Rational® ClearCase®

Platforms Guide

VERSION: 2003.06.00 AND LATER

UNIX/WINDOWS EDITION

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Preface

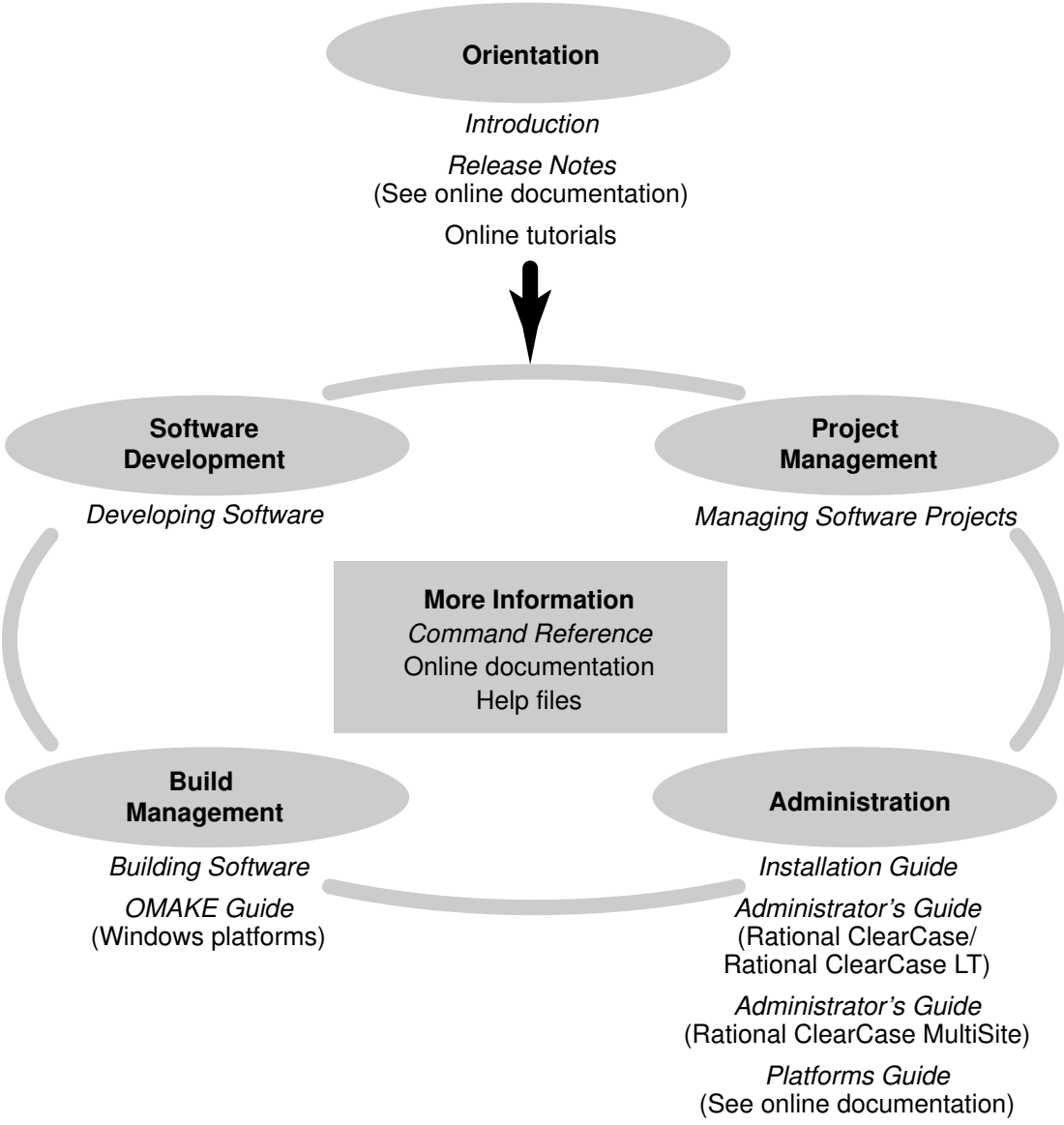
Rational ClearCase is a comprehensive software configuration management system that manages multiple variants of evolving software systems and tracks the versions that were used in software builds. It can perform builds of individual programs or entire releases according to user-defined version specifications, and enforce site-specific development policies.

About This Manual

This document provides information about features and functionality of Rational ClearCase that differ by platform. It is intended primarily for ClearCase administrators and is organized as follows:

- Chapter 1, *Overview*, provides an overview of the ClearCase features that are dependent on the operating system.
- Chapter 2, *ClearCase on Windows*, provides information specific to Windows platforms.
- Chapter 3, *ClearCase on UNIX*, provides information specific to UNIX platforms.
- Chapter 4, *NAS Devices Certified for Use with ClearCase*, provides information on using network-attached storage devices.

ClearCase 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 /opt/rational/clearcase on UNIX and C:\Program Files\Rational\ClearCase on Windows.
- *cquest-home-dir* represents the directory into which Rational ClearQuest has been installed. By default, this directory is /opt/rational/clearquest on UNIX and C:\Program Files\Rational\ClearQuest on Windows.
- **Bold** is used for names the user can enter; for example, command names and branch names.
- A sans-serif font is used for file names, directory names, and file extensions.
- **A sans-serif bold font** is used for GUI elements; for example, menu names and names of check boxes.
- *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 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, you can use "**...**" within a pathname as a wildcard, similar to "*" or "?". For more information, see the **wildcards_ccase** reference page.
- If a command or option name has a short form, a "medial dot" (·) character indicates the shortest legal abbreviation. For example:

  lsc·heckout

Online Documentation

The ClearCase Product Family (CPF) includes online documentation, as follows:

Help System: Use the **Help** menu, the **Help** button, or the F1 key. To display the contents of the online documentation set, do one of the following:

- On UNIX, type **cleartool man contents**
- On Windows, click **Start > Programs > Rational Software > Rational ClearCase > Help**
- On either platform, to display contents for Rational ClearCase MultiSite, type **multitool man contents**
- Use the **Help** button in a dialog box to display information about that dialog box or press F1.

Reference Pages: Use the **cleartool man** and **multitool man** commands. For more information, see the **man** reference page.

Command Syntax: Use the **–help** command option or the **cleartool help** command.

Tutorial: Provides a step-by-step tour of important features of the product. To start the tutorial, do one of the following:

- On UNIX, type **cleartool man tutorial**
- On Windows, click **Start > Programs > Rational Software > Rational ClearCase > ClearCase Tutorial**

PDF Manuals: Navigate to:

- On UNIX, *ccase-home-dir*/doc/books
- On Windows, *ccase-home-dir*\doc\books

ClearCase Integrations with Other Rational Products

Integration	Description	Where it is documented
Base ClearCase-ClearQuest	Associates change requests with versions of ClearCase elements.	ClearCase: *Developing Software* ClearCase: *Managing Software Projects* ClearQuest: *Administrator's Guide*
Base ClearCase-Apex	Allows Apex developers to store files in ClearCase.	*Installing Rational Apex* (UNIX)
Base ClearCase-ClearDDTS	Associates change requests with versions of ClearCase elements.	*ClearCase ClearDDTS Integration*
Base ClearCase-PurifyPlus	Allows developers to invoke ClearCase from PurifyPlus.	PurifyPlus Help

Integration	Description	Where it is documented
Base ClearCase-RequisitePro	Archives RequisitePro projects in ClearCase.	*RequisitePro User's Guide* RequisitePro Help
Base ClearCase-Rose	Stores Rose models in ClearCase.	Rose Help
Base ClearCase-Rose RealTime	Stores Rose RealTime models in ClearCase.	*Rose RealTime Toolset Guide* *Rose RealTime Guide to Team Development*
Base ClearCase-SoDA	Collects information from ClearCase and presents it in various report formats.	*Using Rational SoDA for Word* *Using Rational SoDA for Frame* SoDA Help
Base ClearCase-XDE	Stores XDE models in ClearCase	XDE Help
UCM-ClearQuest	Links UCM activities to ClearQuest records.	ClearCase: *Developing Software* ClearCase: *Managing Software Projects* ClearQuest: *Administrator's Guide*
UCM-PurifyPlus	Allows developers to invoke ClearCase from PurifyPlus.	PurifyPlus Help
UCM-RequisitePro	Allows RequisitePro administrators to create baselines of RequisitePro projects in UCM, and to create RequisitePro projects from baselines.	*RequisitePro User's Guide* RequisitePro Help *Using UCM with Rational Suite*
UCM-Rose	Stores Rose models in ClearCase.	Rose Help *Using UCM with Rational Suite*
UCM-Rose RealTime	Associates activities with revisions.	*Rose RealTime Toolset Guide* *Rose RealTime Guide to Team Development*
UCM-SoDA	Collects information from ClearCase and presents it in various report formats.	*Using Rational SoDA for Word* *Using Rational SoDA for Frame* SoDA Help

Integration	Description	Where it is documented
UCM-TestManager	Stores test assets in ClearCase.	*Rational TestManager User's Guide* TestManager Help *Using UCM with Rational Suite*
UCM-XDE	Stores XDE models in ClearCase	XDE Help
UCM-XDE Tester	Stores XDE Tester Datastores in ClearCase	XDE Tester Help

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Overview 1

Rational ClearCase supports the major UNIX and Windows platforms used for software development. The term *platform* means a specific operating system that is running on a specific hardware architecture. For general information about the platforms that are supported, see the *Installation Guide* for Rational ClearCase.

Differences Between ClearCase on UNIX and Windows

Because ClearCase is tightly integrated with the operating system, it varies somewhat according to the operating system you are running it on. The comprehensive source of information about operating system differences is the *Administrator's Guide*. Other sources of this kind of information are as follows:

- *Developing Software*, which describes how to access UNIX VOBs and views from Windows computers and explains issues regarding case-sensitivity in naming and referring to ClearCase objects.
- Help, which describes the use of text modes in the interchange of data between Windows and UNIX computers.
- *Building Software*, which describes differences in writing make files for different platforms and compilers.
- Reference pages in the *Command Reference*, which describe OS-specific differences in commands, when there are any.

Table 1 shows the most important differences between ClearCase on UNIX and ClearCase on Windows.

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Table 1 Differences Between UNIX and Windows

Feature	On UNIX	On Windows
Starting dynamic views	Use **setview** or **startview**. The **setview** command starts a new shell that uses a set of rules to select specified versions of files stored in a VOB. The **startview** command starts a process that is consulted when accessing files by means of a view-extended pathname to a VOB.	ClearCase Explorer creates shortcuts to views that you own. In ClearCase Explorer, start a view by clicking the icon for the view shortcut. A dynamic view that you have started appears as a folder below the dynamic-views drive (drive M by default), which is accessible through Windows Explorer or a command shell. There is no equivalent to the **cleartool setview** command. However, clicking a view shortcut, mapping a drive letter to a view, or browsing for a view using **My Network Places**, are all comparable.
Accessing active dynamic views	Access the views through the /view directory.	Access all dynamic views active on the current computer from the dynamic-views drive (drive M by default), or map each active view to its own drive letter from ClearCase Explorer by clicking the view shortcut. Each active view tag also appears under the UNC name \\view*viewname*.
Activating VOBs	All users can mount all public VOBs. Private VOBs can be mounted only by the VOB owner or **root**.	All users can mount all VOBs, public or private. Public VOBs are distinguished only by the fact that they can be mounted with the command **cleartool mount –all**.

Table 1 Differences Between UNIX and Windows (Continued)

Feature	On UNIX	On Windows
Accessing mounted VOBs through dynamic views	From a shell started with the **setview** command, access each VOB mounted on the current computer using the *vob-tag* path name. When using the **startview** command, access VOBs through the pathname /view/*view-tag*/*vob-tag*.	Access each VOB mounted on the current computer through a specific view tag. For example, M:*view-tag**vob-tag* or D:*vob-tag*.
Security model for modifying VOBs	A VOB inherits the identity, primary group, and additional group list of the user who runs the **mkvob** command.	When you create a VOB, it does not include the "additional group" list. Only the creator's UID and primary group are assigned ownership of the VOB. Windows VOBs must be created by a user whose primary group is the same as the primary group of all other users who will be writing to the VOB. If any users are members of more than one group, the administrator must set the CLEARCASE_PRIMARY_GROUP environment variable to specify the primary group. For more information, see the *Administrator's Guide* and the **env_ccase** reference page.

Table 1 Differences Between UNIX and Windows (Continued)

Feature	On UNIX	On Windows
Symbolic links and hard links	UNIX file systems support symbolic links and hard links.	Windows file systems do not support symbolic links or hard links. Therefore, remote storage pools (**mkpool –ln**) and remote view-private storage (**mkview –ln**) are not supported on Windows VOBs and views. However, dynamic views do support VOB symbolic links and VOB hard links.
Wildcard characters (See the **wildcards_ccase** reference page.)	Standard command shells support wildcard characters (*****, **?**, and so on) on the command line.	Because standard Windows command shells do not expand pathname wildcard characters (*****, **?**, and so on) on the command line, **cleartool** commands cannot include pathname wildcards unless the commands are issued in interactive mode, when **cleartool** itself processes the command line.
Case sensitivity	File creation and file lookups are case-sensitive.	File-creation operations typically preserve case, but file lookups are not case sensitive. Note that **cleartool** is case-sensitive on Windows.

Table 1 Differences Between UNIX and Windows (Continued)

Feature	On UNIX	On Windows
Line termination	Line termination sequences in most text editors are typically a single newline (NL) character or a line feed (LF) character.	Line termination sequences in most text editors are typically a CR and LF sequence. Note how the text editors that you use handle line termination. Information about line termination issues are discussed in the *Administrator's Guide*, the help, and the **msdostext_mode** reference page.

Platform-Specific Differences in ClearCase

ClearCase functionality also varies somewhat according to the platform you are using. Platform-specific differences are chiefly UNIX platform differences; there are hardly any differences affecting Windows platforms. In addition to this manual, consult the following reference pages in the *Command Reference*, which describe platform-specific differences in commands:

- **export_mvfs**
- **exports_ccase**
- **init_ccase**
- **mount_ccase**
- **softbench_ccase**

ClearCase on Windows

2

Rational ClearCase is almost identical on Windows NT, Windows 2000, and Windows XP. This chapter provides information on the few differences.

Upgrading from Windows NT

After upgrading your Windows NT operating system to Windows 2000 or Windows XP, you must reinstall ClearCase. If you do not, dynamic views will not work, and you may have problems with your snapshot views.

Comparing and Merging on Windows 2000

On Windows 2000 systems, running Diff Merge on files containing a return character (ASCII 13 decimal) by itself—that is, not part of a CR/LF sequence—can cause the GUI to show false differences. The effect is that the number of lines displayed in the Diff Merge output window is less than the number ClearCase expects. Two logical lines are joined in one physical line, and unaware that the lines are joined, the Diff Merge utility maps differences using its understanding of the lines' positions, which are apt to be offset by these appended lines.The differences shown are often wrong and this offset causes the GUI to fail when you try to merge the files. Instead of the GUI, use the **diff** command, which is not affected by the invalid return character and shows the differences accurately.

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ClearCase on UNIX 3

Some aspects of Rational ClearCase functionality are particular to specific UNIX platforms. For a discussion of issues common to many or all UNIX platforms, see *General UNIX Platform Issues*. Issues relevant to individual platforms are discussed in the following sections:

- *Solaris SPARC Functionality*
- *HP-UX Functionality*
- *HP-UX/IPF Functionality*
- *SGI IRIX Functionality*
- *AIX Functionality*
- *Linux Functionality*

General UNIX Platform Issues

This section describes the following, general platform-related issues:

- *Shared Libraries in Rational ClearCase*
- *ClearCase Platform Compatibility Modes*
- *Using Cfront-Based Compilers to Build C++ Programs*
- *ClearCase Client/Server Functionality on UNIX*
- *GUI Issues on Some UNIX Systems*
- *Backup Tools*

Shared Libraries in Rational ClearCase

Rational ClearCase is implemented through a set of shared libraries. In addition, three shared libraries are supplied from vendors in *ccase-home-dir*/shlib (where *ccase-home-dir* is your installation directory, /opt/rational/clearcase by default). The libraries are the C++ compiler library libC.so or libC.sl (depending on vendor; other possible shared C compiler library names follow the pattern libC*string*.so, where *string* may be any short character string), the Galaxy run-time library libvgalaxy++.so (or libvgalaxy++.sl, depending on vendor), and the EZ-RPC run-time library libezrpc.so (.sl).

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Note that the SGI IRIX and Linux for IBM/390 platforms do not provide Galaxy libraries in /opt/rational/clearcase/shlib. The AIX, HP-UX/IPF, and Linux for x86 platforms do provide the Galaxy libraries.

If, for any reason, the ClearCase libraries in the *ccase-home-dir*/shlib directory are missing, the ClearCase executables do not run.

Installing in a Nondefault Installation Directory

If you install Rational ClearCase in a nondefault location (that is, other than in /opt/rational/clearcase), you must set the proper platform-dependent library search-path environment variable to include the *ccase-home-dir*/shlib pathname so that ClearCase executables can find the required ClearCase shared libraries and vendor-supplied libraries.

The order of the pathnames in the environment variable is important. At run time, ClearCase must find the three supplied vendor libraries before it finds any other versions of those libraries in other paths in the list. Other applications that use this definition of the library search-path environment variable may find these supplied vendor libraries instead of other versions of those libraries installed on your system. This behavior may or may not be compatible with those applications.

If the supplied vendor libraries are missing, the executables may search the system libraries (the order of search, where it searches, and whether it searches is platform dependent). If a library of the appropriate name is found, the execution may not succeed because the library found may not be compatible with the ClearCase executable.

The following table indicates the search-path environment variable that you need to define on each supported UNIX platform so that you can access the ClearCase shared libraries. To find the architecture mnemonic associated with your platform, see the sections dealing with individual platforms.

Architecture Mnemonic	**Search-Path Environment-Variable Names**
sun5	LD_LIBRARY_PATH
sgi6	LD_LIBRARY64_PATH
rhat_x86, linux_s390	LD_LIBRARY_PATH
hp11_pa, hp11_ia64	SHLIB_PATH
aix4_power[1]	LIBPATH

[1]Note that on AIX, if LIBPATH contains *any* pathnames, it must also include *ccase-home-dir*/shlib.

ClearCase Platform Compatibility Modes

When running **clearmake**, you can invoke compatibility modes to incorporate features of **make** programs native to some UNIX platforms. For more information, see *Building Software*.

Using Cfront-Based Compilers to Build C++ Programs

Some platforms continue to provide Cfront-based compilers. If you are using such a compiler, you may find detailed information about the best way to use it with ClearCase in *Building Software*. In general, it is recommended that you use a compiler that supports the ANSI C++ explicit instantiation syntax for best results.

ClearCase Client/Server Functionality on UNIX

ClearCase is a client/server application. Developers use client hosts to run the client programs that constitute the user-level interface to ClearCase. ClearCase data (for example, VOB storage directories and view storage directories) reside on server hosts. ClearCase server processes run on server hosts, communicating with client programs through remote procedure calls (RPCs).

For descriptions of the installation models and of the requirements for ClearCase server hosts and client hosts, see the *Installation Guide*.

All UNIX platforms that ClearCase supports can act as registry, license, or view servers. A typical developer's workstation is both a client host (because the developer runs ClearCase on it) and a server host (because the developer's views reside there).

All UNIX platforms that ClearCase supports can also act as VOB servers. However, the ability to act as a VOB server in a heterogeneous environment may have some platform dependencies. To ensure that any computer on which you are planning to host a VOB can act as a VOB server to all its intended clients, see the sections on individual UNIX platforms.

For details about using UNIX systems as ClearCase servers in a Windows/UNIX environment, see the *Administrator's Guide*.

GUI Issues on Some UNIX Systems

On some UNIX systems, ClearCase GUI programs added in Release 3.0.*x* are not supported or have restricted support:

- The Properties Browser (**cleardescribe** or **cleartool describe –graphical**) GUI is supported on Solaris SPARC, HP-UX, Linux for x86, and AIX platforms. For all other platforms, properties information is provided by means of text windows.
- The VOB Admin Browser (**clearvobadmin** or **cleartool lsvob –graphical**) is supported on Solaris SPARC, HP-UX, HP-UX/IPF, AIX, and Linux for x86 platforms. This browser is not provided for IRIX and Linux for IBM S/390 and zSeries.
- The Log Browser (**cleargetlog** or **cleartool getlog –graphical**) is supported on Solaris SPARC, HP-UX, AIX, and Linux/x86 platforms. This browser is not provided for IRIX, HP-UX/IPF, and Linux for IBM S/390 and zSeries.

These ClearCase GUI issues are related to restricted support for the Release 3.0.*x* interfaces:

- *Command-Line Versions of Graphical Command cleardescribe*
- *Merge Manager Functionality on Systems Without Full Property Browser Support*

Command-Line Versions of Graphical Command cleardescribe

Support for the ClearCase Merge Manager includes a new program, **cleardescribe**. This program is not the same as the graphical command by that name on platforms supporting the Release 3.0.*x* GUIs. Rather, it is similar to **cleartool describe**, except that it provides a restricted set of options. The syntax for the **cleardescribe** command is as follows:

cleardescribe { *object-selector* | *pname* } ...

There is no change in support for **xclearcase** and **xcleardiff**.

Merge Manager Functionality on Systems Without Full Property Browser Support

The Merge Manager relies on data provided by **cleartool describe** to get information necessary for a merge. On platforms that support the 3.0.*x* GUI programs, it displays this data using the Properties Browser GUIs.

IRIX, HP-UX/IPF, and Linux for IBM S/390 and zSeries systems do not support these GUIs. Instead, an **xterm** displays the output of the **cleartool describe** command.

Note: If the user tries to resize the window before seeing the prompt `Type <CR> to exit,` some of the data displayed in the window may be duplicated. This problem occurs because of the behavior of **more(1)**.

Backup Tools

Warning: On some UNIX systems (for example, HP and Solaris), **tar(1)** sets file access times to the current time when it is run, which can interfere with derived object (DO) and cleartext storage pool scrubbing patterns. For example, a nightly **tar** operation backs up DO pools. The scrubber utility, by default, scrubs only DOs not accessed in four days (96 hours). Because DOs from the backed-up pools never appear to be more than one day old, they are never scrubbed. For more information about backup procedures, see the *Administrator's Guide*.

Solaris SPARC Functionality

This section describes ClearCase functionality specific to the Solaris SPARC (**sun5**) platform, with references to other places in the documentation set where more information is available.

Modifying a crontab Entry

The *Administrator's Guide* discusses modifying crontab entries or other scripts to prevent recursion. On Solaris systems, the standard **cron** job for removing old .nfs files is now in the script /usr/lib/fs/nfs/nfsfind, which is called by the **root** crontab, so you do not need a separate **root crontab** entry for removing old .nfs files. However, you can use the **-prune** option with any **find** commands in the crontab file to prevent recursion into mounted VOBs.

For example, you can replace an entry like this one

```
15 3 * * * find / -name core -mtime +7
-exec rm -f {} ';' -o -fstype nfs -prune
```

with this entry:

```
15 3 * * * find / -name core -mtime +7
-exec rm -f {} ';' -o -fstype nfs -prune
-o -fstype mvfs -prune
```

Note: In the previous example, long lines are broken for readability. In crontab files, each entry must be a single text line.

Using the lp Print Command

On Solaris SPARC, by default, the **lp** command does not copy a file to the print spooler. Instead, it passes a path specification to link to. When you are set to a view and issue the **lp** command, the path specification has no view context, so the spooler cannot see the file.

To work around this behavior, do one of the following:

- Use **lp -c** to copy the file to the spooler and then print the file from there.
- Use a view-extended pathname when issuing the **lp** command. For example:

  lp /view/*current-view***/vobs/***path-specification*

SoftBench Installation and Configuration

For information about installing and configuring SoftBench to work with ClearCase on Solaris SPARC computers, see the Help on ClearCase integrations with third-party products and the **softbench_ccase** reference page.

User Preparation on Solaris Hosts

On Solaris SPARC hosts, users must include /usr/ucb in their search paths. A user whose search path does not include this directory cannot use the **clearmake** Sun compatibility mode (**–C sun**) and may experience problems in other contexts that require access to standard system-supplied programs. For example, if /usr/ucb is not in your search path, then **whoami** is not accessible, with the consequence that some scripts run by **xclearcase** fail.

Using Solaris SPARC 2.6, Solaris 7, Solaris 8, and Solaris 9 with Non-ClearCase Access

If you use non-ClearCase access from an NFS V.2 server on a Solaris SPARC 2.6, Solaris 7, or Solaris 8 host, you must add the following line to /etc/system on each Solaris SPARC 2.6, Solaris 7, and Solaris 8 NFS V.2 server:

```
set nfs:nfs2_limit_inum=0
```

Starting with Solaris SPARC 2.6, the NFS v2 server code, by default, added a check to ensure that inode numbers have fewer than 31 bits of data. This check is not valid for file systems that use all of the 32-bit unsigned inode, such as the MVFS. Making this proposed change to /etc/system disables this check.

If this check has not been disabled, you see either `File too big` errors or `NFS server not responding` when accessing files in a VOB using non-ClearCase access.

On Solaris 9 systems, it is unnecessary to set **nfs2_limit_inum** in /etc/system. If the /etc/system file on a Solaris 9 system attempts to set this variable, a message is displayed at boot time indicating that the variable cannot be set. To eliminate the message, remove the **nfs2_limit_inum** entry.

Limited Support for CacheFS on Solaris SPARC

CacheFS should only be used for cleartext storage pools. It should be considered as a form of remote NFS storage.

Specifying Fonts for CPF Product GUIs

If you are running Solaris in an environment where no X Font Server is running, the default font used by CPF product GUIs may not be to your liking. To specify the font used by CPF product GUIs, use one of the following methods (listed in decreasing order of precedence):

1. Specify the font when you invoke the application on the command line:

   % **clearhistory –font** *value*

2. Add the following lines to your .Xdefaults file (or any other mechanism that loads the font value into the Xserver resource database):

```
clearhistory*font:   -misc-fixed-medium-*-*--15-*-*-*-*-*-*-*
cleardescribe*font:  -misc-fixed-medium-*-*--15-*-*-*-*-*-*-*
cleargetlog*font:    -misc-fixed-medium-*-*--15-*-*-*-*-*-*-*
clearvobadmin*font:  -misc-fixed-medium-*-*--15-*-*-*-*-*-*-*
```

3. Specify the font as an environment variable.

   For example, in the C shell:

   % **setenv font** *value*

   In the Korn shell, enter:

   $ **export font=**
   "family:lucida sans-face:sans-size:12-encoding:iso88591-foundry:b&h"

Configuring the coreadm Utility on VOB Servers

On Solaris 7 and later, you must use the Solaris **coreadm** utility to enable VOB server processes to generate core files if they fail. Core files are often needed to help resolve problems that cause server failures. To enable core file generation for these server processes:

1. Log on to the VOB server host as **root**.
2. Run the **coreadm** command with the **-e proc-setid** argument.

coreadm -e proc-setid

3 Verify that the system is now configured to allow core file dumps by running the **coreadm** command with no arguments. Look for the output line `per-process setid core dumps: enabled`. (This does not require the **root** identity).

coreadm

```
global core file pattern:
init core file pattern: core
global core dumps: disabled
per-process core dumps: enabled
global setid core dumps: disabled
per-process setid core dumps: enabled
global core dump logging: disabled
```

HP-UX Functionality

This section describes ClearCase functionality specific to the HP-UX 11 (**hp11_pa**) platform, with references to other places in the documentation set where more information can be obtained.

Modifying a crontab Entry

The *Administrator's Guide* discusses modifying crontab entries or other scripts to prevent infinite looping of scripts. On an HP-UX system, no crontab entry is provided by default. The following entry does not search file systems of type **NFS**, nor does it search the viewroot directory:

```
15 3 * * * find / -path /view -prune
-o -name .nfs\* -mtime +7 -exec rm -f {} \;
-o -fstype nfs -prune
```

Note: In the previous example, long lines are broken for readability. In crontab files, each entry must be a single text line.

Moving a VOB

The *Administrator's Guide* describes how to move a VOB to another host. When moving a VOB, whether or not the hosts have different architectures, one required step is to copy the VOB storage directory. For most architectures, the command **tar –xBpf –** is recommended. However, the **tar –B** option is not supported on HP-UX hosts. Instead of the command lines given in the *Administrator's Guide*, use these:

- On the same host to a different disk partition:

  # **tar –cf – libpub.vbs | (cd /src_2/vobstore ; tar –xpf –)**

- On a different host with the same architecture:

  # **tar –cf – libpub.vbs | remsh ccsvr04 'cd /src_2/vobstore ; tar –xpf –'**

- On a different host with a different architecture:

  # **tar –cf – libpub.vbs | remsh ccsvr04 'cd /src_2/vobstore ; tar –xpf –'**

Moving a View

The *Administrator's Guide* describes how to move a view from one host to another. Moving a view also requires using a **tar** command to move the storage directory. On an HP-UX system, which does not support the **–B** option to **tar**, substitute the following commands for the commands given in the *Administrator's Guide*:

- On the same host:

  % **tar –cf – gomez.vws | (cd /public; tar –xpf –)**

- On a different host with the same architecture:

  % **tar –cf – gomez.vws | remsh ccsvr04 'cd /public; tar –xpf –'**

- On a different host with a different architecture:

  # **tar –cf – gomez.vws | remsh ccsvr04 'cd /public; tar –xpf –'**

Manipulating the Block Buffer Cache

The functioning of the block buffer cache has a significant effect onVOB host performance; for more information, see the chapter about VOB performance in the *Administrator's Guide*.

HP-UX provides the **glance** tool for monitoring buffer cache performance. It also provides user-level control over the frequency of flushing the cache to disk through the **syncer(1M)** utility.

Enable Transitional Links on HP-UX 11.x

ClearCase relies on transitional links supplied by Hewlett-Packard to handle the relocation of operating system components between HP-UX 9.*x* and HP-UX 10.*x*/11.*x*. HP-UX 11.*x* systems must be installed with transitional links enabled. These links are enabled by selecting the UPG-TLINK fileset on installation.

SoftBench Installation and Configuration

Because of changes to SoftBench in version 6.*x*, it is no longer possible to create a ClearCase menu item on the SoftBench Development Manager file browser. Setting up the ClearCase-SoftBench integration, as described in the Help, enables you to use ClearCase as the Configuration Manager for your SoftBench files. However, it does not rename the Configuration Manager menu item to ClearCase on the SoftBench file browser as it did with SoftBench 4 or 5, and it does not add ClearCase functionality to that ClearCase menu.

For information about installing and configuring SoftBench to work with ClearCase on HP-UX computers, see the online information about ClearCase integrations with third-party products.

HP-UX/IPF Functionality

This section describes ClearCase functionality specific to the HP-UX/IPF (Itanium) architecture running HP-UX 11 (**hp11_ia64**), with references to other places in the documentation where more information is available.

Modifying a crontab Entry

The *Administrator's Guide* discusses modifying **crontab** entries or other scripts to prevent infinite looping of scripts using the **find /** command. On HP IPF systems, no **crontab** entry is provided by default. The following entry does not search file systems of type NFS, nor does it search the viewroot directory:

```
15 3 * * * find / -path /view -prune

-o -name .nfs\* -mtime +7 -exec rm -f {} \;

-o -fstype nfs -prune
```

Note: In the previous example, long lines are broken for readability, but in a crontab file, each entry must be a single text line.

Moving a VOB

The *Administrator's Guide* describes how to move a VOB to another host. When moving a VOB, whether or not the hosts have different architectures, a required step is to copy the VOB storage directory. For most architectures, the command **tar –xBpf –** is recommended. However the **–B** option to **tar** is not supported on HP IPF hosts. Instead of the commands given in the *Administrator's Guide*, use the following commands:

- To a different disk partition on the same host:

  # **tar –cf – libpub.vbs | (cd /src_2/vobstore ; tar –xpf –)**

- On a different host with the same architecture:

  # **tar –cf – libpub.vbs | remsh ccsvr04 'cd /src_2/vobstore ; tar –xpf –'**

- On a different host with a different architecture:

  # **tar –cf – libpub.vbs | remsh ccsvr04 'cd /src_2/vobstore ; tar –xpf –'**

Moving a View

The *Administrator's Guide* describes how to move a view from one host to another. Moving a view also requires using the **tar** command to move the storage directory. On an HP IPF system, which does not support the **–B** option to **tar**, substitute the following commands for those given in the *Administrator's Guide*:

- On the same host:

  % **tar –cf – gomez.vws | (cd /public; tar –xpf –)**

- On a different host with the same architecture:

  % **tar –cf – gomez.vws | remsh ccsvr04 'cd /public; tar –xpf –'**

- On a different host with a different architecture:

  # **tar –cf – gomez.vws | remsh ccsvr04 'cd /public; tar –xpf –'**

Manipulating the Block Buffer Cache

The functioning of the block buffer cache has a significant effect on VOB host performance; for more information, see the *Administrator's Guide*.

HP IPF provides the **glance** tool for monitoring buffer cache performance. It also provides user-level control over the frequency of flushing the cache to disk through the **syncer(1M)** utility.

Increasing MVFS Cache Size

The *Administrator's Guide* discusses changes you can make to improve the performance of ClearCase clients. Use the information in this section with that material.

The instructions that follow increase the size of the MVFS cache in such a way that the changes are persistent.

Setting Individual Cache Sizes

On each ClearCase client:

1. Become **root**.
2. Change to the directory /usr/conf/mvfs.
3. Edit mvfs_param.c and set the MVFS configuration parameters.
4. Rebuild the MVFS parameters. (This command builds mvfs_param.c and adds the newly rebuilt mvfs_param.o file to /usr/conf/libusrdrv.a.)

   ```
   # make -f mvfs_param.mk regen
   ```

5. Save the old kernel, then rebuild and install a new one, as follows:

   ```
   # cd /stand/build
   # mv /stand/vmunix /stand/vmunix.prev
   /usr/sbin/mk_kernel -o /stand/vmunix
   ```

   Note: Without the **–o** option, **mk_kernel** leaves the kernel in the location specified by config.mk, which is by default /stand/build/vmunix_test. If you build that way, move the kernel as follows:

   ```
   # mv vmunix_test /stand/vmunix
   ```

6. Reboot the system:

   ```
   # /etc/shutdown
   ```

Optionally, Change All Clients Before Installing ClearCase

If you want to make these changes on all your clients before you install a release of ClearCase, you can edit the configuration files in the ClearCase release area. If you do this, you can avoid an extra reboot of each client machine. The ClearCase installation process from the release area to the client host includes the customized parameters when it rebuilds the system kernel.

1. Become **root**.
2. Change the directory to the ClearCase release area.
3. Edit hp11_ia64/usr/conf/mvfs/mvfs_param.c to set the MVFS configuration parameters as described in the *Administrator's Guide*. For example, *release6* may be **6.5_64**.
4. Install ClearCase from the release area on the clients.

Enabling Transitional Links

ClearCase relies on transitional links supplied by Hewlett-Packard to handle the relocation of operating system components between HP-UX 9.*x* and HP-UX 10.*x*/11.*x*. HP-UX 11.*x* systems must be installed with transitional links enabled. These links are enabled by selecting the **UPG-TLINK** fileset on installation.

SGI IRIX Functionality

This section describes ClearCase functionality specific to the IRIX 64-bit (**sgi6**) platform, with references to other places in the documentation where more information can be obtained.

The SGI IRIX systems that run 64-bit kernels are the Fuel, Octane, Origin, and all "Power" systems. On these systems, running **uname –s** returns `IRIX64`. For more information, see your IRIX release notes.

Modifying a crontab Entry

The *Administrator's Guide* discusses modifying crontab entries or other scripts to prevent infinite looping of scripts. In particular, the chapter discusses altering scripts using the **find /** command. On an IRIX system, make sure that the **–local** option is present, to prevent crossing of mount points. Because the viewroot directory is mounted, this option prevents recursion.

For example, replace an entry like this one

```
0 5 * * * find / -type f
  '(' -name core -o -name dead.letter ')'
  -atime +7 -mtime +7 -exec rm -f '{}' ';'
```

with this entry:

```
0 5 * * * find / –local -type f
  '(' -name core -o -name dead.letter ')'
  -atime +7 -mtime +7 -exec rm -f '{}' ';'
```

Note: In this example, long lines are broken for readability. However, in a crontab file, each entry must be a single line of text.

Manipulating the Block Buffer Cache

The functioning of the block buffer cache has a significant effect on VOB host performance. For more information, see the chapter on VOB performance in the *Administrator's Guide*.

IRIX provides the **osview** tool for monitoring buffer cache performance.

Increasing the MVFS Cache Size

The *Administrator's Guide* discusses changes you can make to improve the performance of ClearCase clients. Use the information in this section along with the material in that chapter. The instructions that follow increase the size of the MVFS cache, in such a way that the changes are persistent.

Setting Individual Cache Sizes

On each ClearCase client:

1. Log in as **root**.
2. Edit /var/sysgen/master.d/mvfs and set the MVFS configuration parameters, as described in the *Administrator's Guide*.
3. Run **/etc/autoconfig –f** to reconfigure the kernel.
4. Reboot the system to install the new kernel with the updated MVFS parameters.

Optionally, Change All Clients Before Installing ClearCase

If you want to make these changes on all your clients before you install a release of ClearCase, you can edit the configuration files in the ClearCase release area. If you do this, you can avoid an extra reboot of each client machine. The ClearCase installation process from the release area to the client host includes the customized parameters when it rebuilds the system kernel.

1. Log in as **root**.
2. Change the directory to the ClearCase release area.
3. Edit sgi6/sysgen/*release6*/master.d/mvfs and set the MVFS configuration parameters as described in the *Administrator's Guide*. For example, *release6* may be **6.5_64**.
4. Install ClearCase from the release area on the client machines.

Using Schemes Files

On IRIX systems, scheme files supplied with ClearCase are copied to /usr/lib/X11/schemes. If you are developing a scheme for use on IRIX systems, your custom scheme directory must reside in a directory named schemes (not Schemes), and the custom scheme directory and its files must mimic the file names and directory structure in a predefined scheme like /usr/lib/X11/schemes/Print. On IRIX, the default scheme search path is /usr/lib/X11/schemes, and in SCHEMESEARCHPATH entries, the **%T** is replaced by `schemes`, not `Schemes`.

If you are developing a scheme for use on both IRIX and non-IRIX systems, you must create two scheme directories: .../schemes/MyScheme for IRIX systems and .../Schemes/MyScheme for all other systems. The IRIX version of the custom scheme directory must follow the file name and directory structure in a predefined IRIX scheme directory such as /usr/lib/X11/schemes/Print. The structure and contents of the second version of the scheme directory must be based on a predefined scheme directory such as /usr/atria/config/ui/Schemes/Print.

Compatibility with API Shared Libraries

The ClearCase API shared libraries are in n32 format. Only programs that are in n32 format (compiled with the **-n32** option) are compatible with these libraries.

IRIX User Checkpointing and MVFS State

The IRIX user checkpointing facility does not save MVFS state. For information about IRIX user checkpointing, see the SGI technical support Web site.

CXFS Not Supported

ClearCase does not support the CXFS file system.

AIX Functionality

This section describes ClearCase functionality specific to the AIX (**aix4_power**) platforms, with references to other places in the documentation set where more information can be obtained.

Increasing the MVFS Cache Size

The *Administrator's Guide* discusses changes you can make to improve client-side ClearCase performance. Use the information in this section along with the material in that chapter.

The instructions that follow increase the size of the MVFS cache in such a way that the changes are persistent.

Setting Individual Cache Sizes on AIX 4

On each ClearCase client:

1. Become the **root** user.
2. Change directory to $ATRIAHOME/lib/drivers/*release-dir*.

For example, *release-dir* may be 5.0.

3 Edit mvfs_param.c and set the MVFS configuration parameters as described in the *Administrator's Guide*.

4 Run **make –f mvfs.mk** to rebuild mvfs.o from mvfs_param.o and premvfs.o.

5 Stop and restart ClearCase to install the new MVFS with updated parameters:

```
# /etc/rc.atria stop
# /etc/rc.atria start
```

Export of VOBs or Views on AIX 4.3.x Systems Requires Patches

In order for AIX 4.3.*x* systems to support the export of VOBs or views using NFS to non-ClearCase systems, the following patch, which contains an NFS fix, must be installed:

AIX 4.3.*x* systems	APAR IX79570

AIX 5.1 Systems Require IBM Patch to run Rational ClearCase 2002.05.000

The following patch, available from IBM, must be installed to support ClearCase on AIX 5.1 32-bit kernels. This patch is not required for AIX 5.1 64-bit kernels.

AIX 5.1 32-bit systems	APAR IY21485

Running clearmake Distributed Builds on AIX 4.x Systems

Distributed building with an AIX 4 platform requires a workaround to function properly. Parallel building on AIX 4 platforms works fine. The distributed builds fail because of the way **clearmake** interprets the reporting of load factors on AIX.

Workaround: Edit the .bldhost.*ccase_host_type* file, where *ccase_host_type* corresponds to the value of the CCASE_HOST_TYPE environment variable. (For example, on an AIX system, you may define CCASE_HOST_TYPE to be **aix4_power**.) Edit the file by adding **–idle 0** at the top. This causes **clearmake** to ignore load averages when determining build host suitability. For information about the .bldhost file, see *Building Software*.

Restrictions on MVFS Access to Non-Clearcase (Non-VOB) Files

Due to the way the AIX logical file system is implemented, ClearCase cannot safely allow the deletion of non-VOB objects through view-extended names, or in the root directory (for example, /) when set to a view. In general, this means that those objects also cannot be read, written or created. Although we do allow directories to be listed

and symbolic links to be followed, the object that is linked to is subject to the same restrictions as if it were accessed by its direct pathname.

The implementation of these restrictions can sometimes allow objects to be created that cannot then be deleted. For example, a file that you create through a link in / while set to a view cannot be deleted through the link path. However, it can be deleted through its actual path.

The restricted operations return an error (normally, EROFS or EACCES). In particular, **ls -l** of a view-extended non-VOB directory or of / returns “no permission" for every non-directory object (file) name. Also, if a process running as root has its home directory set to / and is running in a setview context, errors may be seen because files in home directory files cannot be created, read, written, or deleted.

The recommended workaround is to do the operation using the actual path (not a view-extended path), or to do the operation when not set to a view.

Need to Upgrade to VisualAge C Compiler 5.0.1.1

A bug in the VisualAge C compiler Version 5.0.1.0 can cause a core dump at run time in the resulting executable. If you are using this version of the compiler, upgrade to Version 5.0.1.1, in which the problem is fixed.

Linux Functionality

This section provides information necessary to run ClearCase on Linux platforms, with references to other places in the documentation set where more information can be obtained. Installation-related information can be found in the *Installation Guide*.

NFS, Automounter, and root ClearCase Access

A **root** user of ClearCase will find that the Linux operating system’s NFS implementation can cause some unexpected behavior. For example, using the default /etc/exports file, **root** can create a view that cannot be removed by **root**.

If, when using Linux NFS and the automounter, a user references /net/*hostname*, the host is NFS mounted on the mount point specified in the automounter configuration file. This is true even if the user is currently on host. The default rule for NFS mounts—unless explicitly overridden in the /etc/exports file—is to map requests from **uid/gid=0** (that is, **root**) to the anonymous uid/gid. This means that under the default configuration, a file owned by **root** cannot be removed by **root** by means of the /net/*hostname* path.

ClearCase creates files locally, but accesses these files through global path specifications (by default, /net/*hostname*/...). Therefore, if **root** creates a view on the local machine, all the special files that ClearCase creates in the view are owned by **root**. However, if **root** tries to remove the view, the view is accessed through the global path, and the special ClearCase files are not deleted because the ownership and permissions do not allow deletion by the anonymous user.

Workaround: To avoid this problem, the /etc/exports entries must include the option **no_root_squash**. This option allows all ClearCase activities to proceed normally. Note that you must exercise caution when using the **no_root_squash** option because it allows any **root** user—on any host that NFS mounts a host's exported file system—to have **root** permissions on that file system. This can be a dangerous security problem in some environments.

Typically, **root** does not create views, and the problem arises only on those ClearCase administrative tasks that require **root** privileges, for example, using the **protectvob** command. In such cases, it is recommended that the modifications to /etc/exports be temporary and that the original settings be restored after the ClearCase administrative tasks are performed.

Note: The use of /net/*hostname* in global paths is pervasive in ClearCase: the inability of ClearCase to access files through these global paths can cause anomalous behavior, often with no warning. Correct configuration of Linux to allow proper ClearCase access is essential for successful ClearCase operation.

Using Linux as a VOB Server

If you use Linux as a VOB server, you may receive intermittent error messages in ClearCase because of NFS caching issues in the Linux operating system. In most cases, when you perform the same ClearCase operation again, it succeeds.

The ClearCase configurations listed below are less likely to experience these problems:

- Remote Linux VOB server and a local Windows view server and client using the CCFS protocol, where remote refers to a separate host and local refers to the same host.
- Remote UNIX VOB server and a local Linux view server and client. See the *Installation Guide* for the list of supported architectures.

Linux mount Command Will Not Mount MVFS Directories

The Linux **mount** command does not properly mount file systems other than those included in the default distribution. If you try to mount a ClearCase MVFS with the Linux **mount** command, you will cause a kernel fault and must reboot your system.

Workaround: Always use the **cleartool mount** command to mount VOBs.

Non-ClearCase Access Using NFS Is Not Supported

Because of limitations in the interfaces between NFS and the MVFS, non-ClearCase access using NFS is not supported. Exporting MVFS file systems is unsupported on Linux systems.

Add MVFS to File System Exclusion List To Prevent Recursion in slocate Command

The **slocate(1)** command on Linux provides a form of indexed find. Just as you should avoid having the **find** command descend into the viewroot at /view, you should also prevent **slocate** from doing so. You can accomplish this by issuing the **slocate** command with the **-f** command line option and the **mvfs** file type.

If the **slocate** command is in /etc/cron.daily/slocate.cron, this change is made for you during installation and appears in the install log.

Unable To Perform Certain File Operations on Sockets, Character Devices, and Block Devices When Set to a View

Because of limitations in the interface between the MVFS and Linux, when set to a view, it is not possible to perform certain file operations—such as the **mv** command—on sockets, character devices, and block devices. For example, if you attempt to rename the character device ptyx3 using the command

 # mv ptyx3 foo

the following error message appears:

```
mv: cannot move ‘ptyx3’ to subdirectory of itself ‘foo’
```

Workaround: Perform these file operations outside a view context.

Rebuilding the Linux Kernel and vnode Module

The Linux kernel and the vnode module must be built using the same compiler and the same kernel heading. See the file, /var/adm/rational/clearcase/mvfs/vnode_src/README.txt, for details.

General Issues for Linux on IBM Mainframe Systems

This section discusses general issues related to Rational ClearCase 2002.05.00 and later on IBM mainframes running Linux.

The following are known limitations:

- **Symmetric Multiprocessing.** The Linux kernel as distributed by SuSE contains support for symmetric multiprocessing (SMP). It is possible to build a kernel without this support, but the SMP kernel is the only one supported for ClearCase.

  Moved to the install guide (6.0NR?)

- **Extended VOB Support.** For Version 2002.05.00, ClearCase schema 54 only is supported. Schema 54 provides extended VOB support.

- **VOB Admin Browser and Log Browser GUIs Not Supported.** Linux on IBM mainframe systems does not support the ClearCase GUI programs for the VOB Admin Browser and the Log Browser, which were added in ClearCase Release 3.0.*x*. For details, see *GUI Issues on Some UNIX Systems* on page 11.

- There is no Web browser support for SuSE Linux for the S/390 and zSeries.

NAS Devices Certified for Use with ClearCase

4

Network-attached storage (NAS) devices provide data storage resources to other hosts on a local area network using a network file system protocol like the Network File System (NFS) or the Common Internet File System (CIFS). The *Administrator's Guide* describes how you can use NAS devices to provide storage for VOBs, views, and other Rational ClearCase data. This chapter explains platform-specific features of those NAS devices that have been certified for use with ClearCase.

Caution: Every certified NAS device must be specially configured to support VOB or view databases. NAS devices that are not configured correctly put any ClearCase data stored on them at risk.

Supported Platforms and Protocols

Table 2 shows NAS devices that are supported for the uses described in this chapter. Not all NAS devices can support VOB or view servers on Windows.

Table 2 Supported NAS Devices

Vendor	Product	Software versions	VOB or view server platforms supported
Auspex	4Front NS2000	NetOS 3.0.1	UNIX only
EMC	Celerra File Server	2.2 (contact EMC Customer Service for ClearCase patch)	UNIX and Windows
Network Appliance	Series 7xx Filer Series 8xx Filer	DataOnTAP OS V5.3.6 DataOnTAP OS V6.0.1	UNIX and Windows

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Note: Rational supports the use of the NFS protocol only to connect a UNIX VOB server host with a VOB database on a NAS device. You must use the CIFS protocol to connect with NAS devices from Windows hosts. Use of NFS software to connect Windows hosts to NAS devices is not supported.

All of the NAS devices described in this chapter can be configured to support native interoperation with UNIX and Windows hosts. You do not need to install any cross-platform file-access software on ClearCase client or server hosts if you are using a NAS device to provide VOB and view storage for a mixed network of Windows and UNIX computers.

Device-Specific Procedures

This section describes procedures for configuring and using various NAS devices with ClearCase. This section assumes the following:

- You are familiar with the basic configuration and operation the NAS device you are using.
- You have already installed the device on your network and verified that it can be used with applications other than ClearCase.
- You have read the applicable material in the *Administrator's Guide* for ClearCase.

It also assumes that you have established the appropriate level of cross-platform interoperability for your site if both UNIX and Windows computers are in use as ClearCase hosts. All the requirements described in the *Administrator's Guide* for user and group accounts on both UNIX and Windows must be met if you are using a NAS device to host ClearCase data that is accessed from UNIX and Windows computers. NAS devices often provide their own implementation of cross-platform file-access solutions, such as NFS and CIFS (SMB), but these implementations usually require that any user who must access files on the NAS device can be authenticated using the same user name and group name regardless the type of platform (UNIX or Windows) they are using. If ClearCase users at your site use UNIX and Windows computers, verify that users can create and delete file and directories on the NAS device from both UNIX and Windows before proceeding with more NAS device configuration steps.

Caution: Rational does not support use of CIFS oplocks on any NAS device used for VOB or view storage. By enabling oplocks on such a NAS device, you put any ClearCase data on that device at risk. Instructions for disabling oplocks on each certified NAS device are included in this chapter.

Auspex NS2000

This section describes configuration procedures that you must perform before you can use an Auspex NS2000 NAS device for VOB or view storage as described in this chapter. For more information about the NS2000, see www.auspex.com.

Data stored on an Auspex NS2000 can be organized into virtual file systems and shares on virtual partitions and RAID sets. A RAID set may be "sliced" into independent file systems using virtual partitions. A RAID set must contain at least three data disks. A RAID set with at least six data disks for frequently accessed ClearCase data is recommended.

Configuring the Auspex NS2000 for ClearCase

To configure the Auspex NS2000 for use by ClearCase:

1. **Create a file system if necessary.** You may use an existing file system or create a new one specifically for use by ClearCase.
2. **Create partitions.** For ease of administration, using virtual partitions on the NS2000 to hold ClearCase data is recommended. The remaining steps in this section assume you are using a virtual partition named /dev/axvp/fsp*n*vp*x*, where *n* is the number of the file-system partition and *x* is the virtual partition number.
3. **Create a file system mountpoint.** Log in to the NS2000 as **root**. Run the following command to create a mountpoint for the virtual file system you created in Step 2:

   mkdir /vobstg
4. **Mount the virtual file system.** Run the following command to mount the virtual file system you created in Step 2 at the mountpoint you created in Step 3:

   mount -F lofs /dev/axvp/fsp*n*vp*x* /vobstg

   To ensure that a virtual file system is mounted at boot time, create an entry for it in /usr/AXbase/etc/lfstab.
5. **Enable read/write access for the ClearCase Unix server process user account.** The *Administrator's Guide* describes this account, which provides a UNIX user identity to which the Windows domain account for the ClearCase server process user can be mapped. All volumes used for VOB or view storage must be configured with read/write (rw) access for this account.
6. **Make the file system accessible.** Volumes that will be accessed only by UNIX computers must be shared by using the NetOS **share** command. Volumes that will be accessed only by Windows computers must be shared by using the NetOS **net share** command. Volumes that must be accessed by both UNIX and Windows

computers must be made accessible using both commands. The following command makes the file system mounted at /vobstg accessible to NFS clients:

share -F NFS /vobstg

7 **Disable oplocks.** Opportunistic locking (CIFS oplocks) is enabled by default on the NS2000. You must disable oplocks by setting the NS2000 registry key:

HKLM\SYSTEM\CurrentControlSet\Services\AdvancedServer \FileServiceParameters\UseOplocks

to a value of 0 using the NetOS **regconfig** command or the Windows registry editor. To use the Windows registry editor to edit the registry on the NS2000, click

Registry > Select Computer

and type the name of the NS2000 in the Select Computer dialog box.

Using NS2000 Snapshot Backups

The Auspex NS2000 snapshot backup tool **ax_snapshot** allows you to quickly make a read-only copy of a virtual file system. Rational supports use of **ax_snapshot** to make backups of all ClearCase data, including VOB data. The following command creates a snapshot on cache partition fsp1m0rd1s0 of a virtual partition mounted at /vobstg:

ax_snapshot ckpt /vobstg fsp1m0rd1s0

As with any VOB backup strategy, you must lock the VOB before backing it up. Because the snapshot backup copy can be made quickly, lock time required for the backup will be minimal.

A cached snapshot backup should also be backed up to hard media such as tape or CD, using backup software (for example, the Auspex utility **ax_gtar**) that will preserve all file system information, including ACLs if the file system is used to hold VOBs or views served by a VOB or view server on Windows.

Note: To back up a cached snapshot, you must first mount it.

By default, NS2000 file-based backup does not back up files larger than 2 GB. VOBs using schema version 54 may include some files larger than 2 GB. To ensure that these files are included in hard-media (file-based) backups of a snapshot cache, edit the file /usr/AXndmp/etc/config on the NS2000 as follows:

1 Locate the following line:

#ALLOW_TAR_EXTENSION # auspex extension to support large files (>=2GB)

2 Remove the first comment delimiter (#) to enable this feature.

ALLOW_TAR_EXTENSION # auspex extension to support large files (>=2GB)

Note: When this option is enabled and a large file is encountered during file-based backup, Auspex's proprietary extension to standard GNU tar format is used instead of the standard GNU tar format. With this option on, you may not be able to use the standard GNU tar command to recover data from file-based backups.

EMC Celerra File Server

This section describes configuration procedures that you must perform before you can use an EMC Celerra File Server for VOB or view storage as described in this chapter. For more information about the Celerra File Server, see www.emc.com.

Configuring a Celerra File Server for ClearCase

These are the steps you must take to configure a Celerra File Server for use by ClearCase.

1. **Configure storage.** Create an appropriate network interface, metavolume, and file system for use by ClearCase.
2. **Create a mountpoint** for the file system you created in Step 1.
3. **Mount the file system.** Use the **-o nooplock** option to **server_mount** to disable CIFS oplocks. The default access-checking policy for **server_mount** is NATIVE. This default policy is recommended.
4. **Export the file system** as needed for UNIX (NFS) and/or Windows (CIFS) clients. The following commands export the file system /ufssc1 on Data Mover **server_2** for NFS and CIFS access.

   server_export server_2 /ufssc1
   server_export server_2 -P cifs -n ufssc1 /ufssc1

   Note: You must also configure and start CIFS services if you are exporting a file system for CIFS access.

Using Celerra TimeFinder and SnapSure Backups

The EMC Celerra TimeFinder facility creates a mirrored copy of a file system on the Celerra device. The SnapSure facility creates a read-only copy of a Celerra file system on another volume on the device. Rational supports use of either facility to make backups of all ClearCase data, including VOB data.

As with any VOB backup strategy, you must lock the VOB before backing it up. Because these copies can be made quickly, lock time required for the backup will be minimal.

Network Appliance Filer

This section describes configuration procedures that you must perform before you can use a Network Appliance Filer for VOB or view storage as described. For additional information about Network Appliance Filers, see www.netapp.com.

Data on a Network Appliance filer is organized in volumes. A volume is an independent file system with its own RAID groups. Every RAID group must contain at least two disks (the default is 8). It is recommended that you create volumes with at least four data disks if they contain frequently accessed ClearCase data. Smaller volumes may be adequate for storage pools containing infrequently accessed or read-only data.

In addition to creating volumes to hold ClearCase data on a Network Appliance Filer, you must also create qtrees to manage access control for the files and directories in these volumes, and you must use the appropriate commands to make these volumes accessible to UNIX and/or Windows clients.

Configuring a Network Appliance Filer for ClearCase

To configure a Network Appliance Filer for use by ClearCase:

1 **Create volumes.** Create one or more volumes on the Filer for use by ClearCase. You must use the **nvfail on** option to the Data ONTAP **vol** command. The following commands create a volume named **ccvol** that uses 10 disks:

vol create ccvol 10
vol options ccvol nvfail on

Note: Network Appliance Filers provide a specialized snapshot backup facility (not related to the ClearCase snapshot backup program), which is managed at the volume level. Keep backup considerations in mind when allocating volumes to hold VOB data or other ClearCase data. It will simplify implementation of Network Appliance snapshot VOB backups if you dedicate one or more volumes exclusively to VOB storage.

2 **Disable quotas on volumes to be used for VOB storage.** If quotas are enabled, it is recommended that you disable them on volumes that are used for VOB storage. The following Data ONTAP command reports on whether the volume **ccvol** has quotas enabled:

quota report ccvol

The following Data ONTAP command disables quotas on the volume **ccvol**.

quota off ccvol

3 **Make the volumes accessible.** Volumes that will be accessed only by UNIX computers must be exported by using the Data ONTAP **exportfs** command. Volumes that will be accessed only by Windows computers must be shared by using the Data ONTAP **cifs_shares** command. Volumes that must be accessed by both UNIX and Windows computers must be exported and shared.

4 **Enable read/write access for the albd_server and root.** All volumes used for VOB or view storage must be configured with read/write (rw) access by the **albd_server** account if accessed from Windows and **root** if accessed from UNIX.

5 **Create qtrees.** A qtree is a special subdirectory of the root directory of a volume. The following Data ONTAP command creates a qtree named **vobstg** in a volume named **ccvol**.

qtree create /vol/ccvol/vobstg

6 **Specify each qtree's security style.** The Data ONTAP **qtree** command allows you to specify the type of access checking (security style) that will be used when a determining whether a user has rights to access a file or directory. You can specify any of three security styles:

- **unix** evaluates user access rights by considering the UID and GID of the user and the access mode of the file or directory.
- **ntfs** evaluates user access rights by considering the SID of the user and the ACL of the file or directory.
- **mixed** provides support for both security styles.

The following Data ONTAP command specifies that the **unix** security style will be implemented in the qtree named **vobstg**

qtree security vobstg unix

Note: For any qtree used to provide VOB storage server by a VOB server running Windows, you must set the qtree security style to **ntfs**.

7 **Disable oplocks.** Opportunistic locking (CIFS oplocks) is enabled by default when a qtree is created. The following Data ONTAP command disables oplocks on the qtree named vobstg:

qtree oplocks vobstg disable

Using Network Appliance Snapshot Backups

The Network Appliance snapshot backup facility creates a read-only copy of a volume on another volume on the Filer. Rational supports use of this facility to make backups of all ClearCase data, including VOB data.

As with any VOB backup strategy, you must lock the VOB before backing it up. Because the snapshot backup copy can be made quickly, lock time required for the backup will be minimal.