

# Sun HPC ClusterTools™ 8.2.1c Software

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## Installation Guide



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# Preface

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This document describes the standard procedure for installing Sun HPC ClusterTools™ 8.2.1c software. These instructions are intended for experienced system administrators who know how to perform the following tasks in the Solaris™ 10 Operating System (OS) or Red Hat or SUSE Linux:

- 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

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## 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 8.2.1c 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™ Grid Engine software.

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# How This Book Is Organized

Chapter 1 provides a few notes about the installation process.

Chapter 2 explains how to install and verify Sun HPC ClusterTools software on nodes running the Solaris OS.

Chapter 3 explains how to install and verify Sun HPC ClusterTools software on nodes running a Linux-based OS.

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# Using UNIX Commands

This document might not contain information on basic UNIX<sup>®</sup> 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 OS documentation, which is at:

<http://docs.sun.com>

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# Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

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# Related Documentation

Application	Title	Part Number
Sun HPC ClusterTools Software	<i>Sun HPC ClusterTools 8.2.1c Software Release Notes</i>	821-1317-10
	<i>Sun HPC ClusterTools 8.2.1c Software User's Guide</i>	821-1319-10

The Sun HPC ClusterTools documentation is available online at:

<http://www.sun.com/documentation>

For more information about the Sun HPC ClusterTools software, see the related Web site at:

<http://www.sun.com/clustertools>

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>

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# Documentation, Support, and Training

The Sun web site provides information about the following additional resources:

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- Support (<http://www.sun.com/support>)
- Training (<http://www.sun.com/training>)

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*Sun HPC ClusterTools 8.2.1c Software Installation Guide*, part number 821-1318-10.



## Preliminary Notes

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This chapter provides information you should understand before proceeding with the rest of the manual. It consists of the following sections:

- “Reference to Quick Installation Instructions” on page 1
- “General Prerequisites” on page 2
- “Notes on the Standard Software Installation Procedures” on page 2
- “Supported Compilers” on page 3
- “Cluster Console Tools” on page 3

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## Reference to Quick Installation Instructions

The standard installation procedures described in this manual require superuser (root) privileges.

You can bypass the superuser requirement by following the lighter weight procedure described in the *Sun HPC ClusterTools 8.2.1c Quick Installation Guide*. The alternative procedure involves simply unpacking a tarball that contains the HPC ClusterTools software and locating the extracted files by hand.

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**Note** – You should use the standard installation tools if you want the system’s package management system to be able to identify or otherwise manage the software.

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The *Sun HPC ClusterTools 8.2.1c Quick Installation Guide* is a text file that is part of the documentation tarball located on the software download site:

<http://www.sun.com/clustertools>

# General Prerequisites

TABLE 1-1 provides a summary of the conditions that must be satisfied to allow a successful installation of the Sun HPC ClusterTools software.

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

Description	Requirement
Hardware	Sun UltraSPARC III or x64-based systems. For Sun UltraSPARC systems, the minimum compatible processor is the UltraSPARC III.
Disk space	Approximately 50-105 Mbytes per node.
Operating system	<ul style="list-style-type: none"><li>• Solaris 10 11/06 or any subsequent Solaris release that supports Sun HPC ClusterTools 8.2.1c software.</li><li>• Red Hat (RHEL) 5</li><li>• SUSE (SLES) 10</li><li>• CentOS 5.3</li></ul>
Installation host	Must have <code>rsh</code> , <code>ssh</code> , or <code>telnet</code> connections to the target nodes.

## Notes on the Standard Software Installation Procedures

There are two standard software installation procedures described in this manual:

- [Chapter 2](#) explains how to install and remove HPC ClusterTools software on nodes running the Solaris OS. These operations employ the HPC ClusterTools utilities `ctinstall` and `ctremove`.
- [Chapter 3](#) explains how to install and configure RPM packages on nodes running a supported Linux OS.

The default path used for installing for the Sun HPC ClusterTools software depends on the node's OS environment and, for nodes running the Linux OS, which compiler version was used. The following list identifies the current default paths:

- Solaris OS: `/opt/SUNWhpc/HPC8.2.1c/sun/bin`
- Linux OS:
  - `/opt/SUNWhpc/HPC8.2.1c/gnu/bin` for the GNU compiled version

- `/opt/SUNWhpc/HPC8.2.1c/sun/bin` for the Sun Studio compiled version
- `/opt/SUNWhpc/HPC8.2.1c/pgi/bin` for the PGI compiled version
- `/opt/SUNWhpc/HPC8.2.1c/intel/bin` for the Intel compiled version
- `/opt/SUNWhpc/HPC8.2.1c/pathscale/bin` for the Pathscale compiled version

You can have different versions of HPC ClusterTools software installed on the same node, so long as they are installed in different locations.

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**Note** – If you want to use Sun HPC ClusterTools software that is in a non-standard location, use the `OPAL_PREFIX` environment variable to specify its non-default path.

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## Supported Compilers

Sun HPC ClusterTools 8.2.1c software supports the following compilers:

- Red Hat Linux versions 5 (RHEL)
- SUSE Linux versions 10 (SLES)
- CentOS 5.3 Linux
- Sun Studio 10, 11, 12, and 12 U1 C, C++, and Fortran compilers
- gcc Linux compiler versions 3.3.3, 3.4.6, and 4.1.2
- Intel 11.0 20081105 compiler
- PGI 7.1-4 compiler
- Pathscale 3.2 compiler

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## 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.

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## 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 8.2.1c Software User's Guide* contains information about how to set up close integration with Sun Grid Engine.

# Installing the Software on Nodes Running the Solaris OS

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This chapter explains how to install Sun HPC ClusterTools software on systems running the Solaris OS using the installation utilities supplied with the HPC ClusterTools software. For information about how to install Sun HPC ClusterTools software on a Linux-based system, see [Chapter 3](#).

This chapter contains the following topics:

- [“Recommendations for Installing Sun HPC ClusterTools 8.2.1c Software on Large Cluster Installations” on page 5](#)
- [“Downloading and Extracting the Software” on page 7](#)
- [“Installing the Software” on page 8](#)
- [“Verifying the Software Installation” on page 13](#)
- [“Sun HPC ClusterTools 8.2.1c Installation Log Files” on page 14](#)
- [“Removing Previously Installed Sun HPC ClusterTools Software” on page 15](#)

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## Recommendations for Installing Sun HPC ClusterTools 8.2.1c Software on Large Cluster Installations

The following are tips for installing Sun HPC ClusterTools 8.2.1c software on clusters containing hundreds of nodes using the centralized method:

- Minimize other system activity during installation – Invoking installation of Sun HPC ClusterTools 8.2.1c 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.

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**Note –** If you use `rsh` connections to install or remove software packages on hundreds of nodes at a time, system resource limitations may prevent some node connections from being established. 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.

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**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.

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# Downloading and Extracting the Software

Before you can install and configure the software, you must download the correct software archive for your hardware platform and then 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.

## ▼ Download and Extract the Software

The following procedure downloads Sun HPC ClusterTools 8.2.1c software to a standard location and prepares it for installation by the `ctinstall` utility.

1. **Boot the cluster nodes.**
2. **Download and extract the archive file containing the Sun HPC ClusterTools software to a location that is visible to all the nodes in the cluster.**

If you download the file to a shared file system, ensure that the following conditions are met:

  - a. **All compute and administrative nodes have access to the shared file system.**
  - b. **The file system is readable by superuser and accessible through a common path from all nodes.**

For centralized installations, these conditions must be met on the central host as well.

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

<http://www.sun.com/clustertools>

3. **Log in as superuser on the system from which you will execute the ClusterTools installation utilities.**
4. **Change directory to one of the following locations:**
  - a. **If you are installing the software on a SPARC-based system, change directory to:**  
`sun-hpc-ct8.2.1c-sparc/Product/Install_Uilities/bin`
  - b. **If you are installing on an x64-based system, change directory to:**  
`sun-hpc-ct8.2.1c-i386/Product/Install_Uilities/bin`

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# Installing the Software

Use the `ctinstall` command to install Sun HPC ClusterTools software. See [TABLE 2-1](#) for a summary of the `ctinstall` options.

**TABLE 2-1** `ctinstall` Options

Options	Description
<b>General</b>	
-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.
<b>Specific to Command</b>	
-c	Specify the server and mount path for the software.
-d	Specify a non-default <i>install from</i> location. The default is <i>distribution/Product</i> , relative to the directory where <code>ctinstall</code> is invoked.
-p	List of packages to be installed. Separate names by comma.
-t	Specify a nondefault <i>install to</i> location. The default is <i>/opt</i> .
<b>Centralized Operations Only</b>	
-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: <code>rsh</code> , <code>ssh</code> , or <code>telnet</code> .
-S	Specify full path to an alternate <code>ssh</code> 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.

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# Installation Location Notes

By default, `ctinstall` installs the software into `/opt/SUNWhpc/HPC8.2.1c/compiler`. You can use the `-t` switch on the `ctinstall` command line to install the software into another location. The path you specify with the `-t` switch will replace the `/opt` portion of the default path.

For example, the following command line will cause the software to be installed on the local node in a location whose pathname that begins with `/usr/mpi`:

```
# ./ctinstall -l -t /usr/mpi
```

The full pathname of the non-standard installation locations is `/usr/mpi/SUNWhpc/HPC8.2.1c/compiler`.

To use this path, you must set both the `PATH` and `OPAL_PREFIX` variables and specify the appropriate compiler name in place of `compiler`. In the following example, a Sun Studio compiled version of the software is being installed.

```
# setenv PATH OPAL_PREFIX /usr/mpi/SUNWhpc/HPC8.2.1c/sun
# setenv PATH $(OPAL_PREFIX)/bin:$(PATH)
```

## Local Versus Centralized Command Initiation

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

- **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.
- **Local** – Initiate commands directly on the node you are logged into. The effects of the command are restricted to the local node.

---

**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 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.

## Central Host Command Examples

This section shows examples of HPC ClusterTools software being installed from a central host.

### To Install From a Central Host Using `rsh`

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

This command 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 `ssh`. This requires a trusted hosts setup.

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

### To Install From a Central Host Using `ssh`

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

This example is the same as that in the previous section, 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

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

This command 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 the above example

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

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

The command in this section is the same as that shown in the previous section, except that 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 (for example, `/tmp`). This will avoid unnecessary network traffic in the transfer of log files and will result in faster execution of the operation.

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# Local Installation Command Examples

This section shows examples of HPC ClusterTools software being installed on the local node.

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**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 Locally

```
# ./ctinstall -l
```

This command installs the full Sun HPC ClusterTools software suite on the local node only.

## To Install Specified Software Packages Locally

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

The command in this section installs the packages `SUNWompi` and `SUNWompimn` on the local node.

[“Solaris OS Packages” on page 13](#) lists the packages in the Sun HPC ClusterTools 8.2.1c installation.

## Installing Specified Software Packages

The following command installs only the specified software packages.

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

This command 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`.

[“Solaris OS Packages” on page 13](#) lists the packages in the Sun HPC ClusterTools 8.2.1c installation.

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

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

This command 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`.

## Solaris OS Packages

The following is the Solaris OS package breakdown for the Sun HPC ClusterTools 8.2.1c (Open MPI) release.

**TABLE 2-2** Solaris OS Packages in the Sun HPC ClusterTools 8.2.1c 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
SUNWompir	Open MPI Root Filesystems files

---

## Verifying the Software Installation

You can verify that the software is installed properly by launching a simple non-MPI parallel job using `mpirun`. In the following example, *hostname* is the name of the system on which the RPM packages were installed:

```
% /opt/SUNWhpc/HPC8.2.1c/bin/mpirun hostname
```

---

# Sun HPC ClusterTools 8.2.1c Installation Log Files

The Sun HPC ClusterTools 8.2.1c 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`

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 8.2.1c 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.

# Removing Previously Installed Sun HPC ClusterTools Software

This section describes how to remove Sun HPC ClusterTools software using the `ctremove` utility. See Table 1 for a summary of the `ctremove` options.

TABLE 2-3 `ctremove` Options

Options	Description
<b>General</b>	
-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.
<b>Specific to Command</b>	
-p	List of packages to be selectively removed. Separate names by comma.
<b>Centralized Operations Only</b>	
-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: <code>rsh</code> , <code>ssh</code> , or <code>telnet</code> .
-S	Specify full path to an alternate <code>ssh</code> executable.

## General Example of `ctremove` Command

This section shows the basic steps involved in removing Sun HPC ClusterTools software from one or more platforms.

```
# cd $INSTALL_LOC/SUNwhpc/HPC8.2.1c/bin/Install_Uilities/bin
# ctmremove options
```

`$INSTALL_LOC` is the location of the software that will be removed.

---

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

---

## Removing Nodes From a Central Host

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

---

**Note** – If you use `rsh` connections to install or remove software packages on hundreds of nodes at a time, system resource limitations may prevent some node connections from being established. 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.

---

### ▼ Remove the Software From Specified Nodes

- Use the `-N` option to specify a file containing a list of nodes to be removed and the `-r` option to specify the remote connection method.

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

This command removes the software from the nodes listed in `/tmp/nodelist`. The remote connection method is `rsh`.

### ▼ Remove the Software From Specified Nodes and Generate Log Files

- Use the `-k` option to direct log files to a central location and the `-g` option to generate lists of successful and unsuccessful node removals.

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

This command example is the same as the in the previous section, except that it specifies the options `-k` and `-g` in addition to `-N` and `-r`.



## ▼ Remove Specified Software Packages

- Use the `-p` option to specify a list of packages to be removed.

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

This command 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 examples of software removal from a local node.

### ▼ Remove Software Locally

- Use the `-l` option to remove the software from the node on which the command is run.

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

### ▼ Remove Specified Software Packages From the Local Node

- Use the `-p` option to specify a list of packages to be removed. When used with the `-l` option, the packages are removed only from the local node.

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



# Installing the Software on Nodes Running the Linux OS

---

This chapter includes the following sections:

- “Supported Linux Versions” on page 19
- “Unpacking the Linux Packages” on page 20
- “Installing the RPM Packages” on page 21
- “Verifying the Software Installation” on page 22

---

## Supported Linux Versions

Sun HPC ClusterTools 8.2.1c software supports Red Hat Linux (RHEL) 5, SUSE Linux (SLES) version 10, and CentOS 5.3 Linux. The Linux packages are delivered in RPM and tarball format. Ten ClusterTools 8.2.1c RPMs are available and built with each of the following compilers:

- Sun Studio
- GNU (GCC)
- Intel
- Pathscale
- PGI compilers

For each compiler-specific RPM, an i386 (32-bit) and x86\_64 (64-bit) RPM is available. The file names of the RPMs are listed below. The <x> component represents the build number of the most recent build of the software:

- `ClusterTools_gnu-8.2.1c-<x>.i386.rpm`
- `ClusterTools_gnu-8.2.1c-<x>.x86_64.rpm`
- `ClusterTools_intel-8.2.1c-<x>.i386.rpm`

- ClusterTools\_intel-8.2.1c-<x>.x86\_64.rpm
  - ClusterTools\_sun-8.2.1c-<x>.i386.rpm
  - ClusterTools\_sun-8.2.1c-<x>.x86\_64.rpm
  - ClusterTools\_pathscale-8.2.1c-<x>.i386.rpm
  - ClusterTools\_pathscale-8.2.1c-<x>.x86\_64.rpm
  - ClusterTools\_pgi-8.2.1c-<x>.i386.rpm
  - ClusterTools\_pgi-8.2.1c-<x>.x86\_64.rpm
- 

## Unpacking the Linux Packages

In this example, the commands install the SUSE Linux version 9 package built with the Sun Studio 12 compiler. Substitute the file name of the Linux version you want to install for `ClusterTools-8.2.1c_compiler-name-x.x86_64.rpm`.

1. Create a scratch directory (called `$SCRATCH_DIR` in this example) on the system on which you are installing the ClusterTools 8.2.1c software.
2. Type the following commands to unpack the Linux packages, substituting the name of your scratch directory and the name of the Linux package you want to install.

```
# cd SunHPCClusterTools_8.2.1c/  
# cp sun-hpc-ct-8.2.1c-Linux-x86_64.tar.gz $SCRATCH_DIR  
# cd $SCRATCH_DIR  
# gunzip sun-hpc-ct-8.2.1c-Linux-x86_64.tar.gz  
# tar xf sun-hpc-ct-8.2.1c-Linux-x86_64.tar
```

---

## Installation Location Notes

By default, the software is installed into `/opt/SUNWhpc/HPC8.2.1c/compiler`. You can use the `--relocate` option on the `rpm --install` command line to install the software into another location.

For example, the following command line will cause the software to be installed into `/usr/mpi/clustertools8.2.1c/intel`:

```
# rpm --install --relocate=/opt/SUNWhpc/HPC8.2.1c/intel=  
/usr/mpi/clustertools8.2.1c/intel
```

To use this path, you must set both the `PATH` and `OPAL_PREFIX` variables. The following example uses the non-default path specified in the previous example:

```
# setenv PATH OPAL_PREFIX /usr/mpi/clustertools8.2.1c/intel
# setenv PATH $(OPAL_PREFIX)/bin:$(PWATH)
```

---

## Installing the RPM Packages

You need to install the RPM packages individually on each Linux node in your cluster. To facilitate the process, you might want to use a parallel SSH tool such as `cconsole`. For more information on `cconsole`, see [“Cluster Console Tools” on page 3](#).

Other parallel SSH tools include the following:

- `Mrxvt`
- `Konsole`
- `omnitty`
- `pssh`
- `taktuk`
- `dish`

The following example shows the commands you would type to install the ClusterTools 8.2.1c package (built with the Sun Studio compiler) for SUSE Linux version 9.

---

**Note** – You only need to use the `rpm --erase` command if you already have a previous version of Sun HPC ClusterTools software installed on the system.

---

```
# cd sun-hpc-ct-8.2.1c-Linux-x86_64/Product/Install_Uutilities/bin
# rpm --erase ClusterTools
# rpm --install ClusterTools-8.2.1c-23.x86_64-sles9-built-with-sun.rpm
```

---

## Verifying the Software Installation

You can verify that the software is installed properly by launching a simple non-MPI parallel job using `mpirun`. In the following example, *hostname* is the name of the system on which the RPM packages were installed:

```
% /opt/SUNWhpc/HPC8.2.1c/bin/mpirun hostname
```

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