPLE 3-7

```
# ./ctinstall –l
```

▼ To Install Specified Software Packages

CODE EXAMPLE 3-7 installs the full Sun HPC ClusterTools software suite on the local node only.

CODE EXAMPLE 3-8

```
# ./ctinstall –l –p SUNWompi,SUNWompimn
```

CODE EXAMPLE 3-8 installs the packages SUNWompi and SUNWompimn on the local node.

Appendix A lists the packages in the Sun HPC ClusterTools 7.1 installation.

Activating Sun HPC ClusterTools Software

In Sun HPC ClusterTools 7.1 software, the activation step sets up symbolic links to the program binaries. If you are running Sun HPC ClusterTools 7.1 only, you may skip the activation step and run Sun HPC ClusterTools 7.1 software from the directory in which it is installed (by default /opt/SUNWhpc/HPC7.1/bin).

However, Sun HPC ClusterTools 6 must be activated after installation. In Sun HPC ClusterTools 6, the activation step sets up the symbolic links and starts the daemons. If you are using both Sun HPC ClusterTools 6 and 7, you must activate the Sun HPC ClusterTools 6 software in order to use it.

ctact Options

Use the ctact command to activate Sun HPC ClusterTools software on cluster nodes. See TABLE 3-2 for a summary of the ctact options.

Note – The general options and options specific to centralized operations serve essentially the same role for ctact as for ctinstall. Consequently, fewer examples are used to illustrate ctact than were used for ctinstall.

TABLE 3-2   ctact Options

Options	Description
General	
–h	Command help.
–l	Execute the command on the local node only.
–R	Specify the full path to be used as the root path.
–x	Turn on command debug at the specified nodes.
Command Specific	
–c	Specify that you are activating on an NFS client node.
Centralized Operations Only	

TABLE 3-2   `ctact` Options *(Continued)*

Options	Description
-g	Generate node lists of successful and unsuccessful activation.
-k	Specify a central location for storing copies of local log files.
-n	List of nodes targeted for activation. Separate names by comma.
-N	File containing list of nodes targeted for activation. One node per line.
-r	Remote connection method: rsh, ssh, or telnet.
-S	Specify full path to an alternate ssh executable.

Activating Nodes From a Central Host

This section shows examples of software activation in which the `ctact` command is initiated from a central host.

▼ To Activate Specified Cluster Nodes From a Central Host in a Non-NFS Configuration

CODE EXAMPLE 3-9

```
# ./ctact -n node1,node2 -r rsh
```

CODE EXAMPLE 3-9 activates the software on node1 and node2 . The remote connection method is rsh.

▼ To Activate Cluster Nodes and Create Log Files

CODE EXAMPLE 3-10

```
# ./ctact -n node1,node2 -r rsh -k /tmp/cluster-logs -g
```

CODE EXAMPLE 3-10 is the same as CODE EXAMPLE 3-9, except it specifies the options –k and –g.

In this example, the `-k` option causes the local log files of all specified nodes to be saved in `/tmp/cluster-logs` on the central host.

Note – Specify a directory that is local to the central host rather than an NFS-mounted directory. This avoids unnecessary network traffic and results in faster execution of the operation.

The -g option causes files ctact.pass$$ and ctact.fail$$ to be created on the central host in /var/sadm/system/logs/hpc/nodelists. ctact.pass$$ lists the cluster nodes on which software activation was successful and ctact.fail$$ lists the nodes on which activation was unsuccessful. The $$ symbol is replaced by the process number associated with the activation.

These generated node list files can then be used for command retries or in subsequent operations using the -N switch.

Activating the Local Node

This section shows an example of software activation on the local node.

▼ To Activate Locally

CODE EXAMPLE 3-11

```
# ./ctact -l
```

CODE EXAMPLE 3-11 activates the software on the local node.

Deactivating Sun HPC ClusterTools Software

Use the ctdeact command to deactivate Sun HPC ClusterTools software on cluster nodes.

ctdeact Options

See TABLE 3-3 for a summary of the ctdeact options.

TABLE 3-3 ctdeact Options

Options	Description
General	
-h	Command help.
-l	Execute the command on the local node only.

TABLE 3-3 `ctdeact` Options *(Continued)*

Options	Description
–R	Specify the full path to be used as the root path.
–x	Turn on command debug at the specified nodes.
Centralized Operations Only	
–g	Generate node lists of successful and unsuccessful deactivation.
–k	Specify a central location for storing copies of local log files.
–n	List of nodes targeted for deactivation. Separate names by comma.
–N	File containing list of nodes to be deactivated. One node per line.
–r	Remote connection method: rsh, ssh, or telnet.
–S	Specify full path to an alternate ssh executable.

Deactivating Software From a Central Host

This section shows examples of software deactivation in which the `ctdeact` command is initiated from a central host.

▼ To Deactivate Specified Cluster Nodes in a Non-NFS Configuration

CODE EXAMPLE 3-12

```
# ./ctdeact –N /tmp/nodelist –r rsh
```

CODE EXAMPLE 3-12 deactivates the software on the nodes listed in `/tmp/nodelist`. The remote connection method is rsh.

▼ To Deactivate Cluster Nodes and Create Log Files

CODE EXAMPLE 3-13

```
# ./ctdeact –N /tmp/nodelist –r rsh –k /tmp/cluster-logs –g
```

CODE EXAMPLE 3-13 is the same as CODE EXAMPLE 3-12, except it specifies the options –k and –g.

In this example, the –k option causes the local log files of all specified nodes to be saved in `/tmp/cluster-logs` on the central host.

> **Note –** Specify a directory that is local to the central host rather than an NFS-mounted directory. This will avoid unnecessary network traffic in the transfer of log files and will result in faster execution of the operation.

The –g option causes files ctdeact.pass$$ and ctdeact.fail$$ to be created on the central host. ctdeact.pass$$ lists the cluster nodes where software deactivation was successful. ctdeact.fail$$ lists the nodes where deactivation was unsuccessful. The $$ symbol is replaced by the process number associated with the software deactivation.

These generated node list files can then be used for command retries or in subsequent operations using the –N switch.

Deactivating the Local Node

This section shows software deactivation on the local node.

▼ To Deactivate Locally

CODE EXAMPLE 3-14

```
# ./ctdeact –l
```

CODE EXAMPLE 3-14 deactivates the software on the local node.

Removing Sun HPC ClusterTools Software

Use the ctremove command to remove Sun HPC ClusterTools software from cluster nodes.

ctremove Options

See TABLE 3-4 for a summary of the ctremove options.

Note – If the nodes are active at the time ctremove is initiated, they will be deactivated automatically before the removal process begins.

TABLE 3-4   ctremove Options

Options	Description
General	
–h	Command help.
–l	Execute the command on the local node only.
–R	Specify the full path to be used as the root path.
–x	Turn on command debug at the specified nodes.
Command Specific	
–p	List of packages to be selectively removed. Separate names by comma.
-c	Specify that you are removing Sun HPC ClusterTools 7.1 from the NFS client node.
Centralized Operations Only	
–g	Generate node lists of successful and unsuccessful removals.
–k	Specify a central location for storing copies of local log files.
–n	List of nodes targeted for removal. Separate names by comma.
–N	File containing list of nodes targeted for removal. One node per line.
-r	Remote connection method: rsh, ssh, or telnet.
–S	Specify full path to an alternate ssh executable.

Removing Nodes From a Central Host

This section shows examples of software removal in which the ctremove command is initiated from a central host.

▼ To Remove Software From Specified Cluster Nodes in a Non-NFS Configuration

CODE EXAMPLE 3-15

```
# ./ctremove -N /tmp/nodelist -r rsh
```

CODE EXAMPLE 3-15 removes the software from the nodes listed in /tmp/nodelist. The remote connection method is rsh.

▼ To Remove the Software and Generate Log Files

CODE EXAMPLE 3-16

```
# ./ctremove -N /tmp/nodelist -r rsh -k /tmp/cluster-logs -g
```

CODE EXAMPLE 3-16 is the same as CODE EXAMPLE 3-15, except it specifies the options –k and –g.

▼ To Remove Specified Software Packages

CODE EXAMPLE 3-17

```
# ./ctremove -N /tmp/nodelist -r rsh -p SUNWompi,SUNWompimn
```

CODE EXAMPLE 3-17 removes the packages SUNWompi and SUNWompimn from the nodes listed in /tmp/nodelist. The remote connection method is rsh.

Removing Software From the Local Node

This section shows software removal from the local node.

▼ To Remove Software Locally

CODE EXAMPLE 3-18

```
# ./ctremove -l
```

CODE EXAMPLE 3-18 deactivates the software on the local node.

▼ To Remove Specified Software Packages

CODE EXAMPLE 3-19

```
# ./ctremove -l -p SUNWompi,SUNWompimn
```

CODE EXAMPLE 3-19 removes the packages SUNWompi and SUNWompimn from the local node.

Installing the Software in an NFS Configuration

This chapter contains the following sections:

Overview

The following is a summary of the basic operations involved in installing Sun HPC ClusterTools software in an NFS client/server configuration:

- Before you use an NFS server to install Sun HPC ClusterTools 7.1 software on the nodes in your cluster, you must increase the number of concurrent server requests allowed.
- Use the `ctnfssvr` command to install the Sun HPC ClusterTools software packages on the NFS server and to enable the Sun HPC ClusterTools software.
- Export the file system on which you installed the Sun HPC ClusterTools software so that the client nodes can access the shared file system.
- Once the NFS server has been set up and the file system has been made accessible, you can install the Sun HPC ClusterTools software on the client nodes. For more information about the client setup, see "Installing the Client Software in an NFS Configuration" on page 35.

About the Software CLI Utilities

You configure the Sun HPC ClusterTools software using the CLI utilities:

- `ctinstall` – Install the software on the cluster nodes.
- `ctact` – Activate the software on the cluster nodes.
- `ctdeact` – Deactivate the software on the cluster nodes.
- `ctremove` – Remove the software from the cluster nodes.

The procedures in this chapter show how to install Sun HPC ClusterTools software in an NFS configuration. For information about how to install the software in a non-NFS configuration, see Chapter 3.

Adjusting Server Requests for NFS Installations

▼ To Set Up Installation From a Server Running Solaris 9 Software

For installations from an NFS server, increase the number of concurrent server requests allowed from 16 to 256.

1. **Change the relevant line in** `/etc/default/nfs` **and restart the NFS server:**

```
if [$startnfsd -ne 0];
then
    /usr/lib/nfs/mountd
    /usr/lib/nfs/nfsd -a 256
fi
```

2. **Restart the NFS server daemon.**

▼ To Set Up Installation From a Server Running Solaris 10 Software

Note – This procedure applies to both SPARC- and AMD Opteron-based servers.

1. **Open the** `/etc/default/nfs` **file in a text editor.**

2. **Change the value for NFSD_SERVER in the file from 16 to 256. the portion of the file that you edit looks like the following:**

```
# Maximum number of concurrent NFS requests.
# Equivalent to last numeric argument on nfsd command line.
NFSD_SERVERS=16
```

Installing the Sun HPC ClusterTools Software Packages on an NFS Server

Use the `ctnfssvr` command to install the Sun HPC ClusterTools software packages on the NFS server and to enable the Sun HPC ClusterTools software.

Note – You can set up the server and clients in any order, but the Sun HPC ClusterTools software cannot be activated until the NFS server is installed and the shared file system has been exported.

See TABLE 4-1 for a summary of the `ctnfssvr` options.

TABLE 4-1   `ctnfssvr` Options

Options	Description
Operations	
`-i`	Install packages. The following options can be used only with `-i`.
	`-d` Specify a non-default *install from* location. The default is *distribution*/`Product`, relative to the directory where `ctnfssvr` is invoked.
	`-t` Specify a non-default *install to* location. The default is `/export`.
`-r`	Remove the packages.

TABLE 4-1 `ctnfssvr` Options *(Continued)*

Options	Description
Other	
–h	Command help.
–x	Turn on command debug mode.

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

▼ To Install the Software on the NFS Server

CODE EXAMPLE 4-1

```
# ./ctnfssvr –i
```

sets up the NFS server and installs the packages from the Sun HPC ClusterTools software suite. However, the NFS server has not been enabled to service Sun HPC ClusterTools software requests from the NFS clients (that is, the cluster nodes).

Exporting the Shared File System

After you have installed the Sun HPC ClusterTools software on the NFS server, you need to make the file system on which you installed the software available to the client nodes.

▼ To Export the Shared File System

● **Type the following command:**

```
% share /export/SUNWhpc/HPC7.1
```

If you installed the software in a location other than the default (`/opt/SUNWhpc/HPC7.1`), then specify the path to the file system where you installed the Sun HPC ClusterTools software in place of the default path.

Special Note for Installing Sun HPC ClusterTools Software in an NFS Configuration

When you want to install or activate Sun HPC ClusterTools 7.1 software in an NFS configuration, you must ensure that `ctinstall` and the other CLI commands are available to all nodes on the shared mount point. The `ctinstall -c` command is able to locate the shared mount point on the NFS server (see CODE EXAMPLE 4-2). `ctinstall` ensures that you have access to the activation tools by mounting the correct directory in `/opt/SUNWhpc/HPC7.1`.

This means that your mount point can be any location *except* `/opt/SUNWhpc/HPC7.1`.

You can do this in either of the following ways:

■ Use the activation tool under the NFS mount point on an NFS client:

```
mount_point/*/SUNWhpc/HPC7.1/bin/Install_Utilities/bin
```

■ Or, explicitly mount the directory in which `SUNWhpc` is installed. For example, if `SUNWhpc` is installed in `/export`, enter the following on an NFS client:

```
# mount server:/export mount_point
```

Installing the Client Software in an NFS Configuration

Use the `ctinstall` command to install Sun HPC ClusterTools software on cluster nodes. See TABLE 4-2 for a summary of the `ctinstall` options.

TABLE 4-2 `ctinstall` Options

Options	Description
General	
–h	Command help.
–l	Execute the command on the local node only.
–R	Specify the full path to be used as the root path.
–x	Turn on command debug at the specified nodes.

TABLE 4-2 `ctinstall` Options *(Continued)*

Options	Description
Command Specific	
−a	Activate automatically after installation completes.
-c	Specify the server and mount path for the software if you are performing an NFS installation.
−d	Specify a non-default *install from* location. The default is *distribution*/`Product`, relative to the directory where `ctinstall` is invoked.
−p	List of packages to be installed. Separate names by comma.
−t	Specify a nondefault *install to* location. The default is `/opt`.
Centralized Operations Only	
−g	Generate node lists of successful and unsuccessful installations.
−k	Specify a central location for storing log files of all specified nodes.
−n	List of nodes targeted for installation. Separate names by comma.
−N	File containing list of nodes targeted for installation. One node per line.
-r	Remote connection method: `rsh`, `ssh`, or `telnet`.
−S	Specify full path to an alternate `ssh` executable.

Installing the Client Software From a Central Host

This section shows examples of software installations in which the `ctinstall` command is initiated from a central host in an NFS configuration.

Note – Sun HPC ClusterTools 7.1 software is ready to run after installation and does not need to be activated. However, if you also have Sun HPC ClusterTools 6 software installed on your system and intend to run both versions, you do need to perform the activation step or install with automatic activation.

▼ To Install the Client Software Without Activating

CODE EXAMPLE 4-2

```
# ./ctinstall -c myserver:/export/SUNWhpc/HPC7.1
-n node1,node2 -r rsh
```

CODE EXAMPLE 4-2 is the same as CODE EXAMPLE 3-1, except that node1 and node2 are NFS client nodes. The -c option specifies the server and mount path for the installation. If the NFS server is to be used as a cluster node, run this command on it as well.

Use ctnfssvr to set up the NFS server and install the packages on it.

▼ To Install and Activate Automatically

CODE EXAMPLE 4-3

```
# ./ctinstall -c myserver:/export/SUNWhpc/HPC7.1
-n node1,node2 -r rsh -a
```

CODE EXAMPLE 4-3 is the same as CODE EXAMPLE 4-2, except it includes the option -a, which causes the software to be activated automatically.

Note – Since this command activates the software on NFS client nodes as soon as the installation completes, the NFS server must be properly installed and enabled before this operation is performed. See "Installing the Sun HPC ClusterTools Software Packages on an NFS Server" on page 33 for details on NFS server setup.

Installing Software Locally in NFS Configurations

This section shows examples of software installations in which the ctinstall command is initiated on the local node in NFS configurations.

▼ To Install Locally Without Activating

CODE EXAMPLE 4-4

```
# ./ctinstall -c myserver:/export/SUNWhpc/HPC7.1 -l
```

CODE EXAMPLE 4-4 installs the Sun HPC ClusterTools software packages on the local node.

▼ To Install Locally and Activate Automatically

Note – The NFS server must be installed and enabled before you can perform this step. For more information, see "Installing the Client Software From a Central Host" on page 36.

CODE EXAMPLE 4-5

```
# ./ctinstall -c myserver:/export/SUNWhpc/HPC7.1 -l -a
```

CODE EXAMPLE 4-5 is the same as CODE EXAMPLE 4-4, except the software is activated as soon as the installation completes.

For more information about activating Sun HPC ClusterTools software, see the following section.

Activating Sun HPC ClusterTools Software

In Sun HPC ClusterTools 7.1 software, the activation step sets up symbolic links to the program binaries. These symbolic links are convenient, but not required. If you are running Sun HPC ClusterTools 7.1 only, you may skip the activation step and run Sun HPC ClusterTools 7.1 software from the directory in which it is installed (by default `/opt/SUNWhpc/HPC7.1/bin`).

However, Sun HPC ClusterTools 6 must be activated after installation. In Sun HPC ClusterTools 6, the activation step sets up the symbolic links and starts the daemons. If you are using both Sun HPC ClusterTools 6 and 7, you must activate the Sun HPC ClusterTools 6 software in order to use it.

Use the `ctact` command to activate Sun HPC ClusterTools software on cluster nodes. See TABLE 4-3 for a summary of the `ctact` options.

Note – The general options and options specific to centralized operations serve essentially the same role for ctact as for ctinstall. Consequently, fewer examples are used to illustrate ctact than were used for ctinstall.

TABLE 4-3 ctact Options

Options	Description
General	
–h	Command help.
–l	Execute the command on the local node only.
–R	Specify the full path to be used as the root path.
–x	Turn on command debug at the specified nodes.
Command Specific	
–c	Specify that you are activating on an NFS client node.
Centralized Operations Only	
–g	Generate node lists of successful and unsuccessful activation.
–k	Specify a central location for storing copies of local log files.
–n	List of nodes targeted for activation. Separate names by comma.
–N	File containing list of nodes targeted for activation. One node per line.
–r	Remote connection method: rsh, ssh, or telnet.
–S	Specify full path to an alternate ssh executable.

Activating Nodes From a Central Host

This section shows examples of software activation in which the ctact command is initiated from a central host.

▼ To Activate the Client Software From a Central Host

CODE EXAMPLE 4-6

```
# ./ctact -c myserver:/export/SUNWhpc/HPC7.1
-n node1,node2 -r rsh
```

Activating Nodes Locally

▼ To Activate the Client Software Locally

CODE EXAMPLE 4-7

```
# ./ctact -c myserver:/export/SUNWhpc/HPC7.1 -l
```

CODE EXAMPLE 4-7 activates the Sun HPC ClusterTools software packages on the local node.

Deactivating Sun HPC ClusterTools Software

Use the `ctdeact` command to deactivate Sun HPC ClusterTools software on cluster nodes. See TABLE 4-4 for a summary of the `ctdeact` options.

TABLE 4-4 `ctdeact` Options

Options	Description
General	
-h	Command help.
-l	Execute the command on the local node only.
-R	Specify the full path to be used as the root path.
-x	Turn on command debug at the specified nodes.
Centralized Operations Only	
-g	Generate node lists of successful and unsuccessful deactivation.
-k	Specify a central location for storing copies of local log files.

Options	Description
-n	List of nodes targeted for deactivation. Separate names by comma.
-N	File containing list of nodes to be deactivated. One node per line.
-r	Remote connection method: rsh, ssh, or telnet.
-S	Specify full path to an alternate ssh executable.

TABLE 4-4 ctdeact Options *(Continued)*

Deactivating Software From a Central Host

This section shows examples of software deactivation in which the ctdeact command is initiated from a central host.

▼ To Deactivate Specified Cluster Nodes in an NFS Configuration

CODE EXAMPLE 4-8

```
# ./ctdeact  -n node1,node2 -r rsh
```

CODE EXAMPLE 4-8 deactivates the software on the nodes node1 and node2 from the central server.

Deactivating Software Locally

▼ To Deactivate Software on the Local Node

CODE EXAMPLE 4-9

```
# ./ctdeact -l
```

CODE EXAMPLE 4-9 deactivates the software on the local node.

Removing Sun HPC ClusterTools Software

Use the `ctremove` command to remove Sun HPC ClusterTools software from cluster nodes. See TABLE 4-5 for a summary of the `ctremove` options.

Note – If the nodes are active at the time `ctremove` is initiated, they will be deactivated automatically before the removal process begins.

TABLE 4-5 `ctremove` Options

Options	Description
General	
–h	Command help.
–l	Execute the command on the local node only.
–R	Specify the full path to be used as the root path.
–x	Turn on command debug at the specified nodes.
Command Specific	
–p	List of packages to be selectively removed. Separate names by comma.
–c	Specify that you are removing Sun HPC ClusterTools 7.1 from the NFS client node.
Centralized Operations Only	
–g	Generate node lists of successful and unsuccessful removals.
–k	Specify a central location for storing copies of local log files.
–n	List of nodes targeted for removal. Separate names by comma.
–N	File containing list of nodes targeted for removal. One node per line.
–r	Remote connection method: `rsh`, `ssh`, or `telnet`.
–S	Specify full path to an alternate `ssh` executable.

Removing Client Nodes From a Central Host

This section shows examples of software removal in which the `ctremove` command is initiated from a central host.

▼ To Remove Software From Specified Cluster Nodes in an NFS Configuration

CODE EXAMPLE 4-10 removes the software from nodes `node1` and `node2` from the server `myserver`. In this example, `telnet` is the connection type.

CODE EXAMPLE 4-10

```
# ./ctremove -c -n node1,node2 -r telnet
```

Note – The `ctremove` command unmounts the nodes from the mount point, but it does not unshare the shared file system.

▼ To Unshare the Shared File System

● **Type the following command:**

```
# unshare /export/SUNWhpc/HPC7.1
```

If you installed the Sun HPC ClusterTools 7.1 software to a location other than the default, then substitute the path to the file system where you installed the Sun HPC ClusterTools software for `/export/SUNWhpc/HPC7.1`.

Removing the Server Software

▼ To Remove Software From the NFS Server

CODE EXAMPLE 4-11

```
# ./ctnfssvr -r
```

CODE EXAMPLE 4-11 removes all NFS server software.

Additional Steps

This chapter describes the final steps needed to get your Sun HPC system ready for use after the software has been activated.

Enabling Close Integration With Batch Processing Systems

Open Run-Time Environment (ORTE) provides close integration with several distributed resource management (DRM) systems, such as Sun Grid Engine. For information on how close integration works and how to set up the integration for each of the supported resource managers, refer to the *Sun HPC ClusterTools Software Administrator's Guide*.

The *Sun HPC ClusterTools 7.1 Software Migration Guide* contains information about how to set up close integration with Sun Grid Engine.

APPENDIX **A**

Packages

The following is the package breakdown for the Sun HPC ClusterTools 7.1 (Open MPI) release.

TABLE A-1   Packages in the Sun HPC ClusterTools 7.1 Installation

Package Name	Contents
SUNWompi	Open MPI Message Passing Interface files
SUNWompiat	Open MPI installer utilities
SUNWompimn	Open MPI Message Passing Interface man pages
SUNWomsc	Extra package to include miscellaneous files

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