# Working in Base ClearCase

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# 1 ClearCase Concepts

Rational ClearCase provides a flexible set of tools that your organization uses to implement its development policies. To use these tools, you need to understand the following concepts:

- ClearCase views
- Versions, elements, and VOBs
- Parallel development

## 1.1 Recommended Reading Paths

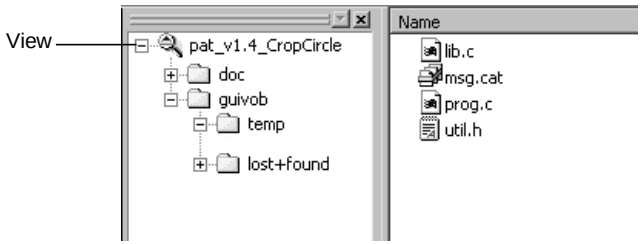
Read this chapter first. Then, if you want to start working immediately, use online help to learn as you go. Or, if you prefer a more structured approach, use the remainder of *Working in Base ClearCase* as a guide through your organization's development cycle.

The sections titled *Under the Hood* provide detailed information and suggest ways to become an advanced ClearCase user.

## 1.2 ClearCase Views

To access files under ClearCase control, you set up and work in a *view*. Figure 1 shows a view named **pat_v1.4_cropcircle** as seen from ClearCase Explorer.

Figure 1 A View as Seen from ClearCase Explorer




A *view* shows a directory tree of specific *versions* of source files. The view **pat_v1.4_ cropcircle** is a directory tree of source files for developing release 1.4 of the Cropcircle software product.

### Snapshot Views and Dynamic Views

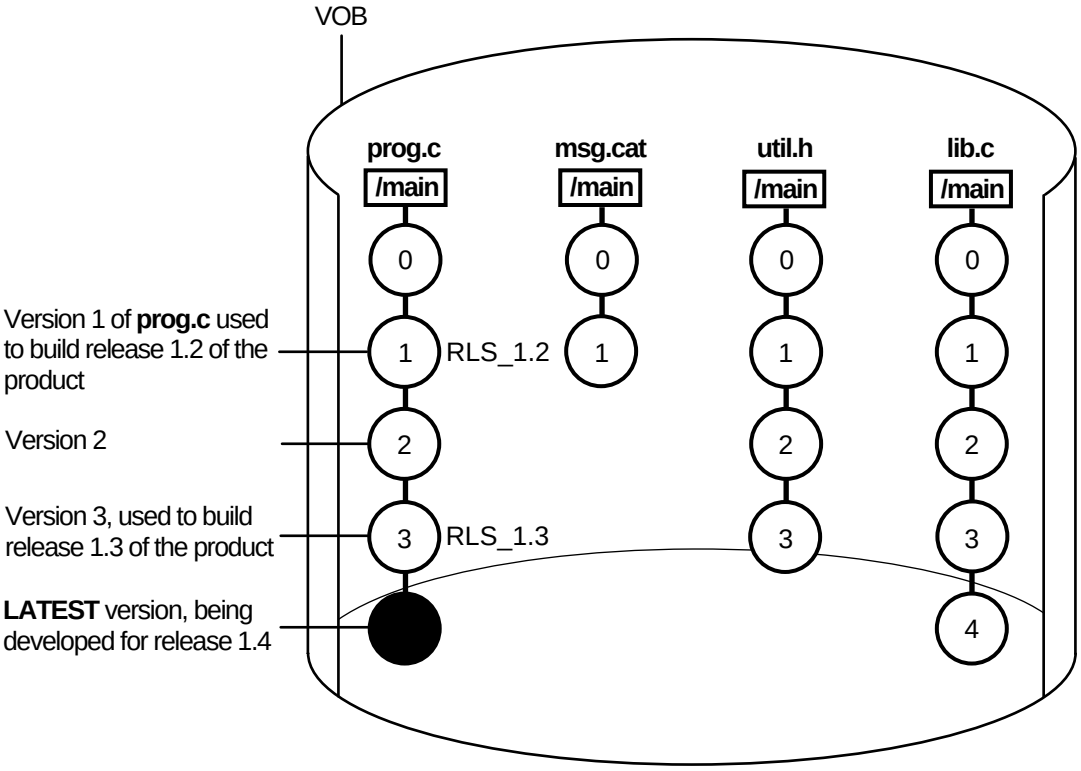
ClearCase includes two kinds of views:

- *Snapshot views*, which copy files from data repositories called *VOBs* (*versioned object bases*) to your computer.
- *Dynamic views*, which use the ClearCase *multiversion file system* (MVFS) to provide immediate, transparent access to the data in VOBs. (Dynamic views may not be available on all platforms. For more information, see ClearCase online help.)

## 1.3 Versions, Elements, and VOBs

Each time you revise and check in a file or directory from a view, ClearCase creates a new *version* of it. Files and directories under ClearCase control (and all of their constituent versions) are called *elements* and are stored in *VOBs*. Figure 2 illustrates a VOB that contains the file elements **prog.c**, **util.h**, **msg.cat**, and **lib.c**.

Figure 2 A VOB Contains All Versions of an Element




Depending on the size and complexity of your software development environment, ClearCase *elements* may be distributed across more than one VOB. For example, the elements used by the documentation group are stored in one VOB, while the elements contributing to software builds are stored in a different VOB.

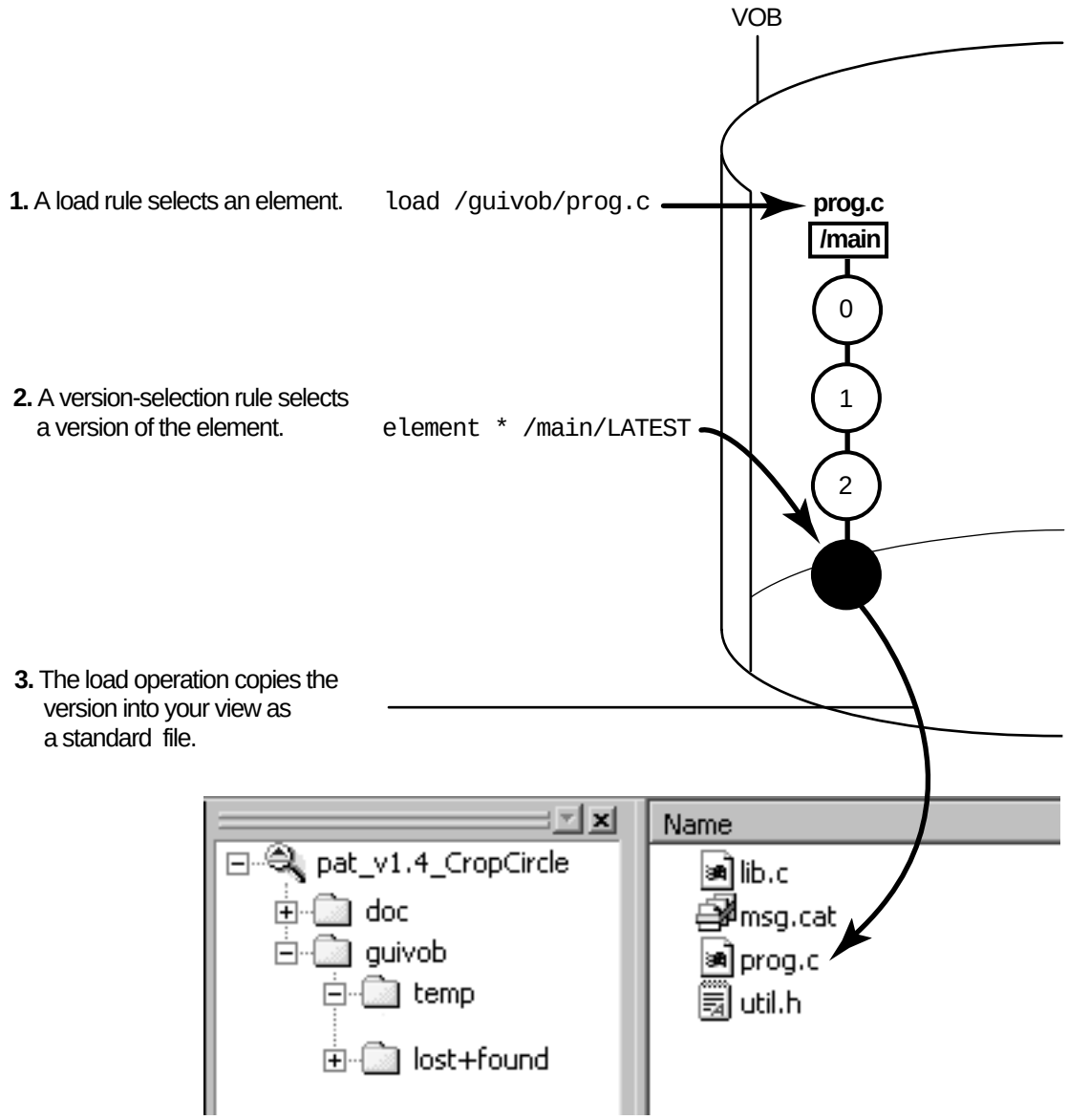
## Selecting Elements and Versions

A set of rules called a configuration specification, or *config spec*, determines which files are in a view.

### Config Specs for Snapshot Views

Config specs for snapshot views contain two kinds of rules: *load rules* and *version-selection rules*. Figure 3 illustrates how the rules in a config spec determine which files are in a view.

Figure 3 Config Spec Selecting Versions



### Config Specs for Dynamic Views

Dynamic views use version-selection rules only (and ignore any load rules). A dynamic view selects all elements in all VOBs activated on your computer, and then uses the version-selection rules to select a single version of each element. Instead of copying the version to your computer as a standard file, the view uses the *MVFS* (multiversion file system) to arrange the data selected in the VOB into a directory tree.

### Criteria for Selecting Versions

The rules in the config spec constitute a powerful and flexible language for determining which versions are in your view. For example, version-selection rules can specify the following criteria:

- The latest version.
- A version identified by a *label*.

  A label is a text annotation that you can attach to a specific version of an element. Usually, your project manager attaches a label to a set of versions that contributed to a specific build. A typical config spec rule uses version labels to select versions:

  ```
  element * BASELINE_1
  ```

  For example, if your project manager attaches version label **BASELINE_1** to a version of element **prog.c**, any view configured with this rule selects the labeled version (unless some rule earlier in the config spec matches another version of **prog.c**).For more information about labels, see *Managing Software Projects*.
- A version identified by a *time rule*, that is, a version created before or after a specific time.

The version-selection rules are prioritized. For example, the view can try to select a version identified by a label first, and if no such version exists, the view can select a version based on a time rule.

### Version Labels in Version-Extended Pathnames

In addition to affecting the way the element appears in views, labeling a version of an element also provides a way to access the version with a version-extended pathname. Labeling a version effectively adds a new hard link to the version in the extended namespace. If you attach version label **R4.1A** to version **/main/rls4/12** of element **lib.c**, these pathnames are equivalent:

```
lib.c@@/main/rls4/12
lib.c@@/main/rls4/R4.1A
```

In addition, a third pathname is *usually* equivalent:

```
lib.c@@/R4.1A
```

This version-extended pathname is valid if it is unambiguous, that is, if no other version of **lib.c** is currently labeled **R4.1A**. (This is usually the case because, by default, label types are restricted to being used once per element. See the description of the **–pbranch** option in the **mklbtype** reference page in the *Command Reference*.)

### Learning the Config Spec Syntax

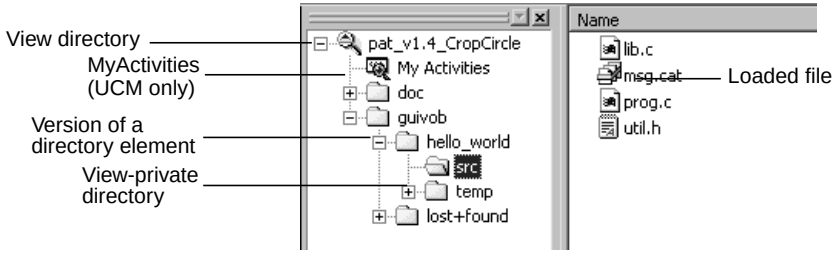
Usually only one or two members of your software team learn the syntax for these rules and create config specs for everyone on the project to use. For more information, see *Managing Software Projects* and the **config_spec** reference page in the *Command Reference*.

## View-Private Objects

In addition to versions of source files, a view also contains file-system objects that are not under ClearCase source control, such as temporary files that you create while developing your source files. These non-ClearCase file system objects are called *view-private files* and *view-private directories*.

Figure 4 shows the **pat_v1.4_cropcircle** view with the objects labeled.

Figure 4 A View Contains Versions of Elements and View-Private Objects



## 1.4 Parallel Development

The combination of config spec rules, views, VOBs, and *branches* (described in Chapter 5, *Working On a Team*) provide the basis for *parallel development*, a strategy in which an organization can work on multiple versions of the same source file concurrently. For example, you're working on release 1.4 of a software product, and you want to experiment with the GUI as a result of feedback from usability testing. You can create a view that isolates your modifications from the rest of the release 1.4 development project. Although you work with the same set of files used in the official builds, the versions of the files that you create from this view evolve separately from the versions used in the official builds. When you're satisfied with your usability modifications, you can use ClearCase tools to merge your work with the files used in the official release 1.4 build.

## 1.5 About Rational ClearCase Explorer

Rational ClearCase Explorer is a developer's tool that supplies a coherent, adaptable, and customizable interface to your software environment, providing:

- Organization of ClearCase developer tools
- Access to the ClearCase environment
- Flexible navigation mechanisms

Using a Windows Explorer-like interface with dockable panes, ClearCase Explorer supports shortcuts to ClearCase tools, to ClearCase documentation, and to ClearCase objects.

### The ClearCase Explorer Window

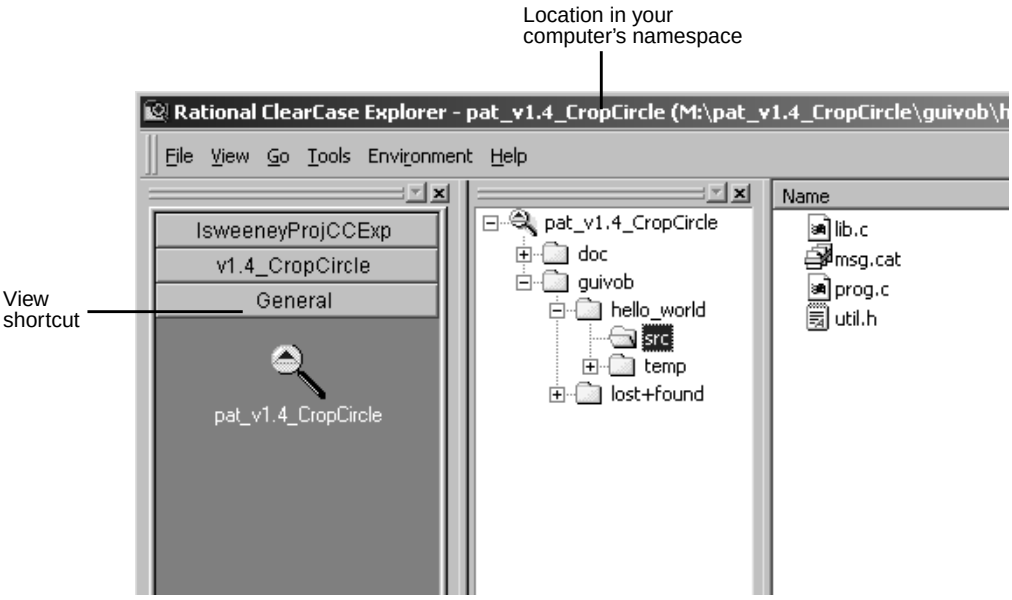
In its initial state, the ClearCase Explorer window has three panes (Figure 5). The leftmost pane, called the Shortcut pane, is dockable and provides the **Views** tab to access ClearCase objects and the **Toolbox** tab to start ClearCase tools and configurable user tools. In the Toolbox page, rectangles at the top and bottom provide a paging mechanism to access hidden tool icons.

The middle pane, called the Folder pane, is dockable and contains the tree control that displays the directory hierarchy for a given view.

The rightmost pane, called the Details pane, is not dockable and contains the list control that displays the contents of a selected folder.

An optional pane, called the Information pane, is not dockable. It provides context-dependent ClearCase state and processing information and access to introductory online help topics.

Figure 5 A Base ClearCase View From ClearCase Explorer




## ClearCase Explorer Tool Organization

ClearCase Explorer supports access to tools by clicking a tab in the Shortcut pane or by right-clicking in the Folder pane or Details pane.

### Toolbox Tab

In the Shortcut pane, ClearCase Explorer provides the **Toolbox** tab for finding and running both ClearCase tools and user-selectable tools and for accessing documentation. Tools are organized by tool groups divided into two pages, **UCM** for project-related tools and **Base ClearCase** for tools not related to UCM projects. The tools provided by default are classified as developer tools. Other ClearCase tools classified as project manager or administrator tools are accessible in the Windows Taskbar by clicking **Start** > **Programs** > **Rational ClearCase Administration**.

The **Toolbox** tab also presents a **Getting Started** page that provides access to online help information, online versions of printed documentation, and tutorials.

### Shortcut Menu Support

ClearCase Explorer provides two types of shortcut menus:

- For the ClearCase integration in the Folder pane and in the Details pane
- For customizing the Shortcut pane

If you right-click in the Folder pane or the Details pane, a context-sensitive shortcut menu appears offering access to file handling operations and ClearCase functions. The shortcut menu commands are activated based on the state of the item you select. You can also add tool shortcuts to your **Send To** folder to access your favorite integrated development environment (IDE), your favorite editor, or a command shell. Any tool shortcuts newly added to your **Send To** folder appear on the shortcut menu **Send To** command the next time ClearCase Explorer starts.

If you right-click in the Shortcut pane, another type of context-sensitive shortcut menu appears enabling you to add your own tool groups and tool shortcut icons. In the **Toolbox** tab, the shortcut menu commands enable you to add shortcuts to your favorite tools and URLs and add page controls for your own tools. In the **Views** tab, with the shortcut menu, you can add and remove view shortcuts and add pages to organize view shortcut icons. And you can perform some ClearCase operations on views. The ways to do this are described in the online help.

### Tool Context

A tool started from the Shortcut pane or from a shortcut menu command can have view context, if applicable. For example, starting the History Browser shows the event log for the currently selected element. If you start a project file (for example, a .DSW or a .VPB file) from within ClearCase Explorer, you can perform ClearCase functions from within the IDE. As you are working with ClearCase objects within the IDE, you can refresh the ClearCase Explorer display to see the state change of the elements in the Details pane.

## ClearCase Explorer Navigation

Through the **Views** tab in the Shortcut pane, ClearCase Explorer provides means for accessing and navigating among ClearCase views.

### View Access

You access a non-UCM view by clicking the **General** page in the **Views** shortcut pane. In the **General** page are icons for views that you own.

Clicking a view icon activates (starts) the view. ClearCase Explorer displays in the Folder pane a folder hierarchy rooted at the view-tag, and, as subfolders under the view, the contents of the view. For a dynamic view, the subfolders are for all mounted VOBs. For a snapshot view, the subfolders are for all VOBs rooted at the view. By default, in a snapshot view, only loaded elements are visible. You can change this default so that unloaded elements are displayed. The title bar shows the currently selected path within the view.

As you click a subfolder, the subordinate elements display in the Details pane showing ClearCase details about the items, element and version information. In the Details pane, elements possessing unique characteristics (like a file under version control or an eclipsed version) display with visual characteristics familiar in other ClearCase tools.

### History of Visited Locations

As you move within the Folder pane from one location to another, ClearCase Explorer stores the path for each of your visits. To return to a previously visited location, click **File** and, from the numbered list of pathnames (ordered most recently visited to first visited), select the pathname.

## Access to ClearCase Information

The tree control provided in the Folder pane provides navigation to ClearCase objects in a view.

### Display of ClearCase Information

Each view is represented as a top-level folder in the Folder pane. Expanding the subfolders provides details about the ClearCase objects accessible in the view. Selecting a folder displays fields of file system and ClearCase information in the Details pane. You can customize which fields are displayed. Because gathering some data for display takes more processing time and affects tool performance, you may not want to display all possible fields. You can also sort the data in the columns using standards Windows techniques. Any customizations you make are persistent across invocations of the tool.

### Initial Use and Appearance

If you start ClearCase Explorer on a computer without any projects or views defined, the Shortcut pane under the **Views** tab contains only the **General** page. If you join a project, the tool creates a page under the **Views** tab with the project name.

If you create a view associated with a project from within ClearCase Explorer, the tool creates a shortcut for that view on the page for that project. If you introduce into ClearCase Explorer a view that is associated with a project that does not have a page, the tool creates a shortcut bar for that page.

For any view that you own that is not associated with a project, the tool adds to the **General** page an icon with the view-tag. (There is no way to tell ClearCase Explorer not to create an icon for a view that you own.) When ClearCase Explorer exits, it stores, as the default view, information about the view that you last worked in. When ClearCase Explorer starts again, it restores the default view.

### Ongoing Use and Appearance

Use the **View** menu to adjust the window appearance. Click the check boxes to toggle the display of window panes and bars. Click the **Refresh** commands to have ClearCase Explorer examine the system for the latest state information and re-display the information in the Folder pane and Details pane.

If you remove a view that you own, its shortcut in ClearCase Explorer is removed. If you remove all the views for a project, its page in ClearCase Explorer is removed. To remove a shortcut for a view that you do not own, remove its view-tag from the registry.

### Features for a New User

For new users, ClearCase Explorer offers an Information pane whose contents depend on the context of your work. The Information pane presents workflow help topics that outline the stages required while working in different ClearCase environments.

As you work with ClearCase objects, the Information pane displays contextual information about a selected element. Included is brief information about a selected element and its current state. For example, if you select a file, the Information pane shows two columns, one listing the details of your selection and the other offering, under the heading **About**, informative text or, under the heading **Uses**, tips on some of the operations that you can perform with the selected object.

In a view context in ClearCase Explorer, you can work in the Details pane where you can create a new file or directory. If you select the newly created file or directory, the Information pane tells you that you can add it to source control. If you add the file or directory to source control, the Information pane keeps the item selected and tells you that you can check it out. If you are working within a UCM project, you can select an activity; or, if you are checking an element out, you can create a new activity. If the project is enabled for ClearQuest, you can select a change request.

After you become used to the environment, you can hide the Information pane to reclaim the screen area.

## 1.6 Extended Namespace for Elements, Branches, and Versions

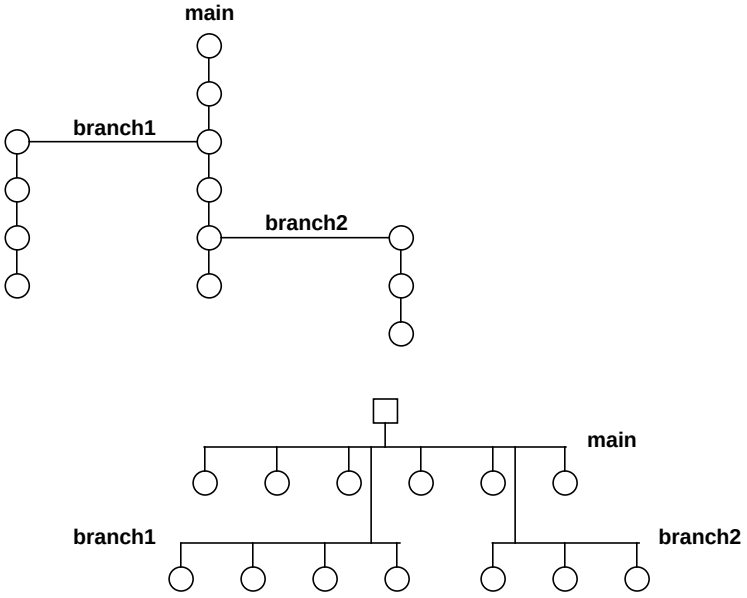
An element's version tree has the same form as a standard directory tree (Figure 6), which compares components of the version tree to components of a directory tree in extended namespace.

As a component of the version tree, the element is the root of the directory tree in the extended namespace. The element itself appears to be a directory, which contains a single subdirectory, corresponding to the **main** branch. (It can also contain some version labels.)

A branch in the version tree appears as a subdirectory in the extended namespace. As a directory, each branch can contain files (individual versions and version labels), directories (subbranches), and links (version labels).

A version in the version tree is a leaf name of the directory tree in the extended namespace. Each version of an element is a leaf of the directory tree. For a file element, the leaf contains text lines or binary data. For a directory element, the leaf contains a directory structure.

Figure 6 Version Tree and Extended Namespace



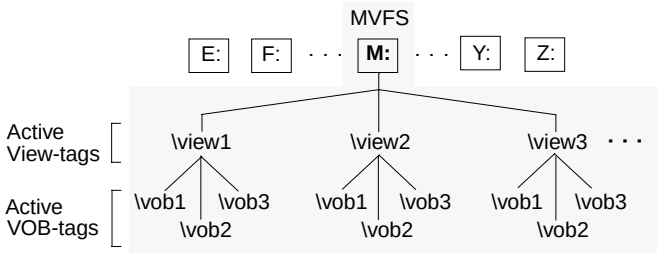

Accordingly, any location within an element's version tree can be identified by a pathname in this extended namespace:

| | |
|---|---|
| **sort.c@@** | *(specifies an element)* |
| **sort.c@@/main** | *(specifies a branch)* |
| **sort.c@@/main/branch1** | *(specifies a branch)* |
| **sort.c@@/main/branch1/2** | *(specifies a version)* |
| **doctn/.@@/main/3** | *(special case: extra component is required in VOB's top-level directory)* |

## Dynamic View Access Model

All ClearCase data is accessed through the MVFS, which, by default, occupies drive M: on each ClearCase host. Each active view has a name called a *view-tag* which appears in the root directory of M. Each active VOB has a path called a *VOB-tag* which appears as a subdirectory under *each* active view, as shown in Figure 7.

Figure 7 ClearCase MVFS Namespace



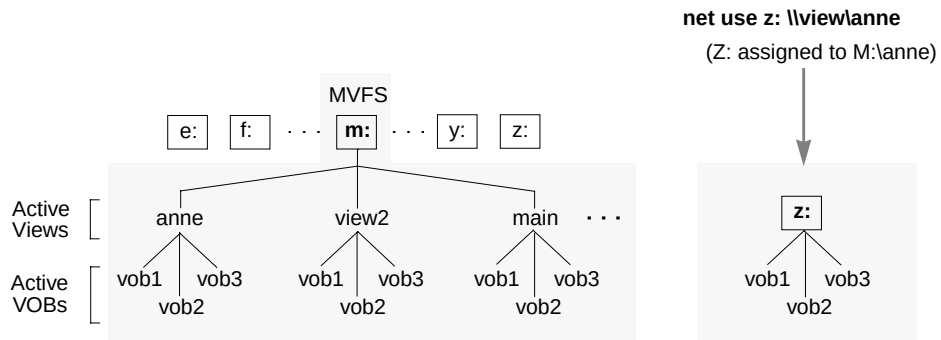

From drive M, you can access VOBs using pathnames of the following form:

*view-tag**vob-tag**pname-in-vob*

Typically, however, you do not work directly on drive M, but in the view root directory accessed by a shortcut in ClearCase Explorer. In Windows Explorer, you typically assign a drive to a view.

Figure 8 shows how the MVFS namespace looks from a drive assigned to a view in the ClearCase Explorer view shortcut, with the **net use** command, or by clicking **Tools** > **Map Network Drive** in Windows Explorer.

Figure 8 The MVFS Namespace from a Drive




From any drive, you can specify view-extended pathnames of the following form:

M:*view-tag**vob-tag**pname-in-vob*

If you move to drive M, you are in view-extended namespace, and all VOB access is by view-extended pathnames.

To eliminate any confusion that may result from unintentional use of view-extended pathnames when you are working at a command prompt, we recommend that you work from a drive letter assigned to a view. This permits you to use VOB pathnames of the following form:

*drive-letter*:*vob-tag**vob-object-pname*

in both **cleartool** and standard operating system commands. Furthermore, this approach is required if you want to share DOs between views at build time.

## 1.7 The Base ClearCase-ClearQuest Integration

Rational ClearQuest is a change-request management system that can integrate with base ClearCase projects to provide extended features. These features enable you to associate change requests in a ClearQuest user database and versions of ClearCase elements on which you are working.

### The Base ClearCase-ClearQuest Schema and User Databases

ClearQuest stores data in two databases: a schema repository and a user database. A schema defines the types of records in the database and other attributes of the database. ClearQuest stores all schemas in a schema repository. The user database stores your change-request data.

The ClearQuest schema package provides additional information in your ClearQuest records to track associations with ClearCase versioned objects. To support associations between base ClearCase and ClearQuest record types, the schema repository needs to have the schema package applied to its record types and the user database used with the integration must be updated to add the new fields provided by the package.

Your ClearQuest user database may include different record types for different purposes. The record type used by the SAMPL database supplied with the base ClearCase-ClearQuest integration is called a defect, but with the ClearCase schema package installed, any record type can be used.

## ClearCase Triggers and ClearQuest Change Requests

The base ClearCase-ClearQuest integration consists of ClearCase triggers that fire when you check out a file, cancel a checkout, or check in a file. Your ClearCase administrator installs the integration triggers into each target VOB. The integration associates one or more ClearQuest change requests with one or more ClearCase versions stored in one of the target VOBs.

- A single change request may be associated with more than one version. The set of versions that implement the requested change is called the *change set* for that request.
- A single version may be associated with more than one change request. These change requests are called the *request set* for that version.

## Uses of the Base ClearCase-ClearQuest Integration

The integration provides a text-based user interface for users of the **cleartool** command-line interface and a **clearprompt** pop-up window interface for users of the ClearCase GUIs such as ClearCase Explorer and Windows Explorer (on Windows computers) and ClearCase File Browser (on UNIX workstations).

The base ClearCase-ClearQuest integration has triggers on checkin, checkout, and cancel checkout operations. As a ClearCase user, you can do the following:

- Associate a version with one or more change requests when you check out or check in the element.
- List the request sets that are associated with a project over a period of time, list the change requests associated with a specific version, and see the related hyperlinks.

As a ClearQuest user, you can do the following:

- View the change set for a change request.
- See the files that fix a specific problem.

ClearCase administrators can do the following:

- Install the related triggers in a VOB and set a policy for each VOB that determines the conditions under which you are prompted to associate versions with change requests.
- Specify that you are prompted on checking out a version, checking in a version, or both.

- Specify that prompting occurs only for some VOBs, branch types, or element types. Associations of checked-in versions with change requests can be either optional or required.

A ClearQuest administrator adds the ClearCase schema package to a ClearQuest schema. The administrator sets a policy for one or more VOBs that specifies the conditions under which you are prompted to associate versions with change requests.

# 2 Setting Up a View

Usually you set up a separate view for each development project to which you contribute. Setting up a view involves the following tasks:

- Choosing snapshot view or dynamic view
- Choosing a location and name
- Adding or modifying version-selection rules
- Selecting elements to load into snapshot views

**NOTE**: If you plan to access source files stored in UNIX VOBs, you may need to create your view in MS-DOS text mode, depending on how your shared source files handle line termination sequences. For more information, see *Accessing Views and VOBs Across Platform Types* on page 110.

## 2.1 Starting the View Creation Wizard

The View Creation Wizard assists you in each step of setting up a view. Start the View Creation Wizard and use this chapter to complete the steps.

### To Start the View Creation Wizard

1. Start ClearCase Explorer by clicking the shortcut on your desktop. If you did not install the shortcut, click **Start** > **Programs** > **Rational ClearCase** > **ClearCase Explorer**.
2. In the ClearCase Explorer Shortcut pane, click **Toolbox**. Then, click **Base ClearCase** > **Create View**.

3. The first step of the wizard asks whether you want to work on a UCM project. Click **No**, and then click **Next**. If you do want to work on a UCM project, see *Working in UCM*.

## 2.2 Choosing a Snapshot View or a Dynamic View

Depending on how your computer is configured, the View Creation Wizard may ask you to choose to create a snapshot view or dynamic view. As described in *ClearCase Views* on page 2, snapshot views load elements onto your computer; dynamic views use the *MVFS* to arrange VOB data into a directory tree. (Dynamic views may not be available on all platforms. For more information, see ClearCase online help.)

Work in a snapshot view when any of these conditions is true:

- Your computer does not support dynamic views.
- You want to optimize build performance to achieve native build speed.
- You want to work with source files under ClearCase control when you are disconnected from the network that hosts the VOBs.
- You want to access a view from a computer that is not a ClearCase host.
- Your development project doesn't use the ClearCase *build auditing* and *build avoidance* features.

Work in a dynamic view when any of these conditions is true:

- Your development project uses build auditing and build avoidance.
- You want to access elements in VOBs without copying them to your computer.
- You want the view to reflect changes made by other team members at all times (without requiring an *update* operation).

For more information, see the *Administrator's Guide* for Rational ClearCase.

## 2.3 Choosing a Location and Name

For a snapshot view, the View Creation Wizard prompts you to choose a location for the view. For a dynamic view, the wizard prompts you to choose a name, drive letter, and, the first time you create a dynamic view, a location for the *view storage directory*.

### Snapshot View: Choosing a Directory

When creating a snapshot view, you must specify a directory into which ClearCase *loads* (copies) files and directories. When choosing a directory for the view, consider these constraints:

- The view's root directory must be located on a disk with enough space for the files loaded into the view and any *view-private files* you add.
- Your organization may restrict where you can create a view. For example, you may be required to use a disk that is part of a data-backup scheme.
- If you want to access the view from other computers, it must be located in a shared directory.

If your makefiles or other files require absolute pathnames with a specific drive letter, assign the view to a drive letter. See *Assigning Snapshot Views to Drive Letters* on page 104.

#### Under the Hood: A Snapshot View Storage Directory

Every snapshot view has a *view storage directory* in addition to the directory tree of source files that it loads from VOBs. ClearCase uses the snapshot view storage directory to keep track of such information as which files are loaded into your view and which versions are checked out to it. The view storage directory is for ClearCase administrative purposes only. Do not modify anything in it.

For every 1,000 elements loaded into the view, ClearCase uses about 400 KB of disk space for the view storage directory.

#### Locations for Snapshot View Storage Directories

Usually, your ClearCase administrator sets up a storage location, which is a directory on a ClearCase server host on UNIX or Windows. By default, ClearCase locates snapshot view storage directories there. If your ClearCase administrator sets up more than one storage location, ClearCase selects any one of these locations as the default when you create a view.

If your ClearCase administrator does not set up storage locations, by default, ClearCase software locates the view storage directory under the root directory of the snapshot view.

You can override these defaults. If your administrator sets up multiple storage locations, you can select one explicitly. If your ClearCase host is set up to store view storage directories (which happens when you install ClearCase), you can place the view storage directory under the root directory of the snapshot view. Or you can choose another location.

If you place the view storage directory under the root directory of the view, be aware of the following recommendations:

- Do not choose this configuration if you use the view when disconnected from the network. You can corrupt the data in the view storage directory if you disconnect it from the network while the view's **view_server** process is running.
- Make sure that the view storage directory is accessible to any data backup schemes your organization institutes.

If you override the default and place the view storage location under a directory other than the root directory of the view, the directory must be below a shared network directory on a ClearCase host running Windows NT or Windows 2000 and must remain connected to the network. (A view process runs on the machine that physically stores the view storage directory, and only a ClearCase host running on Windows NT or Windows 2000 can run a view process.) The pathname for the directory must not use a Windows special share name, for example, the share that is designated by *drive-letter*$ and allows an administrator access to a drive over the network. The directory cannot be on a removable storage device or on a laptop.

**NOTE**: If you plan to work while disconnected from the network, or if your ClearCase host is not set up to store view storage directories, your administrator must set up storage locations.

### To Override the Default Value for a Snapshot View Storage Location

1. When creating a view, on the step of the wizard that asks you to choose a location for a snapshot view, click **Advanced Options**.
2. In the **Advanced View Options** dialog box, do **one** of the following:
   - If **Use Server Storage Location** is selected and your administrator created multiple locations, ClearCase selects one for you. To choose a different one, click the name of the location.

- ➢ If your computer is set up to store view storage directories and you want to locate the view storage directory in the root directory of the snapshot view or choose another location, select **Use explicit path**.

  Do not select this option if you plan to use the view while disconnected from the network.

3. If you select **Use explicit path**, do **one** of the following:

   - ➢ Accept the default path displayed in the **View storage location** box.
   - ➢ Edit the path in the **View storage location** box to specify a valid location.
   - ➢ Click **Browse** and choose a valid location.

4. Click **OK** to return to the view location step of the wizard.

## Choosing a View Name

Each view must have a descriptive name (called a *view-tag*) that is unique within a network region. For dynamic views, the View Creation Wizard suggests a view-tag based on the following convention: *username*_**view**. This name is designed to help you determine the owner and purpose of the view. Names like **myview** or **work** do not describe the view's owner or contents; if you work with more than one view, such generic names can lead to confusion. Here are some suggested names:

| | |
|---|---|
| **pat_v1.4_cropcircle** | Personal view for a user named Pat to develop source files for release 1.4 of the Cropcircle product |
| **1.3_fix** | Shared view for use in a particular bug-fixing task |

A view's name must be a simple name; that is, it must follow the format of a single file or directory name with no special characters or spaces.

## Dynamic View: Choosing a Drive Letter

If your makefiles or other files require absolute pathnames, assign your view to a drive letter. When you use a wizard to create a view, ClearCase prompts you to assign the dynamic view to a drive letter. After creating a view, if you want to change a drive-letter assignment or assign a

drive letter to a team member's view, you can create or modify the assignment while adding a view shortcut to ClearCase Explorer.

In addition, you can create or modify drive-letter assignments from Windows Explorer. Any changes you make to a view's drive-letter assignments outside ClearCase Explorer will invalidate the view's shortcut in ClearCase Explorer.

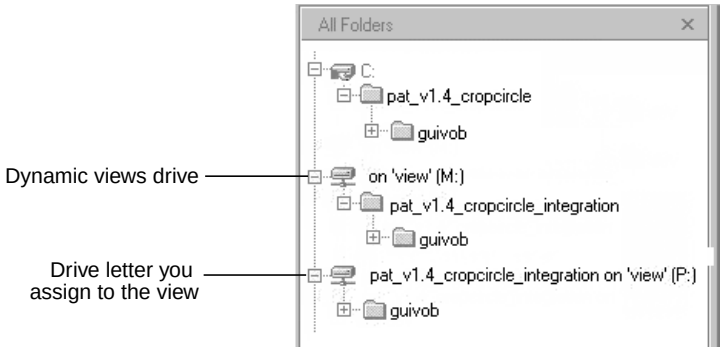
### Pathname Differences

In Windows Explorer, you can access any dynamic view that is started on your computer from the *dynamic-views-drive* (by default, drive M). However, when you access a view from the dynamic-views drive, its pathname includes one more component than when you access a view from an assigned drive letter (Figure 9).

For example, both of the following pathnames are available to an element in the **pat_v1.4_cropcircle dynamic** view that is assigned to drive P:

```
M:\pat_v1.4_cropcircle\guivob\lib.c
P:\guivob\lib.c
```

Figure 9 Dynamic Views Started on a Host




### Dynamic View Storage Directories

If this is the first time you're setting up a dynamic view, ClearCase prompts you to choose a shared directory on your host as a location for the view storage directory. For dynamic views you create subsequently, ClearCase uses this location by default.

Every view has a view storage directory. For dynamic views, ClearCase uses this directory to keep track of which versions are checked out to your view and to store view-private objects. The

view storage directory is for ClearCase administrative purposes only. Do not modify anything in it.

The size of the view storage directory depends on the following factors:

- Whether you use the **clearmake** or **omake** *build auditing* and *build avoidance* features
- The size and number of view-private files

For more information, refer to the *Administrator's Guide* for Rational ClearCase and to the **clearmake** and **omake** reference pages in the *Command Reference*.

### Choosing Locations for Dynamic View Storage Directories

If your computer is set up to store view storage directories, ClearCase reduces communication over the network by locating the view storage directory on your computer.

Consider the following restrictions when choosing a dynamic view storage directory location:

- The directory must be a subdirectory of a shared network resource on a ClearCase host on Windows NT or Windows 2000. View processes (specifically, **view_server** processes) run on the computer that physically stores the view storage directory, and only ClearCase hosts on Windows NT can run view processes. The pathname for the directory must not use a Windows special share name. Special share names usually include the dollar sign ($), such as the driveletter$ share name that allows an administrator to gain access to a drive over the network. For example, **\\bread\c$\view\pat_1.4_cropcircle.vws** is not a valid pathname.

- To maintain data integrity, the view storage directory must remain connected to the network. For example, do not locate the view storage directory on a removable storage device.

- If you locate the view storage directory on a laptop and then disconnect the laptop from the network, all of the following restrictions apply:

  - You cannot use the dynamic view.

  - Team members who try to start your view from their hosts will receive error messages from ClearCase.

  - Any **clearmake** or **omake** process that attempts to wink in a derived object from your view will spend some amount of time trying to contact your view. If it cannot contact your view, it will not consider derived objects in your view as *winkin* candidates for 60 minutes. (You can change the amount of time by setting the **CCASE_DNVW_RETRY** environmental variable.) For more information, see the **clearmake** reference page.

- If your ClearCase administrator sets up storage locations (which are directories on ClearCase server hosts), you can locate your dynamic view storage directory in a storage location. However, for best performance, we recommend that you locate dynamic view storage directories on your local host.

We recommend that you make the view storage directory accessible to any data backup schemes your organization institutes.

### To Choose a Location for a Dynamic View Storage Directory

1. On the step of the wizard that asks you to choose a name and drive for a dynamic view, click **Advanced Options**.
2. In the **Advanced View Options** dialog box, do **one** of the following:

   - Select **Use Explicit Path** and provide a UNC pathname to a shared directory on a ClearCase host on Windows NT. For best performance, we recommend this option.

     The first time you create a view with the wizard, ClearCase presents a template: `\\`*current-hostname*`\<Share>\`*view-tag*`.vws`

     To locate the view storage directory on your computer (recommended), replace `<Share>` with the name of a shared directory on your computer. For example, **\\bread\view_storage\pat_v1.4_cropcircle.vws**

   - Select **Use Server Storage Location**. If your administrator created more than one location, ClearCase selects one for you. You can choose a different one if you prefer.

## 2.4 Adding Version-Selection Rules

Development projects often require team members to add specific version-selection rules to your view's config spec. This manual assumes that someone in your organization creates these rules, and you must either paste them into your config spec or add an inclusion rule so that your config spec includes them from a config spec available over the network. For information on creating version-selection rules, see *Managing Software Projects*.

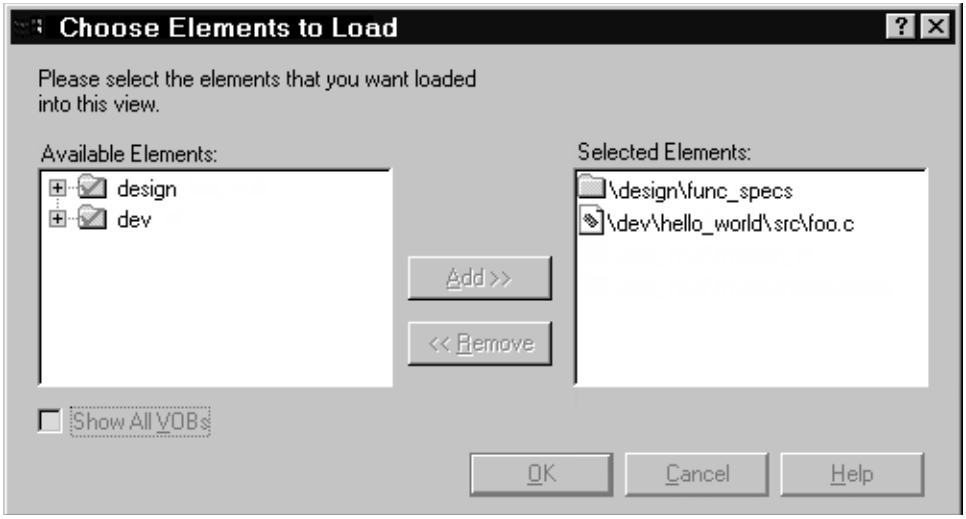
### To Paste or Include Version-Selection Rules

1. In the View Creation Wizard, click **Finish**.
2. In the **Confirm** dialog box, click **Inspect Config Spec**; in the Config Spec Editor, click **Edit**.
3. In the Config Spec Editor, do any of the following:
   - Paste the rules from the Windows clipboard into the Config Spec Editor. Ask the author of the shared config spec whether you need to include any rules other than the ones you paste.
   - Type on its own line **include** *path-to-shared-config-spec*. Ask the author of the shared config spec whether you need to include any rules other than the include rule.
4. Click **OK**.
5. In the **Confirm** dialog box, do **one** of the following:
   - For snapshot views, take note of the path for the view's root directory. This is the directory from which you access source files and directories. Then click **OK** to select elements to load into the view.
   - For dynamic views, take note of any drive letter you assigned. Then click **OK**. By default, ClearCase starts the view.

## 2.5 Snapshot View: Selecting and Loading Elements

After you set up version-selection rules for a snapshot view, the View Creation Wizard starts the VOB Namespace Browser (Figure 10) from which you select the files and directories to load into the view.

Figure 10 Choosing Elements to Load



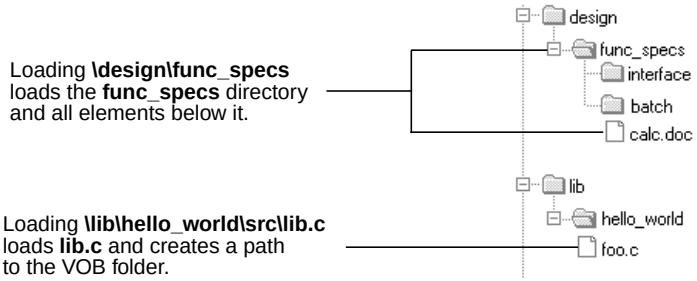

## To Choose Elements

To choose the elements you want to load into your view, browse through the **Available Elements** list. To load an *element*, move it to the **Selected Entries** list. Keep the following in mind:

- If you load a directory element, all of its files and subdirectories are loaded into the view.
- If you load a specific file element, only that file is loaded into the view. To maintain the file's path, ClearCase also copies into the view the empty directories leading up to the VOB directory.

Figure 11 illustrates the results of the load operation.

Figure 11 A View with Loaded Elements




For each element specified in the **Entries to Load** box, the View Creation Wizard adds a *load rule* to your config spec. For example, the **Choose Elements to Load** box shown in Figure 10 creates these two load rules:

```
load \design\func_specs
load \dev\hello_world\lib.c
```

Using these rules, ClearCase loads the directory element **\design\func_specs** and every element below it, along with the file element **\dev\hello_world\src\lib.c**. To maintain the path to **lib.c**, the View Creation Wizard creates the directory **\dev\hello_world\src** in the view.

## Case-Sensitivity

If you're selecting elements from VOBs located on a UNIX host, you may encounter problems that are due to case-sensitivity. Because native file systems for UNIX are case-sensitive, it is possible to create two elements from a UNIX host whose names differ only in capitalization. For example, in a UNIX VOB, these two elements are distinct:

```
/design/func_specs/bas
/design/func_specs/Bas
```

However, Windows does not support case-sensitive file lookups and does not distinguish the two elements in the previous example. If you were to load these two elements, only one of them would have the correct data when copied into the view; duplicated files are reported as *hijacked*. (Hijacked files are discussed throughout Appendix A, *Working in a Snapshot View While Disconnected from the Network*.)

The *Administrator's Guide* for Rational ClearCase discusses case-sensitivity issues in depth. We suggest that you not use mixed-case names for elements that you store in VOBs.

## Setting Up for a New Development Project

If none of your development project's files and directories are under ClearCase source control, you can close the **Choose Elements to Load** box by clicking **OK**. The section *To Add Elements for a New Development Task* on page 94 describes how to add elements to the VOB for a new development project.

## Loading Versions of Elements into a View

When you close the **Choose Elements to Load** box, ClearCase loads elements as follows:

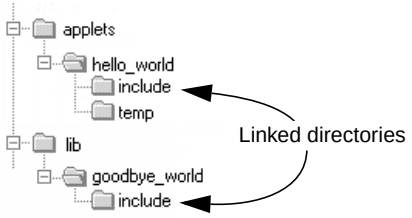
1. It uses the *version-selection rules* to select one *version* of each *element* specified by a *load rule*.
2. It copies the version into the snapshot view.
3. It records which version it copies into the view.

As ClearCase loads files and directories into your view, it shows a progress indicator in the **Snapshot View Update** dialog box. The complete list of files copied into your view appears in the Snapshot View Update window.

## Under the Hood: VOB Links

A VOB link makes a file element or directory element accessible from more than one location in the VOB namespace. There are two kinds of VOB links: *symbolic links*, which are available for file and directory elements, and *hard links*, which are available for file elements only. We recommend that you use VOB symbolic links instead of VOB hard links whenever possible. In Figure 12, the directory element **include** is linked.

Figure 12 VOB Link



You use the **cleartool ln** command to create VOB links. For more information, see the **ln** reference page in the *Command Reference*.

### Symbolic Links and Hard Links in Dynamic Views

In *dynamic views* (which use the MVFS, or multiversion file system), VOB links behave similarly to symbolic links or hard links in a UNIX file system: symbolic links point to a file or directory element in a different location, and hard links are alternate names for a single file element.

You cannot check out a VOB symbolic link; you must check out the symbolic link target.

When you check out a hard-linked element from a given pathname, ClearCase considers other pathnames for the element as "checked out but removed." That is, to prevent you from modifying the element from multiple pathnames, ClearCase executes standard checkout behavior at only one pathname (the one from which you entered the **checkout** command), but does not create view-private files at other pathnames. For information about standard checkout behavior, see the **checkout** reference page in the *Command Reference*.

### Symbolic Links in Snapshot Views

*Snapshot views* created from a Windows host do not support links. ClearCase approximates VOB symbolic link behavior in the following ways:

- If a *load rule* selects a symbolic link, ClearCase copies the link target into the view at the link's pathname.

  We recommend that you do not load a linked directory more than once in your view unless it is necessary for build purposes. Although ClearCase keeps track of multiply loaded elements accurately, you may become confused and modify the wrong copy of a file, losing information upon checkin. For more information, see *Caution: Losing Data Because of VOB Hard Links*.

- You cannot check out a file element from a symbolic link pathname; you must check out the link target. In ClearCase Explorer, the shortcut menu for a symbolic link includes the **Explore Link Target** command, which displays the link target's parent directory. Use this command to find and check out the link target.When you check in the modified link target, ClearCase updates all associated symbolic links loaded in your view. Unlike directory link targets, you can check out a file link target only if it is loaded in your view.

- The **Add to Source Control** command (available from ClearCase GUIs) checks out, modifies, and checks in the link target directory whether you issue the command from a directory symbolic link or from the link target (and whether or not the target directory is loaded into the view).

If you issue the **cleartool checkout** command from a symbolic link directory, you must use the following syntax:

**cleartool checkout .**

A **checkout** command issued for the current directory checks out the link target whether or not the target directory is loaded into the view.

However, if you use the **cleartool checkout** *dirname* form of the command to check out a different directory, *dirname* must be a link target.

When either you or ClearCase checks in a link target directory, ClearCase updates the associated symbolic links that are loaded in your view.

- If you *hijack* a file symbolic link, the Update Tool detects it. However, you cannot check out the hijacked symbolic link. To add your hijacked changes to the VOB, you must check out and modify the link target.

### Hard Links in Snapshot Views

Each time a load rule selects a hard link, ClearCase loads the element into the view as a standard file.

### Caution: Losing Data Because of VOB Hard Links

If you load multiple instances of a hard-linked element into a snapshot view, you must be careful to check out, modify, and check in only one instance of the file.When you check in a hard-linked file (or a file below a symbolic-linked directory), ClearCase updates all other instances in your view, which could result in loss of data if you modified multiple copies of the same file. (Note that, when updating instances of files because of a checkin, ClearCase renames any *hijacked* file to *filename*.**keep** before updating it.)

For example, the following sequence of events will lead to lost data:

1. You check out the hard-linked file **src\util.h**.
2. ClearCase removes the read-only attribute from **util.h** in the **src** directory only (which is the location from which you issued the **checkout** command).
3. You modify **src\util.h** but do not check it in.
4. Later, you lose track of which file you checked out. You then remove the read-only attribute and modify **util.h** in the **temp** directory.

5. You check in **temp\util.h**. Even though you checked out and modified **src\util.h**, ClearCase does not prevent you from checking in **temp\util.h**; with a VOB hard link, **temp\util.h** is just another name for **src\util.h**.

6. Any changes you made to **src\util.h** are lost upon checkin because ClearCase updates all copies of duplicated files when you check in an element. Note that ClearCase does not consider any copy of **util.h** to be hijacked (even if you change attributes), because you checked out the element in the VOB.

# Working in a View

# 3

This chapter guides you through the everyday tasks of managing source files from Rational ClearCase:

- Accessing files
- Checking out files
- Working with checkouts
- Canceling checkouts
- Checking in files

## 3.1 Accessing Files

The **Views** tab in ClearCase Explorer provides access to views (see *About Rational ClearCase Explorer* on page 7). By default, ClearCase Explorer creates shortcuts to all base ClearCase views that you own and places the shortcuts on the **General** page of the **Views** tab.

### Starting Dynamic Views

To access files from a dynamic view, you must start the view and activate the VOBs that contain your source files.

Starting the view also starts a **view_server** process, which maps the data in the VOBs that are activated on your computer into a directory tree. VOBs that you activate appear as subdirectories of a view. Then you browse the VOB as you would any other directory.

If you assign a view to a drive letter, ClearCase starts the view when you log on to your computer. If you do not assign a view to a drive letter but have a ClearCase Explorer shortcut to the view, ClearCase starts the view when you click the shortcut.

To start a dynamic view that was created from a UNIX host, you must first use the Region Synchronizer to import the view's view-tag into your Windows network region. Then, refresh the view shortcuts in ClearCase Explorer.

### To Start Dynamic Views

1. In the ClearCase Explorer Shortcut pane, click **Views**. Then, click **General** or the page in which the shortcut to the dynamic view resides.
2. Click the shortcut for the view.

The view-tag appears as the top-level folder in the Folder pane with folders below for the active VOBs (see *About Rational ClearCase Explorer* on page 7). If you do not have a shortcut, refresh the view shortcuts (if you own the view or created the view-tag). To access other dynamic views from ClearCase Explorer (for example, to access a team member's view), add a view shortcut to the **Views** tab. For information on creating or modifying shortcuts in ClearCase Explorer, refer to ClearCase Explorer online help.

The ClearCase Explorer title bar shows the location of the view in your computer's namespace. Any command you issue from ClearCase Explorer that requires a pathname uses the pathname displayed in the title bar.

If you are unable to start a dynamic view that is on another host, check with your administrator to make sure that you can access the view's view storage directory. For more information, see the *Administrator's Guide* for Rational ClearCase.

### To Activate VOBs

To access files from a dynamic view, you must activate the VOBs that contain your source files.

1. On the Windows desktop, click **Start** > **Programs** > **Rational ClearCase Administration** > **Mount VOB**.
2. In the **Mount** dialog box, select the VOBs containing your source files.
3. Select **Reconnect at Logon** to activate the VOBs when you log on.
4. Click **Mount**.

5. In ClearCase Explorer, click **View** > **Refresh** to see the activated VOBs as folders in the Folder pane.

## Accessing Snapshot Views

To access files from a snapshot view, use the view shortcut in ClearCase Explorer.

1. In the ClearCase Explorer Shortcut pane, click **Views**. Then, click **General** or the page in which the shortcut to the snapshot view resides.
2. Click the shortcut for the view.

If you do not have a shortcut, either refresh the view shortcuts (if you own the view) or add a view shortcut (if someone else owns the view; see *To Access Another's Snapshot View from ClearCase Explorer* on page 106).

The view-tag appears as the top-level folder in the Folder pane with folders below for the elements loaded in the view (see *About Rational ClearCase Explorer* on page 7). The ClearCase Explorer title bar shows the location of the view in your computer's namespace. Any command you issue from ClearCase Explorer that requires a pathname uses the pathname displayed in the title bar.

If you are unable to access a snapshot view that is on another host or its storage location is on another host, check with your administrator to make sure that you can access the view's view directory or view storage location. For more information, see the *Administrator's Guide* for Rational ClearCase.

If you plan on working disconnected from the network, follow the guidelines in Appendix A, *Working in a Snapshot View While Disconnected from the Network*.

## Accessing Views from Windows Explorer

This section describes how to access snapshot views and dynamic views from Windows Explorer.

### Accessing Snapshot Views from Windows Explorer

A snapshot view is a directory tree in a standard file system (plus some hidden, administrative files). You can access it through Windows Explorer as you would access any other directory tree

in a file system. For information on assigning a snapshot view to a drive letter, see *Using the subst Command for Snapshot View Access* on page 106.

### Accessing Someone Else's Snapshot View from Windows Explorer

You can access someone else's snapshot view as you would access any other directory on another computer. If the directory's owner has shared the directory and set up the proper permissions, you can use Network Neighborhood to access the view. If you want to perform ClearCase operations in the view, see *To Register Another's Snapshot View for Windows Explorer Use* on page 107.

### Accessing Dynamic Views from Windows Explorer

You can access any view that you have started on your computer from the *dynamic-views-drive* (by default, drive M) in Windows Explorer. If you assign the view to a drive letter, you can also access it from the drive letter in Windows Explorer. For information on assigning dynamic views to drive letters, see ClearCase online help.

## 3.2 Checking Out Files

To modify files and directories under ClearCase control, you must check them out. (Placing files and directories under source control is a separate procedure; see *Adding Files and Directories to Source Control* on page 87.) If you work in an environment with the base ClearCase-ClearQuest integration, you may have to perform additional steps (see *Checking Out Files in a VOB Enabled for ClearQuest* on page 44).

### To Check Out Files

1. In ClearCase Explorer, navigate to the directory that contains the files you want to check out. Then select the files.
2. Right-click one of the selected files. On the shortcut menu, click **Check Out** to open the **Check Out** dialog box.
3. In the **Check Out** dialog box, provide comments describing the changes you plan to make.
4. Determine whether you want a *reserved* or *unreserved checkout* (refer to *Reserved and Unreserved Checkouts* on page 40).

5. Click **OK**.

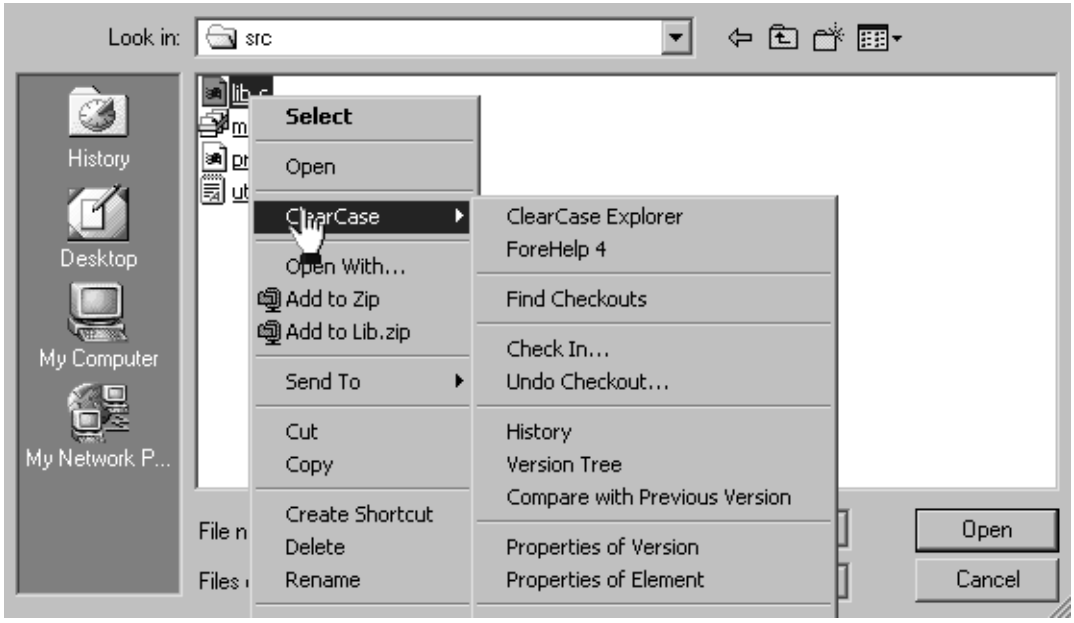
### Using the Open Dialog Box

The **Open** dialog box that many applications use is actually part of ClearCase Explorer. As illustrated in Figure 13, right-clicking a loaded version of a ClearCase element in the **Open** dialog box displays the ClearCase shortcut menu.

To check out a file from an **Open** dialog box:

1. In an application such as Microsoft Notepad, click **File** > **Open**.
2. In the **Open** dialog box, access the file or directory that is under source control.
3. Right-click the file; then click **ClearCase** > **Check Out**.

Figure 13 The ClearCase Shortcut Menu from the Open Dialog Box



## Checking Out Directories

Directories, as well as files, are under ClearCase source control, yet you rarely need to check out a directory explicitly. ClearCase checks out and checks in a file's parent directory when you add the file to source control.

What does it mean for a directory to be under source control? In a version-controlled directory, ClearCase creates a new version of the directory when you add or rename a file element under source control. Having versions of directories can be helpful if, for example, you rename a source file used in a particular release and then modify your makefile to reflect this change. If you need to rebuild a previous release, you can set up your view to select the version of the directory that contains the file under its previous name.

**NOTE**: When you issue commands from a command-line interface (CLI), such as an MS-DOS command prompt, ClearCase does not check out directories automatically. When using a CLI to change a directory element, you need to check out the directory explicitly. For more information about checking out files and directories from a CLI, see the **checkout** reference page in the *Command Reference*.

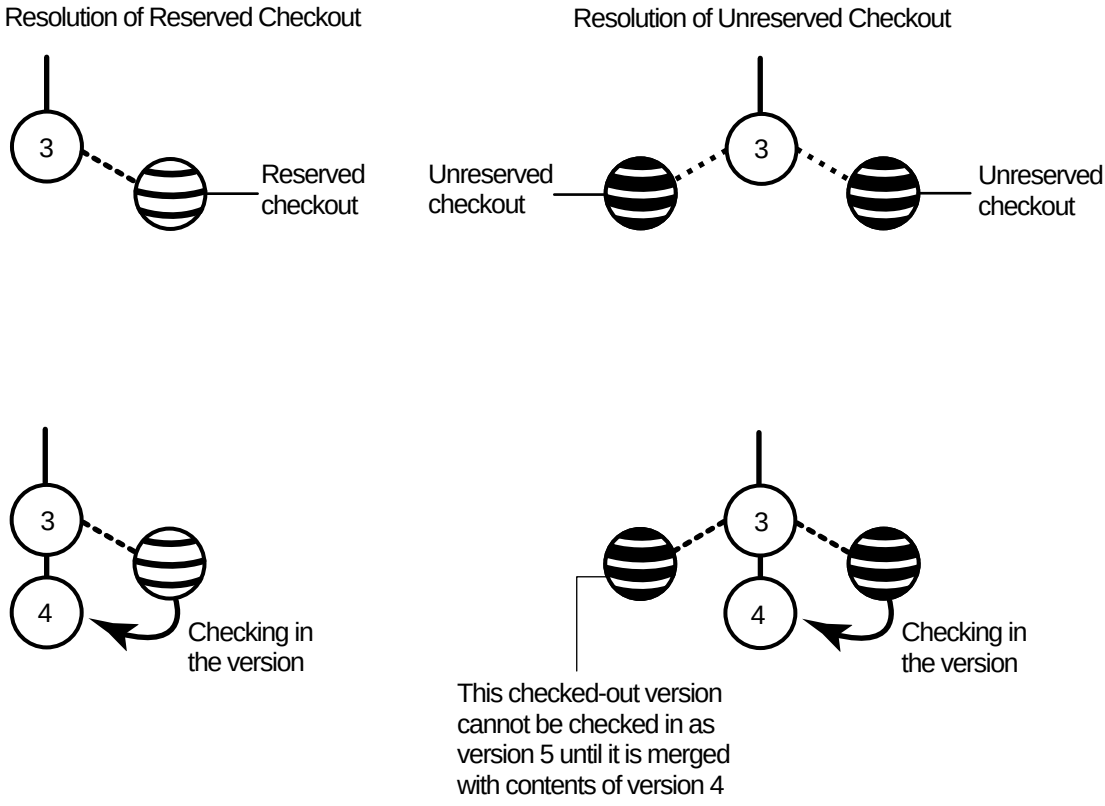
## Reserved and Unreserved Checkouts

In some version-control systems, only one user at a time can reserve the right to create a new version. In other systems, many users can compete to create the same new version. ClearCase supports both models by allowing two kinds of checkouts: reserved and unreserved.

The view with a reserved checkout has the exclusive right to check in a new version for a given development project. Many views can have unreserved checkouts. An unreserved checkout does not guarantee the right to create the successor version. If several views have unreserved checkouts, the first view to check in the element creates the successor; developers working in other views must merge the checked-in changes into their own work before they can check in. Your organization's development policy may determine whether to check out reserved or unreserved.

Figure 14 illustrates checked-out versions created by reserved and unreserved checkouts, and the effects of subsequent checkins.

Figure 14 Resolution of Reserved and Unreserved Checkouts




Another kind of checkout is an unreserved, nonmastered checkout, which can be used only in a replicated VOB (created with Rational ClearCase MultiSite). For more information about this kind of checkout, see *Sharing Control of a Branch with Developers at Other Sites* on page 81.

### To Change the Status of a Checked-Out Version

1. In the ClearCase Explorer Details pane select a checked-out version.
2. Select the **Tools** menu and choose either **Reserve** or **Unreserve**.

### Setting the Default for Reserved or Unreserved Checkouts

**NOTE:** Your ClearCase administrator can make this option unavailable to you.

1. In ClearCase Explorer, select **Tools** > **Options**.

2. In the **Options** dialog box, click **ClearCase Options**.

3. In the **ClearCase User Options** dialog box, do **one** of the following in the **Check Out** box:

   - To make reserved checkouts the default setting, select **Reserved**. With this selection, you can also select **Unreserved if already reserved** to check out unreserved by default if someone else has a reserved checkout for the same element. If you do not select this check box, attempts to reserve a reserved checkout fail.

   - To make unreserved checkouts the default setting, clear the **Reserved** check box.

For more information unreserved, nonmastered checkouts, see *Setting the Default for Nonmastered Checkouts* on page 86.

## Under the Hood: What Happens When You Check Out a File or Directory

Because a snapshot view contains copies of files and directories, and a dynamic view provides access to data in VOBs, ClearCase follows different procedures for checking out from the different view types.

### From a Snapshot View

When you use the GUI to check out a file or directory from a snapshot view, the ClearCase software handles the request as follows:

1. It gathers the following information:

   - The version currently loaded in the view
   - The version selected by the config spec
   - The latest version in the VOB

2. If the version of a file in your view is not the latest in the VOB, ClearCase asks you to specify which version to check out. For directory elements, ClearCase requires you to check out the version of the directory currently loaded in your view.

   The version in your view will not be the latest in the VOB if either of these conditions exist:

   - Someone else has checked in a new version since you last updated your view.

   - Your view's config spec selects versions based on a label or a time rule, and the latest version in the VOB falls outside those parameters (Figure 15).

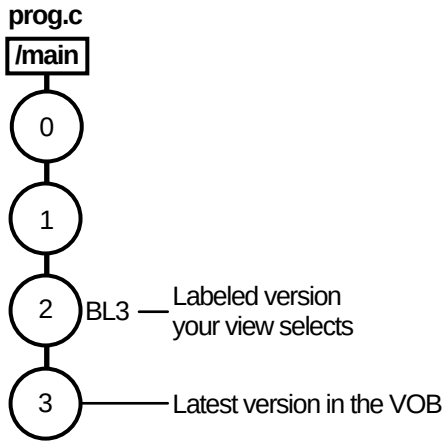
3. If you check out a version other than the one currently loaded in your view, ClearCase loads the checked-out version into your view.

4. ClearCase notifies the VOB which version of the element you checked out.

5. For files, it removes the **Read-Only** attribute. For directories, it allows you to add new elements to source control.

For information on checking out VOB links in a snapshot view, see *Under the Hood: VOB Links* on page 30.

Figure 15 Selecting the Non-Latest Version of an Element




### From a Dynamic View

When you use the GUI to check out a file from a dynamic view, ClearCase handles the request as follows:

1. If your view's version-selection rules do not select the latest version in the VOB, ClearCase prompts you to choose a version to check out.

   Your view may not select the latest version in the VOB if, for example, your config spec selects versions based on labels or time rules (Figure 15).

   See *Merging with the Latest Version* on page 52 for information about checking in a nonlatest version.

2. ClearCase notifies the VOB which version of the element you checked out.

3. For files, ClearCase creates in the view an editable view-private file, which is a copy of the checked-out version. For directories, it allows you to use add new elements to source control.

## Checking Out Files in a VOB Enabled for ClearQuest

If the VOB in which you access versions is set up for the base ClearCase-ClearQuest integration, you may have to associate the version on which you are working with a ClearQuest change request record. For more information, see *The Base ClearCase-ClearQuest Integration* on page 15.

### Logging on to a ClearQuest User Database

The first time that you attempt to check out a file from or check in a file to a VOB enabled for the base ClearCase-ClearQuest integration, you are prompted to log in to ClearQuest. Specify a ClearQuest user ID, password, and database name. ClearQuest keeps its own database of user IDs and passwords. Make sure that your ClearQuest administrator has added a user ID and password to the ClearQuest user database for you.

After you log in to ClearQuest, you can use the integration to complete your checkout and checkin operations (see *Using the Base ClearCase-ClearQuest Integration Interface*). The integration stores the user ID and an encoded version of the password in a file named **.cqparams**, which it creates in platform-specific areas. On Windows computers:

```
<windows>\Profiles\<login>\Application Data\Rational\Cqcc\
```

On UNIX workstations, it is stored in the home directory.

Thereafter, the integration uses the user ID and password in **.cqparams** instead of prompting you for them. If you change your password or connect to a different database, the next time you check out or check in a version from that VOB, the integration displays an error message and prompts you to reenter the user ID and password. The integration updates the **.cqparams** file with the new information.

### Using the Base ClearCase-ClearQuest Integration Interface

If you are logged in to a ClearQuest user database (see *Logging on to a ClearQuest User Database* on page 44) and check out or check in a file, you see a different interface. You have the options shown in Table 1.

Table 1 Base ClearCase-ClearQuest Integration Options

| Option | Description |
|---|---|
| OK - commit associations | Make the requested associations and exit. |
| CANCEL | Exit without making any changes and cancel the related ClearCase operation. |
| HELP | Print this text. |
| REVIEW Associations | Shows currently selected associations and allows you to delete one or more items from the list. |
| QUERY - Select from ClearQuest Query | Displays the contents of a query that your local administrator defines to show defects that are appropriate. Depending on your local policy, you select one or multiple items. |
| TYPEIN - Enter Associations from Keyboard | Allows you to enter one or more change-request IDs directly. |
| DATABASE | Shows the current database name; allows you to change to a different database. |
| RECORD TYPE | Shows the current record type with which you are working; for example, a defect. Allows you to change to a different record type if multiple entities are supported by the current database. |
| PATHNAME | Shows the full path for the version that you are checking in or checking out. Select this item to see more information. |

If you use a **cleartool** command line interface (CLI), you see a numbered menu of the options shown in Table 1. To select an option, type the number of the entry and press Enter. Some menus allow multiple choices, to which you can enter one or more number separated by a space or a comma. To dismiss the menu without making a choice, simply press Enter.

If you use ClearCase Explorer or Windows Explorer, you see the **ClearQuest Associations Menu** provided by ClearPrompt. The dialog box opens when you check out or check in a version of an element in a VOB enabled for ClearQuest. In the dialog box, select an option from those shown in Table 1 and click **Yes** to continue. If multiple choices are allowed, click multiple items. Clicking

the same choice a second time clears it as a choice. To close the dialog box without making a change, click **Yes** or **Abort**.

Both the CLI and GUI interfaces use the same text for the choices to associate a ClearCase version with one or more ClearQuest change requests and to remove a version's existing associations with change requests.

Some systems use an integration based on a Visual Basic trigger to provide a GUI. You use the **Associate Change Requests** dialog box to associate a ClearCase version with one or more ClearQuest change requests and to remove existing associations. To change your stored user name, password, or database name, use the Registry Editor to delete the following key:

```
HKEY_CURRENT_USER\Software\Rational Software\ClearQuest\1.0\Common\CQIntSvr
```

The integration prompts you for the information the next time you checkin or checkout a version.

### Associating a Checkout with a ClearQuest Entity

If you are required to associate versions with change requests, use the options from Table 1 to enter change-request IDs as follows:

- Use the QUERY option to see a list of all open change-request IDs currently assigned to you and select one or more items from the list to make associations.
- Use the TYPEIN option to enter one or more change-request IDs with which to associate the version that you are checking out.
- Use the REVIEW option to list and possibly delete current associations.
- If the association is optional and you do not want to specify a change request, enter the OK option and click **Yes** (clearprompt) or press Enter (text menu).
- To cancel the checkout operation, use the CANCEL option or click **Abort**.
- To display help text, use the HELP option.

After you specify your options, use the **OK** option to create or update the associations your specified and complete the checkout operation.

## 3.3 Working with Checkouts

After you check out a version, you do not need to interact with ClearCase until you're ready to check in. However, some ClearCase tools can help you with the following tasks:

- Viewing an element's history
- Comparing versions of elements
- Tracking checked-out versions

### Viewing an Element's History

The History Browser displays the history of an element's modifications, including version-creation comments (entered when someone checks out or checks in an element).

#### To View an Element's History

In ClearCase Explorer, right-click an element; on the ClearCase shortcut menu, click **History**.

### Comparing Versions of Elements

As you modify source files, you may want to compare versions to answer such questions as these:

- What changes have I made in my checked-out version?
- How does my checked-out version differ from a particular historical version or from the version being used by one of my team members?

#### To Compare with a Predecessor

In ClearCase Explorer, right-click a file. On the ClearCase shortcut menu, click **Compare with Previous Version**.

#### To Compare with a Version Other Than the Predecessor

1. In ClearCase Explorer, right-click a file and click **Version Tree**.

2. In the Version Tree Browser, right-click a version and click **Compare** > **with Another Version**.

   The cursor changes to a target icon.

3. Click the version you want to compare.

### To Compare Any Two Files

If you want to compare any two files, you can use the **Diff Merge** utility from a **Send To** menu. First, create a shortcut in your **SendTo** folder. Use Windows Explorer to navigate to the **SendTo** folder, right-click in the details pane and click **New > Shortcut**. In the **Create Shortcut** dialog box, enter **cleardiffmrg.exe** in the **Type the location of the item** box. No path is necessary. Then stop and restart ClearCase Explorer.

After you create the entry in your **Send To** menu, right-click any file in ClearCase Explorer (also Windows Explorer or any application with a **Send To** menu) and click **Send To > cleardiffmrg**. Then, in the **Open a Second File to Compare with** dialog box, navigate to the second file and click **Open**. Diff Merge runs. This method can be used anywhere in the file system, not just within a view.

## Tracking Checked-Out Versions

Depending on how you work, you may forget exactly how many and which files are checked out. To list all the files and directories you currently have checked out to your view:

1. In the ClearCase Explorer Folder window (middle), right-click a folder for a versioned directory and click **Find Checkouts**.

2. In the **Find Criteria** dialog box, edit the path from the root directory of the snapshot view in the **Search folder** box.

3. Under **Include additional folders?**, select **Include subfolders**.

4. Click **OK**.

### Prototype Builds

Typically, when you're developing source files for a project, you want to perform prototype builds to test your modifications. If your organization uses **clearmake** or **omake**, you can use these ClearCase build tools for your prototype builds; however, the *build auditing* and *build avoidance* features are available only from dynamic views.

For more information, see *Building Software* and the **clearmake** or **omake** reference pages in the *Command Reference*.

## 3.4 Canceling Checkouts

If you check out a file but don't want to check in your changes or want to start with a fresh copy, you can cancel the checkout as follows:

1. In the ClearCase Explorer Details pane, select one or more checkouts. Then right-click.
2. On the shortcut menu, click **Undo checkout**.
3. Click **Yes** in the **Confirm Undo Checkout** dialog box. You can choose to save any of your changes in the file *filename*.**keep**.

### Under the Hood: Canceling Checkouts

When you cancel the checkout of a file element, ClearCase handles the request as follows:

1. It prompts you to rename the file in your view to *filename*.**keep**.
2. It notifies the VOB that you no longer have the version checked out in your view.
3. In a snapshot view, it copies from the VOB the version that was in your view when you performed the checkout operation.

   In a dynamic view, it uses the config spec's version-selection rules to select a version.

If you work in an environment with the base ClearCase-ClearQuest integration, any associations with ClearQuest change requests you may have made at checkout (see *Checking Out Files in a VOB Enabled for ClearQuest* on page 44) are canceled if you cancel the checkout.

### Canceling Directory Checkouts

Although you rarely need to check out a directory explicitly, if you do and then cancel the checkout, ClearCase notifies the VOB that you no longer have the version of the directory checked out to your view. ClearCase does not prompt you to rename a canceled directory checkout to *directory-name***.keep**.

If you cancel a directory checkout after changing its contents, any changes you made with **cleartool rmname**, **mv**, and **ln** are lost. Any new elements you created with **mkelem** or **mkdir** become orphaned. (When you create elements from the GUI with the **Add to source control** command, ClearCase checks out the directory, adds the element, and checks in the directory, avoiding the creation of orphaned elements.) ClearCase moves orphaned elements (and any data that exists in the view at the pathname of the new element) to the VOB's **lost+found** directory under names of this form:

*element-name.UUID*

In such cases, **uncheckout** displays this message:

```
cleartool: Warning: Object "prog.c" no longer referenced.
cleartool: Warning: Moving object to vob lost+found directory as
"prog.c.5f6815a0a2ce11cca54708006906af65".
```

In a snapshot view, ClearCase does not remove *view-private objects* or start the update operation for the directory in the view. To return the directory in your view to its state before you checked it out, you must start the Update Tool. For information on starting the Update Tool, see ClearCase online help.

In a dynamic view, ClearCase does not remove view-private objects, but it does revert the view to its previous state.

### To Move and Delete Orphaned Elements

To move an element from the **lost+found** directory to another directory within the VOB, use the **cleartool mv** command. To move an element from the **lost+found** directory to another VOB, use the **relocate** command. For more information about moving elements to another VOB, see the **relocate** reference page in the *Command Reference*.

To permanently delete an element in the **lost+found** directory, take note of the orphaned element's name and use this command:

**cleartool rmelem** *VOB-pathname***lost+found***orphaned-element-name*

For example, from a dynamic view:

**cleartool rmelem \guivob\lost+found\prog.c.5f6815a0a2ce11cca54708006906af65**

From a snapshot view:

**cd c:\pat_v1.4_cropcircle_sv**
**cleartool rmelem guivob\lost+found\prog.c.5f6815a0a2ce11cca54708006906af65**

NOTE: In a snapshot view, ClearCase treats the **lost+found** directory, which is located immediately below the root directory of a VOB, as any other directory. To load the directory in your view, you must use a load rule that specifies either the element's parent directory or the directory itself. However, as with any other directory in a snapshot view, you do not need to load the **lost+found** directory to issue ClearCase commands for elements in the directory.

### To Cancel the Checkout of a Deleted File

If you check out a file element and then delete that file from your view (by using, for example, the **Delete** command in ClearCase Explorer), use this procedure to cancel the checkout:

1. In ClearCase Explorer, right-click the directory containing the deleted file.
2. On the shortcut menu, click **Find Checkouts**.
3. Complete the **Find Criteria** dialog box.
4. In the Find Checkouts window, select the file whose checkout you want to cancel and click **Undo Checkout**.

## 3.5 Checking In Files

Until you check in a file, ClearCase has no record of the work in your view. Checking in a file or directory element creates a new version in the VOB, which becomes a permanent part of the element's history. We recommend that you check in a file or directory any time you want a record of its current state.

Ideally, your organization's development strategy isolates your checked-in work from official builds and requires you to merge your work to official project versions at specified intervals.

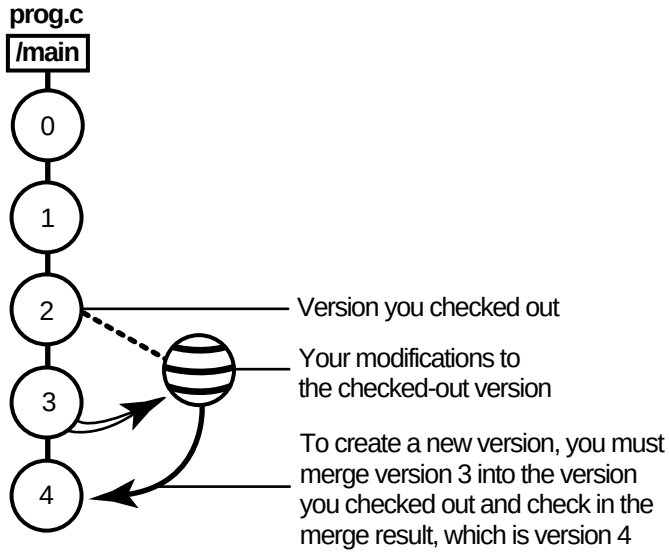
## To Check In Files

1. In ClearCase Explorer, select one or more files.
2. Right-click a selected file. On the shortcut menu, click **Check In**.
3. In the **Check In** dialog box, ClearCase displays the comments you entered when you checked out the file. You can reuse these comments or modify them.

## Merging with the Latest Version

If the version you checked out is not the latest version in the VOB and you try to check in your modifications, ClearCase requires you to merge the changes in the latest version into the version checked out in your view (Figure 16).

Figure 16 Merging with the Latest Version




In Figure 16, version 2 of **prog.c** is the one that you checked out. Before you check in your modifications, someone else checks in version 3 of **prog.c**. When you check in your modifications, ClearCase tells you that the version you checked out is not LATEST on the branch. (The section *Under the Hood: What Happens When You Check Out a File or Directory* on page 42

describes the situations in which you may have to merge before checking in.) Note that the reserve status of the checkout is not relevant to whether your modifications can be checked in.

You need to merge the latest version in the VOB (**prog.c@@/main/LATEST**) to the version in your view before you can check in your modifications. This merge creates a version that reconciles modifications made in the latest version with your modifications. Then, when you check in the merge results, the system sees the merge arrow from version 3 to your checked-out version containing the merge results. The checkin creates a version 3 successor, version 4 of **prog.c**.

### To Merge with the Latest Version

When you issue the **Check In** command for a nonlatest version, you are prompted to merge. If you choose to merge, ClearCase attempts to merge automatically, starting the Diff Merge tool if it needs your input to complete the merge. For information about using Diff Merge, see ClearCase online help. After the merge, ClearCase prompts you to check in the file.

## Under the Hood: Checking In Files

The steps ClearCase follows when you issue the **checkin** command vary depending on the kind of view you use.

### From a Snapshot View

When you issue a **checkin** command from a snapshot view, ClearCase handles the request as follows:

1. It copies your modifications to the VOB as a new version.

   The version you check in remains in the view, regardless of the view's config spec.

2. It removes write permission for the file.

For any other instance of the file loaded into a snapshot view, ClearCase copies the new version from the VOB into your view. (If your load rules specify an element that appears in more than one VOB location, the element is copied into each of the appropriate locations in your view's directory tree.)

When you check in a symbolic-linked directory from a snapshot view, ClearCase does not update any other instances of the directory loaded in your view. As you add file elements to source

control, ClearCase adds a copy of the element to all instances of a parent directory loaded in your view.

### From a Dynamic View

When you issue the **checkin** command from a dynamic view, ClearCase handles the request as follows:

1. It copies your modifications to the VOB as a new version.
2. It uses the config spec's version-selection rules to select a version from the VOB. If the config spec selects a version other than the one you checked in, ClearCase displays a message. ClearCase may select another version if, for example, your view selects versions based on labels or time rules.
3. It removes the view-private file and provides transparent access to the version checked in to the VOB.

## Checking In Files in a VOB Enabled for ClearQuest

If you use the base ClearCase-ClearQuest integration (see *Checking Out Files in a VOB Enabled for ClearQuest* on page 44), the version you are checking in must be associated with at least one change request; otherwise, the checkin cannot proceed. When you check in the version, the base ClearCase-ClearQuest integration displays those change-request IDs whose associations you made during checkout. Using the options in Table 1, you can do the following:

- Keep the same change-request IDs.

  Use the QUERY option to see a list of all open change-request IDs currently assigned to you.

- Delete some or all of the change-request IDs.

  Use the REVIEW option to list and possibly delete current associations.

- Add new change-request IDs.

  Use the TYPEIN option to enter one or more change-request IDs with which to associate the version that you are checking in.

If the associations are correct, use the OK option to continue the checkin.

The base ClearCase-ClearQuest integration creates associations for new change-request IDs that you add, removes associations for change-request IDs that you delete, and updates information on existing ones.

### View the Versions for a Change Request from ClearQuest

To view the ClearCase versions associated with a ClearQuest change request:

1. In ClearQuest, run a query to find the desired set of change requests.
2. In the query result set, select a change request to display its Record form.
3. On the Record form, click the **ClearCase** tab.

The **ClearCase** tab shows the last known names of the versions of ClearCase elements associated with the change request.

# Updating a Snapshot View

# 4

The rules in your view's *config spec* are usually designed to select a discrete set of versions from the VOB. For example, your view is usually intended to contain a set of versions that build successfully. However, when other developers check in new versions from their views, a snapshot view may become out of date or inconsistent with the versions in the VOB. To make sure that your view contains the set of versions the config spec selects, you must update it.

This chapter explains

- Starting an update operation
- What happens when you update a view
- Unloading elements

An update operation copies versions of elements from a VOB to your view. Only the checkin operation copies changes from your view back to a VOB.

## 4.1 Starting an Update Operation

You can start an update operation for

- The entire view
- At least one file or at least one directory tree

## Updating the View

Update the entire view periodically to make sure you have the correct version of all loaded files and directories.

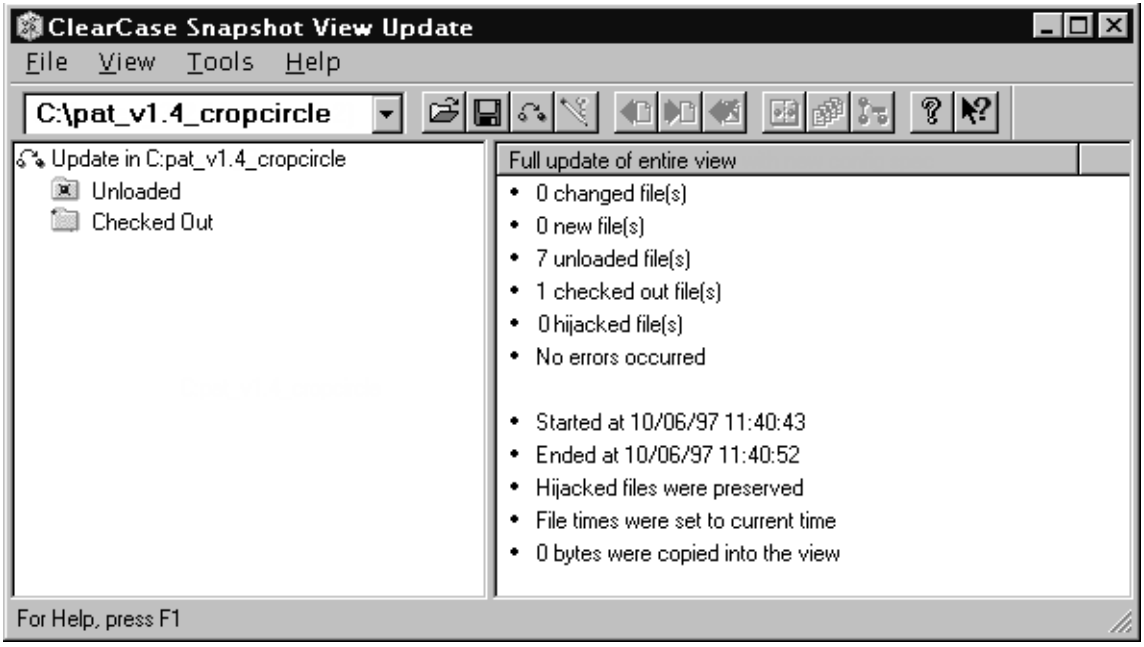
1. In ClearCase Explorer, select the root directory of the snapshot view.
2. Right-click to display the shortcut menu. Then click **Update View**
3. To change default behavior for the update operation, click the **Advanced** tab in the **Start Update** dialog box and change the currently selected options. Any changes you make become the defaults for subsequent updates.

   If you do not change options on the **Advanced** tab, the defaults for the update operation are as follows:

   - For any file or directory that is neither checked out nor hijacked, if the version the config spec selects is different from the version in the view, overwrite it with the version from the VOB.
   - Leave all hijacked files in the view with their current modifications.
   - For any files or directories modified by the update operation, use the time-stamp option specified when the view was first created.
4. **C**lick **OK** to start the update.

   Rational ClearCase begins the update procedure and displays a progress indicator. When the update is complete, the Snapshot View Update window displays a categorized list of the actions taken to update the view (Figure 17). For a description of this window, see the online help.

Figure 17 The Snapshot View Update Window




## Updating Files and Directory Trees

To save time, you can update individual files or directories. (Rational ClearCase updates directories recursively.) Updating only specific parts of your view may eventually cause the view to contain an inconsistent set of versions.

1. In ClearCase Explorer, select the files or directories you want to update.
2. Right-click to display the shortcut menu; then click **Update**.

   ClearCase begins the update procedure and displays a summary of its progress.

**NOTE**: You cannot update a checked-out file. To undo changes to a checked-out file and start over with the version in the VOB, cancel the checkout. See *Canceling Checkouts* on page 49.

### Tip: Finding a Set of Files

If you know that the files you want to update share a common attribute, such as a similar modification date, you can use the Search command in ClearCase Explorer to find the set of files. Then, you can update the files from the **Find** dialog box.

1. In ClearCase Explorer, right-click in the Folder pane and click **Search**.
2. In the **Find: All Files** dialog box, enter the path to the view or to a specific directory in the view in the **Look In** box.
3. Use the **Date Modified** and **Advanced** tabs to specify search criteria.
4. Click **Find Now**.

   The **Find: All Files** dialog box expands to display the files and directories it finds.
5. Select the files you want to update. On the shortcut menu, click **Update**.

## 4.2 Under the Hood: What Happens When You Update a View

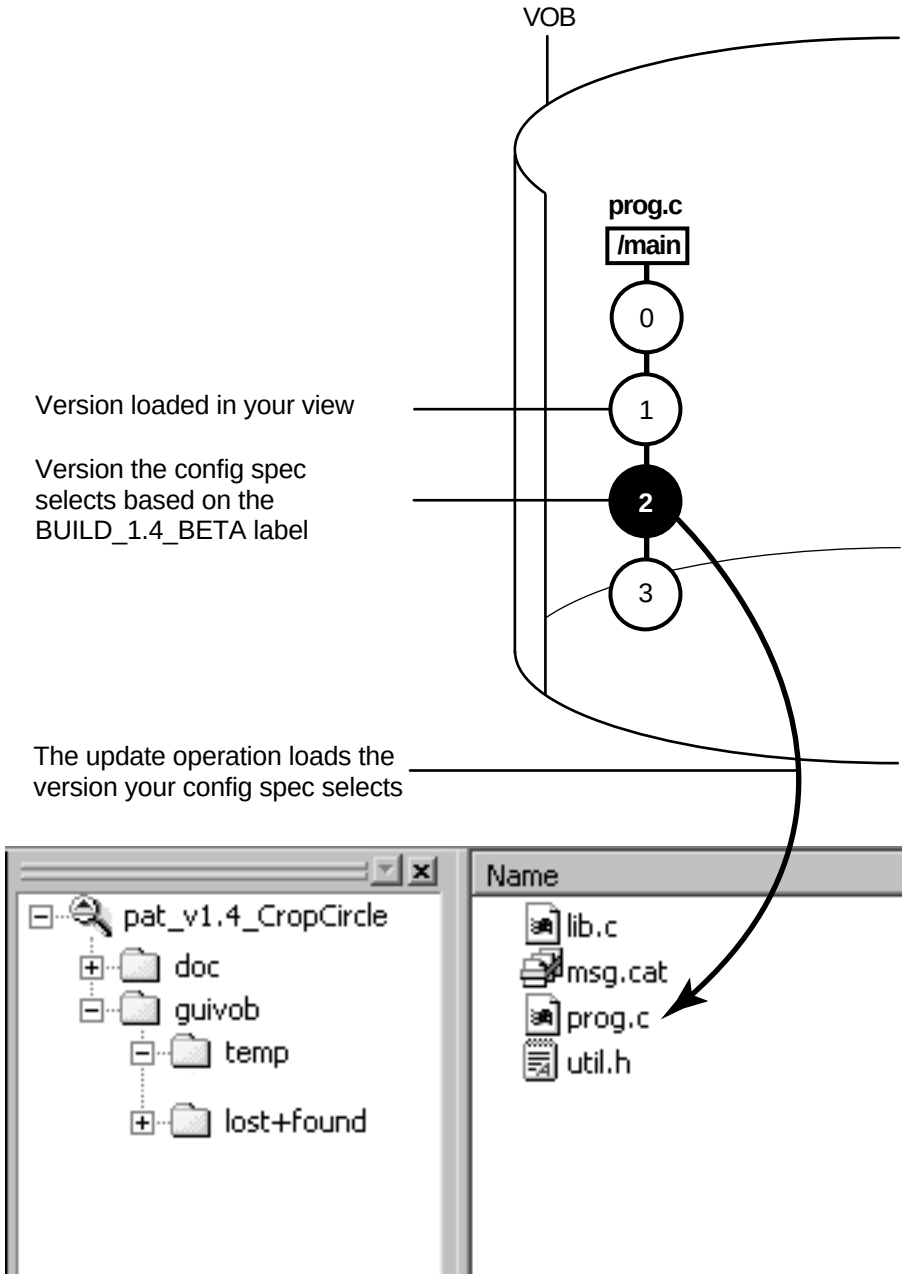
When you start an update operation, ClearCase compares the version of the elements loaded in the view with the version the config spec selects in the VOB. If the config spec selects a version in the VOB that is different from the version loaded in your view, ClearCase copies the version from the VOB into your view (Figure 18). ClearCase does not make this comparison or otherwise modify versions currently checked out to the view.

The update operation takes into account the fact that changes may be occurring in the VOB during the update. As ClearCase updates your view, other developers may check in new versions of elements your view's load rules select. To avoid loading an inconsistent set of versions, the update operation ignores versions in the VOB that meet both of the following conditions:

- The version was checked in after the moment the update began.
- The version is now selected by a config spec rule that involves the **LATEST** version label.

The update operation adjusts for the possibility that the system clocks on different hosts in a network may be out of sync (clock skew).

Figure 18 The Update Operation



## 4.3 Unloading Elements

If a view's config spec no longer selects an element, ClearCase removes, or unloads, it from the view. Unloading does not affect view-private files or view-private directories.

Updating can cause an element to be unloaded from a view in the following situations:

- You remove the load rule that specifies the element (or that specifies a directory element somewhere above it). For information on removing load rules, see *To Change Which Elements Are Loaded into a Snapshot View* on page 101.
- The version-selection rules no longer select any version of the element. This can happen when your config spec selects a version of the parent directory that no longer contains a version of the file element.

### Unloading Files

The action that ClearCase takes to unload a file depends on the file's current state:

- For a file that is not checked out, ClearCase deletes the file from the view.
- For a *hijacked* file, ClearCase appends **.unloaded** to the file name, unless you set the Update Tool to delete hijacked files. (Hijacked files are discussed throughout Appendix A, *Working in a Snapshot View While Disconnected from the Network*.) You change the settings on the **Advanced** tab in the **Start Update** dialog box. Refer to *Updating the View* on page 58.
- For a checked-out file, ClearCase appends **.unloaded** to the file name. The version remains checked out to your view.

### Unloading Directories

ClearCase unloads directories recursively. To unload a directory element, ClearCase unloads the files in the directory. If any view-private objects, hijacked files, or checked-out files are in the directory, or if the directory is currently in use (for example, if your current working directory is in or below the directory) ClearCase appends **.unloaded** to the name of the directory. For example, if the directory **src** contains view-private files, ClearCase renames the directory to **src.unloaded**.

# 5 Working On a Team

The development cycle presented so far is a fairly simple one in which everyone in an organization contributes to the same development project. But a software development cycle often involves several concurrent development projects. For example:

- You may want to experiment with some changes to the GUI as a result of feedback from usability testing, but are not yet sure whether to include your changes in official builds.
- Another team may try to optimize the database schema without upsetting the current one.
- Another group may need to get a head start on a feature for the next release of the product.

This chapter describes the functions that Rational ClearCase provides to support parallel development, a style of working in which teams use the same set of source files for different, concurrent development projects:

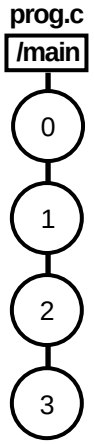
- Version trees
- Working on branches
- Merging
- Sharing control of a branch in an environment using Rational ClearCase MultiSite

(You do not need to read the section about sharing control of a branch with developers at other sites unless your project manager or MultiSite administrator directs you.)

## 5.1 The Version Tree

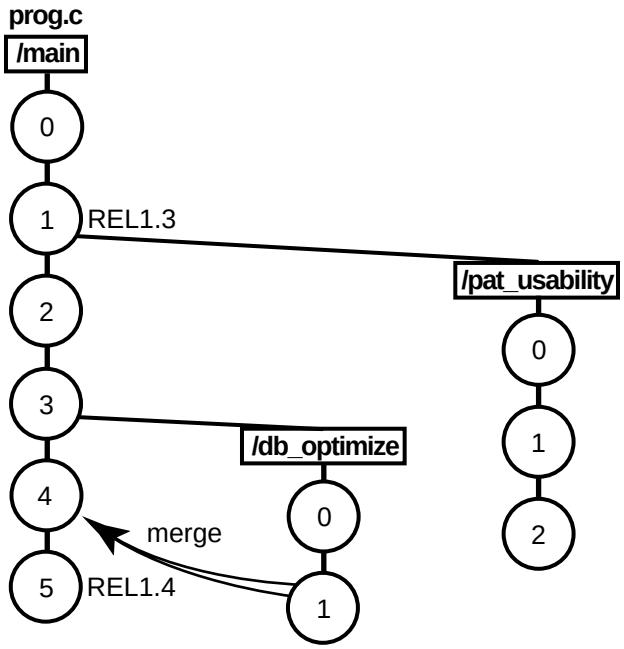
Each time you revise and check in an element, ClearCase creates a new version of the element in the VOB. Throughout this part of the book, this linear progression has been illustrated with a graphic similar to Figure 19.

Figure 19 Linear Progression of Versions




ClearCase can organize the different versions of an element in a VOB into a version tree. Like any tree, a version tree has branches. Each branch represents an independent line of development. Changes on one branch do not affect other branches until you merge. In Figure 20, **main**, **pat_usability**, and **db_optimize** are branches being used to develop different releases of the file element **prog.c** concurrently.

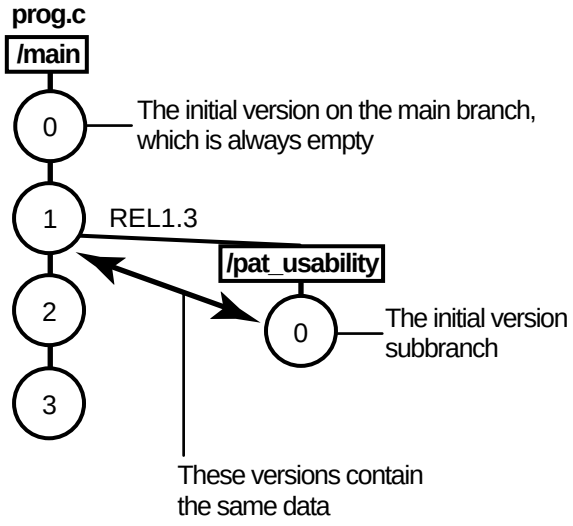
Figure 20 Version Tree of a File Element




## Under the Hood: The Initial Version on a Subbranch

When you create a subbranch for an element, which is any branch below the **main** branch, the initial version contains the same data as the version from which you start the branch (Figure 21). (The initial version on the **main** branch contains no data. For more information, see *Excluding Elements* on page 101.)

Figure 21 The Initial Version on a Subbranch



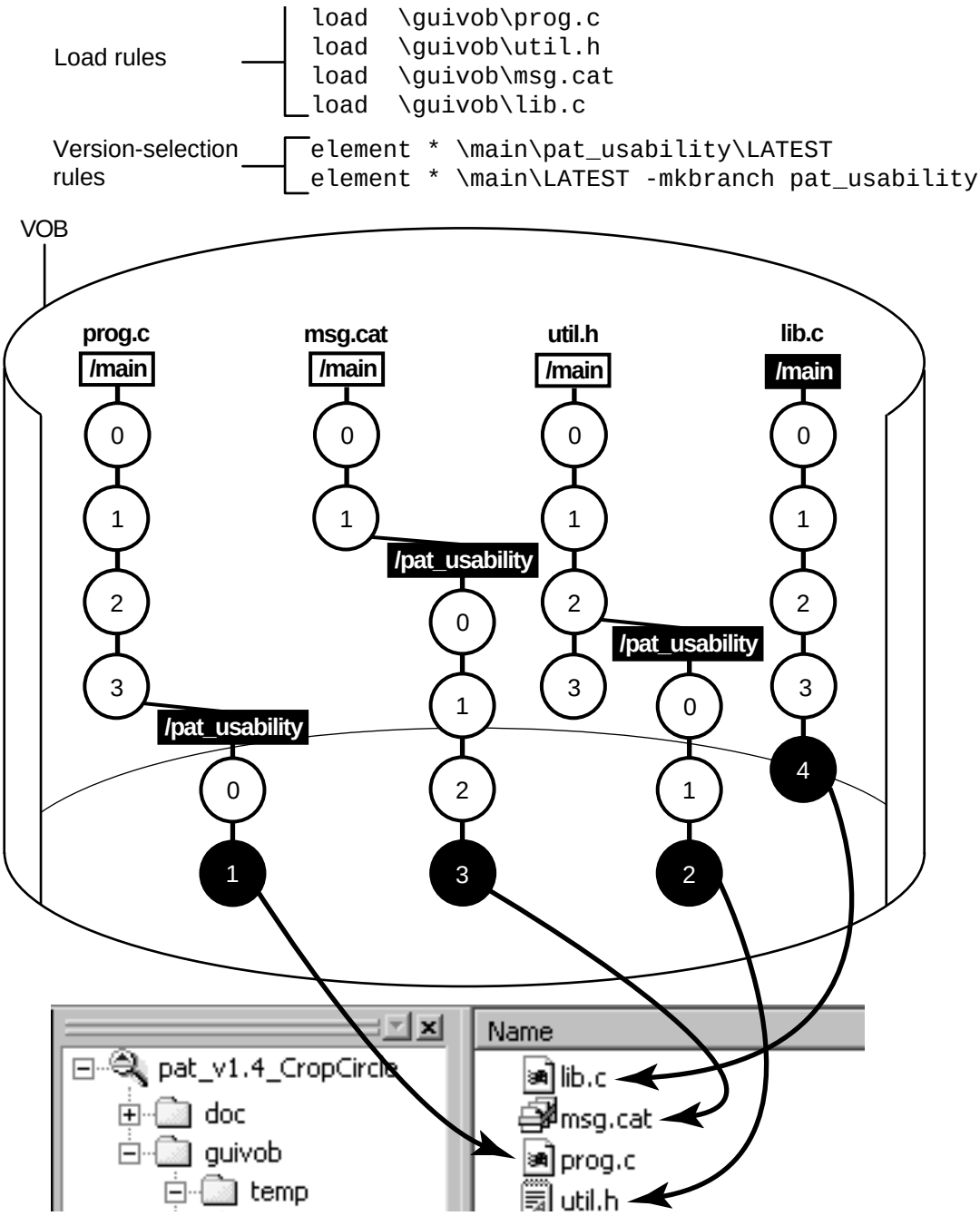

## 5.2 Working on Branches

Your organization's policies may dictate that each development project use its own branch to isolate its changes from other development projects. To adhere to this policy, each member of a project team uses a view whose config spec specifies this information:

- The versions to select in the development project's specific branch. As Figure 22 illustrates, some or all source files for the project have at least one version on the specified branch. If an element does not have a version on the specified branch, other rules in the config spec select a version of the element. In Figure 22, because **lib.c** does not have a version on the **pat_usability** branch, the view selects the version on the **main** branch.
- A special *make branch* rule. When this view checks out a version, the make-branch rule creates the development project's branch (if it doesn't already exist).

For example, each member of the project team that is optimizing the database schema uses a view that selects versions on the **db_optimize** branch and creates new versions on that branch.

Figure 22 Elements Have Common Branches

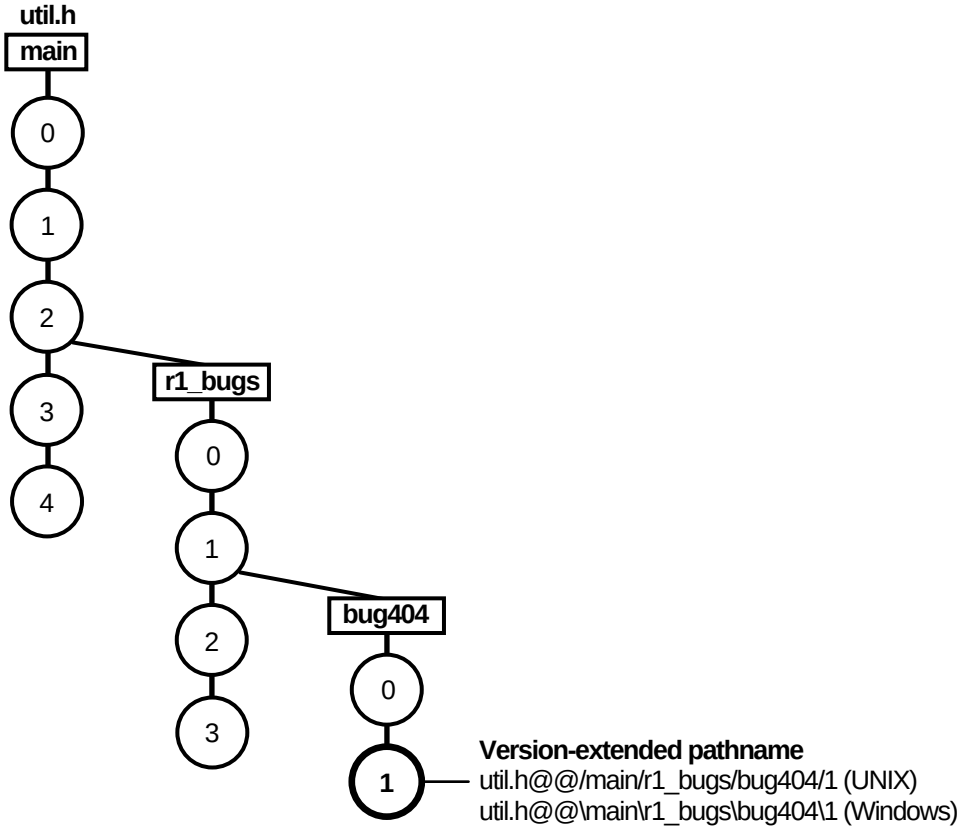


For more information about branches, see *Managing Software Projects* and the **mkbranch** reference page in the *Command Reference*.

## The Version-Extended Pathname

ClearCase commands and documentation use a notation to specify a version of an element on a branch. For example, **util.h@@\main\2** specifies version 2 of **util.h** on the **main** branch; **util.h@@\main\r1_bugs\bug404\1** specifies version 1 of **util.h** on the **bug404** subbranch below the **r1_bugs** subbranch, which is below the **main** branch (Figure 23).

Figure 23 Version-Extended Pathnames




From a command-line interface, you can use version-extended pathnames to access versions other than the ones currently selected by your view. To view the contents of a version that is not

currently in a snapshot view, you must use the **cleartool get** command in addition to version-extended pathnames.

For a full description of the syntax for version-extended pathnames, see the **pathnames_ccase** reference page in the *Command Reference*.

## 5.3 Merging

In a parallel development environment, the opposite of branching is merging. In the simplest scenario, merging incorporates changes on a subbranch into the **main** branch. However, you can merge work from any branch to any other branch. ClearCase includes automated merge facilities for handling almost any scenario.

One of the most powerful of ClearCase features is versioning of directories. Each version of a directory element catalogs a set of file elements and directory elements. In a parallel development environment, directory-level changes may occur as frequently as file-level changes. All the merge scenarios discussed in this chapter apply to both directory and file elements.

This section describes the following merge scenarios:

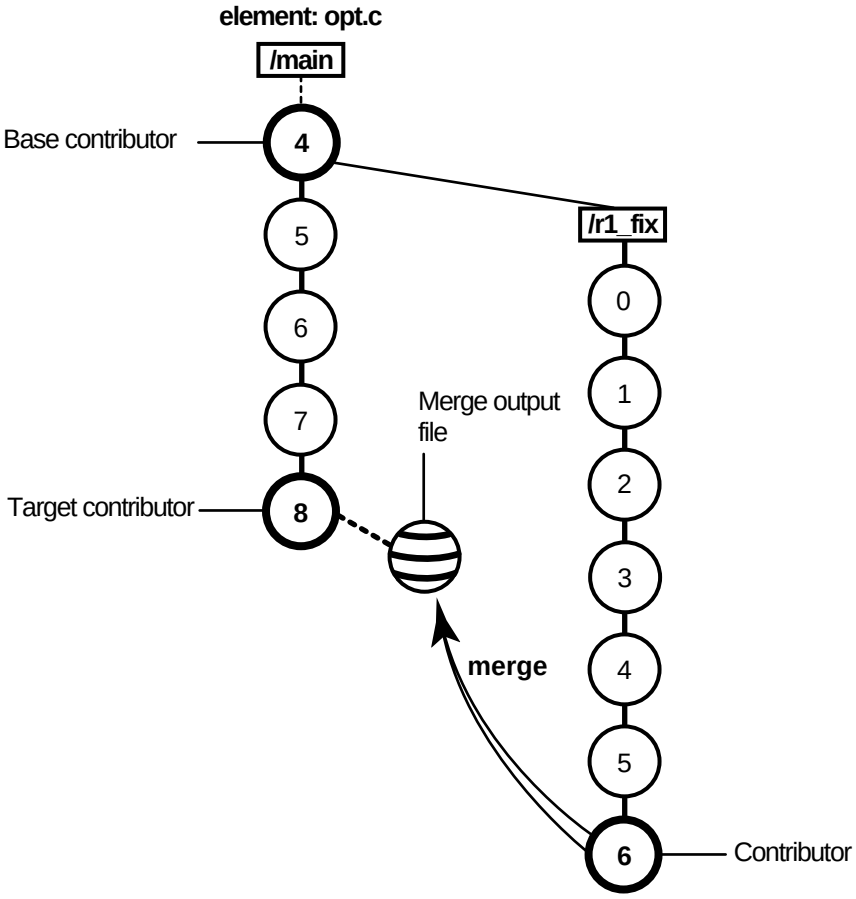
- Merging all changes made on a single subbranch (see *Scenario: Merging All Changes Made on a Subbranch* on page 75)
- Merging selectively from a single subbranch (see *Scenario: Selective Merge from a Subbranch* on page 77)
- Removing the contributions of some versions on a single subbranch (see *Scenario: Removing the Contributions of Some Versions* on page 79)
- Recording merges that occur outside ClearCase (see *Recording Merges That Occur Outside ClearCase* on page 80)

ClearCase also supports merging work from many branches to a single branch; this is typically a project manager's or integrator's task (see *Managing Software Projects*).

### Under the Hood: How ClearCase Merges Files and Directories

A merge combines the contents of two or more files or directories into a new file or directory. The ClearCase merge algorithm uses the following files during a merge (Figure 24):

Figure 24 Versions Involved in a Typical Merge



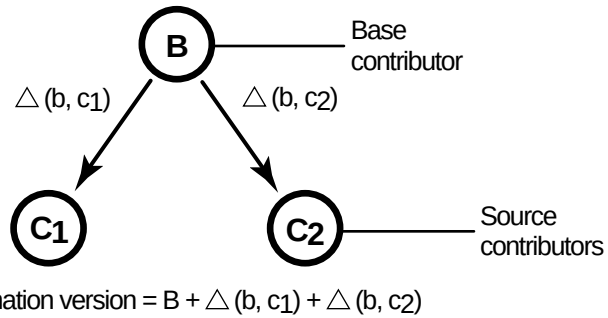

- Contributors, which are typically one version from each branch you are merging. (You can merge up to 15 contributors.) You specify which versions are contributors.
- The base contributor, which is typically the closest common ancestor of the contributors. (For selective merges, subtractive merges, and merges in an environment with complex branch structures, the base contributor may not be the closest common ancestor.) If all the contributors are versions of the same element, ClearCase determines which contributor is the base contributor (but you can specify a different one). For more information about determining a base contributor, see *Determination of the Base Contributor* on page 72.
- The target contributor, which is typically the latest version on the branch that will contain the results of the merge. You determine which contributor is the target contributor.

- The merge output file, which contains the results of the merge and is usually checked in as a successor to the target contributor. By default, the merge output file is the checked-out version of the target contributor, but you can choose a different file to contain the merge output.

To merge files and directories, ClearCase takes the following steps:

1. It identifies the base contributor.
2. It compares each contributor against the base contributor (Figure 25).
3. It copies any line that is unchanged between the base contributor and any other contributor to the merge output file.
4. For any line that has changed between the base contributor and one other contributor, ClearCase accepts the change in the contributor; depending on how you started the merge operation, ClearCase may copy the change to the merge output file. However, you can disable the automated merge capability for any given merge operation. If you disable this capability, you must approve each change to the merge output file.
5. For any line that has changed between the base contributor and more than one other contributor, ClearCase requires that you resolve the conflicting difference.

Figure 25 ClearCase Merge Algorithm




### File Merge Algorithm

A merge is a straightforward extension of a file comparison. Instead of displaying the differences, Diff Merge analyzes them (sometimes with your help) and copies sections of text to the output file:

- Sections in which there are no differences among the contributors are copied to the output file.

- When *one* contributor differs from the base contributor, Diff Merge accepts the change and copies the contributor's modified section to the output file:

```
------------[changed 3-4]----|--------[changed to 3-4 file 2]---
now is the thyme                     | now is the time
for all good men                     | for all good people
                                    -|-
*** Automatic: Applying CHANGE from file 2 [lines 3-4]
============
```

  (You can turn off automatic acceptance of this kind of change.)

- When two or more contributors differ from the base contributor, Diff Merge detects the conflict, and prompts you to resolve it. It displays all contributor differences and allows you to accept or reject each one.

```
               [changed 10]          |          [changed to 10 file 2]---
cent                                 | sent
                                    -|-
               [changed 10]          |          [changed to 10 file 3]---
cent                                 | scent
                                     |-
Do you want the CHANGE made in file 2? [yes] no
Do you want the CHANGE made in file 3? [yes] yes
Applying CHANGE from file 3 [line 10]
============
```

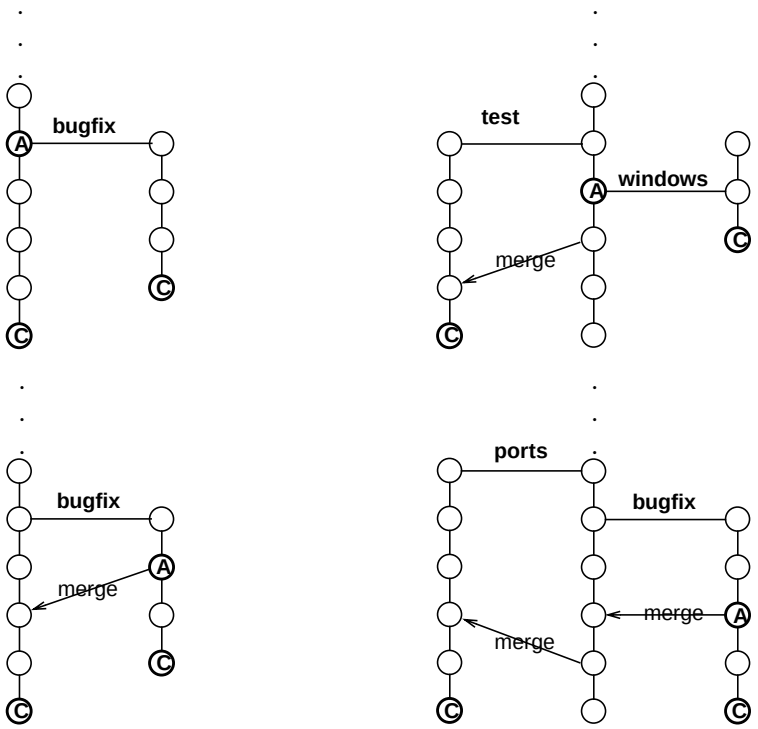
  Be sure to verify that the changes you accept produce consistent merged output. For example, after performing a merge involving file **util.h**, you can compare files **util.h.contrib** (which contains its previous contents) and the new **util.h** (which contains the merge output).

### Determination of the Base Contributor

If all the contributors are versions of the same element, Diff Merge determines the base contributor automatically. It examines the element's version tree, which includes all the merge arrows created by previous merge operations. This examination reveals the relationships among versions from the standpoint of their contents (which versions contributed their data to this version?), rather than their creation order (which versions were created before this version?). Diff Merge selects as the base contributor the closest common ancestor in this enhanced version tree.

Figure 26 illustrates common cases of merging. If no merges have been performed in the element, the actual common ancestor (**A**) of the contributors (**C**) in the version tree is selected to be the base contributor.

Figure 26 Determination of the Base Contributor for a Merge




If the contributors are not all versions of the same element, there is no common ancestor (or other base contributor). In this case, ClearCase turns off automated merging, and you must resolve all discrepancies among the contributors.

### Recording of Merge Arrows

Under the following conditions, the merge is recorded by creating one or more merge arrows (hyperlinks of type **Merge**):

- All contributor files must be versions of the same file element.
- One of the contributors must be a checked-out version, and you must specify this version as the target to be overwritten with the merge output (the **–to** option in the **merge** command). (Alternatively, you can optionally create merge arrows without performing a merge; in this case, you do not need to check out any of the contributors.)
- You must not perform the merge but suppress creation of merge arrows.

- You must not use any of these options: selective merge, subtractive merge, or base contributor specification (the **–insert**, **–delete**, and **–base** options in the **merge** command).

Diff Merge draws an arrow from each contributor version (except the base contributor) to the target version. You can see merge arrows with the Version Tree Browser.

### Locating Versions with Merge Hyperlinks

The **find** and **lsvtree –merge** commands can locate versions with **Merge** hyperlinks. The **describe** command lists all of a version's hyperlinks, including merge arrows:

**cleartool describe util.h@@/main/3**

```
version "util.h@@/main/3"
.
.
.
 Hyperlinks:
 Merge@278@/vob_3 /vob_3/src/util.h@@/main/rel2_bugfix/1
 -> /vob_3/src/util.h@@/main/3
```

### Directory Merge Algorithm

Each version of a ClearCase directory element contains the names of certain file elements, directory elements, and VOB symbolic links.Diff Merge can process two or more versions of the same directory element, producing a directory version that reflects the contents of all contributors. The algorithm is similar to that for a file merge. Diff Merge prompts for user interaction only when two or more of the contributors are in conflict.

One of the directory versions—the merge target—must be checked out. (Typically, it is the version in your view.) Diff Merge updates the checked-out directory by adding, removing, and changing names of elements and links.

**NOTE:** A directory merge does not leave behind a **.contrib** file, with the pre-merge contents of the target version.

### Merging Directories

We recommend that you use this procedure when merging directories:

1. Ensure that all contributor versions of the directory are checked in.
2. Check out the target version of the directory.

3. Perform the directory merge immediately, without making any other changes to the checked-out version.

If you follow this procedure, it easier to determine exactly what the merge accomplished. Enter a **diff –predecessor** command on the checked-out version, which has just been updated by **merge**.

### Using ln and rmname in Diff Merge

ClearCase implements directory merges using VOB hard links. You can use the **ln** and **rmname** commands to perform full or partial merges manually. See the **ln** and **rmname** reference pages in the *Command Reference*.

## Scenario: Merging All Changes Made on a Subbranch

Merging all changes made on a subbranch is the simplest and most common scenario (Figure 27).

Bug fixes for an element named **opt.c** are being made on branch **r1_fix**, which was created at the baseline version **RLS1.0** (**\main\4**). Now, all the changes made on the subbranch are to be incorporated into **main**, where a few new versions have been created in the meantime.

### Task Overview

Merging the changes from the **r1_fix** branch involves the following tasks:

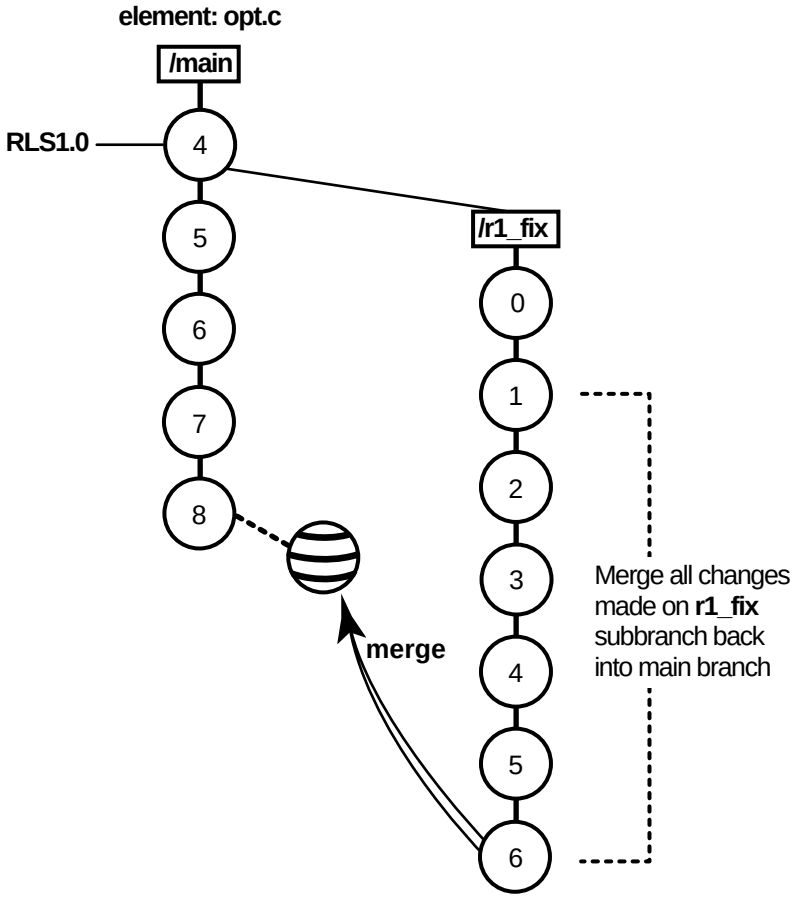
1. Start a dynamic view or change directories to a snapshot view. The view must select the target version, which in Figure 27 is **opt.c@@\main\8**.

2. If the target version is checked out to your view for other revisions, create a pre-merge checkpoint by checking it in. To make it easier to find this checkpoint, consider labeling the version.

3. Use the Merge Manager to find elements with versions on a specific subbranch and automatically merge any nonconflicting differences. For example, in Figure 27, you find elements with versions on the **r1_fix** subbranch.

   In your project, several elements might have versions on the **r1_fix** branch. With the Merge Manager, you can choose for which elements you merge changes from one branch to another.

Figure 27 Merging All Changes from a Subbranch




4. Use Diff Merge to resolve any conflicting differences between merge contributors.

5. Test the merge results in the view you start in Step #1. Then check in the target version (which contains the results of the merge).

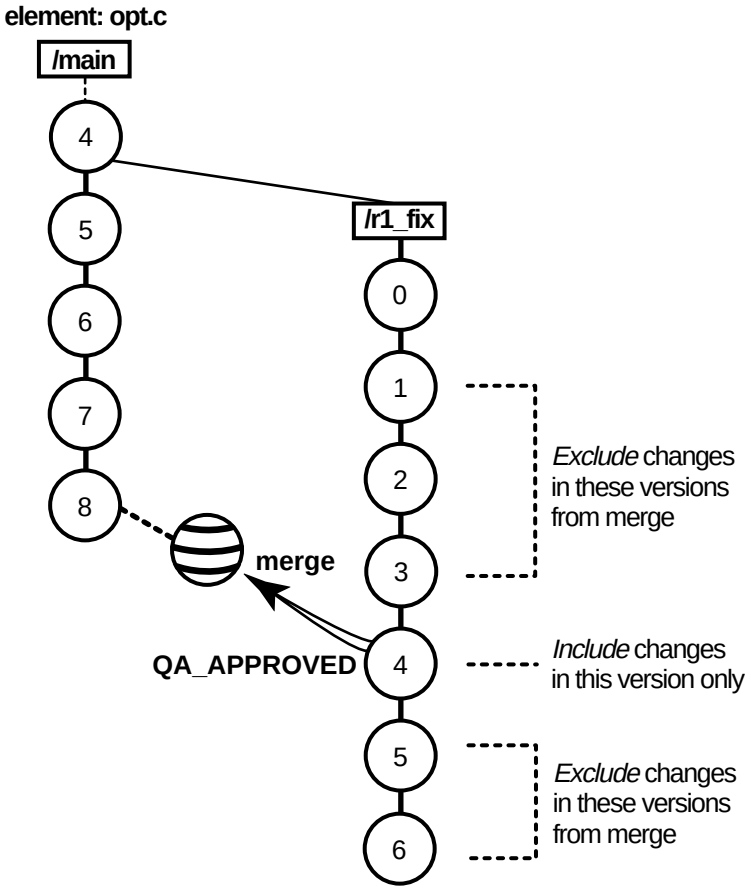
### Getting More Information

For detailed information about completing this task, see ClearCase online help.

## Scenario: Selective Merge from a Subbranch

In the selective merge scenario, the project manager wants to incorporate into new development several lines of code that were added in version **\main\r1_fix\4** (Figure 28).

Figure 28 Selective Merge from a Subbranch




It's critical that you merge only the lines of code as written in this version: it was used and verified to fix a specific bug that prevents further development on the new project.

Selective merges can be tricky: versions you exclude as contributors to the merge may contain needed revisions. For example, if the function you added in **\main\r1_fix\4** relies on a variable definition that was added in **\main\r1_fix\2**, you must include version 2 in the merge.

### Merging a Range of Versions

You can also specify a single range of consecutive versions to contribute to the merge. For example, if you need the variable definitions added in **\main\r1_fix\2** as well as the code added in **\main\r1_fix\4**, you can include versions 2 through 4 in the merge.

### Task Overview

Merging selective versions from the **r1_fix** branch involves the following tasks:

1. Start a dynamic view or change directories to a snapshot view. The view must select the target version, which in Figure 28 is **opt.c@@\main\8**.

2. If the target version is checked out to your view for other revisions, create a pre-merge checkpoint by checking it in.

3. To determine which versions contain changes that you want to merge to the target version, use the Version Tree Browser and the History Browser. In a snapshot view, use either the **cleartool get** command or **Send To** command in the Version Tree Browser or History Browser to see the contents of versions not loaded into your view. (For information about opening a version not currently in your view, see ClearCase online help.)

4. To start the merge, check out the target version, and then issue the **cleartool merge** command with the **–insert –graphical** arguments. (You cannot start a selective merge from Diff Merge.)

   For example, the following commands merge only the changes in version 4 on the **r1_fix** branch:

   **cleartool checkout opt.c**
   **cleartool merge –graphical –to opt.c –insert –version \main\4**

   These commands merge only the changes in versions 2 through 4 on the **r1_fix** branch:

   **cleartool checkout opt.c**
   **cleartool merge –graphical –to opt.c –insert –version \main\r1_fix\2  \main\4**

5. In Diff Merge, complete the merge. Then save the results and exit. For information on using Diff Merge, refer to the online help.

6. Test the merge results in the view you start in Step #1. Then check in the target version.

**NOTE**: In a selective merge, ClearCase does not create a merge arrow. A merge arrow indicates that all of a version's data has been merged, not parts of it.

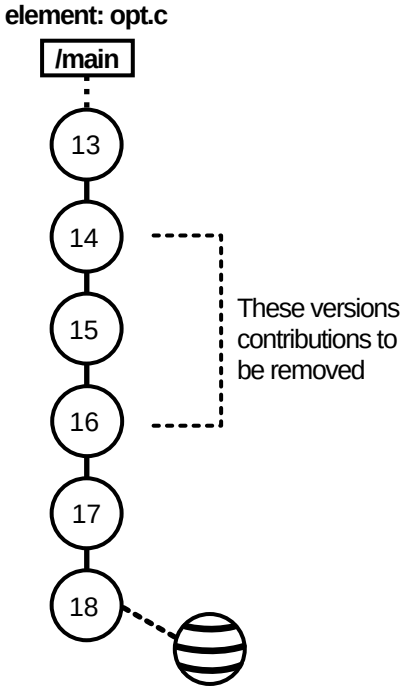
### Getting More Information

For detailed information about completing this task, see the **merge** and **version_selector** reference pages in the *Command Reference* or ClearCase online help.

## Scenario: Removing the Contributions of Some Versions

The project manager has decided that a new feature, implemented in versions 14 through 16 on the **main** branch, will not be included in the product. You must perform a subtractive merge to remove the changes made in those versions (Figure 29).

Figure 29 Removing the Contributions of Some Versions




### Task Overview

A subtractive merge is the opposite of a selective merge: it removes from the checked-out version the changes made in one or more of its predecessors. Performing a subtractive merge involves the following tasks:

1. Start a dynamic view or change directories to a snapshot view. The view must select the branch from which you want to remove revisions.

2. If the target version is checked out to your view for other revisions, create a pre-merge checkpoint by checking it in. In Figure 29, the target version is **opt.c@@\main\18**.

3. To determine which versions contain changes you want to remove, use the Version Tree Browser and the History Browser. From a snapshot view, use either the **cleartool get** command or the **Send To** command in the Version Tree Browser or History Browser to see the contents of versions not loaded into your view. (For information about opening a version not currently in your view, see ClearCase online help.)

4. To perform the merge, check out the target version, and then use the **cleartool merge** command with the **–delete –graphical** arguments. (You cannot start a subtractive merge from Diff Merge.)

   For example, the following commands remove revisions to versions 14 through 16 on the **main** branch:

   **cleartool checkout opt.c**
   **cleartool merge –graphical –to opt.c –delete –version  \main\14 \main\16**

5. In Diff Merge, complete the merge. Then save the results and exit. For information on using Diff Merge, refer to online help.

6. Test the merge results in your view. Then check in the target version (which contains the results of the merge).

**NOTE**: In a subtractive merge, ClearCase does not create a merge arrow. A merge arrow indicates that data has been merged, not removed.

### Getting More Information

For detailed information about completing this task, see the **merge** and **version_selector** reference pages in the *Command Reference* or ClearCase online help.

## Recording Merges That Occur Outside ClearCase

You can merge versions of an element manually or with any available analysis and editing tools. To update an element's version tree with a merge that occurs outside ClearCase, check out the target version, perform the merge with your own tools, and check it back in. Then record the

merge by drawing a merge arrow from the contributors to the new version that contains the result of the merge. After you've drawn the merge arrow, your merge is indistinguishable from one performed with ClearCase tools.

For example, use the following commands to merge a version of **nextwhat.c** on the **enhance** branch to the branch currently selected by your view:

**cleartool checkout nextwhat.c**
```
Checkout comments for "nextwhat.c":
```
**merge enhance branch**
**.**
```
Checked out "nextwhat.c" from version "\main\1".
```

*<use your own tools to merge data into checked-out version>*

**cleartool merge –to nextwhat.c –ndata –version ...\enhance\LATEST**
```
Recorded merge of "nextwhat.c".
```

The **–ndata** option suppresses the merge but creates merge arrows as if ClearCase had merged the versions.

### Getting More Information

For detailed information about completing this task, see the **merge** and **version_selector** reference pages in the *Command Reference* or ClearCase online help.

## 5.4 Sharing Control of a Branch with Developers at Other Sites

**NOTE:** This section describes how to request control of a branch from another development site. You do not need to read this section unless your project manager or MultiSite administrator directs you to.

If your company uses MultiSite to distribute development among multiple geographical sites, you may share source files with developers at other sites. Each site has its own replica of the VOB, and developers work in their site-specific replica (known as the *current replica*). Each replica controls (masters) a particular branch of an element, and only developers at that replica's site can work on that branch. In this scenario, MultiSite branch mastership does not affect you, and you can do your work as usual.

However, sometimes elements cannot have multiple branches. For example, some file types cannot be merged, so development must occur on a single branch. In this scenario, all developers must work on a single branch (usually, the **main** branch). MultiSite allows only one replica to master a branch at any given time. Therefore, if a developer at another site needs to work on the element, she must request mastership of the branch.

**NOTE:** The developer can also request mastership of branch types. For more information, see the *Administrator's Guide* for Rational ClearCase MultiSite.

For example, the file **doc_info.doc** cannot be merged because it is a file type for which you do not have a *type manager*, but developers at different sites need to make changes to it. If the branch is mastered by your current replica, you can check out the file. If the branch is mastered by another replica, you cannot check out the file. If you try to check out the file, ClearCase presents an error message:

- In the graphical interface:

```
Branch '\main' is not mastered by the current replica. Master replica of
branch is 'raleigh'. Only unreserved, nonmastered checkout is allowed at
the current replica.
```

- On the command line:

```
cleartool: Error: Cannot checkout branch 'main'.
The branch is mastered by replica 'raleigh'.
Current replica is 'lexington'.
cleartool: Error: Unable to check out 'doc_info.doc'.
```

For you to check out the file reserved or to check in the file after a nonmastered checkout, your current replica must master the branch. You can request mastership through the graphical interface or with a **cleartool** command.

If you have permission to request mastership from the master replica of the branch, if mastership requests are enabled, and if there are no blocking conditions, then the mastership change is made at the master replica, and a MultiSite update packet that contains the change is sent to your current replica. When your current replica imports the packet, it receives mastership of the branch and you can check out the file.

**NOTE:** Authorizing developers to request mastership and enabling mastership requests at a replica are tasks performed by the MultiSite administrator. For more information, see the *Administrator's Guide* for Rational ClearCase MultiSite.

When you use mastership requests to transfer control of a branch, you can use either of two methods to do your work:

- Request mastership of the branch and wait for mastership to be transferred to your current replica; then perform a reserved checkout. You must use this method if you cannot or do not want to merge versions of the element.
- Request mastership of the branch and check out the branch immediately, using a nonmastered checkout. You may have to perform a merge before you can check in your work.

The following sections describe both methods.

## To Request Mastership of a Branch and Wait for the Transfer

From the command line:

1. At a command prompt, enter a **cleartool reqmaster** command for the branch you need to check out.

   **cleartool reqmaster –c "add info re new operating systems"**
   **^ read_me_first.doc@@\main**

2. Wait for mastership to be transferred to your current replica. To list the master replica of a branch, use **describe**:

   **cleartool describe read_me_first.doc@@\main**
   ```
   branch "read_me_first.doc@@\main"
     created 15-May-99.13:32:05 by sg.user
     branch type: main
     master replica: doc_lex@\doc
   ...
   ```

   In this example, your current replica is **lexington** in the VOB family **\doc**. The output of the **describe** command shows that **lexington** is the master replica of the branch, which means that you can check out the branch as reserved.

3. Perform a reserved checkout, edit the file, and check in your work.

For detailed information about requesting mastership from the graphical interface, see ClearCase online help:

1. From ClearCase Explorer, click **Help** > **Help Topics**.
2. In the ClearCase Help window, click **Help Topics**.

3. On the **Contents** tab of the Help Contents window, select **Developing Software with Base ClearCase** > **Requesting mastership of a branch** > **To request mastership of a branch**.

You can request mastership from the Find Checkouts window, the Merge Manager, or the Version Tree Browser.

## To Check Out the Branch Before Mastership Is Transferred

If you can merge versions of the element you need to check out, you can work on the file while you wait for mastership to be transferred to your replica.

To use this method from the graphical interface:

1. In ClearCase Explorer, right-click the element you want to check out and click **Check Out** on the shortcut menu.
2. In the **Check Out** dialog box, select the **Unreserved if already reserved** check box.
3. If the **Confirm Version to Check Out** dialog box is open, select the **Request mastership of the branch** check box and click **Yes**.
4. In the **Request Mastership** dialog box, click **Request Mastership**.
5. Make changes to the element.
6. Wait for mastership to be transferred to your current replica. To list the master replica of a branch, use the Property Browser:
   a. Right-click the element and click **Version Tree** on the shortcut menu.
   b. In the Version Tree, right-click the branch icon and click **Properties** on the shortcut menu.
   c. Click the **Mastership** tab.
7. Check in the element. If the checkin succeeds, you're finished. If the checkin fails because you have to perform a merge, proceed to Step #8.
8. Use the Merge Manager to merge from the latest version on the branch to your checked-out version.
9. Check in the file.

To use this method from the command line:

1. Enter a **reqmaster** command for the branch you need to check out.

   **cleartool reqmaster –c "fix bug #28386" prog.c@@\main\integ**

2. Use **cleartool checkout –unreserved –nmaster** to perform a nonmastered checkout.

   **cleartool checkout –c "fix bug #28386" –unreserved –nmaster prog.c@@\main\integ**

3. Make changes to the element.

4. Wait for mastership to be transferred to your current replica. To list the master replica of a branch, use **describe**:

   **cleartool describe \lib\prog.c@@\main**
   ```
   branch "\lib\prog.c@@\main"
     created 15-May-99.13:32:05 by nlg.user
     branch type: main
     master replica: lib_london@\lib
   ...
   ```

5. Check in the element. If the checkin succeeds, you are finished.

   **cleartool checkin –nc prog.c**
   ```
   Checked in "prog.c" version "\main\65".
   ```

   If the checkin fails because you have to perform a merge, proceed to Step #6:

   **cleartool checkin –nc prog.c**
   ```
   cleartool: Error: The most recent version on branch "\main" is not the
   predecessor of this version.
   cleartool: Error: Unable to check in "prog.c".
   ```

6. Merge from the latest version on the branch to your checked-out version.

   **cleartool merge –to prog.c –version \main\LATEST**
   *(if necessary, you are prompted to resolve conflicts)*
   ```
   Moved contributor "prog.c" to "prog.c.contrib".
   Output of merge is in "prog.c".
   Recorded merge of "prog.c".
   ```

7. Check in the element.

### Requesting Mastership After the Checkout

You can perform a nonmastered checkout, but not request mastership at the time of the checkout. You can request mastership at any time by using the **reqmaster** command, or by clicking **Request Mastership** on the shortcut menu for nonmastered checkouts available in Find Checkouts or the Merge Manager.

## Setting the Default for Nonmastered Checkouts

You can set the default behavior of the **Check Out** dialog box so that you always perform a nonmastered checkout if a reserved or unreserved checkout would fail.

1. Click **Start** > **Programs** > **Rational ClearCase** > **User Preferences**.
2. Click the **Operations** tab.
3. Select the **Unreserved, nonmastered if branch is mastered by another replica** check box.

When you check out an element in a replicated VOB, the **Check Out** dialog box opens with the **Unreserved, nonmastered** check box selected. When you check out an element in an unreplicated VOB, this setting is ignored.

## Troubleshooting

If the request for mastership fails because there are checkouts on the branch at the master replica, try your request again later or ask the other developer to check in the file or directory and then try again. If you receive other errors, contact your project manager or MultiSite administrator.

# 6 Other Tasks

Chapter 3, *Working in a View*, describes tasks you perform daily or weekly. You may need to perform some of these tasks less often:

- Adding files and directories to source control
- Moving, removing, and renaming elements
- Accessing elements not loaded into a snapshot view
- Adjusting the scope of a view
- Assigning snapshot views to drive letters
- Registering snapshot views
- Moving views
- Regenerating a snapshot view's **view.dat** file
- Accessing views and VOBs across platform types

## 6.1 Adding Files and Directories to Source Control

You can add files or directories to source control at any time. Usually, you add a few files to a directory that is already under source control. Less frequently, you may need to add an entire directory tree to source control.

This section explains these tasks:

- Adding files and directories to an existing directory
- Adding a directory tree for a new development project

## To Add Elements to Source Control

NOTE: Your view's version-selection rules determine the branch on which an element's first version is created. Make sure the view you use to add elements creates versions on an appropriate *branch*.

To add files and directories to source control from an existing directory tree:

1. In ClearCase Explorer, navigate to the view used for your development task.
2. Navigate to the parent directory to which you want to add the files or directories.
3. If the files or directories are not present, drag them to the parent directory.
4. Select the files and directories you want to add to source control.
5. Right-click one of the selected objects. On the shortcut menu, click **Add to Source Control**.

   We recommend you select items that are the farthest from the root of the directory tree: the **Add to Source Control** command for any given file or directory also adds any parent directories (up to the VOB root directory) that are not already *elements*.
6. Click **OK**.

## Under the Hood: What Happens When You Add a File or Directory to Source Control

The **mkelem** or **Add to Source Control** command always creates an element and initializes its version tree by creating a single branch (named **main**) and a single, empty version (version 0) on that branch. The following arguments for the **mkelem** command or options in the **Add to Source Control** dialog box determine optional ClearCase behavior:

- Selecting the **Keep checked out** check box or using **mkelem** with no arguments checks out the element. Any view-private data that corresponds to the element pathname remains in your view only and is added to version 1 in the VOB when you check in (Figure 30).
- Clearing the **Keep checked out** check box or using **mkelem –ci** checks in the element, using any existing view-private data that corresponds to the element pathname as the content for version 1. Your view's config spec determines the branch on which ClearCase creates version 1.

- Selecting the **Preserve file modification time** check box or using **mkelem -ci -ptime** does not alter the date and time that the file was last modified.
- Clearing the **Preserve file modification time** check box changes the modified time on the file to the checkin time.
- Using **mkelem –nco** suppresses automatic checkout; **mkelem** creates the new element, along with the **main** branch and version **\main\0**, but does not check it out. If *element-pathname* exists, it is moved aside to a **.keep** file.
- (Replicated VOBs only) Selecting the **Make current replica the master of all newly created branches** check box or using **mkelem –master** assigns to your *current replica* mastership of all branches created during element creation. You will be able to create new versions on the branches.

  Clearing this check box or using **mkelem** without the **–master** option assigns mastership of a new branch to the VOB replica that masters the associated branch type. If this replica is not your current replica, you cannot create new versions on the branch.

  You can set the default for mastership assignment in the **User Options** dialog box:

  a. In ClearCase Explorer, click **Tools** > **Options**.

  b. In the **User Options** dialog box, click **ClearCase Options**.

  c. In the **ClearCase User Options** dialog box, click the **Operations** tab.

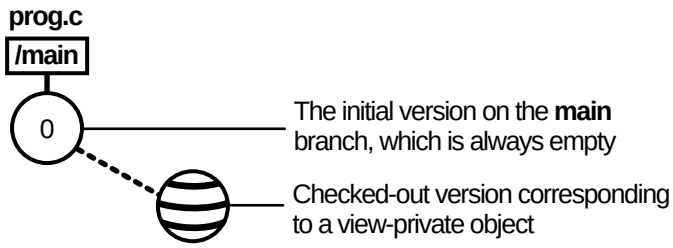
  d. Click **Advanced Options**.

  e. Select the **When creating an element in a replicated VOB, make current replica the master of all newly created branches** check box.

  f. Click **OK**.

Other views do not see the element until you check in the element's parent directories (the **Add to Source Control** command does this for you) and check in the file or directory.

Figure 30 Creating an Element




**NOTE**: *VOB links* make it possible to have more than one copy of a directory in a snapshot view. When you add a file or directory to a snapshot view, ClearCase updates all other instances of the parent directory that are loaded into your view.

### File Types and Element Types

Each element is an instance of an element type. You can specify an element type with the **–eltype** option. (The **lstype –kind eltype** command lists a VOB's element types.) The element type must already exist in the VOB in which you are creating the new element, or must exist in the Admin VOB hierarchy associated with the VOB in which you are creating the new element. A **mkelem –eltype directory** command is equivalent to a **mkdir** command.

If you do not specify an element type on the command line, **mkelem** determines one by using the magic files to perform file-typing. This involves matching patterns in the new element's name (and examining the existing view-private file with that name, if one exists; see *Conversion of View-Private Files to Elements* on page 91). If file-typing fails, an error occurs and no element is created:

```
cleartool: Error: Can't pick element type from rules in ...
```

For more information about file-typing, see **cc.magic** in the *Command Reference*.

### Access Mode

Elements are controlled by ClearCase permissions, as described in the **permissions** reference page in the *Command Reference*, not by the access modes for files and directories that are set by the operating system. When your view selects a checked-in version of an element, all of its write permissions are turned off. When you check out an element, write permissions are added to the view-private copy. (See the **checkout** reference page in the *Command Reference* for details.)

When you convert a view-private file to an element (see *Conversion of View-Private Files to Elements* on page 91),its access mode is changed to read-only. To add execute permission for an executable element, use **protect –chmod +x** (see the **protect** reference page in the *Command Reference*).

### Conversion of View-Private Files to Elements

You can use the **mkelem** command to convert a view-private file to a file element with the same name. There are several cases:

- By default, **mkelem** creates an empty version 0 of the new element, then checks out the new element to your view. The view-private file becomes the checked-out version of the new element.
- If you use the **–ci** option (check in), **mkelem** does all of the above, then proceeds to check in version 1 of the new element. Thus, version 1 has the contents of the view-private file. With **–ptime**, **mkelem** preserves the modification time of the file being checked in.
- If you use the **–nco** option (no check out), **mkelem** creates an empty version 0 of the new element.

During the element-creation process, the view-private is renamed to prevent a name collision that would affect other ClearCase tools (for example, triggers on the **mkelem** operation). If this renaming fails, a warning message appears. There are two renaming procedures:

- If a new element is checked out, **mkelem** temporarily renames the view-private file, using a .**mkelem** (or possibly, **.mkelem**.*n*) suffix. After the new element is created and checked out, **mkelem** restores the original name. This action produces the intended effect: the data formerly in a view-private file is now accessible through an element with the same name.
- If no checkout is performed on the new element, **mkelem** alerts you that the view-private file has been renamed, using a **.keep** (or possibly, **.keep.***n*) extension. Note that the view-private file is not converted to an element; it is moved out of the way to allow creation of an element in its place.

**NOTE:** If **mkelem** does not complete correctly, your view-private file may be left under the .**mkelem** file name.

### Conversion of Nonshareable Derived Objects to Elements

**mkelem** does not perform any special processing for a nonshareable DO. The process is the same as for a shareable DO, as described in *Conversion of View-Private Files to Elements* on page 91.

However, when you check in version 1 of the new element, the checkin converts the nonshareable DO to a shareable DO, then checks it in.

**NOTE:** When a nonshareable DO is converted to a shareable DO, its DO-ID changes. For more information, see *Derived Objects and Configuration Records* in *Building Software*.

### Creation of Directory Elements

If you create a new directory element, you cannot use the same name as an existing view-private file or directory, and you cannot use **mkelem** to convert an existing view-private directory structure into directory and file elements. To accomplish this task, use the **clearfsimport** and **clearimport** utilities.

### Auto-Make-Branch During Element Creation

If your config spec has a **/main/LATEST** rule with a **–mkbranch** clause, **mkelem** checks out a subbranch instead of the **main** branch. For example, suppose your view has this config spec:

```
element * CHECKEDOUT
element * .../gopher_port/LATEST
element * V1.0.1 -mkbranch gopher_port
element * /main/LATEST -mkbranch gopher_port
```

In this case, a **gopher_port** branch is created for the new element, and this branch is checked out instead of **main**:

**cleartool mkelem –c "new element for Gopher porting work" base.h**

```
Created element "base.h" (type "text_file").
Created branch "gopher_port" from "base.h" version "\main\0".
Checked out "base.h" from version "\main\gopher_port\0".
```

The **auto-make-branch** facility is not invoked if you use the **–nco** option to suppress checkout of the new element. For more about this facility, see the **checkout** and **config_spec** reference pages in the *Command Reference*.

### Creation of Elements in Replicated VOBs

By default, when you create an element in a replicated VOB, **mkelem** assigns mastership of the element's main branch to the VOB replica that masters the branch type **main**. If this replica is not your current replica, you cannot create versions on the **main** branch. (You can create versions on other branches if they are mastered by the current replica.)

To assign mastership of a new element's **main** branch to the current replica, use the **–master** option. The **–master** option also allows auto-make-branch during element creation, even if the branch type specified in your config spec is not mastered by the current replica. In this case, **mkelem** assigns mastership of newly created branches to the current replica. For example, suppose your view has the following config spec:

```
element * CHECKEDOUT
element * .../gms_dev/LATEST
element * /main/LATEST -mkbranch gms_dev
```

When you create a new element with **mkelem –master** and do not use the **–nco** option, **mkelem** creates the branches **main** and **gms_dev** and assigns their mastership to the current replica.

**NOTE:** If you use the **–nco** option with **–master**, only the main branch is mastered by the current replica, because it is the only branch created by **mkelem**.

### Element Object and Version References

You sometimes need to distinguish an element itself from the particular version of the element that is selected by your view. In general:

- Appending the extended naming symbol (by default, @@) to an element's name references the element itself.
- A simple name (no extended naming symbol) is a reference to the version in the view.

For example, **msg.c@@** references an element, whereas **msg.c** refers to a version of that element. In many contexts (for example, **checkin** and **lsvtree**), you can ignore the distinction. But there are ambiguous contexts in which you need to be careful. For example, you can attach attributes and hyperlinks either to version objects or to element objects. Thus, these two commands are different:

**cleartool mkattr BugNum 403 msg.c** *(attaches attribute to version)*
**cleartool mkattr BugNum 403 msg.c@@** *(attaches attribute to element)*

The first command operates on the version of the element selected in your view, but the second command operates on the element itself.

**CAUTION:** Do not create elements whose names end with the extended-naming symbol. ClearCase software cannot handle such elements.

### Storage Pools

Physical storage for an element's versions (data containers) is allocated in the storage pools that **mkelem** assigns. You can change pool assignments with the **chpool** command.

### Group Membership Restriction

Each VOB has a group list. If your principal *group* is on this list, you can create an element in that VOB. For more information about group lists, see the **protectvob** reference page in the *Command Reference*.

## To Add Elements for a New Development Task

**NOTE**: This procedure assumes that a VOB exists. For information about creating VOBs, see *Managing Software Projects*.

1. In ClearCase Explorer, navigate to the view you created for the development task.
2. Do **one** of the following, depending on whether you work in a snapshot view or a dynamic view.

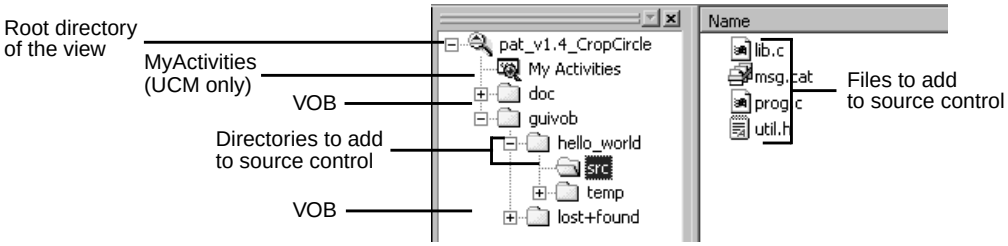
   - If you work in a snapshot view, create a folder in the view that corresponds to each VOB to which you want to add files and directories.
   - If you work in a dynamic view, make sure that each VOB to which you want to add files and directories is accessible from your view. If a VOB isn't accessible, activate it on your computer (see *To Activate VOBs* on page 36).

3. Under each VOB, do one of the following:

   - Create a directory structure.
   - If files and directories already exist, copy them into the appropriate location within the directory tree.

   When you are finished, the view resembles Figure 31.

Figure 31 Directory Structure in a Snapshot View




4. In the Details pane of ClearCase Explorer, select files and directories.

   We recommend that you select items that are the farthest from the root of the directory tree: the **Add to Source Control** command for any given file or directory also adds any parent directories (up to the VOB root directory) that are not already *elements*. For example, in Figure 31, if neither **\guivob\hello_world** nor **\guivob\hello_world\src** are elements, you can add both directories to source control by adding **\guivob\hello_world\src** to source control.

5. Right-click one of the selected objects. On the shortcut menu, click **Add to Source Control**.

### Importing Files

If you're adding a large number of files and directories to source control, use the **clearfsimport** command (or **clearexport** commands) and **clearimport** command. For more information, see the **clearfsimport** and **clearimport** reference pages in the *Command Reference*.

## 6.2 Moving, Removing, and Renaming Elements

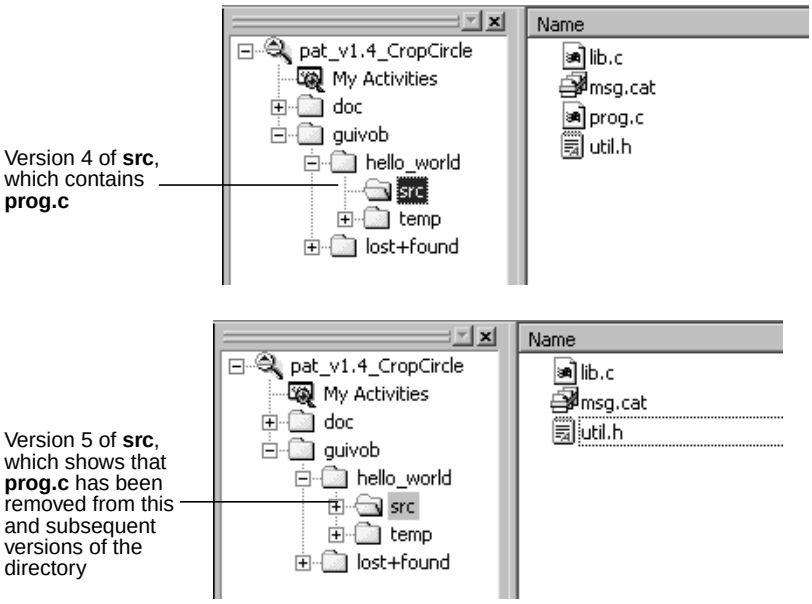
This section explains how to move, remove, and rename elements.

### Moving and Removing Elements

Because directories as well as files are under ClearCase control, you can move or remove elements from specific versions of directories without affecting the element itself. Moving or removing elements creates new versions of the parent directories to record the modifications.

For example, version 4 of **\gui_vob\hello_world\src** contains an element named **prog.c**. If you remove **prog.c** from the **hello_world\src** directory, ClearCase creates version 5 of **\gui_vob\hello_world\src**, which does not contain the **prog.c** file element. The element **prog.c** itself is not modified (Figure 32).

Figure 32 Removing an Element Name from a Directory




Before you move or remove an element name from a directory, verify with your project manager that your changes will not adversely affect other team members or break project builds.

### To Move an Element Within a VOB

Do **one** of the following:

- In the ClearCase Explorer Details pane, drag an element to its destination directory in the Folder Window.
- In the ClearCase Explorer Details pane, right-click an element and click **Cut**. In the Details pane, right-click the destination directory and click **Paste**.

### To Move an Element to Another VOB

Use the **cleartool relocate** command.

**WARNING**: The **relocate** command makes irreversible changes to at least two VOBs and their event histories. We recommend that you not use it for minor adjustments. Furthermore, we recommend that you stop VOB update activity before and during a relocate operation. Check with your project manager and ClearCase administrator before using the **relocate** command.

### To Remove an Element Name from a Directory

In the ClearCase Explorer Details pane, right-click an element and click **Delete**.

### Other Methods for Removing Elements

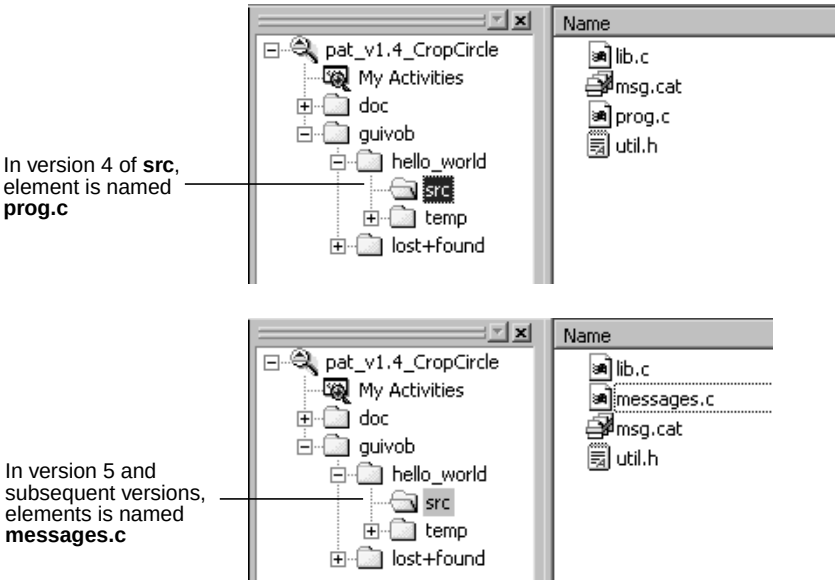
Removing an element from its parent directory does not affect the element itself, but two other types of a removal operation do irrevocably affect an element, and we recommend that you be very conservative in using these operations:

- Removing a version from an element's version tree. For more information, see the **rmver** reference page in the *Command Reference*.
- Removing an element from a VOB. For more information, see the **rmelem** reference page in the *Command Reference*.

## Renaming Elements

Renaming an element creates a new version of the parent directory to catalog the new element name. The element uses its new name in subsequent versions of its parent directory, but previous versions of the parent directory refer to the element by its previous name (Figure 33).

Figure 33 Renaming an Element




Before you move or remove an element name from a directory, verify with your project manager that your changes will not adversely affect other team members or break project builds.

### To Rename an Element

1. In the ClearCase Explorer Details pane, right-click an element and click **Rename**.
2. In the Details pane, type a new name for the element
3. Press ENTER.

## 6.3 Accessing Elements Not Loaded into a Snapshot View

While working with source files in a snapshot view, you may need to see the contents of elements that are not loaded into the view or see ClearCase information about these nonloaded elements. For example, you may have chosen not to load a VOB that contains functional-specification documents. However, you may want to check periodically whether the functional specifications have been modified by reviewing the element's ClearCase history.

## Listing All Elements in the VOB Namespace

You can set up ClearCase Explorer to provide a directory listing of nonloaded file and directory elements. ClearCase Explorer displays the version of the element that would be selected if the element were loaded in the view. The Version column in the Details pane indicates which version the view is selecting. Then, you can display the nonloaded element's history, version tree, and properties sheet, and compare versions of the element.

### To See Nonloaded Elements from ClearCase Explorer

1. In ClearCase Explorer, click **Tools** > **Options**.
2. In the **Options** dialog box, under **Snapshot View Options**, select **Show Unloaded Snapshot View Elements**.
3. Click **OK**.

   The Details pane uses an icon and the State column to indicate which versions are not loaded.

### To See Metadata for Nonloaded Versions

*Metadata* is information that ClearCase keeps about elements under source control. To see metadata for a nonloaded version, click the version in the Details pane and select commands from the **Tools** menu.

## Viewing the Contents of a Nonloaded Version

To see the contents of a nonloaded version, you can do either of the following:

- Use the **Send To** command from the version's shortcut menu in the Version Tree Browser. The **Send To** command uses the set of shortcuts in your Send To folder, which is a function that the Windows operating system provides. For information about your Send To folder, see Windows online help.
- Copy the version into your view with the **cleartool get** command.

You can view nonloaded files or copy them into your view for build purposes, but you cannot check them out. Only file elements that are loaded into the view can be checked out.

NOTE: You cannot use the **Send To** command or **cleartool get** for directory elements.

### To Copy a Nonloaded Version with cleartool get

1. In the ClearCase Explorer Details pane, in the Version column, note the *version-extended pathname* of the unloaded element, which is displayed in the Version column.
2. Right-click the parent directory and from the shortcut menu, click **Command Prompt** to display a **cleartool** prompt.
3. Type the **cleartool get** command using the following syntax:

   **get –to** *filename version-extended-pathname*

For example:

**cleartool get –to prog.c.previous.version prog.c@@\main\v3.1_fix\10**

This command copies **prog.c@@\main\v3.1_fix\10** into your view under the name of **prog.c.previous.version**.

## 6.4 Adjusting the Scope of a View

At any time during a development cycle, you may need to change the set of files and directories in your view. Two factors determine which files and directories are in your view:

- The set of elements available to your view. In a snapshot view, *load rules* in the config spec determine which elements are available. In a dynamic view, all elements in all VOBs active on your computer are available.
- Within the set of available elements, the *version-selection rules* in the config spec select specific versions.

This section describes the following tasks:

- Changing which elements are loaded into a snapshot view
- Excluding elements
- Activating or deactivating VOBs
- Changing which versions the view selects

## To Change Which Elements Are Loaded into a Snapshot View

1. In the ClearCase Explorer Shortcut pane, click **Toolbox.** Then click **Base ClearCase** > **Edit View Properties**.
2. In the **Edit View Properties** dialog box, select the view and click **Edit**.
3. In the **Properties** dialog box, click the **Load Rules** tab.
4. On the **Load Rules** tab, click **Edit Load Rules**.
5. In the **Choose Elements to Load** dialog box, click **Add** to load another element into the view, or click **Remove** to unload a file or directory from the view.
6. Click **OK**.

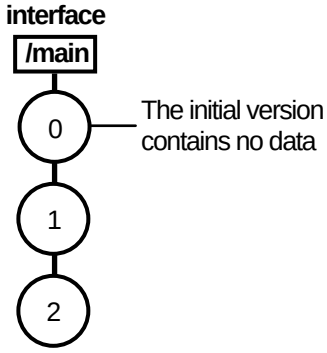
ClearCase starts the update operation to match the modified config spec. For more information, see *Under the Hood: What Happens When You Update a View* on page 60.

## Excluding Elements

ClearCase loads all directory elements recursively. If you want to load only a few elements from a given parent directory, you can use the VOB Namespace Browser to add each element separately. For each element you add, the VOB Namespace Browser creates a separate *load rule* in the *config spec*.

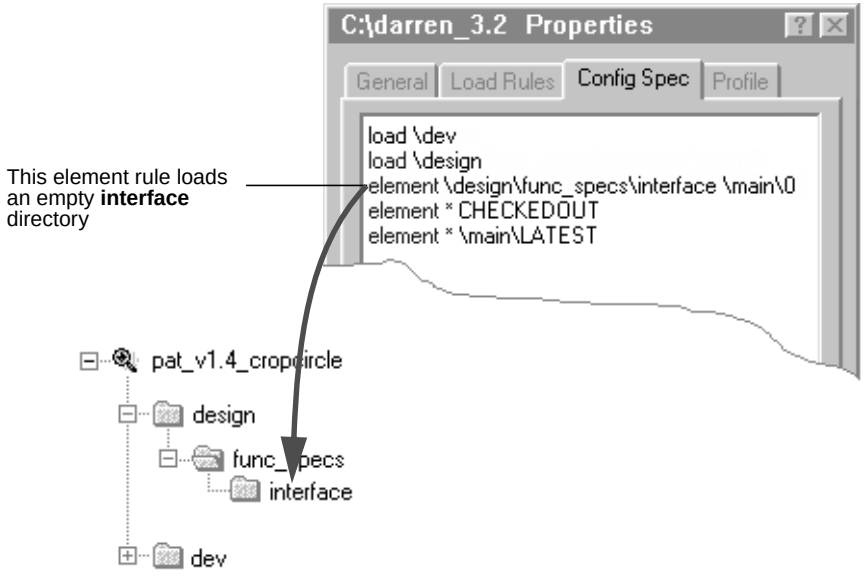
To exclude some elements, you can use an element rule in the *config spec* that selects an element's initial version on the **main** *branch*. For all ClearCase elements, the initial version on the **main** branch (illustrated in Figure 34) contains no data. (See Chapter 5, *Working On a Team* for a description of branches.)

Figure 34 Initial Version on the Main Branch




For example, to load all elements in the **design** VOB except elements below the **interface** directory, you can create a load rule that specifies the **design** VOB and an element rule that selects the initial, or empty, version of the **interface** directory (Figure 35). When you specify the initial version of the **interface** directory, the entire subtree below it is no longer selected by the config spec and is not loaded.

Figure 35 Excluding the interface Directory



### To Load an Empty Version of an Element

1. In the ClearCase Explorer Shortcut pane, click **Toolbox**. Then click **Base ClearCase** > **Edit View Properties**.
2. In the **Edit View Properties** dialog box, select the view and click **Edit**.
3. In the **Properties** dialog box, click the **Config Spec** tab.
4. On the **Config Spec** tab, click **Edit** to make the rules on the **Config Spec** tab editable.
5. As illustrated in Figure 35, type an element rule specifying the initial version of the element you want to exclude by using the following syntax:

   **element** *path* **\main\0**

   The path must start from the VOB directory.
6. In the Properties dialog box, click **OK**.

## Activating or Deactivating VOBs in Dynamic Views

Activating a VOB on your computer makes its files and directories available to your dynamic views (see *To Activate VOBs* on page 36). Deactivating a VOB frees your computer's resources.

### To Deactivate VOBs

1. In the system taskbar, click **Start**. Then click **Programs** > **Rational ClearCase Administration** > **Unmount VOB**.
2. In the **Unmount** dialog box, select one or more VOBs.
3. Click **Unmount**.

## To Change the Versions the View Selects

Before completing these steps, refer to *Working on Branches* on page 66. Depending on your organization's development policies, your view's version-selection rules may select versions on a specific branch.

1. In the ClearCase Explorer Shortcut pane, click **Toolbox.** Then click **Base ClearCase** > **Edit View Properties**.
2. In the **Edit View Properties** dialog box, select the view and click **Edit**.
3. In the **Properties** dialog box, click the **Config Spec** tab.
4. On the **Config Spec** tab, click **Edit**. Modify the version-selection rules either by creating your own rules or using the Windows clipboard to paste a set of rules into the config spec.

To learn more about *version-selection rules*, see the **config_spec** reference page in the *Command Reference* or to *Managing Software Projects*.

## 6.5 Assigning Snapshot Views to Drive Letters

If your makefiles or other files require absolute pathnames with a specific drive letter, assign your view to a drive letter.

Depending on your computer's configuration, two methods are available:

- Make the snapshot view a shared directory and then assign it to a drive letter.
- Use the **subst** command.

**Assign Only the Root Directory**. You must assign only the snapshot view's root directory to a drive letter. The root directory of the snapshot view contains a hidden file named **view.dat**. ClearCase searches for this file to determine whether the current directory is in a snapshot view.

If you assign a directory below the view's root to a drive letter, ClearCase cannot find the view's **view.dat** file and assumes that the current directory is not a snapshot view.

### Making a Directory Shareable and Assigning a Drive Letter

From ClearCase hosts running either Windows NT or Windows 2000, you can make a directory shareable (see *To Enable Sharing on the Snapshot View Root Directory*) and assign it to a drive letter (see *To Assign the Snapshot View Shared Directory to a Drive Letter*). With this method, you can access a snapshot view through either My Network Places or Network Neighborhood, but the performance is slightly slower than if you use the **subst** command to assign the view to a drive letter (see *Using the subst Command for Snapshot View Access*).

From ClearCase hosts running Windows 98, you can assign a shared directory to a drive letter only if the directory is on some other host; for example, you can use this method to assign someone else's view to a drive letter.

### To Enable Sharing on the Snapshot View Root Directory

**NOTE**: If you want to share a directory on a Windows 95 or Windows 98 computer (for example, so team members can assign your view to a drive letter on their computers), you must enable file sharing using this procedure.

1. In Windows Explorer, click the snapshot view's root directory; then click **File** > **Sharing**.
2. On the **Sharing** tab, click **Shared As**.
3. For the sake of consistency, accept the default value in the **Share Name** box. (Make the share name the same as the leaf name of the snapshot view's root directory.)
4. Click **OK**.

Other team members can now assign a drive letter on their computers to this snapshot view root directory (see *To Assign the Snapshot View Shared Directory to a Drive Letter*) or can create a shortcut to the view in ClearCase Explorer (see *To Access Another's Snapshot View from ClearCase Explorer* on page 106).

### To Assign the Snapshot View Shared Directory to a Drive Letter

If the root directory of the snapshot view is shareable (see *To Enable Sharing on the Snapshot View Root Directory*), you can assign the directory to a drive letter on your computer.

**NOTE**: If you prefer to use the command line, you can use the **net use** command instead of the following procedure.

1. From Windows Explorer, click **Tools** > **Map Network Drive**.
2. In the **Map Network Drive** dialog box, select a drive letter from the **Drive** box.
3. In the **Folder** box, enter the path to the shared folder of the snapshot view root directory or click **Browse** and navigate to the view's root directory in My Network Places or Network Neighborhood.
4. Click **Finish**.

### Using the subst Command for Snapshot View Access

Assigning a snapshot view root directory to a drive letter with the **subst** command provides slightly better performance than making the snapshot view a shared directory (see *Making a Directory Shareable and Assigning a Drive Letter* on page 104). However, only shared directories are accessible through My Network Places or Network Neighborhood. (To assign your own view to a drive letter on Windows 98 computers, you must use the **subst** command.)

1. Open a command shell.
2. Enter **subst** *driveletter***:** *view's-path*. For example, the command

   **subst Y: C:\library\pat_v1.4_cropcircle**

   maps the **pat_v1.4_cropcircle** snapshot view root directory to drive Y.

Assign only the view's root directory to a drive letter. For more information on the **subst** command, type **help subst** in a command shell.

## 6.6 Registering a Snapshot View

When you create a snapshot view or click on a view shortcut in ClearCase Explorer, ClearCase registers it in your Windows User Profile. The integration with Windows Explorer recognizes files and directories below a registered snapshot view as ClearCase objects.

If a view is not registered in your Windows User Profile and you access the view through Network Neighborhood, the Windows Explorer integration does not recognize the files or directories as ClearCase objects. If you want to perform ClearCase operations in this view, you must either create a view shortcut in ClearCase Explorer or, if you want to access the view only through Windows Explorer, register the view.

**NOTE**: You cannot register a snapshot view that was created from a UNIX host.

### To Access Another's Snapshot View from ClearCase Explorer

You can use ClearCase Explorer to perform ClearCase operations on the files in a team member's snapshot view. To access another's snapshot view, create a view shortcut in ClearCase Explorer.

If the root directory of the snapshot view is shareable (see *To Enable Sharing on the Snapshot View Root Directory* on page 105), follow these steps on your computer:

1. On the **Views** tab of the Shortcut pane, right-click and click **Add View Shortcut**.
2. In the **Add a New View Shortcut** dialog box, click the ellipsis button to the right of the **Snapshot Location** text box; navigate to and select the shareable root directory under My Network Places or Network Neighborhood; and click **OK**.
3. Click **OK**.

This registers the view in your Windows User Profile. Click the view shortcut to access the snapshot view.

### To Register Another's Snapshot View for Windows Explorer Use

If you want to use Windows Explorer to perform ClearCase operations on the files in another team member's snapshot view, register the view. If the root directory of the snapshot view is shareable (see *To Enable Sharing on the Snapshot View Root Directory* on page 105), proceed as follows:

1. In Windows Explorer, navigate to the root directory of the view you want to register.
2. Right-click the root directory of the view.

ClearCase registers the view by adding an entry to your Windows User Profile.

## 6.7 Moving Views

This section discusses the following tasks:

- Changing the physical location of a snapshot view's directory tree
- Moving a view storage directory

For information about changing a view-tag, see the **mktag** reference page in the *Command Reference*.

## Changing the Physical Location of a Snapshot View

If the snapshot view storage directory is in a storage location, you can use standard Windows commands (such as **Cut** and **Paste** commands or drag and drop operations in Windows Explorer) to move the snapshot view's directory tree of loaded elements and view-private files. You can move the view to a different computer, but the computer must run a Windows operating system.

**CAUTION**: If the view storage directory is located below the root directory of the view, **do not use** standard Windows commands to move the snapshot view. Instead, see *Moving a View Storage Directory* on page 108.

### To Find the Location of the View Storage Directory

1. In ClearCase Explorer, right-click the view's root directory.
2. In the **View Properties** dialog box, click **Advanced**.

   The **Host Path** box displays the pathname for the view storage directory.

### Update After Moving

After moving a snapshot view, you must update any view shortcuts in ClearCase Explorer that use the old pathname to the view. If you did not create a ClearCase Explorer shortcut for the view and you move a view to a different computer, you must register its new location. Until you register its new location, the ClearCase user interface continues to present the old location.

## Moving a View Storage Directory

Each dynamic view and snapshot view includes a view storage directory, which ClearCase uses to maintain the view. **Do not use** standard Windows commands (such as **Cut** and **Paste** commands or drag and drop operations) to move a view storage directory for the following reasons:

- The view storage directory includes a database. Moving the database without first shutting down the view's **view_server** process can corrupt the database.
- ClearCase stores the location of view storage directories in its own set of registries. The information in these registries must be correct for you to perform ClearCase operations in

your views. In a dynamic view, the location in ClearCase registries must be correct for you to access any file or directory in the view.

We suggest that you ask your ClearCase administrator to move view storage directories because it may affect other, potentially many other, ClearCase users at your site. For more information about the procedure for moving view storage directories, see the *Administrator's Guide* for Rational ClearCase.

**CAUTION**: You will lose data (including view-private files in a dynamic view) if you move a view storage directory without following the procedure described in the *Administrator's Guide* for Rational ClearCase.

## 6.8 Regenerating a Snapshot View's view.dat File

The root directory of a snapshot view contains a hidden file, **view.dat**. If you delete this file inadvertently, ClearCase no longer identifies the view as a ClearCase object, and you can no longer perform ClearCase operations on files or directories loaded in the view.

### To Regenerate the view.dat File

1. Open a command shell.
2. Type this command:

   **ccperl** *ccase-home-dir***\etc\utils\regen_view_dot_dat.pl**
   **^** [ **–tag** *snapshot-view-tag* ] *snapshot-view-pathname*

   For example:

   **ccperl c:\atria\etc\utils regen_view_dot_dat.pl**
   **^ –tag pat_v1.4_cropcircle**
   **^ c:\pat_v1.4_cropcircle**

   If the view storage directory is under the root directory of the view, you do not need to use the **–tag** *snapshot-view-tag* argument.

## 6.9 Accessing Views and VOBs Across Platform Types

ClearCase supports environments in which some ClearCase hosts use a Microsoft Windows operating system and others use a UNIX operating system.

This section discusses the following topics:

- Creating views across platform types
- Accessing VOBs across platform types
- Developing software across platform types

### Creating Views Across Platforms of Different Types

Your administrator can set up storage locations on Windows and UNIX server hosts. Any snapshot view that you create can use one of these storage locations, regardless of the platform type of the server host. For more information about storage locations, see the **mkstgloc** reference page in the *Command Reference*.

For a dynamic view, the view storage directory must be located on a host of the same platform type as the host from which you create the view. If you create a dynamic view from a UNIX host, you must locate the view storage directory on a ClearCase host on UNIX; if you create a dynamic view from a Windows host, you must locate the view storage directory on a Windows NT host that is set up to store view storage directories. We recommend that you locate dynamic view storage directories on the host from which you most often use the view.

#### Snapshot View Characteristics and Operating-System Type

For snapshot views, the operating system type from which you create the view determines view characteristics; the operating system type that hosts the files and processes related to a snapshot view do not affect the view's behavior.

For example, it is possible to create a snapshot view from a Windows host and locate the view directory tree and the view storage directory on a ClearCase host on UNIX (assuming that you use third-party software to access UNIX file systems from Windows computers). Even though all files related to the view are on a UNIX workstation, because you created the view from a Windows host, the view behaves as if its files are located on a Windows computer: it does not create symbolic links if the load rules encounter a VOB symbolic link, and you can issue ClearCase commands for the view only from Windows hosts. (ClearCase hosts on UNIX do not recognize the directory tree as a snapshot view.)

## Accessing Views Across Platforms of Different Types

This section describes support for accessing a view residing on a platform that differs from the platform from which it is being accessed.

### Accessing UNIX Snapshot Views from Windows Hosts

ClearCase supports a set of third-party products for accessing UNIX file systems from Windows computers. If your organization uses one of these products, you can access UNIX snapshot views from Windows Explorer (or a command prompt) just as you would access any other directory tree on a UNIX workstation.

You can access snapshot views across platforms, but you cannot issue ClearCase commands across platforms. For example, you cannot check out files in UNIX snapshot views from Windows hosts nor can you create shortcuts to UNIX snapshot views from ClearCase Explorer.

If, from a Windows host, you hijack a file in a UNIX snapshot view, ClearCase detects the hijack when you update the view from a ClearCase host on UNIX.

### Accessing Windows Snapshot Views from UNIX Hosts

ClearCase does not support accessing Windows file systems from UNIX workstations.

### Accessing UNIX Dynamic Views from Windows Hosts

ClearCase supports a set of third-party products for accessing UNIX file systems from Windows computers. If your organization uses one of these products, you can complete the following tasks to access UNIX dynamic views from Windows computers:

1. Create the UNIX view with the proper text mode. For more information, see *Developing Software Across Platforms of Different Types* on page 112.
2. Import the UNIX view's view-tag into your Windows network region.
3. Start the dynamic view or add a shortcut to the view in ClearCase Explorer.

### Accessing Windows Dynamic Views from UNIX Hosts

ClearCase does not support products for accessing Windows file systems from UNIX workstations. You cannot access Windows views from UNIX hosts.

## Accessing VOBs Across Platforms of Different Types

Your administrator sets up VOBs on Windows or UNIX hosts and creates *VOB-tags* in each ClearCase network region that needs to access the VOBs. (For information about registering UNIX VOB-tags in a Windows network region, see the *Administrator's Guide* for Rational ClearCase.) Then, from any ClearCase host on Windows or UNIX systems, you can create snapshot views to load elements from VOBs that have tags in your network region.

From a ClearCase host on Windows that supports dynamic views, you can access VOBs on Windows and UNIX from dynamic views as well as snapshot views. To access VOBs on UNIX from Windows dynamic views, you must use third-party software that provides access to UNIX file systems from Windows computers. From a ClearCase host on UNIX, you cannot access VOBs on Windows from dynamic views. Table 2 summarizes your options for accessing VOBs across platform types.

Table 2 Accessing ClearCase VOBs Across Platform Types

| **Platform of your ClearCase host** | **Platform on which VOB is located** | **View from which you can access source files** |
|---|---|---|
| Windows computer | Windows computer or UNIX workstation | Snapshot view or dynamic view |
| UNIX workstation | Windows computer | Snapshot view |
| UNIX workstation | UNIX workstation | Snapshot view or dynamic view |

## Developing Software Across Platforms of Different Types

If developers check in source files from views created on both Windows and UNIX hosts, consider creating your views in interop (MS-DOS) text mode. The text modes change how a view manages line terminator sequences. For more information about view text modes, see the *Administrator's Guide* for Rational ClearCase or ClearCase online help.

# Working in a Snapshot View While Disconnected from the Network

# A

If you need to work with your source files from a computer that is disconnected from the network of Rational ClearCase hosts and servers, you can set up a snapshot view for disconnected use.

This chapter describes the following tasks:

- Setting up a view for your hardware configuration
- Preparing the view
- Disconnecting the view
- Working in the view
- Reconnecting to the network
- Using the Update Tool

**NOTE**: While disconnected from the network, you cannot access ClearCase information about the files in your view or issue most ClearCase commands. If you want to work from a remote location and continue to access ClearCase information and issue ClearCase commands, consider using the ClearCase Web interface. Ask your ClearCase administrator whether the ClearCase Web interface has been configured at your site and what URL you need to supply to your Web browser to access it. For information about using the Web interface, see the Web interface online help.

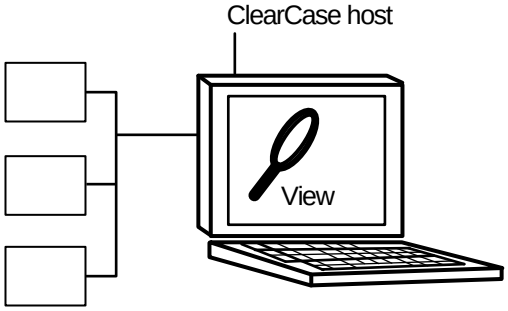
## A.1 Setting Up a View for Your Hardware Configuration

You can use one of several hardware configurations to work in a snapshot view that is disconnected from the network.

This chapter describes the following recommended configurations:

- Creating and using the view on a laptop computer that periodically connects to the network (Figure 36).

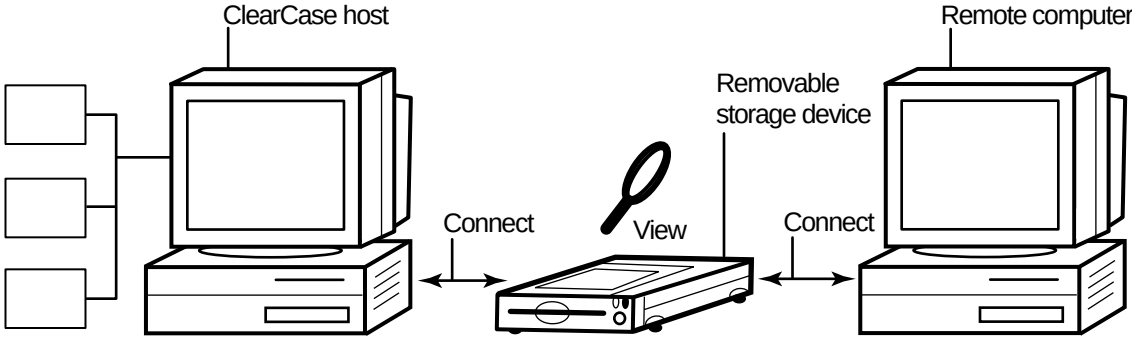
Figure 36 View on a Laptop




**NOTE**: The laptop computer must run a Windows operating system.

- Creating and using the view on a removable storage device such as an external hard drive or some other device (such as a Jaz drive) that provides satisfactory read/write performance (Figure 37).

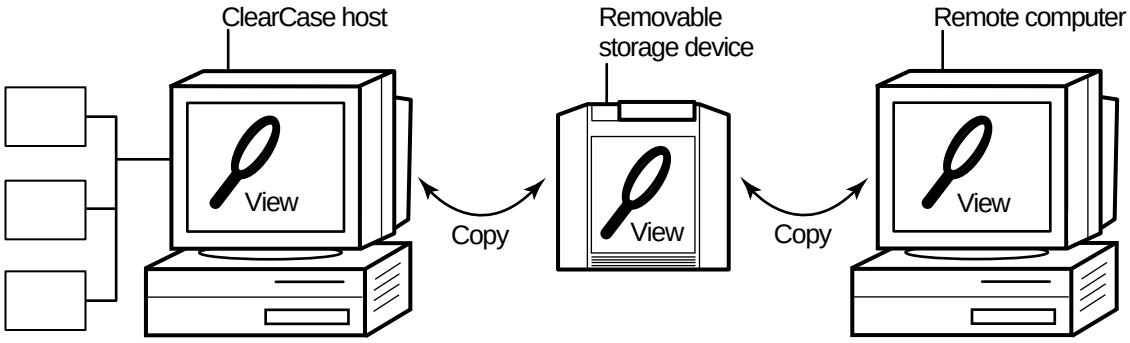
Figure 37 View On a Removable Storage Device




**NOTE**: The remote computer must run a Windows operating system.

- Copying the view from a ClearCase host to a temporary, removable storage device such as a diskette or a tape drive, which usually does not provide satisfactory read/write performance, and then copying the view from the storage device to a computer that is disconnected from the network (Figure 38).

Figure 38 Copy the View




**NOTE**: The remote computer must run a Windows operating system.

### Under the Hood: Location of the View Storage Directory in Disconnected-Use Configurations

In all the configurations recommended for disconnected use, the snapshot view storage directory is in a server storage location. We recommend (and in the case of a removable storage device, we enforce) this configuration because a view's **view_server** process runs on the host that contains the view storage directory. A **view_server** is a long-lived process that manages activity for a specific view. If the view storage directory is in the root directory of the snapshot view and you disconnect the view from the network while the **view_server** process is writing to the storage directory, you can corrupt the data ClearCase uses to maintain your view.

## A.2 Preparing the View

Before you disconnect the view from the network, complete these tasks:

- Update the view to establish a checkpoint. (For information on updating the view, see *Updating the View* on page 123.)

- Check out the files you expect to modify. After you're disconnected from the network, you cannot check out files, although there are workarounds. (See *Hijacking a File* on page 118.)

When you are no longer connected to the network, you cannot use most ClearCase commands. At this point, the disconnected computer does not distinguish a snapshot view directory from any other directory in the file system.

## A.3 Disconnecting the View

How you disconnect the view depends on which hardware configuration you use. This section describes disconnecting the view for the following hardware configurations:

- View on a laptop
- View on a removable storage device
- View Copied to a storage device

### Hardware Configuration: View on a Laptop

If the view is located on a laptop, you must deactivate the ClearCase integrations with Windows Explorer and other developer tools before you disconnect the view. Most ClearCase operations communicate with various ClearCase servers. Even if you install view server software on your host, almost any time you start a ClearCase operation (even an operation as simple as displaying the ClearCase shortcut menu in Windows Explorer), your host must connect to the ClearCase license server. The ClearCase integration with Microsoft Visual Studio attempts to connect to the license server periodically. If you are disconnected from the network, the application that attempts to connect to the ClearCase license server locks for several seconds until it returns an error message. Although the application doesn't fail, such interruptions are unnecessary.

#### To Deactivate ClearCase Integrations

1. In Control Panel, click **ClearCase**.
2. Click the **Options** tab and clear the **Connect to network for ClearCase operations** check box.
3. Disconnect the laptop from the network.

Deactivating the integrations removes ClearCase commands from the Windows Explorer shortcut menus.

## Hardware Configuration: View on a Removable Storage Device

If the view is located on a removable storage device, disconnect the removable storage device from the network computer and reconnect the media to the remote computer.

## Hardware Configuration: View Copied to a Storage Device

If you do not have a storage device with satisfactory read/write performance, use the **xcopy** command to copy files from your view to the storage media and from the storage media to the remote computer as follows

**xcopy** *path\snapshot-view-directory destination* [ **/D** [**:***m-d-y*] | **/M** ] **/S /K /R**

For example, **xcopy c:\Library\pat_v1.4_cropcircle e:\temp /D /S /K /R**

The command options accomplish the following:

- The **/D** option instructs **xcopy** to copy only the files that have changed, which is useful if you frequently alternate between the network computer and the nonnetwork computer. Use **/D** if you configured the Update Tool to set the time stamp of updated files to the time at which the files are loaded into the view. You can view or change the Update Tool's time stamp option on the **Advanced** tab of the **Start Update** dialog box. For more information, refer to Step #3 of *Updating the View* on page 123.

  If you set the Update Tool to create time stamps based on the version-creation time, consider using the **/M** option, which causes **xcopy** to copy the files with the archive attribute set. The **/M** option is less reliable than the **/D** option, because some applications alter the archive attribute without writing the file.

- The **/S** option instructs **xcopy** to copy all subdirectories of the snapshot view.

- The **/K** option keeps the read-only file attribute as established by ClearCase.

- The **/R** option allows **xcopy** to overwrite read-only files.

## A.4 Working in the View

You cannot use most ClearCase commands when disconnected from the network. Yet you may need to work on files that you did not check out or locate files you have modified. This section provides workarounds for these ClearCase operations.

### Hijacking a File

If you need to modify a loaded file element that you have not checked out, you can *hijack* the file. ClearCase considers a file hijacked when you modify it without checking it out. For more information, see *Under the Hood: How ClearCase Determines Whether a File is Hijacked* on page 123.

When you reconnect to the network, you use the Update Tool to find the files you hijacked. You can do the following with a hijacked file:

- Check out the file. You can then continue to modify it and, when you're ready, check in your changes.
- Undo the hijack. For more information, see *To Undo a Hijack* on page 122.

#### To Hijack a File

1. In Windows Explorer, right-click the file you want to hijack.
2. On the shortcut menu, click **Properties** to display the file's property sheet.
3. On the **General** tab, clear the **Read-only** check box.

### Finding Modified Files While Disconnected

You can use Windows Explorer to find all files that have been modified after a specified date.

1. In Windows Explorer, click **Tools** > **Find** > **Files or Folders**.
2. In the **Find: All Files** dialog box, type the path to the view or to a specific directory in the view in the **Look In** box.
3. Use the **Date Modified** tab to define your search criteria.

4. Click **Find Now**.

   The **Find: All Files** dialog box expands to display the files and directories it finds.

## A.5 Reconnecting to the Network

When you return to the office and can access the network directly, do one of the following, depending on your hardware configuration.

### Hardware Configuration: View on a Laptop

If you're using the view on a laptop, connect the laptop to the network. If ClearCase is installed on the laptop, activate the ClearCase integrations as follows:

1. In Control Panel, click **ClearCase**.
2. Click the **Options** tab and select the **Enable ClearCase network operations** check box.

### Hardware Configuration: View on a Removable Storage Device

If you're using the view on a removable storage device, connect the removable storage device to the computer on the network.

### Hardware Configuration: View Copied to a Storage Device

If you copied the view onto removable media, use **xcopy** with the **[ /D | /M ] /S /K /R** options to copy files back to the original location on the network computer.

## A.6 Using the Update Tool

When you're connected to the network, use the Update Tool for the following tasks:

- Determine how to handle hijacked files
- Update the view

## Determining How to Handle Hijacked Files

Handling hijacked files involves the following tasks:

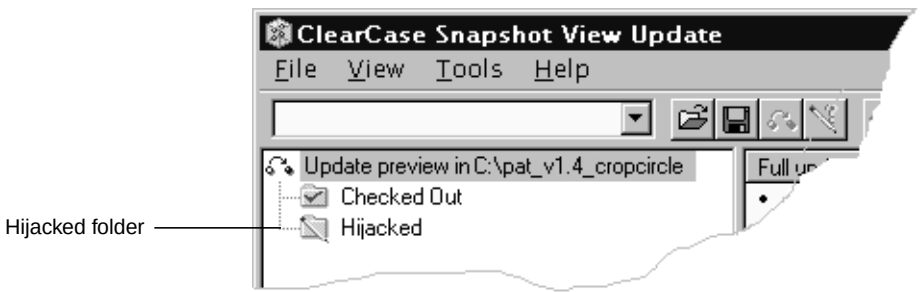
- Finding hijacked files
- Comparing a hijacked file to the version in the VOB
- Checking out a hijacked file
- Merging changes to a hijacked file
- Undoing a hijack
- Choosing other ways to handle hijacked files

### To Find Hijacked Files

1. In ClearCase Explorer, right-click the root directory of the snapshot view.
2. On the shortcut menu, click **Find Modified Files**.

   Select **Display results when closed** and quit the **Modified File Search Complete** window.
3. If any hijacked files are in your view, the ClearCase Snapshot View Update window displays a folder in the left pane titled **Hijacked** (Figure 39). Select **No** for the option asking whether you want to check out the hijacked files now.

Figure 39 Hijacked Files in the Results Window



### To Compare a Hijacked File to the Version in the VOB

You can use the Diff Merge tool to see how the hijacked file differs from the checked-in version of the file:

1. In the right pane of the ClearCase Snapshot View Update window, right-click a hijacked file.
2. On the shortcut menu, click **Compare with Original Version**. For information on using the Diff Merge tool, see the online help.

### To Check Out a Hijacked File

To keep the modifications in a hijacked file, check out the file:

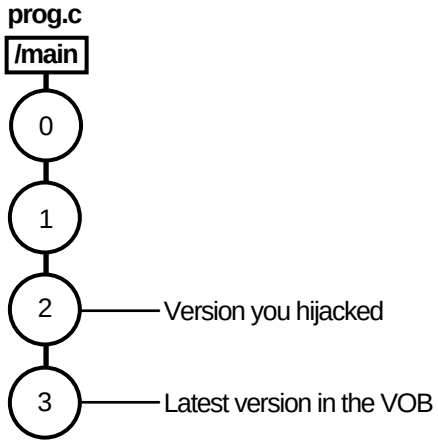
1. In the right pane of the ClearCase Snapshot View Update window, right-click a hijacked file.
2. On the shortcut menu, click **Check Out**.
3. ClearCase treats a checked-out hijacked file as it does any other checkout.

When you're ready, you can check in the file.

### Merging the Latest Version to a Hijacked File

If you're working with a shared set of versions and someone has checked in a newer version of the file while it was hijacked in your view (Figure 40), ClearCase prevents you from checking in the file.

Figure 40 Hijacked Version May Not Be the Latest Version




You have to merge the latest version in the VOB with the checked-out file before ClearCase allows the checkin.

When you issue the **Check In** command for a nonlatest version, ClearCase opens the dialog box to ask whether you want to merge the file now. If you choose to merge, ClearCase attempts to merge automatically, starting the Diff Merge tool if it needs your input to complete the merge. For information about using Diff Merge, see ClearCase online help. After the merge, ClearCase prompts you to check in the file.

### To Undo a Hijack

If, for specific hijacked files, you want to discard your changes and get a fresh copy of the version from the VOB, you can undo the hijack.

1. In the right pane of the ClearCase Snapshot View Update window, select one or more hijacked files.

2. Right-click the selected files, and, on the shortcut menu, click **Undo Hijacked File**.

ClearCase overwrites the hijacked file with the version that was loaded in the view. If you want to overwrite hijacked files with the versions the config spec selects in the VOB, see Step #3 in *Updating the View* on page 123.

### Under the Hood: How ClearCase Determines Whether a File is Hijacked

To keep track of file modifications in a snapshot view, ClearCase stores a loaded file's size and last-modified time stamp (as reported by the Windows file system). ClearCase updates these values each time you check out a file, check in a file, or load a new version into the view.

To determine whether a file is hijacked, ClearCase compares the current size and last-modified time stamp of a non-checked-out file with the size and time stamp recorded in the view database. If either value is different from the value in the view database, ClearCase considers the file hijacked.

Changing a non-checked-out file's read-only attribute alone does not necessarily mean ClearCase considers the file hijacked.

### Other Ways to Handle Hijacked Files

While updating the view, you can handle hijacked files in any of the following ways:

- Leave hijacked files in place
- Rename the hijacked files and load the version from the VOB
- Overwrite hijacked files with the version the config selects in the VOB

See *Updating the View* for more information.

## Updating the View

1. In ClearCase Explorer, select the snapshot view's root directory.
2. Right-click to display the shortcut menu and click **Update View**.
3. To configure the Update Tool for handling hijacked files, in the **Start Update** dialog box click the **Advanced** tab and select a method for handling the remaining hijacked files. You have these choices:
   - Leave hijacked files in place
   - Rename the hijacked files and load the selected version from the VOB
   - Delete hijacked files and load the selected version from the VOB
4. To start the update, click **OK**.

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