Rational Software Corporation®

RATIONAL® CLEARCASE® LT

INSTALLATION GUIDE

UNIX EDITION

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the software development company

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This product includes software developed by Greg Stein <gstein@lyra.org> for use in the mod_dav module for Apache (http://www.webdav.org/mod_dav/).

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Preface

About This Manual

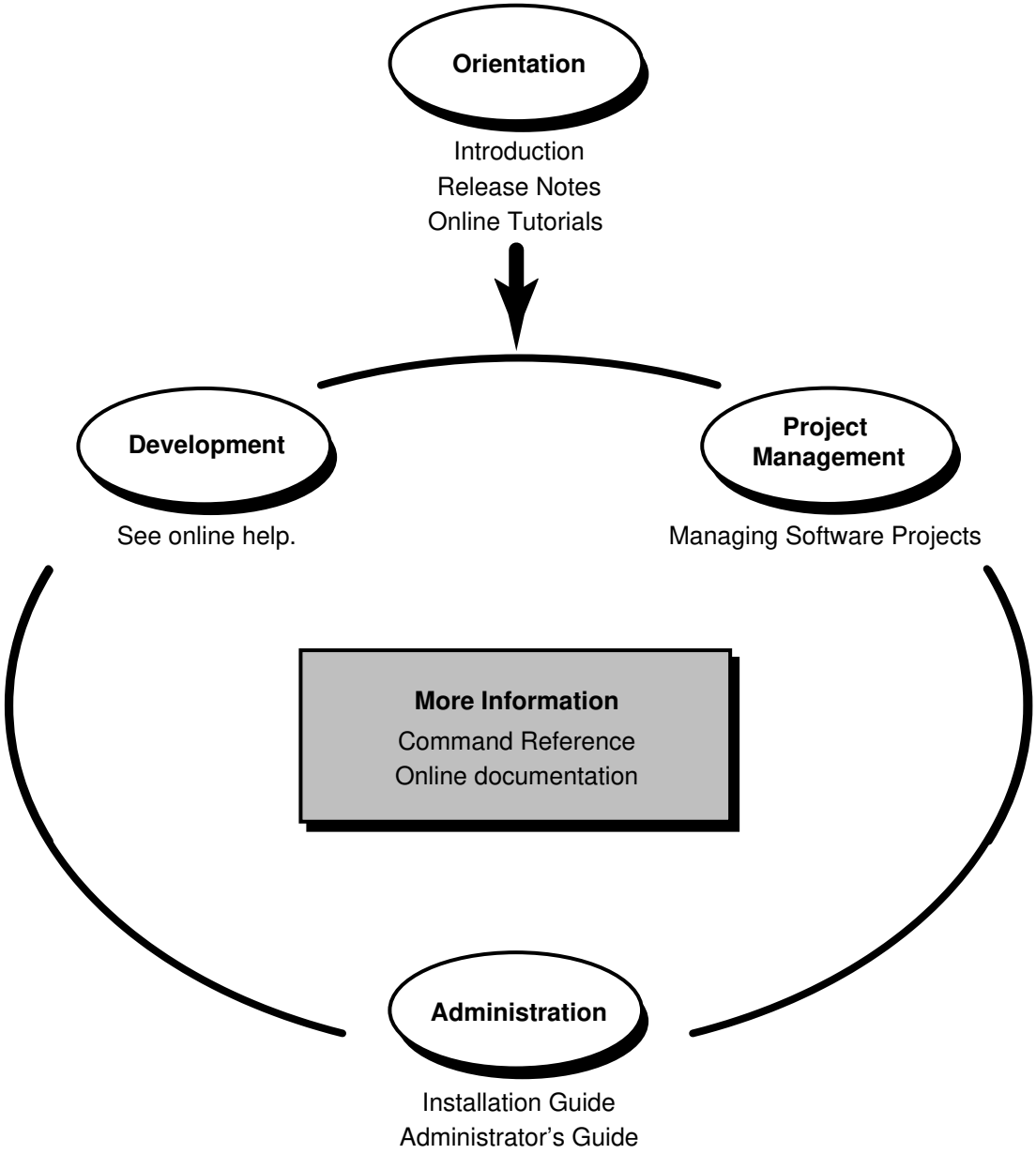
This manual provides detailed instructions for installing Rational ClearCase LT on UNIX computers.

The basic procedure for installing ClearCase LT includes these steps:

1. Copy the software from the release media (CD) to a networkwide release area.
2. Customize the release area with local settings.
3. Install and configure the FLEXlm license server, if needed.
4. Acquire license keys from Rational and install them on the FLEXlm server.
5. Designate a computer as the ClearCase LT server, and establish any other networkwide resources you'll need.
6. Install and configure the ClearCase LT server.
7. Install the ClearCase LT clients.

Chapter 1 explains steps 1 and 2 of this process. Chapter 2 explains steps 3 and 4. And Chapter 3 explains how to perform steps 5 through 7.

ClearCase LT Documentation Roadmap



Typographical Conventions

This manual uses the following typographical conventions:

- *ccase-home-dir* represents the directory into which the ClearCase Product Family has been installed. By default, this directory is **/usr/atria** on UNIX and **C:\Program Files\Rational\ClearCase** on Windows.
- *attache-home-dir* represents the directory into which ClearCase Attache has been installed. By default, this directory is **C:\Program Files\Rational\Attache**, except on Windows 3.*x*, where it is **C:\RATIONAL\ATTACHE**.
- **Bold** is used for names the user can enter; for example, all command names, file names, and branch names.
- *Italic* is used for variables, document titles, glossary terms, and emphasis.
- `A monospaced font` is used for examples. Where user input needs to be distinguished from program output, **bold** is used for user input.
- Nonprinting characters are in small caps and appear as follows: **<EOF>**, **<NL>**.
- Key names and key combinations are capitalized and appear as follows: SHIFT, CTRL+G.
- [ ] Brackets enclose optional items in format and syntax descriptions.
- { } Braces enclose a list from which you must choose an item in format and syntax descriptions.
- | A vertical bar separates items in a list of choices.
- ... In a syntax description, an ellipsis indicates you can repeat the preceding item or line one or more times. Otherwise, it can indicate omitted information.

  NOTE: In certain contexts, ClearCase recognizes "**...**" within a pathname as a wildcard, similar to "*" or "?". See the **wildcards_ccase** reference page for more information.
- If a command or option name has a short form, a "medial dot" (·) character indicates the shortest legal abbreviation. For example:

  lsc·heckout

  This means that you can truncate the command name to **lsc** or any of its intermediate spellings (**lsch**, **lsche**, **lschec**, and so on).

Online Documentation

The ClearCase graphical interface includes an online help system.

There are three basic ways to access the online help system: the **Help** menu, the **Help** button, or the F1 key. **Help > Contents** provides access to the complete set of ClearCase online documentation. For help on a particular context, press F1. Use the **Help** button on various dialog boxes to get information specific to that dialog box.

ClearCase also provides access to full "reference pages" (detailed descriptions of ClearCase commands, utilities, and data structures) with the **cleartool man** subcommand. Without any argument, **cleartool man** displays the **cleartool** overview reference page. Specifying a command name as an argument gives information about using the specified command. For example:

cleartool man	*(display the cleartool overview page)*
cleartool man man	*(display the cleartool man reference page)*
cleartool man checkout	*(display the cleartool checkout reference page)*

ClearCase's **–help** command option or **help** command displays individual subcommand syntax. Without any argument, **cleartool help** displays the syntax for all **cleartool** commands. **help checkout** and **checkout –help** are equivalent.

cleartool uncheckout –help

```
Usage: uncheckout | unco [-keep | -rm] [-cact | -cwork ] pname ...
```

Additionally, the online *ClearCase Tutorial* provides a step-by-step tour through ClearCase's most important features. To start the tutorial:

- On Windows, choose **Tutorial** in the appropriate ClearCase folder off the **Start** menu.
- On UNIX, type **hyperhelp cc_tut.hlp**.

Technical Support

If you have any problems with the software or documentation, please contact Rational Technical Support via telephone, fax, or electronic mail as described below. For information regarding support hours, languages spoken, or other support information, click the **Technical Support** link on the Rational Web site at **www.rational.com**.

Your Location	Telephone	Facsimile	Electronic Mail
North America	800-433-5444 toll free or 408-863-4000 Cupertino, CA	408-863-4194 Cupertino, CA 781-676-2460 Lexington, MA	**support@rational.com**
Europe, Middle East, and Africa	+31-(0)20-4546-200 Netherlands	+31-(0)20-4546-201 Netherlands	**support@europe.rational.com**
Asia Pacific	61-2-9419-0111 Australia	61-2-9419-0123 Australia	**support@apac.rational.com**

1 Preparing for Installation

Rational ClearCase LT is distributed as part of a merged *release area*, which includes executables for the ClearCase LT server, ClearCase LT clients, and FLEXlm license server software. This chapter presents both background information and detailed installation instructions for creating this release area on a host in your network and preparing for installation of ClearCase LT.

1.1 Selecting a Networkwide Release Host

One host in the network acts as the *release host*, accommodating a release area that provides online storage for the ClearCase LT distribution: executable files, configuration files, online documentation, and so on. This host is essentially a file server for ClearCase LT hosts during installation and, usually, during normal operation. When selecting a release host, choose a computer with these characteristics:

- Is highly available and infrequently rebooted
- Can provide fast file-system access
- Is accessible over the network to all ClearCase LT hosts

Because ClearCase LT does not need to run on the release host, you can select any computer that satisfies these requirements. If the release host has an architecture that ClearCase LT supports, you can also install ClearCase LT software there. You can designate the ClearCase LT server as the networkwide release host; however handling this task may affect the performance of ClearCase VOB and view access on the server if certain installation models are selected (see *Installation Methods and Models* on page 23).

1.2 Setting Up the Networkwide Release Host

Setting up the release host involves these tasks:

- Loading files from the ClearCase LT product distribution media onto the release host's file system. See *Loading the Software Distribution from CD* on page 3.
- Setting the ownership and access modes of the release area and files. See *Running the site_prep Script* on page 4.
- Optionally, enabling non-**root** users to install ClearCase LT on individual hosts. See *site_prep Options* on page 5.
- Ensuring that other ClearCase LT hosts in the network can access the files. See *Ensuring That the Release Area Is Accessible to All Hosts* on page 2.

Setting Up a New Release Area

1. Log on as **root** to the machine you will use as the networkwide release host.
2. Decide where to create the ClearCase LT product release area, into which you will load the contents of the product distribution medium. You must select a location in a file system that can be NFS-mounted by all prospective ClearCase LT hosts. The ClearCase LT server must not mount the release-area file system with the **nosuid** option. This option prevents use of the **reformatvob** command if the server is link-installed.

   The file system must have sufficient disk space to hold the release area. See the *Release Notes* for Rational ClearCase LT for specific information.

NOTE: This document assumes that you locate the release area in **/usr/ccase_lt_rls**. If you choose another location (for example, **/opt/ccase_lt_rls**), modify the commands listed for subsequent steps accordingly. Do not use the name **/usr/atria** for the release area. This name is reserved (but not required) for the directory where ClearCase LT software is installed on individual hosts. ClearCase LT documentation refers to the installation directory as *ccase-home-dir*.

Ensuring That the Release Area Is Accessible to All Hosts

Make sure that the release host exports the directory **/usr/ccase_lt_rls** (or the file system where it resides). See the *Release Notes* for details.

Loading the Software Distribution from CD

ClearCase LT product software is distributed on a ISO-9660 formatted CD ("High Sierra", **hsfs**, **cdfs**). To copy the software from the CD to the machine you've selected as the networkwide release host:

1. Log on as **root** to a host with a CD drive. Ideally, this is the networkwide release host itself. But if that host does not have a CD drive, log on to another host that is NFS-accessible to the networkwide release host and mount the CD drive using NFS.

2. Place the ClearCase LT product distribution CD in the drive. On Solaris hosts, the volume manager mounts the CD automatically, so you can skip to Step #4.

3. Mount the CD. See the *Release Notes* for Rational ClearCase LT for the mount command for your platform.

4. If the CD drive is not on the networkwide release host, use NFS facilities to export that CD drive's mount point from its host, and mount it on the networkwide release host. For example:

   On the host with the CD drive:

   # **/usr/etc/exportfs –i –o ro /cdrom**

   On the release host:

   # **mount** *drive-host*:**/cdrom /cdrom**

5. Log on as **root** to the networkwide release host. From the Bourne shell, run the script to load the ClearCase LT software from the CD to the networkwide release host:

   # **cd /cdrom** *(most architectures)*
   or
   # **cd /cdrom/rational** *(on Solaris)*
   # **sh copy_rel.sh** *(most architectures)*
   or
   # **sh COPY_REL.SH**

Running the site_prep Script

NOTE: Most examples in this chapter refer to specific architectures by their abbreviations, such as **sun5**, or to specific releases of ClearCase LT, such as 5.0 (for 2002.05.00). You may need to substitute other abbreviations or release numbers when you use these commands.

After the distribution has been loaded, run the **site_prep** script. **site_prep** is *required* to prepare the release area for installation of ClearCase LT software on individual hosts. This script requires **root** permissions and does the following:

- Sets correct permissions on all files in the release area
- Lets you specify the license server host and ClearCase LT server host that appear as the default choices when installations of ClearCase LT are run from this release area

You must run **site_prep** for each architecture your site supports. To guarantee access, log on to the release host as **root**. On this host, go to the **install** subdirectory for the first supported architecture.

For example:

```
# cd /usr/ccase_lt_rls
# cd sun5/install
# ./site_prep
```

If you specify no options, **site_prep** does the following:

- Makes all files in the merged release area read-only and owned by **root**.
- Makes the **db_loader** and **db_dumper** programs (used by the **reformatvob** command) setUID-**root**.
- Checks for any port number conflict between the **albd_server** and other services registered in the NIS services database.
- Prompts you for this information:
  - The host name of the *license server host*. If your site already has a FLEXlm license server configured to serve Rational product licenses, you can provide the name of that host here. If you need to set up a new license server host, supply the name of the computer you plan to use as this host. It must meet or exceed the requirements described in *Selecting a Computer to Be the License Server Host* on page 14.

- The host name of the computer that you plan to configure as the ClearCase LT server host. A ClearCase LT server must meet or exceed the requirements described in the *Release Notes* for Rational ClearCase LT.

The names that you specify become the suggested defaults when **install_release** is run to install individual hosts.

Remember to run **site_prep** for any additional architectures that your site supports.

NOTE: A single release area can support many ClearCase LT communities (groups of ClearCase LT clients that use the same ClearCase LT server), but the default server name that you provide to **site_prep** will only be correct for a single community. Many ClearCase LT communities can share a license server, but each community can have only one ClearCase LT server. If you plan to install more than one ClearCase LT community from a release area, users must know whether to accept the site defaults and what to use for the ClearCase LT server name (and, if necessary, license server host name) if the defaults cannot be accepted.

site_prep Options

Usage: **site_prep** [**–enable_non_root** | **–disable_non_root**]
[**–license_host** *hostname* | **–lh** *hostname*]
[**–server_host** *hostname* | **–sh** *hostname*]
[**–no_query** | **–nq**] [**–help**] [**–chmod** | **–setuid**]

Option	Description
–license_host	The name of the FLEXlm license server that will serve licenses for all ClearCase LT hosts
–server_host	The name of the computer that will become the ClearCase LT server.
–enable_non_root	Allows non-root users to install this release
–disable_non_root	Reverts to allowing only **root** users to install this release
–no_query	If values are not specified using the command line: sets license host, registry host, registry region and backup registry host to `Unknown`; leaves the setuid mount options for install hosts unchanged; enables remote administration; suppresses querying for other values not set in the command line.

–help	Displays this summary of **site_prep** options
–chmod	Disables write access to release area files and directories
–setuid	Mark certain files as setUID-**root**

Allowing Non-root Users to Install ClearCase LT

If you want to allow users to install ClearCase LT without becoming **root**, use the **–enable_non_root** option:

```
# site_prep –enable_non_root
```

If you have enabled non-**root** installation, enter the following command after all ClearCase LT hosts have been installed to eliminate the possibility of a security breach.

```
# site_prep –disable_non_root
```

Rational has taken care to minimize the security risks of non-**root** installation, but taking this step provides extra assurance.

Specifying Server Hosts

If you do not specify the names of your ClearCase LT server host and FLEXlm license server host on the **site_prep** command line, you are prompted to enter them. The **–no_query** option suppresses the query, but sets the values as specified in the command line. If either host name is not specified, **–no_query** sets that value to `Unknown`.

When you users install ClearCase LT on individual hosts, these host names are offered as defaults. Accepting the defaults ensures that all hosts use the same networkwide resources.

Setting Protections on Files in the Release Area

If you have not loaded the distribution as **root**, the **–chmod** and **–setuid** options allow you to correct the release area's file and directory protections. (See *Setting Up a New Release Area on page 2*.) ClearCase LT requires that the files in the release area be write-protected and owned by **root**. These options are separated because you may need to use only **–setuid**, which only affects a few files; **–chmod** affects all files and therefore takes longer. If you didn't load the distribution as **root**:

- The directories may have been created with write access enabled. The **–chmod** option corrects the write-protection problem.

- The programs **db_loader** and **db_dumper** are not setUID-**root** as required. The **–setuid** option corrects this.

Verifying site_prep Selections

The **site_prep** script creates or edits a text file named **site.dat** in each architecture-specific directory of the release area for which **site_prep** is run. For the example release area and scenario mentioned in *Running the site_prep Script* on page 4, the directory is **/usr/ccase_lt_rls/v5.0/sun5**.

For each architecture that your site supports, examine **site.dat** to verify that there were no typographical errors in the information provided to **site_prep**. If the information is incorrect, reexecute **site_prep** for that architecture.

Publicizing the Location of the Release Area

After the release area is set up, inform any users who will be installing their own ClearCase LT hosts of the location of release areas for each type of host your site supports (for example, **/net/filsvr1/usr/ccase_lt_rls**).

2 Configuring ClearCase LT Licensing

Rational ClearCase LT uses Rational Common Licensing, a model based on the license management tool from GLOBEtrotter Software, Inc. called FLEXlm. It requires Suite or ClearCase LT licenses to run ClearCase LT programs or issue ClearCase LT commands.

Licenses are usually set up when a Rational Suite product is installed. If that is the case, you can skip this chapter. If you are adding ClearCase LT as a new point product to your system, you have to request new license keys for it. You cannot use the existing Suite licenses for new point product installations. This chapter explains licensing tasks for installing ClearCase LT as a new point product.

To configure ClearCase LT licensing, you must first determine the type of licenses you will use:

- If you choose node-locked licenses, you must specify in the license map file that ClearCase LT is to use the Rational Suite license keys. Rational does not provide a stand-alone node-locked license for ClearCase LT. For information about modifying settings in the license map file, see *Customizing License Usage Order* on page 19.

- If you choose floating licenses, you must set up a license server to control the use of the licenses. After a period of inactivity by a ClearCase LT user, the user's license may be taken by another user. For information about setting up a license server, see *Using license_setup* on page 12.

You must also choose between temporary licenses and permanent licenses:

- Startup, temporary, or evaluation licenses are provided on the Rational License Key Certificate included with your product's release media.

- Permanent or Term License Agreement (TLA) licenses can be obtained from the Rational AccountLink Web site, or by fax if you do not have Internet access. For information about using AccountLink, see *Using AccountLink* on page 10.

This following sections explains these licensing procedures:

- Acquiring licenses for ClearCase LT from the AccountLink Web site
- Setting up a license server host
- Installing permanent or temporary license keys on a new or existing license server host
- Administering licenses

2.1 Using AccountLink

The AccountLink Web site, **www.rational.com/accountlink**, simplifies the process of obtaining license keys for ClearCase LT and other Rational products. To use AccountLink, gather the information you'll need to fill out the license request form; then use any Web browser to access the AccountLink Web site.

NOTE: If you are using the temporary or evaluation license key, you can skip this section.

Information You Need for AccountLink

In addition to contact information, you will need to provide the account and product information summarized in Table 1 to obtain a file containing ClearCase LT license keys.

Table 1 AccountLink Information

Data	Notes	Your Entry
Your Rational account number	Source: your Rational license key certificate.	
License type	Floating for ClearCase LT licenses; floating or node-locked for Suite licenses	

Table 1 AccountLink Information

Data	Notes	Your Entry
Rational product line	ClearCase LT is part of the ClearCase product line.	**CLEARCASE**
Product name	Source: your Rational license key certificate.	**Rational ClearCase LT**
Quantity	Source: your Rational license key certificate. This is the number of licenses that you have purchased.	
Host name and host ID	This is the name and host ID of the server machine for floating licenses or the machine on which ClearCase LT will be used for node-locked licenses. If the license server host is different from the installation machine, you must have remote shell access from the installation machine to the license server host. In addition, the installation directory must be accessible from the license server host. If you do not know the host ID of your license server host, download the tool **gethostinfo.sh** from AccountLink, and run it on the computer that will be your license server host.	

When the process is complete, you will receive a file named **license_for_<***server name***>.upd** by e-mail.

If you have chosen to use floating licences, you must run **license_setup** to set up a license server.

2.2 Using license_setup

After you have obtained your licenses, you can run **license_setup** to install the licenses on an existing license server or set up a new license server to which you can then add the licenses.

Information You Need for license_setup

Whether you are setting up a new license server host or adding licenses to an existing one, you will need all the information in Table 2 before you begin running **license_setup**.

Table 2 License Request Information

Data	Notes	Your Entry
Host name or IP address of the computer on which the license server is to run	If this computer (the license server host), is different from the installation host, you must have remote shell access from the installation machine to the license server host. In addition, the installation directory must be accessible from the license server host.	
License server port number	Default is 27000. This is the port at which the license server listens for license requests. This port number must not be in use by any other application on the license server host. Use **ypcat** to list ports in use on a host, or look in **/etc/services**.	
Pathname of installation directory	If you are installing a FLEXlm server, this is the directory in which you will install FLEXlm software. If you are using an existing FLEXlm server, this is the pathname under which the server is installed. In this document, we refer to this pathname as *rational_dir.*	

Table 2 License Request Information

Data	Notes	Your Entry
Pathname of license file	The installation program will suggest a default for a new license file. If you want to use an existing license file, enter its full pathname instead of the default.	
License keys for each product you are installing OR Full pathname of the **.upd** file to import licenses from	Source: Your Rational license key certificate (temporary or evaluation keys) OR Rational AccountLink (**.upd** file with permanent or TLA keys).	
License key type	Source: Your Rational license key certificate. Must be permanent, TLA, startup, or evaluation. **Note:** To enter the permanent license key after you've been using a startup or evaluation license, see *Replacing Temporary License Keys with Permanent License Keys* on page 16.	
License quantity	Source: Your Rational license key certificate. (Note that **0**=uncounted.)	

Table 2 License Request Information

Data	Notes	Your Entry
License expiration date	If you have a permanent license, enter **p**. Source for other license types: Your Rational license key certificate or an e-mail message from Rational Software. If you have a startup or evaluation license, enter the date in the *dd-mm-yyyy* format. (The field is not case sensitive.)	
User IDs for everyone who will be using ClearCase LT (optional)	You can use the FLEXlm options file to provide tighter control over which users and groups can acquire licenses. If you don't want to exercise this level of control, **license_setup** will populate the file with "dummy" names, one for each license you have purchased, and all users will be able to acquire licenses.	

If you are going to set up a new FLEXlm server, select an appropriate host computer first.

Selecting a Computer to Be the License Server Host

When selecting a license server host, choose a computer with these characteristics:

- Is highly available and infrequently rebooted
- Is accessible over the network by all ClearCase LT hosts. Only network access, as verified by a UNIX command like **ping**, is needed when a client requests a license. The ability to access the license server host's file system is not required for any purpose other than adding new licenses to the host.

Because ClearCase LT does not need to run on the license server host, you can select any computer that satisfies these requirements. If the license server host has an architecture that ClearCase LT supports, you can also install ClearCase LT software there. You can designate the ClearCase LT server as the license server host; however, handling this task may affect the

performance of VOB and view access on the server if it must serve licenses for more than about 50 ClearCase LT users.

Running license_setup

The **license_setup** program is included as part of the ClearCase LT install directory.

To run **license_setup**:

1. Log on to the computer you've chosen to be the license server host. Log on as an ordinary user who has rights to create files in the directory where you intend to install the FLEXlm server. Do not log on as *root*. Installing the FLEXlm server while you are logged in as *root* will cause the FLEXlm server processes to run as *root*, which is not necessary and can pose a security risk.

2. Go to the **install** subdirectory within networkwide release area for the appropriate architecture:

   # **cd /net/bigserver/usr/ccase_lt_rls** *(typical release area)*
   # **cd sun5/install** *(architecture-specific location within release area)*

   You can find the list of supported architectures and their abbreviations in the *Release Notes* for Rational ClearCase LT.

3. Run the **license_setup** program:

   ./license_setup

The **license_setup** program confirms the location of the installation directory (*rational_dir* in our examples), then presents the Licensing Options Menu.

2.3 Licensing Options

The **license_setup** program supports three licensing options:

- Use an existing FLEXlm license file or server.
- Set up a permanent or TLA license file and server.

- Set up a temporary (evaluation or startup) license file.

Whichever option you select, **license_setup** prompts you through the installation, providing detailed instructions along with default choices. The defaults appear in brackets, for example `[2]`. To accept a default, press RETURN.

Using an Existing FLEXlm License File

Select this option if you already have an existing license file for version 2000.02.10 or later of Rational Suite DevelopmentStudio. Selecting this option will not upgrade the license server software. We recommend you upgrade the license server software to FLEXlm 7.0f if you have not already done so.

Setting Up a Permanent or TLA License File and Server

Select this option to do either of the following:

- To install a FLEXlm server and then import a new license file obtained from AccountLink or by fax
- To import a new license file to an existing FLEXlm server

Selecting this option will also upgrade the license server software to FLEXlm7.0f.

Setting Up a Temporary License File

Select this option if you are using temporary or evaluation licenses. The license key and related information are provided on the Rational License Key Certificate included with your product's release media. Selecting this option will also upgrade the license server software to FLEXlm7.0f.

Replacing Temporary License Keys with Permanent License Keys

If you have installed a temporary, startup, or evaluation license, you must install permanent licenses to continue to use the product. To install permanent licenses, use AccountLink to request the permanent license keys; then run **license_setup** and specify option 2.

2.4 Common Questions About license_setup

This section contains answers to some common questions about the **license_setup** program.

Can I rerun parts of the installation? Yes. You can rerun **license_setup** any time you need to add or change licenses. You can also run the **license_check** program separately to validate the license you already have. **license_check** is installed in the same directory as **license_setup**.

Do I have to reenter my license server information each time I install a product? No. You enter this information only once. The **license_setup** program saves the information you enter about yourself and about the host to be used as the license server for ClearCase LT licenses in two text files in the *rational_dir*/**defaults** directory: **license_setup.***username*, which contains information about you and your license server, and **license_setup.CCLT.***release-number*, which records product-specific information for ClearCase LT. The **license_setup** program reports the location of these files when you quit the program. The next time you run **license_setup**, the program uses the saved configuration information.

Do I need to install all my licenses on one server? No. You may spread your licenses out over several servers, as long as each client is configured to know which server to contact when requesting a license.

Which type of product license key should I install? If you already have your permanent license key, you can install it right away. If you do not, you must obtain a permanent key from AccountLink as described in *Using AccountLink* on page 10 or use the temporary key on your Rational License Key Certificate. To ensure uninterrupted use of ClearCase LT, install your permanent license key as soon as possible.

2.5 Administering Licenses

This section contains brief information about using the license manager and customizing license usage order. For more information, see the *Installation Guide* for Rational Suite.

Using the License Manager

The FLEXlm Software License Manager monitors license access, simultaneous use, idle time, and so on. It includes the following components:

- A vendor daemon named **rational** that dispenses ClearCase LT licenses. The **rational** daemon is used for all licensed Rational Software products. If you have products from other vendors that also use FLEXlm, they will include their own vendor daemons.
- A license manager daemon named **lmgrd** that is used by all licensed products from all vendors that use FLEXlm. The **lmgrd** daemon does not process requests on its own, but forwards requests to the appropriate vendor daemon.
- A license file that you maintain.

Verifying That FLEXlm Is Working

After you install your license key, the **license_setup** program reminds you that you must configure your license host to restart the license server whenever it reboots. The **license_setup** program gives you instructions for doing this.

To verify that your FLEXlm License Manager is operational and that the daemons are running, type either of the following commands on your license server:

 # ps axw | grep -v grep | egrep "lmgrd|rational"
 # ps -e | grep -v grep | egrep "lmgrd|rational"

The output should include lines similar to the following (your pathnames will vary):

```
538 ?? S 0:03.50 /rational/base/cots/flexlm.6.0i/platform/lmgrd

               -c /rational/config/servername.dat

               -l /rational/config/servername.log

539 ?? I 0:00.90 rational -T servername 6.0 3 -c ...
```

Using FLEXlm Commands

The FLEXlm License Manager supports the following commands for system administration:

Use this command	To
lmdiag	Diagnose problems when you cannot check out a license
lmdown	Shut down the license and vendor daemons
lmhostid	Report the license manager host ID of a workstation
lmreread	Reread the license file and start new vendor daemons
lmstat	Report status on daemons and features used
exinstal	Report on licenses in the license file you specify on the command line

Learning More About FLEXlm

For more information about the FLEXlm Software License Manager, see the *FLEXlm End User Manual* that is installed in the ClearCase LT networkwide release area.

The *FLEXlm End User Manual*, along with answers to frequently asked questions about FLEXlm, is also available at **www.globetrotter.com/manual.htm.**

Customizing License Usage Order

By default, a Rational product requests licenses in this order:

1. Node-locked license before floating license
2. Suite license before point-product license

For example, ClearCase LT is sold as part of Rational Suite and as a stand-alone product. It requests the Suite license before it requests a ClearCase LT license. If a node-locked license is available among the group of Suite licenses, it claims that license.

You can customize the license usage order in the **License_Map** file on a per-product basis.

The License Map File

A default **License_Map** file is created and stored in the config/ subdirectory when you install a Rational Suite product. The file is initially set to claim a Suite license for all products. It contains lines of the following format:

```
component_designator product_designator {, product_designator}
```

For ClearCase LT, the initial setting should be similar to this:

```
ClearCase_LT:1.0 DevelopmentStudioUNIX:1.0, standalone
```

This line tells ClearCase LT's license client to first request a Rational Suite DevelopmentStudio license. If a Rational Suite DevelopmentStudio license is unavailable, it will request a standalone ClearCase LT license. Depending on the Suite product you install, the line you see may differ from the example in this book.

You can modify the settings to customize license usage for all users or for individual users.

You should run the user setup script (such as **rs_setup.csh** or **rs_setup.ksh**) to check if the environment variable, RSU_LICENSE_MAP_ENV, is set. This EV is needed in finding the **License_Map** file to be used. If the EV is not set, the setup script sets the pathname to the default license map file. For example, config/License_Map.

3 Installing the ClearCase LT Server and Clients

After you have set up the networkwide release host, prepared the release area, and configured a license server with ClearCase LT license keys, you can install Rational ClearCase LT on the server and its client hosts.

NOTE: ClearCase LT documentation uses *ccase-home-dir* as shorthand notation for the ClearCase Product Family installation directory. Substitute your own local installation directory for *ccase-home-dir*, whenever you encounter it. (The default installation directory is **/usr/atria**.)

3.1 Types of ClearCase LT Hosts

A ClearCase LT community consists of a ClearCase LT server host and one or more ClearCase LT client hosts. Before you install ClearCase LT, you may want to review the requirements for these hosts.

The Server Host

The ClearCase LT server provides storage and access control for all VOBs and views used by a ClearCase LT community.

Every VOB is managed by several server programs, each of which places a load on the CPU, main memory, mass storage subsystems, and operating system resources of the ClearCase LT server. Routine VOB transactions are designed to make efficient use of the server's resources;

however, some VOB transactions can involve database processing that is both compute intensive and memory intensive. To adequately service these demands, a ClearCase LT server must meet or exceed the requirements described in the *Release Notes* for Rational ClearCase LT.

Views also consume server resources, primarily disk space. Each view consists of a *view directory*, which holds files and directories being modified by developers, and a *view storage directory*, which holds data about these elements. Developers normally keep their view directories on their client hosts. The view storage directory must reside on the ClearCase LT server, but it requires only a fraction of the disk space consumed by the view directory itself.

Maintenance Requirements

VOBs and views make up your organization's data repository. Regular backup of VOBs is critical. VOBs have special backup requirements, as described in the *Administrator's Guide* for Rational ClearCase LT. Views store the developers' current work—in particular, checked-out versions of file elements. Views should be backed up as well, though this task is somewhat less critical than VOB backup, especially if users check in their files regularly. View storage directories reside on the ClearCase LT server. View directories can reside anywhere, though they are most often created on client hosts. See the *Administrator's Guide* for more information on view backups.

Client Hosts

Your network may include a large number of potential ClearCase LT client hosts. The **install_release** program has options for installing a group of client hosts at the same time. You can also allow users to run **install_release** themselves; they may not need to have **root** privileges to run the program (see *Running the site_prep Script* on page 4).

Selection Criteria

ClearCase client programs make reasonable demands on a host's processing power and main memory. In the typical ClearCase LT community, developers use their own workstations, which must meet or exceed the performance characteristics described under *Minimum Hardware Requirements* in the *Release Notes* to perform routine software development tasks.

Several users can share a client host (for example, using X terminals) if the host can provide appropriate multiples of these single-user performance specifications—both processing power and main memory.

Maintenance Requirements

A client host requires no maintenance specific to ClearCase.

3.2 Preparing a Host for ClearCase LT Installation

Before installing ClearCase LT on a server or client host, you may need to install layered software packages or operating system patches available from your hardware vendor. Rational works closely with hardware vendors to maintain a current list of required and recommended operating system patches. Before installing ClearCase LT on a host, consult the *Release Notes* for Rational ClearCase LT, which list all patches and layered software packages that may be needed to support ClearCase LT. Obtain the appropriate layered software and operating system patches from the vendor, and install them before you install ClearCase LT.

NOTE: You cannot install ClearCase LT on a computer that has any version of ClearCase installed on it. You must deinstall ClearCase, using the **install_release** program from the appropriate ClearCase networkwide release area, before you install ClearCase LT.

3.3 Installing ClearCase LT

The following sections describe how to use the various options of the **install_release** program to install ClearCase LT.

Installation Methods and Models

When you run **install_release**, you are prompted to select an *installation method.*

- Select **Local Install** to install software on the ClearCase LT server or any other local computer (the one you are currently logged on to). **Local Install** is the only supported method for installing the ClearCase LT server.
- Select **Remote Install** to install ClearCase LT client software on a single remote computer.
- Select **Multiple Remote Installs** to install ClearCase LT client software—using identical install options—on more than one remote computer of the same architecture.

- Select **Local Deinstall** to remove software from the local computer.

The remote methods operate exactly like the local method for all but the final steps. In the final steps, **install_release** executes a command that carries out one or more remote installations of ClearCase LT client software on the computers you choose, using the model you specify. We recommend starting with **Local Install** to become familiar with the installation options before trying the remote methods.

If you choose **Multiple Remote Installs**, you must provide a file that contains the host names of computers on which you want to install ClearCase LT client software. This file must have one host name per line. You are prompted for the name of this file by **install_release**. Multiple installations are installed with identical options. (Remote installation of the ClearCase LT server is not supported.)

After you select the installation method, **install_release** prompts you to select an *installation model*. There are four installation models, as well as a deinstallation model (see page 25):

- **Standard** —Regular installation, with links to the release area
- **Full-Copy** — Regular installation, with no links to the release area
- **Mounted** — Host install by mounting a pre-populated installation directory
- **Link-Only** — Host install using only symbolic links to the release area

The model you select is used for all installations performed by the current run of **install_release**. Review the models and their characteristics before you run **install_release** for the first time.

The model you choose determines both the file type (directory, symbolic link, or NFS mount point) of *ccase-home-dir* and, if it is a directory, its contents (files, or a combination of files and links to the release area). In choosing the model, you need to consider the amount of available storage and the expected patterns of use for the target machine:

- Is the machine a server or a client?
- Does it need to operate even when the networkwide release area is unavailable?
- If it is a server, does it have adequate local disk space for VOBs and views as well as the ClearCase LT server software?
- Is *ccase-home-dir* on a read-only partition?

You may also want to consider the administrative advantages of each installation model:

- The **Standard** installation model balances a need to conserve disk space with a requirement that essential features should always be accessible on the local system. Essential files are installed directly on the target. Nonessential files are installed on the target as symbolic links to the release area.

- The **Full-Copy** installation model copies all the ClearCase LT software from the release area to the local workstation. Hosts installed using this model do not need to use the network to access ClearCase LT programs and help files, but they require more disk space for ClearCase LT than do hosts installed using other models.

- **Mounted** installs simplify the task of maintaining ClearCase LT software on a large number of clients. But any host installed using this model will not be able to run any ClearCase operations if the mounted *ccase-home-dir* becomes inaccessible because of system or network failure.

- **Link-Only** installs simplify installation and maintenance in a way that is similar to mounted installs, though with similar drawbacks and a few additional constraints.

Each of these models is described in detail below.

Features Common to All Installation Models

No matter which installation model you choose, some ClearCase LT files must be installed on the local system outside of *ccase-home-dir*. These include system components necessary on the ClearCase LT server, system startup/shutdown scripts, X Window System default files, and so forth. The amount of space on the local system required by these files varies from system to system, but rarely exceeds 1 MB.

The Standard Installation Model

The **Standard** installation model creates *ccase-home-dir* on the target system as a directory and populates it with a combination of locally installed files and links back to the release area. All shared libraries and critical executables are copied onto the target system. Files such as online help and nonessential scripts and utilities are installed as links to the release area. Systems installed using the **Standard** model perform all necessary ClearCase functions as long as the ClearCase LT server is accessible, even when the release area is inaccessible. There is no performance penalty associated with the **Standard** installation model, and it consumes significantly less disk space than the **Full-Copy** model.

We recommend the **Standard** installation model for the ClearCase LT server as well as for any client that has adequate disk space and does not need to perform nonessential ClearCase LT operations when the release area is unavailable.

The Full-Copy Installation Model

The **Full-Copy** installation model creates *ccase-home-dir* on the target system and populates it with files and directories. No symbolic links to the release area are needed. Systems installed with this model perform all ClearCase functions as long as the ClearCase LT server is accessible.

We recommend the **Full-Copy** model for any of the following cases:

- You are installing a host that must run essential and nonessential ClearCase LT operations even when the release area is unavailable.
- You are installing a host that provides a shared *ccase-home-dir* for **Mounted** client installations.

For any other situation, the **Full-Copy** model probably represents an unnecessarily conservative approach to installation.

The Mounted Installation Model

A host installed using the **Mounted** installation model mounts *ccase-home-dir* using NFS and needs only a small amount of local disk space for other ClearCase LT files that are not installed in *ccase-home-dir*. This model is useful at sites where systems share the disk partition on which the *ccase-home-dir* resides or where an administrator wants to maintain a single *ccase-home-dir* to be shared by many systems. In either case, *ccase-home-dir* is a remote disk partition, which is typically mounted read-only.

The **Mounted** installation model requires access to a correctly populated *ccase-home-dir* from the system being installed at the time **install_release** is run. When you execute **install_release**, the **Mounted** model verifies that the existing *ccase-home-dir* directory contains software equivalent to that in the release area.

The **install_release** program then performs the installation steps that are common to all installation models. (See *Features Common to All Installation Models* on page 23.) It does not mount any file system to populate *ccase-home-dir* during a **Mounted** installation.

To correctly populate *ccase-home-dir* for use by a **Mounted** model installation, a system that exports a writable disk partition is installed with a **Full-Copy** installation. After this step is performed, the systems that mount this disk partition have a fully populated *ccase-home-dir*.

The **Mounted** installation model requires a stable network. ClearCase LT servers installed using the **Mounted** model may suffer performance degradation on heavily loaded networks. Both the **Mounted** and **Link-Only** models share these characteristics.

The Link-Only Installation Model

The **Link-Only** installation model creates *ccase-home-dir* on the target host as a directory and populates it with symbolic links to the release area. (It also creates **/usr/atria** as a link to *ccase-home-dir* if they are not the same directory.) It does not require you to first create a **Full-Copy** installation that can be mounted later. Instead, clients installed using the **Link-Only** model link directly to the release area for all ClearCase LT programs, not just the nonessential ones as in the **Standard** install model.

In all other respects, the **Link-Only** installation model is the same as the **Mounted** installation model.

The Deinstallation Model

The **Local Deinstall** model provides a list of currently installed products and components to remove from the local system. Selecting a component for deinstallation causes dependencies of that component to be deinstalled at the same time. After all the selections have been made, you are prompted to finish the deinstall.

Local Deinstall preserves important system files in **/var/tmp/Atria.preserve**.

Compatibility Between Models

If you want to change to another installation model, deinstall your currently installed products first. The installation script will warn you if you attempt to change models when installing new software.

VOB Database Support

The current release of ClearCase LT supports two VOB database formats: schema version 53 and schema version 54 (extended VOB support). Schema version 54 allows files in the VOB database to grow beyond 2 GB.

As part of installing this release on a server, you must select which VOB format you want to use:

- If you are an existing ClearCase LT customer, you probably want to select the format that you are currently using. You can run **cleartool -ver** from the command line to see the current vob database schema version.

- If you are an existing customer using schema version 53 and you select schema version 54, you will have to reformat your existing VOBs immediately after installing to allow users to access VOB data.
- If you are a new ClearCase LT customer, you probably want to select the latest VOB format (schema version 54).

If you have an existing installation that uses schema version 53 and you select schema version 54 for this installation but change your mind before having reformatted your VOBs, you can reinstall ClearCase and select schema version 53. However, if you have already reformatted your VOBs, Rational does not support reformatting back to the older VOB format.

See the **reformatvob** reference page for more information about VOB database formats, the implications of each selection, and what you need to know to reformat your VOBs.

Pre-Install Checklist

Before you begin performing installations:

- Verify that the ClearCase LT product release area is visible from every host to be installed. This is typically done through NFS mounts, symbolic links, or both. Note that this is a requirement regardless of the installation model you choose.
- Verify that each host has adequate disk space for the intended model of installation. The ClearCase LT server must also have enough disk space for view and VOB storage. See *Disk Space Requirements for Individual Hosts* in the *Release Notes* for Rational ClearCase LT.
- If you are performing any remote installations, verify that the **root** on the install host (the host on which you will run **install_release**) has remote shell access to *all* the remote targets. Verify this by logging in as root on the install host and executing the following command, substituting each of the remote target's names for *remote-hostname*:

  `#` **rsh** *remote-hostname* **date**

  If **root** has remote shell access to the target, you see the output of the **date** command. If you receive a `permission denied` error, consult your operating system vendor's **man** pages for **rsh**.

  After the release area is prepared with **site_prep** script (see *Running the site_prep Script* on page 4), default values for the ClearCase LT server and the license server host are usually established and are offered as defaults by **install_release**. If you are not going to use these defaults, you need to know the following information before you run **install_release**:

- The name of your ClearCase LT server host
- The name of your FLEXlm license server host

Running install_release

Install the ClearCase LT server before you install the clients. ClearCase LT server installation includes server configuration and license check procedures that set up and validate the ClearCase LT environment. You cannot verify that a client is operating correctly until the ClearCase LT server has been installed and configured.

To run **install_release**:

1. Log on to the host to be installed. If non-root installation has been enabled at your site (see *Running the site_prep Script* on page 8), you can log on as a nonprivileged user. Otherwise, you must log on as **root**.

   NOTE: If the **site_prep** script was not run on the release area, **install_release** aborts.

2. Go to the **install** subdirectory within networkwide release area for the appropriate architecture:

   # **cd /net/bigserver/usr/ccase_lt_rls** *(typical release area)*
   # **cd sun5/install** *(architecture-specific location within release area)*

   You can find the list of supported architectures and their abbreviations in the *Release Notes* for Rational ClearCase LT.

3. Run the **install_release** program:

   # **./install_release**

   After a series of legal notices, you see the list of products that can be installed from this release area. In addition, you are informed of both the temporary and permanent locations of a transcript of your installation. The transcript records all status and error messages displayed on the screen, your input, and the results of your actions.

   If the installation succeeds, the transcript in **/tmp** is deleted. If the installation fails, the transcript is not deleted. If the installation succeeds, even with errors, the transcript is saved in **/var/adm/atria/log**.

   NOTE: You can type **q** at any prompt to quit the installation.

4. Choose your installation method.

5. Choose your installation model. All products installed in this session are installed using the same model.

6. Specify the directory on the local machine in which to install ClearCase LT. Unless you have been instructed otherwise, we recommend accepting the supplied defaults, shown in [square brackets], on all such prompts. Accept the default by pressing RETURN.

7. Name the location of the networkwide release area. This is where any files or directories installed as symbolic links actually reside.

8. Now you are presented with the list of products to be installed.

```
1 : ClearCase Web Interface Server
2 : ClearCase LT Client Installation
3 : ClearCase LT Server Installation (includes client)
f : Finish selection
x : Toggle expanded descriptions
r : Reset selections
q : Quit
```

   The list you see may differ from the list shown here. Select a product by typing its number and pressing RETURN. **install_release** responds by redisplaying the list with an asterisk to the left of the selected product. If you need more information about a product, enter **x** to expand (or, if already expanded, contract) the component descriptions. Enter **r** to reset the list to its original state (nothing selected). When you have finished selecting products, enter **f**.

9. After you enter **f**, the **install_release** program displays a list of the components that will be installed. Each product may include other components. Components cannot be selected individually. The choice of products and list of components are recorded in the install transcript.

   Most of the remaining prompts display a suggested default response. Unless you have been instructed otherwise, accept each default by pressing RETURN at the prompt. The defaults will be different on your system. (See *Running the site_prep Script* on page 4 to see where these default names come from.)

10. Regardless of the product selected, **install_release** prompts you to enter the name of the license server host.

```
ClearCase LT License Server Host [<default_license_server_name>]:
```

11. If ClearCase LT Client is selected, **install_release** prompts for the name of the ClearCase LT server host.

```
ClearCase LT Server Host [<default_cclt_server_name>]:
```

12. If ClearCase LT Server is selected, **install_release** prompts for server setup information. Server setup is a required part of the initial installation of a ClearCase LT server. To complete the server setup process, **install_release** needs four items of information:

- *VOB owner name*: Server setup creates three VOBs: one to hold objects required by the ClearCase LT online tutorial, one to hold UCM objects for the initial project, and one to hold source code (files and directories) for the initial project.

```
Specify the name of an existing user who will become the owner of the VOBs
created during server setup. This user and all other users who access
ClearCase LT on this server should have the same primary group:
```

There is no default response to this prompt. Provide the name of an existing user account. We strongly recommend that this user's primary group (the group listed in the user's entry in the *passwd* database) be one to which all ClearCase LT users in this community belong. If you cannot assign all of your ClearCase LT users to the same primary group, you must edit the supplemental group list of each VOB after server setup is complete. For more information about VOB supplemental group lists and ClearCase access controls, see the *Administrator's Guide* for Rational ClearCase LT.

- *Server storage location root*: Server setup creates directories on the ClearCase LT server that provide VOB and view storage for all users. These directories must be located on a disk partition that has adequate space for VOB and view storage and can be backed up regularly.

```
Server storage locations provide storage for the VOBs and Views created by
all users. This directory must be located on this ClearCase LT Server, and
should be regularly backed up: [/usr/ClearCaseStorage]
```

VOB and view server storage locations are created as subdirectories of **/usr/ClearCaseStorage** or another pathname you specify. If you do not have rights to create files and directories at this pathname, server setup will fail.

- *Initial project name*. Specify the name of the initial project if **Initial_Project** is not satisfactory.
- *Source VOB name*. Specify the name of a VOB to hold the initial project's source code if **sources** is not satisfactory.
- *Extended VOB support*. Specify whether to install extended VOB support.

After all the questions are answered, **install_release** has the information needed to perform the installations you have requested, as stated in the on-screen information.

```
The interactive portion of the installation is complete.
If you choose to continue, the previously listed components
will be installed/updated.

Upon completion, the installation status will indicate whether
there were problems, and provide reminders of post-installation
steps.

This WILL include stopping all currently running ClearCase LT
software.


**** Enter 'quit' or 'no' to abort the installation ****
**** Enter 'yes' or press <RETURN> to continue ****

Continue installation?(yes, no, quit)[yes]:
```

At this point, you must decide whether to go ahead with the installation. Until now, there has been no modification of the system (other than creating the transcript). No files have been moved, and no processes have been affected.

After the installation is finished, read all messages displayed. In particular, look for errors that may have occurred. If there is a problem, look in the installation transcript log (**/var/adm/atria/log/Atria_install.***time-stamp*) for information on how to correct the errors. If you are unsure how to proceed, call Rational Technical Support.

NOTE: If the installation was aborted, the installation log may be in **/tmp**.

The most common installation error is lack of permission to create or modify standard system configuration files. Typically, you must become **root** on a remote host to modify a configuration file or administrative file. If you are not accustomed to making such modifications, seek advice from your system administrator before you proceed.

3.4 Recommended Post-Installation Administrative Procedures

Administrative procedures and maintenance programs for the ClearCase LT server are described in the *Administrator's Guide* for Rational ClearCase LT. Recommended procedures include

backing up view and VOB storage. Maintenance programs must be run on VOBs regularly, to control their growth. No periodic maintenance procedures are required for views.

3.5 Verifying Installation on Individual Hosts

Use the **cleartool hostinfo -long** command to verify that ClearCase LT is configured properly. If the command succeeds, the host is able to acquire a ClearCase LT license. The output of **hostinfo** shows the installed version of ClearCase LT, the server name, as well as other information.

```
clearool hostinfo -long
     Client: boron
     Product: Rational ClearCase LT 2002.05.00
     Operating system: SunOS 5.7 Generic_106541-16
     Hardware type: sun4u
     Registry host: elsie
     Registry region: CCLT
```

The name of the ClearCase LT server for this client is listed as the `Registry host`.

3.6 Customizing a Client Host's Environment for ClearCase LT

If this is a first-time installation on your computer, you may want to customize your environment to make it easier to use ClearCase LT.

Modifying Your Search Paths

Access to ClearCase programs and online documentation (reference pages) depends on certain environment variable settings. The most reliable way to establish these settings is to edit your shell startup script.

Shell Program	Startup Script in Home Directory
C shell	**.cshrc**
Bourne shell	**.profile**
Korn shell	**.profile**

NOTE: We recommend that C shell users avoid placing ClearCase settings in file **.login**, which is executed only by login shells.

Search Path for Executables

Add the ClearCase **bin** directory to your executables search path, as shown in Table 3. The variable **ATRIAHOME** must be set if ClearCase is installed at a location other than **/usr/atria**.

Table 3 Setting the Search Path for Executables

ClearCase Installation Directory:	.cshrc (C shell)	.profile (Bourne/Korn shell)
At standard location, /usr/atria	`set path=($path /usr/atria/bin)`	`PATH=${PATH}:/usr/atria/bin` `export PATH`

Other location (/opt/ccase)	`setenv ATRIAHOME /opt/ccase`
	`set path=($path $ATRIAHOME/bin)`
		`ATRIAHOME=/opt/ccase`
		`PATH=${PATH}:$ATRIAHOME/bin`
		`export ATRIAHOME PATH`

Search Path for Reference Pages

Read this section only if you plan to access ClearCase online reference pages with the standard **man** or **xman** commands. You can skip this section if you intend to rely on the help facility built in to the ClearCase graphical user interface, or if you will always use the **cleartool man** subcommand to access reference pages.

Users of UNIX operating systems are accustomed to using the **man(1)** command to get online documentation. ClearCase includes a comprehensive set of reference pages, accessible in several ways:

- Through the standard **man** command (UNIX command-line interface)
- Through the standard **xman** command (X Window System graphical interface)
- Through the **man** subcommand built in to the **cleartool** program

The standard **man** and **xman** commands can locate reference page files in a variety of locations. These programs can use—but don't require—a search path specified by the environment variable **MANPATH**. If you want to read ClearCase reference pages using these programs, add the ClearCase **man** directory to your reference pages search path, as shown in Table 4.

Table 4 Setting the Search Path for Manual Pages

ClearCase Installation Directory:	.cshrc (C shell)	.profile (Bourne/Korn shell)
At standard location, /usr/atria	`setenv MANPATH \ ${MANPATH}:/usr/atria/doc/man`	`MANPATH=\ ${MANPATH}:/usr/atria/doc/man export MANPATH`
Other location	`setenv MANPATH \ ${MANPATH}:$ATRIAHOME/doc/man`	`MANPATH=\ ${MANPATH}:$ATRIAHOME/doc/man export MANPATH`

NOTE: If your shell startup file does not set the **MANPATH** environment variable, consult the reference page for the **man** command itself to determine your system's default search path for **man** pages. Then, set **MANPATH** accordingly in your shell startup script, just after the commands that you've copied from Table 3. For example:

setenv MANPATH /usr/man:/usr/contrib/man:/usr/local/man

Other ClearCase Search Paths

ClearCase uses configuration files and environment variables to find various other resources that it may require during processing. In particular, some ClearCase utilities need a way to distinguish different file types (text and binary files, for example) or to find a text editor. The graphical tools also need access to file typing data, icons and bitmaps, X Window System resource schemes, group files, and text editors.

Unlike the **PATH** and **MANPATH** variables, the configuration information for these additional resources is usually predefined, and you do not need to do anything. However, if you choose to customize these resources, or if ClearCase behavior leads you to suspect that some adjustment is required, use Table 5 to find more information.

Table 5 Information on ClearCase Search Paths

Object or Resource	Where to Find More Information
File-typing data	**cc.magic** reference page
Icons, bitmaps	**cc.icon** reference page
X resource schemes	**schemes** reference page

Table 5 Information on ClearCase Search Paths

Object or Resource	Where to Find More Information
Group files	**env_ccase** reference page (**GRP_PATH** environment variable)
Text editor	**env_ccase** reference page (**VISUAL**, **EDITOR**, **WINEDITOR** environment variables)

NOTE: X resource schemes control the appearance of the ClearCase graphical interface. See the **schemes** reference page for information.