PERFORCE

Helix Versioning Engine User Guide

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Preface

This guide tells you how to use the Helix Command Line Client (**p4**). Unless you're an experienced Helix user, we strongly urge you to read the "Basic Concepts" chapter of *Helix Versioning: An Overview* before reading this guide.

Perforce provides many applications that enable you to manage your files, including the command line client, GUIs — such as P4V — and plug-ins. The command line client enables you to script and to perform administrative tasks that are not supported by Helix GUIs.

Note

If you're new to Helix software, start with the Chapter 3, "Tutorial" on page 7, and then read Chapter 2, "Overview" on page 3.

What's new in this guide for 2016.2

This section provides a list of changes to this guide for the Helix Versioning Engine 2016.2 release. For a list of all new functionality and major bug fixes in Helix Versioning Engine 2016.2, see the Helix Versioning Engine 2016.2 Release Notes.

You can now undo a submitted change	See Chapter 4, "Basic tasks" on page 23.

Helix documentation

The following table lists and describes key documents for Helix users, developers, and administrators. For complete information see the following:

http://www.perforce.com/documentation

For specific information about…	See this documentation…
Overview of Helix version control concepts and workflows; Helix architecture, and related products.	*Helix Versioning: An Overview*
Administering the Helix versioning engine to support git repos and LFS files.	*Helix4Git*
Using the command-line interface to perform software version management and codeline management; working with Helix streams; jobs, reporting, scripting, and more.	*Helix Versioning Engine User Guide*
Basic workflows using P4V, the cross-platform Helix desktop client.	*P4V User Guide*
Working with personal and shared servers and understanding the distributed	*Using Helix for Distributed Versioning*

For specific information about…	See this documentation…
versioning features of the Helix Versioning engine.	
p4 command line (reference).	*P4 Command Reference*, **p4 help**
Installing and administering the Helix versioning engine, including user management, security settings.	*Helix Versioning Engine Administrator Guide: Fundamentals*
Installing and configuring Helix servers (proxies, replicas, and edge servers) in a distributed environment.	*Helix Versioning Engine Administrator Guide: Multi-site Deployment*
Helix plug-ins and integrations.	IDEs: *Using IDE Plug-ins* Defect trackers: *Defect Tracking Gateway Guide* Others: online help from the Helix menu or web site
Developing custom Helix applications using the Helix C/C++ API.	*C/C++ API User Guide*
Working with Helix in Ruby, Perl, Python, and PHP.	*APIs for Scripting*

Syntax conventions

Helix documentation uses the following syntax conventions to describe command line syntax.

Notation	Meaning
`literal`	Monospace font indicates a word or other notation that must be used in the command exactly as shown.
italics	Italics indicate a parameter for which you must supply specific information. For example, for a *serverid* parameter, you must supply the id of the server.
[`-f`]	Square brackets indicate that the enclosed elements are optional. Omit the brackets when you compose the command. Elements that are not bracketed are required.
…	Ellipses (…) indicate that the preceding element can be repeated as often as needed.
element1 | *element2*	A vertical bar (|) indicates that either *element1* or *element2* is required.

Please give us feedback

We are interested in receiving opinions on this manual from our users. In particular, we'd like to hear from users who have never used Perforce before. Does this guide teach the topic well? Please let us know what you think; we can be reached at manual@perforce.com.

If you need assistance, or wish to provide feedback about any of our products, contact support@perforce.com.

Chapter 1

Installation

This chapter tells you how to install the Helix Command-Line Client (**p4**) and the Helix Versioning Engine (**p4d**) on your computer.

Instructions vary by operating system.

On Unix and OS X

On UNIX and OS X, download the server and command line client binaries into the `/usr/local/bin` directory.

1. **Change into the download directory.**

```
$ cd /usr/local/bin
```

2. **Download the p4d and p4 executable files from the Perforce website.**

   http://www.perforce.com/downloads/complete_list

3. **Make the server and client binaries executable, if they aren't already.**

```
$ chmod +x p4d
$ chmod +x p4
```

On Windows

To install the Helix server (**p4d**) and Helix command-line client (**p4**) on Windows, download and run the Helix Windows installer (`helix-versioning-engine-x64.exe` or `helix-versioning-engine-x86.exe`) from the Downloads page of the Perforce web site:

http://www.perforce.com/downloads/complete_list

The Helix installer walks you through the steps to install and uninstall the Helix server (`p4d.exe`), the Helix command-line client (`p4.exe`), and other Helix Windows components.

Chapter 2

Overview

This chapter provides an overview of the Helix version management system.

Important	Read the "Basic Concepts" chapter of *Helix Versioning: An Overview* before reading this guide.

This guide documents the command-line client *only*. For documentation on other clients, see the Helix documentation website.

Although this guide presents the command line interface, it discusses all the other things you need to know regardless of interface choice.

Introduction

Helix is an enterprise version management system in which you connect to a shared versioning server; you sync files from a shared repository called the *depot*, and edit them on your computer in your *workspace*. You manage files with the help of *changelists*. You have the option of submitting to the depot any changes you make locally to make them available to other users.

The Helix *server* also known as **p4d**, manages depots, which contain every revision of every file under version management. Files are organized into directory trees. The server also maintains a database to track data associated with files and client activity: logs, user permissions, metadata, configuration values, and so on.

Helix *clients* provide an interface that allows you to check files in and out of the depot, resolve conflicts, track change requests, and more. Helix includes a number of clients: a command-line client, a graphical user interface client, and various plugins that work with commercial IDEs and productivity software.

Helix also supports a decentralized ("distributed") workflow. See the "Basic Concepts" chapter of *Helix Versioning: An Overview*, and *Using Helix for Distributed Versioning*.

File management

You use Helix clients to manage a special area of your computer, called a *workspace*. Directories in the depot are mapped to directories in your workspace, which contain local copies of managed files. You always work on managed files in your workspace:

1. You populate your local workspace by syncing files from the depot.
2. You check the files out of the depot (and into your workspace).
3. You make changes to the files.
4. You check them back into the depot, also known as *submitting*.
5. If the changes you try to submit conflict with changes that other users, working in parallel with you, have already submitted, you must resolve conflicts as needed.

Changelists

The unit of file submission is the *changelist*; it is the means by which you check files in and out of the depot. A changelist must contain at least one file and may contain tens of thousands. A changelist is numbered and allows you to track all changes with respect to the contents of the depot: file modifications, the addition of a file, or the deletion of a file.

A changelist is the simplest way to organize your work. A changelist also represents the atomic unit of work in Helix: if a changelist includes several files, changes for all the files are committed to the depot or none of the changes are. For example, if a network connection between the client and the server fails during changelist submission, the entire submit fails.

Parallel development

As with all version management systems, Helix is designed to let multiple users work on the same files, codelines, or digital assets in parallel and then reconcile differences later. When conflicts occur, the system resolves them if the user cannot.

Helix permits parallel development at two levels:

- At the file level, with shared files
- At the codeline level, with *branching*.

Shared files

Parallel development also happens when multiple users check the same file(s) out of the depot, work on them in parallel, and check them back into the depot by submitting them. At the time of submission, Helix reports whether there are conflicts with other users' changes to the same file or files, and requires that any conflicts be resolved.

Branching: branches versus streams

In the course of a collaborative development project, you may find it useful to split off the codeline into multiple codelines, each having a distinct intended purpose. For example, when a certain milestone is reached in development, you may choose to copy the code — also known as *branching* it — into a new codeline for testing, thereby creating a QA *branch*. After it passes all tests, it is copied up to the Beta test line where it is subjected to real-world use. Later, you may choose to *merge* one or more of these new branches back into the main codeline.

Streams: branches with additional intelligence

Streams are like branches, with additional intelligence built in. They provide clues of where and how to do branching and merging. They guide merging and branching actions that support both stability and innovation. In addition, using streams eliminates a lot of the work needed to define branches, to create workspaces, and to manage merges.

When you create a stream, you specify its type, information about the files it is associated with, its relationship to other streams, and how files are to be treated for branching and merging. The

system uses the information you provide to encourage merging best practices and to track parallel development.

The stream type tells the system how stable the stream is relative to other streams. The stream's path info tells the system a number of things; including which files to populate the workspace with, which files child streams are allowed to branch, and, if necessary, which changelist to lock the files at. Parent labeling specifies how the stream relates to other streams in the system, helping to determine how change flows through the system.

Streams are ideal for implementing the mainline branching model, in which less stable streams merge changes to keep up to date with their parents, then copy work to the parent when the work is stable enough to promote. In addition, streams enable the system to generate views for associated workspaces, eliminating the need for you to update views manually to reflect changes to your stream structure.

Note	This guide assumes the reader is using streams, but notes where instructions differ for branch users.

Security

The Helix command line client supports a number of security-related features, mostly having to do with SSL encryption.

Organizing your work: jobs and labels

In addition to using changelists and streams to organize your work, you can use two other methods: jobs and labels.

- *Jobs* provide lightweight issue tracking that integrates well with third party defect tracking and workflow systems. They allow you to track the status of a bug or an enhancement request. Jobs have a status and a creator and are associated with changelists that implement the bug fix or the enhancement.
- *Labels* are sets of tagged file revisions that allow you to handle a heterogeneous group of files as one unit. While a changelist refers only to the contents of a given set of files at the time they were submitted, a label can refer to a group of file revisions from different points in time. You might want to use labels to define the group of files contained in a particular release, to sync a set of files, to populate a workspace, or to specify a set of file revisions to be branched. You can also use a label as an alias for a changelist number, which makes it easier to remember the changelist and easier to refer to it in issuing commands.

Scripting and reporting

You can use client commands in scripts and for reporting purposes. For example, you could:

- merge and then resolve multiple files in one script
- use the UNIX Stream Editor (sed) in conjunction with a Helix client command to create a job
- issue a command reporting all labels containing a specific file revision (or range)

Chapter 3

Tutorial

Read me first

This tutorial is for users not experienced with the Helix Versioning Engine. After working through this tutorial, you should understand the following:

- the basics of starting up a shared server and command line client
- getting a shared server and client communicating with each other
- adding, editing, deleting, and syncing files on your client computer
- checking those files into the server.

The sections that follow take you — step-by-step — through the tutorial.

Important Before running this tutorial install the shared server and command client binaries onto *the same computer*. See Chapter 1, "Installation" on page 1 for instructions.

Make binaries executable, on UNIX and OS X

On UNIX and OS X, make the server and client binaries executable, if they aren't already.

```
$ cd /usr/local/bin
$ chmod +x p4d
$ chmod +x p4
```

Create a working directory

Create a working directory in which to perform the rest of the steps in this tutorial, and then change to that directory. In this example, we create a directory called *tutorial* in the user's home directory.

On Unix and OS X

```
$ mkdir /Users/bruno/tutorial
$ cd /Users/bruno/tutorial
```

On Windows

```
$ mkdir C:\Users\bruno\tutorial
$ cd C:\Users\bruno\tutorial
```

Start up the shared server

1. **Make a subdirectory in which to start up the server and client.**

When started, the server creates a large number of database files; it's best not to clutter your working directory with these files, so we will start up the server and client in a designated directory.

On Unix and OS X

```
$ mkdir /Users/bruno/server
```

On Windows

```
$ mkdir C:\Users\bruno\server
```

2. **Start up the shared server.**

   Start up the shared server, using the `-r dir` option to specify the directory created in the previous step and the `-p port` option to set the hostname:port number to `localhost:1666`, the required setting for running the shared server and the client on same computer.

   On UNIX and OS X

   ```
   $ p4d -r /Users/bruno/server -p localhost:1666
   ```

   On Windows

   ```
   $ p4d -r C:\Users\bruno\server -p localhost:1666
   ```

   This produces the following output:

   ```
   Perforce db files in 'server' will be created if missing...
   Perforce Server starting...
   ```

   Because the shared server runs in the foreground, you must **open a new terminal window** in which to run subsequent commands.

Start up the command line client

1. **Change to your working directory.**

   This is the working directory you created in "Create a working directory" on page 7.

   On UNIX and OS X

   ```
   $ cd /Users/bruno/tutorial
   ```

On Windows

```
$ cd C:\Users\bruno\tutorial
```

2. **Set the P4PORT environment variable**

   The server is running as `localhost` on port 1666. For the client to communicate with the server, you must set the client's `P4PORT` variable to `localhost:1666.`

   On UNIX and OSX

   ```
   $ export P4PORT=localhost:1666
   ```

   On Windows

   ```
   $ set P4PORT=localhost:1666
   ```

3. **Start up the command line client.**

   ```
   $ p4
   ```

   This produces the following output, followed by a list of help commands.

   ```
   Perforce -- the Fast Software Configuration Management System.

   p4 is Perforce's client tool for the command line.
   ```

Verify the connection to the server

To verify a connection, run the **`p4 info`** command.

```
$ p4 info
```

If `P4PORT` is set correctly, information like the following is displayed:

```
User name: bruno
Client name: dhcp-133-n101
Client host: dhcp-133-n101.dhcp.perforce.com
Client unknown.
Current directory: /Users/bruno/tutorial
Peer address: 127.0.0.1:49917
Client address: 127.0.0.1
Server address: localhost:1666
Server root: /Users/bruno/server
Server date: 2016/03/01 16:15:38 -0800 PST
Server uptime: 00:03:26
Server version: P4D/DARWIN90X86_64/2015.2/1340214 (2016/02/03)
Server license: none
Case Handling: insensitive
```

The `Server address:` field shows the host to which **`p4`** connected and also displays the host and port number on which the Helix server is listening. If `P4PORT` is set incorrectly, you receive a message like the following:

```
Perforce client error:
   Connect to server failed; check $P4PORT.
   TCP connect to perforce:1666 failed.
   perforce: host unknown.
```

If you get the "host unknown" error, speak to your administrator.

Create a stream depot

Create a stream depot in which the stream you create in the next step will reside. Type the following:

```
$ p4 depot -t stream JamCode
```

The `-t` option specifies the type of depot to create, in this case a stream depot. `JamCode` is the name of the depot you're creating.

Helix opens the depot specification in an editor:

```
# A Perforce Depot Specification.
#
#  Depot:       The name of the depot.
#  Owner:       The user who created this depot.
#  Date:        The date this specification was last modified.
#  Description: A short description of the depot (optional).
#  Type:        Whether the depot is 'local', 'remote',
#               'stream', 'spec', 'archive', 'tangent',
#               or 'unload'.  Default is 'local'.
#  Address:     Connection address (remote depots only).
#  Suffix:      Suffix for all saved specs (spec depot only).
#  StreamDepth: Depth for streams in this depot (stream depots only).
#  Map:         Path translation information (must have ... in it).
#  SpecMap:     For spec depot, which specs should be recorded (optional).
#
# Use 'p4 help depot' to see more about depot forms.

Depot:          JamCode

Owner:          bruno

Date:           2016/02/22 13:20:06

Description:
                Created by bruno.

Type:           stream

StreamDepth:    //JamCode/1

Map:            JamCode/...
```

Create your first stream

A stream is where you store your work. The first stream is always a mainline stream. To learn more about streams, see Chapter 6, “Streams” on page 65.

To create the stream:

1. **Issue the `p4 stream`, command, specifying the stream depot name followed by the stream name.**

   Here, we name the stream `main` and — with the `-t` option — specify the stream type as mainline:

   ```
   $ p4 stream -t mainline //JamCode/main
   ```

   Helix opens the stream specification (spec) in an editor:

```
# A Perforce Stream Specification.
#
#  Stream:       The stream field is unique and specifies the depot path.
#  Update:       The date the specification was last changed.
#  Access:       The date the specification was originally created.
#  Owner:        The user who created this stream.
#  Name:         A short title which may be updated.
#  Parent:       The parent of this stream, or 'none' if Type is mainline.
#  Type:         Type of stream provides clues for commands run
#                between stream and parent.  Five types include 'mainline',
#                'release', 'development' (default), 'virtual' and 'task'.
#  Description:  A short description of the stream (optional).
#  Options:      Stream Options:
#                       allsubmit/ownersubmit [un]locked
#                       [no]toparent [no]fromparent mergedown/mergeany
#  Paths:        Identify paths in the stream and how they are to be
#                generated in resulting clients of this stream.
#                Path types are share/isolate/import/import+/exclude.
#  Remapped:     Remap a stream path in the resulting client view.
#  Ignored:      Ignore a stream path in the resulting client view.
#
# Use 'p4 help stream' to see more about stream specifications and command.

Stream: //JamCode/main

Owner:  bruno

Name:   main

Parent: none

Type:   mainline

Description:
        Created by bruno.

Options:        allsubmit unlocked notoparent nofromparent mergedown

Paths:
        share ...
```

A stream spec defines the stream's name and location, its type, its parent stream, the files in the workspace view of workspaces bound to it, and other configurable behaviors. Note that the stream name is composed of the stream depot name followed by the stream name. You edit the stream spec's fields to configure the stream's behavior, as explained at length in "Configure a stream" on page 65.

2. **To verify that your mainline stream has been created, issue the `p4 streams` command.**

   For example:

```
$ p4 streams //JamCode/...
```

This produces the following output:

```
Stream //JamCode/main mainline none 'main'
```

Define a client workspace and bind it to the stream

A client workspace is the set of directories on your local computer where you work on the file revisions that Helix manages. At minimum, you should assign your workspace a name and specify a workspace root where you want local copies of depot files stored. The client workspace name defaults to the hostname of the computer on which your client is running. For details, see "Configure a client workspace" on page 50.

Before you can work in a stream, you must associate your workspace with the stream. When you associate a workspace with a stream, Helix generates the *workspace view* based on the structure of the stream. Workspace views are a crucial concept in Helix and are discussed in detail in "Configure workspace views" on page 57.

To create a workspace and bind it to a stream:

1. **Set the P4CLIENT environment variable to desired workspace name.**

   On UNIX and OS X

   ```
   $ export P4CLIENT=bruno_ws
   ```

   On Windows

   ```
   $ set P4CLIENT=bruno_ws
   ```

2. **Use the `p4 client` command to bind your workspace to the stream.**

   ```
   $ p4 client -S //JamCode/main
   ```

   The `-S` option specifies the name of the associated stream.

   Helix opens the client specification (spec) in an editor:

```
# A Perforce Client Specification.
#
#  Client:      The client name.
#  Update:      The date this specification was last modified.
#  Access:      The date this client was last used in any way.
#  Owner:       The Perforce user name of the user who owns the client
#               workspace. The default is the user who created the
#               client workspace.
#  Host:        If set, restricts access to the named host.
#  Description: A short description of the client (optional).
#  Root:        The base directory of the client workspace.
#  AltRoots:    Up to two alternate client workspace roots.
#  Options:     Client options:
#                      [no]allwrite [no]clobber [no]compress
#                      [un]locked [no]modtime [no]rmdir
#  SubmitOptions:
#                      submitunchanged/submitunchanged+reopen
#                      revertunchanged/revertunchanged+reopen
#                      leaveunchanged/leaveunchanged+reopen
#  LineEnd:     Text file line endings on client: local/unix/mac/win/share.
#  Type:        Type of client: writeable/readonly.
#  Backup:      Client's participation in backup enable/disable. If not
#               specified backup of a writable client defaults to enabled.
#  ServerID:    If set, restricts access to the named server.
#  View:        Lines to map depot files into the client workspace.
#  ChangeView:  Lines to restrict depot files to specific changelists.
#  Stream:      The stream to which this client's view will be dedicated.
#               (Files in stream paths can be submitted only by dedicated
#               stream clients.) When this optional field is set, the
#               View field will be automatically replaced by a stream
#               view as the client spec is saved.
#  StreamAtChange:  A changelist number that sets a back-in-time view of a
#                   stream ( Stream field is required ).
#                   Changes cannot be submitted when this field is set.
#
# Use 'p4 help client' to see more about client views and options.

Client:         bruno_ws

Owner:          bruno

Host:           dhcp-133-n101.dhcp.perforce.com

Description:
                Created by bruno.

Root:           /Users/bruno/tutorial

Options:        noallwrite noclobber nocompress unlocked nomodtime normdir

SubmitOptions:  submitunchanged

LineEnd:        local

Stream:         //JamCode/main

View:
                //JamCode/main/... //bruno_ws/...
```

At this point you have the option to configure the workspace root directory and any other desired settings. The workspace root is the highest-level directory of the workspace under which the managed source files reside. For more information, see "Define a client workspace" on page 50. Once you've done this, save any changes and quit the editor.

For information about configuring other settings, see "Configure workspace views" on page 57.

3. **Verify that your workspace has been created, with the `p4 clients` command.**

```
$ p4 clients -S //JamCode/main
```

This produces the following output:

```
Client bruno_ws 2016/02/22 root /Users/bruno/tutorial 'Created by bruno.'
```

Next, populate the mainline stream with files.

Populate a mainline stream

Now that you've created a stream, you can populate it with files. There are two ways to populate a mainline stream:

- Add files from the local filesystem.
- Branch files from another depot.

In this tutorial, we demonstrate populating by adding files. For information on populating by branching from another depot, see "Branch from other depots" on page 30.

To add files to the mainline stream, copy the files and folders to the workspace root directory and then mark them for add with the **`p4 add`** command.

1. **Copy the files and folders to the workspace root directory.**

   In this example, we add all files residing in a directory named `/Users/bruno/repository`.

   On UNIX and OSX

```
$ cp /Users/bruno/repository/* /Users/bruno/tutorial
```

   On Windows

```
$ copy C:\Users\bruno\repository\* C:\Users\bruno\tutorial
```

2. **Change into the client workspace root directory.**

On UNIX and OSX

```
$ cd /Users/bruno/tutorial
```

On Windows

```
$ cd C:\User\bruno\tutorial
```

3. **Mark the files for add.**

```
$ p4 add *
```

This creates a default `changelist`, which you will use when you submit to the depot the file you added to your workspace. For more information on changelists, see "Changelist-related tasks" on page 37.

4. **Submit the added files**.

To populate the stream, submit the default changelist in which the files are open for add.

```
$ p4 submit
```

Helix opens the `change specification` in an editor:

```
# A Perforce Change Specification.
#
#  Change:      The change number. 'new' on a new changelist.
#  Date:        The date this specification was last modified.
#  Client:      The client on which the changelist was created.  Read-only.
#  User:        The user who created the changelist.
#  Status:      Either 'pending' or 'submitted'. Read-only.
#  Type:        Either 'public' or 'restricted'. Default is 'public'.
#  Description: Comments about the changelist.  Required.
#  ImportedBy:  The user who fetched or pushed this change to this server.
#  Identity:    Identifier for this change.
#  Jobs:        What opened jobs are to be closed by this changelist.
#               You may delete jobs from this list.  (New changelists only.)
#  Files:       What opened files from the default changelist are to be added
#               to this changelist.  You may delete files from this list.
#               (New changelists only.)

Change: new

Client: bruno_ws

User:   bruno

Status: new

Description:
        <enter description here>

Files:
        //JamCode/main/file1.cc        # add
        //JamCode/main/file1.h # add
        //JamCode/main/file1.txt       # add
        //JamCode/main/file2.cc        # add
        //JamCode/main/file2.h # add
        //JamCode/main/file2.txt       # add
        //JamCode/main/file3.cc        # add
        //JamCode/main/file3.h # add
        //JamCode/main/file3.txt       # add
```

Enter a description under `Description` and then save your changes, to store the files you added in the Helix depot. Something like the following output is displayed:

```
Change 1 created with 9 open file(s).
Submitting change 1.
Locking 9 files ...
add //JamCode/main/file1.cc#1
add //JamCode/main/file1.h#1
add //JamCode/main/file1.txt#1
add //JamCode/main/file2.cc#1
add //JamCode/main/file2.h#1
add //JamCode/main/file2.txt#1
add //JamCode/main/file3.cc#1
add //JamCode/main/file3.h#1
add //JamCode/main/file3.txt#1
Change 1 submitted.
```

The files you added are now stored in the Helix depot.

Edit files

Now that the files are stored in the depot, you or others can check them out of the depot to edit them. To open files for edit, issue the **`p4 edit`** command, followed by the names(s) of the files you want to edit:

```
$ p4 edit file1.txt
```

This displays output like the following:

```
//JamCode/main/file1.txt#1 - opened for edit
```

Now you can edit the file in the editor of your choice and make changes. After you've made the desired changes, you submit the changelist associated with the file(s):

```
$ p4 submit
```

This open a `change specification` in an editor:

```
#
#  Change:      The change number. 'new' on a new changelist.
#  Date:        The date this specification was last modified.
#  Client:      The client on which the changelist was created.  Read-only.
#  User:        The user who created the changelist.
#  Status:      Either 'pending' or 'submitted'. Read-only.
#  Type:        Either 'public' or 'restricted'. Default is 'public'.
#  Description: Comments about the changelist.  Required.
#  ImportedBy:  The user who fetched or pushed this change to this server.
#  Identity:    Identifier for this change.
#  Jobs:        What opened jobs are to be closed by this changelist.
#               You may delete jobs from this list.  (New changelists only.)
#  Files:       What opened files from the default changelist are to be added
#               to this changelist.  You may delete files from this list.
#               (New changelists only.)

Change: new

Client: bruno_ws

User:   bruno

Status: new

Description:
        <enter description here>

Files:
        //JamCode/main/file1.txt       # edit
```

Enter a description under **`Description`** and then save your changes, to store the edits you made in the Helix depot. Something like the following output is displayed:

```
Change 2 created with 1 open file(s).
Submitting change 2.
Locking 1 files ...
edit //JamCode/main/file1.txt#2
Change 2 submitted.
```

Delete files

Deleting files is more complicated than just deleting them from your filesystem. To mark files for delete, issue the **`p4 delete`** command. In this case, we choose to delete just the header files.

```
$ p4 delete *.h
```

Helix displays the following:

```
//JamCode/main/file1.h#1 - opened for delete
//JamCode/main/file2.h#1 - opened for delete
//JamCode/main/file3.h#1 - opened for delete
```

As in "Edit files" on page 18, you issue the **p4 submit** command to have the deletion affect files in the depot:

```
$ p4 submit
```

Helix opens the `change specification` in an editor:

```
# A Perforce Change Specification.
#
#  Change:      The change number. 'new' on a new changelist.
#  Date:        The date this specification was last modified.
#  Client:      The client on which the changelist was created.  Read-only.
#  User:        The user who created the changelist.
#  Status:      Either 'pending' or 'submitted'. Read-only.
#  Type:        Either 'public' or 'restricted'. Default is 'public'.
#  Description: Comments about the changelist.  Required.
#  ImportedBy:  The user who fetched or pushed this change to this server.
#  Identity:    Identifier for this change.
#  Jobs:        What opened jobs are to be closed by this changelist.
#               You may delete jobs from this list.  (New changelists only.)
#  Files:       What opened files from the default changelist are to be added
#               to this changelist.  You may delete files from this list.
#               (New changelists only.)

Change: new

Client: jschaffer_ws

User:   jschaffer

Status: new

Description:
        <enter description here>

Files:
        //JamCode/main/file1.h # delete
        //JamCode/main/file2.h # delete
        //JamCode/main/file3.h # delete
```

Enter a description under `Description` and then save your changes, to store the changes you made in the Helix depot. Something like the following output is displayed:

```
Change 3 created with 3 open file(s).
Submitting change 3.
Locking 3 files ...
delete //JamCode/main/file1.h#2
delete //JamCode/main/file2.h#2
delete //JamCode/main/file3.h#2
Change 3 submitted.
```

Sync files from the depot to your client workspace

Syncing (retrieving files from the depot) — with the **`p4 sync`** command — specifies the files and directories you want to retrieve from the depot. You do this to obtain the latest changes — be they edits, adds, or deletes — that have been made by others and then submitted to the depot.

You can only sync files that are mapped in your workspace view. For more information on workspace views, see "Configure workspace views" on page 57.

```
$ p4 sync ...
```

By passing in …, we request to sync all files in the current directory.

Suppose that another user has made changes to `file1.cc` and `file3.cc`. A `sync` request, would yield output like the following:

```
//JamCode/main/file1.cc#3 - updating /Users/bruno/workspace/tutorial/file1.cc
//JamCode/main/file3.cc#5 - updating /Users/bruno/workspace/tutorial/file3.cc
```

Populate child streams

After populating the mainline, you can branch files for development and for release. For example, to create a development stream that is a clone of its mainline parent, issue the following command:

```
$ p4 stream -t development -P //JamCode/main //JamCode/dev
```

Helix displays the stream specification with the type set to development. Save the specification. To populate the stream with the files from the mainline, issue the following commands:

```
$ p4 populate -d "From main" -S //JamCode/dev -r
$ p4 sync
```

Chapter 4

Basic tasks

This chapter describes tasks you commonly perform when setting up and using your version control system. It discusses both tasks you perform just once when getting your system set up, and tasks you may perform one or more times during the lifetime of your installation.

Overview of initial tasks

This section gives you an overview of the tasks for setting up your command client and shared server. The tasks in this workflow should be performed once, and in the order presented in the following table:

Step	Task	Stream or classic user	Link
1	Create a working directory	Both	"Create a working directory" on page 24
2	Log in to the shared server or start up a shared server	Both	"Log in to the shared server" on page 25 or "Start up a shared server" on page 25
3	Start up the command line client and verify the connection to the server	Both	"Start up the command line client and verify the connection to the server" on page 26
4	Create a stream depot	Stream	"Create a stream depot" on page 27
5	Create a mainline stream	Stream. Classic users, see "Organizing the depot" on page 87.	"Create a mainline stream" on page 28
6	Define a workspace	Both	"Define a workspace and bind it to the stream" on page 29
7	Bind the workspace to the stream	Stream	"Define a workspace and bind it to the stream" on page 29
8	Populate the mainline stream	Stream. Classic users populate a codeline.	"Populate the mainline stream" on page 29

Overview of recurring tasks

This section gives you an overview of the tasks you perform during the lifetime of your installation, divided between file-level tasks and other tasks. You may perform them one or more times, or never.

The following table summarizes file-level recurring tasks:

Task	Stream or classic user	Link
Sync files from the depot	Both	"Sync files" on page 32
Edit files	Both	"Edit files and check in changes" on page 34
Rename and move files	Both	"Rename and move files" on page 36
Diff files	Both	"Diff files" on page 36
Revert files	Both	"Revert files, to discard changes" on page 35
Add files	Both	"Add files" on page 33
Delete files	Both	"Delete files" on page 35
Resolve conflicts	Both	Chapter 7, "Resolve conflicts" on page 77

The following table summarizes other recurring tasks:

Task	Stream or classic user	Link
Work with changelists	Both	"Changelist-related tasks" on page 37
Configure client behavior	Both	Chapter 5, "Configure clients" on page 45
Configure stream behavior	Stream	"Configure a stream" on page 65
Branch and populate child streams	Stream	"Branch and populate child streams" on page 43
Propagate changes between streams	Stream	"Propagate changes" on page 43

Initial tasks

You perform the tasks in this section once, in the order presented.

Create a working directory

Create a working directory and then change to the directory. In this example, we create a working directory called *work* in the user's home directory.

```
$ mkdir /Users/bruno/work
$ cd /Users/bruno/work
```

Log in to the shared server

Typically, your administrator starts up a shared server for you. If you need to start up your own shared server, see "Start up a shared server" on page 25.

Your admin provides you with a user id, a password, and the server's address. You then follow these steps:

1. **Set the P4PORT environment variable to the server address the admin gave you.**

   The server is running on as `server1` on port 1666. For the client to communicate with the server, you must set the client's `P4PORT` variable to `server1:1666`.

   On UNIX and OSX

   ```
   $ export P4PORT=server1:1666
   ```

   On Windows

   ```
   $ set P4PORT=server1:1666
   ```

2. **Log in to the server with the `p4 login` command**

   ```
   $ p4 login
   ```

Helix displays the following:

```
Enter password:
```

Enter the password your admin gave you.

Helix displays the following:

```
User bruno logged in.
```

Start up a shared server

Download into your computer's `/usr/local/bin` directory the server (**`p4d`**) and client (**`p4`**) binaries, as described in Chapter 1, "Installation" on page 1. Then, follow these steps:

1. **Make the server and client binaries executable, if they're not already**

```
$ chmod +x /usr/local/bin/p4d
$ chmod +x /usr/local/bin/p4
```

2. **Make a subdirectory in which to start up the server and client.**

   When started, the server creates a large number of database files; it's best not to clutter your working directory with these files, so we will start up the server and client in a different directory, in this case `/Users/bruno/server`.

```
$ mkdir /Users/bruno/server
```

3. **Start up the shared server.**

   Start up the shared server, using the **`-r`** ***`dir`*** option to specify the directory created in the previous step.

```
$ p4d -r /Users/bruno/server
```

This produces the following output:

```
Perforce db files in 'server' will be created if missing...
Perforce Server starting...
```

Start up the command line client and verify the connection to the server

1. **Start up the command line client.**

```
$ p4
```

To verify a connection, issue the **`p4 info`** command. If `P4PORT` is set correctly, information like the following is displayed:

```
User name: bruno
Client name: bruno_ws
Client host: computer_12
Client root: c:\bruno_ws
Current directory: c:\bruno_ws
Peer address; 10.0.102.24:61122
Client address: 10.0.0.196
Server address: ssl:example.com:1818
Server root: /usr/depot/p4d
Server date: 2012/03/28 15:03:05 -0700 PDT
Server uptime: 752:41:33
Server version: P4D/FREEBSD/2012.1/406375 (2012/01/25)
ServerID: Master
Server license: P4Admin <p4adm> 20 users (expires 2015/01/01)
Server license-ip: 10.0.0.2
Case handling: sensitive
```

The `Server address:` field shows the host to which **p4** connected and also displays the host and port number on which the Helix server is listening. If `P4PORT` is set incorrectly, you receive a message like the following:

```
Perforce client error:
   Connect to server failed; check $P4PORT.
   TCP connect to perforce:1666 failed.
   perforce: host unknown.
```

If the value you see in the third line of the error message is `perforce:1666` (as above), `P4PORT` has not been set. Set `P4PORT` and try to connect again.

If your installation requires SSL, make sure your `P4PORT` is of the form `ssl:`*`hostname`*`:`*`port`*.

You will be asked to verify the server's fingerprint the first time you attempt to connect to the server. If the fingerprint is accurate, use the **`p4 trust`** command to install the fingerprint into a file (pointed to by the `P4TRUST` environment variable) that holds a list of known/trusted Helix servers and their respective fingerprints. If `P4TRUST` is unset, this file is `.p4trust` in the user's home directory. For more information, see "SSL-encrypted connections" on page 97.

If your installation requires plain text (in order to support older Helix applications), set `P4PORT` to `tcp:`*`hostname`*`:`*`port`*.

Create a stream depot

Typically your administrator will create a stream depot for you and provide you with the depot name.

However, if you are creating a stream depot yourself, type the following:

```
$ p4 depot -t stream depotname
```

The `-t` option specifies the type of depot to create, in this case a stream depot.

Helix opens the depot specification in an editor:

```
# A Perforce Depot Specification.
#
#  Depot:       The name of the depot.
#  Owner:       The user who created this depot.
#  Date:        The date this specification was last modified.
#  Description: A short description of the depot (optional).
#  Type:        Whether the depot is 'local', 'remote',
#               'stream', 'spec', 'archive', 'tangent',
#               or 'unload'.  Default is 'local'.
#  Address:     Connection address (remote depots only).
#  Suffix:      Suffix for all saved specs (spec depot only).
#  StreamDepth: Depth for streams in this depot (stream depots only).
#  Map:         Path translation information (must have ... in it).
#  SpecMap:     For spec depot, which specs should be recorded (optional).
#
# Use 'p4 help depot' to see more about depot forms.

Depot:          JamCode

Owner:          bruno

Date:           2016/02/22 13:20:06

Description:
                Created by bruno.

Type:           stream

StreamDepth:    //JamCode/1

Map:            JamCode/...
```

Adjust the value of other fields as desired and save the specification.

Create a mainline stream

To create a mainline stream:

1. **Issue the `p4 stream`, command, specifying the depot followed by the stream name.**

   For example:

   ```
   $ p4  stream -t mainline //JamCode/main
   ```

   The stream specification form is displayed.

2. **Change options in the spec to assign the stream the desired characteristics and save the spec. See "Configure a stream" on page 65 for details on the stream spec.**

3. **To verify that your mainline stream has been created, issue the `p4 streams` command.**

For example:

```
$ p4  streams //projectX/...
```

Define a workspace and bind it to the stream

Before you can work in a stream, you must define a workspace associated with the stream. When you associate a workspace with a stream, Helix generates the *workspace view* based on the structure of the stream. Stream users never need edit the workspace view (and, in fact, cannot manually alter it). If the structure of the stream changes, Helix updates the views of workspaces associated with the stream on an as-needed basis.

Note

Classic Helix users define a workspace by issuing the **`p4 client`** command *without* passing the **`-S`** option, and edit the workspace view manually by editing the **`View:`** field in the client spec. See "Configure workspace views" on page 57.

Your Helix administrator may already have configured a client workspace for your computer. If so, the **`Client`** field in the client spec - displayed when you issue the **`p4 client`** command — contains this name.

If not, to create a workspace for a stream:

1. **Issue the `p4 client` command, using the `-S` option to specify the name of the associated stream.**

   For example:

   ```
   $ p4 client -S //JamCode/main
   ```

   The workspace specification form is displayed.

2. **Configure the workspace root directory and any other desired settings, and save the specification**. See "Define a client workspace" on page 50 for details.

3. **Verify that your workspace has been created using `p4 clients`.**

   For example:

   ```
   $ p4 clients -S //JamCode/main
   ```

Now you can populate the mainline with files, as described in the next step.

Populate the mainline stream

Note

Classic users populate a branch. See Chapter 8, "Codeline management" on page 87.

There are two ways to populate a mainline stream:

- Add files from the local filesystem. This is the most typical way.
- Branch files from another depot. This way only applies if you have existing "classic" Helix depots.

If you need to preserve file history, branch the source files to the mainline stream. If you have no requirement for preserving file history, simply add them. The sections that follow describe each approach.

Add files

If you do not need to preserve file history, simply add the files. To add files to the mainline stream:

1. **Create the workspace root directory if it does not exist.**

   For example:

   ```
   C:\bruno_ws> cd C:\Users\bruno\p4clients
   C:\Users\bruno\p4clients> mkdir bruno_projectX_main
   ```

2. **Copy the files and folders to the workspace root directory.**

3. **Change into the client workspace root directory, and use the `p4 reconcile` command to detect files not under Helix control and open them for add**.

   ```
   C:\Users\bruno\p4clients> cd bruno_projectX_main
   C:\Users\bruno\p4clients\bruno_projectX_main> p4 add ...
   ```

To verify that the files are set up to be added correctly, issue the **`p4 opened`** command. To populate the stream, submit the changelist in which the files are open.

For details on working with changelists, see "Changelist-related tasks" on page 37.

Branch from other depots

You can branch files from other stream depots, classic depots, or remote depots into a stream. If you populate the mainline by branching, Helix preserves the connection between the revision history of the source and target files. Your workspace must be set to one associated with the target stream (example: **`p4 set P4CLIENT=bruno_projectX_main`**).

To populate the mainline by branching, issue the **`p4 copy`** command, specifying source and target. Example:

```
$ p4 copy -v //mysourcedepot/mainline/... //ProjectX/main/...
```

In this example the **`-v`** option performs the copy on the server without syncing the newly-created files to the workspace. This can be a significant time-saver if there are many files being copied; you can then sync only the files you intend to work with from the new location.

p4d displays a series of "import from" messages listing the source and target files, and opens the file(s) in a pending changelist. To preview the results of the operation without opening files, specify the **-n** option.

To populate the stream with the files from the mainline, issue the following commands:

1. To verify that the files are set up to be added correctly, issue the **p4 opened** command.
2. To populate the stream, **p4 submit** the changelist in which the files are open.

If you are populating an empty stream, you can simplify this process by using **p4 populate**. For example:

```
$ p4 populate //mysourcedepot/mainline/...  //ProjectX/main/...
```

does the same thing as **p4 copy -v** followed by a **p4 submit**. If you are unsure of the results of **p4 populate**, use **p4 populate -n**, which previews the result of the command.

To undo an erroneous copy operation, issue the **p4 revert** command; for example:

```
$ p4 revert //ProjectX/main/...
```

Recurring file-level tasks

This section describes tasks you perform during the lifetime of your installation that occur at the file level.

Before we look at the tasks in detail, here's a table that provides a snapshot of the sequence in which you perform the most common file-related tasks.

For details on working with changelists, see "Changelist-related tasks" on page 37.

Here are the basic steps for working with files. In general, to change files in the depot (file repository), you open the files in changelists and submit the changelists with a description of your changes. Helix assigns numbers to changelists and maintains the revision history of your files. This approach enables you to group related changes and find out who changed a file and why and when it was changed.

Task	Description
Syncing (retrieving files from the depot)	Issue the **p4 sync** command, specifying the files and directories you want to retrieve from the depot. You can only sync files that are mapped in your client workspace view.
Add files to the depot	1. Create the file in the workspace. 2. Open the file for add in a changelist (**p4 add**). 3. Submit the changelist (**p4 submit**).
Edit files and check in changes	1. If necessary, sync the desired file revision to your workspace (**p4 sync**).

Task	Description
	2. Open the file for edit in a changelist (**p4 edit**). 3. Make your changes. 4. Submit the changelist (**p4 submit**). To discard changes, issue the **p4 revert** command.
Delete files from the depot	1. Open the file for delete in a changelist (**p4 delete**). The file is deleted from your workspace. 2. Submit the changelist (**p4 submit**). The file is deleted from the depot.
Discard changes	Revert the files or the changelist in which the files are open. Reverting has the following effects on open files: Add — no effect - the file remains in your workspace. Edit — the revision you opened is resynced from the depot, overwriting any changes you made to the file in your workspace. Delete — the file is resynced to your workspace.

Files are added to, deleted from, or updated in the depot only when you successfully submit the pending changelist in which the files are open. A changelist can contain a mixture of files open for add, edit and delete.

For details on working with changelists, see "Changelist-related tasks" on page 37.

Sync files

Syncing — with the **p4 sync** command — adds, updates, or deletes files in the client workspace to bring the workspace contents into agreement with the depot. If a file exists within a particular subdirectory in the depot, but that directory does not exist in the client workspace, the directory is created in the client workspace when you sync the file. If a file has been deleted from the depot, **p4 sync** deletes it from the client workspace.

Example 4.1. Sync files from the depot to a client workspace.

The command below retrieves the most recent revisions of all files in the client view from the depot into the workspace. As files are synced, they are listed in the command output.

```
C:\bruno_ws> p4 sync
//Acme/dev/bin/bin.linux24x86/readme.txt#1 - added as c:\bruno_ws\dev\bin
\bin.linux24x86\readme.txt
//Acme/dev/bin/bin.ntx86/glut32.dll#1 - added as c:\bruno_ws\dev\bin\bin.ntx86\glut32.dll
//Acme/dev//bin/bin.ntx86/jamgraph.exe#2 - added as c:\bruno_ws\dev\bin\bin.ntx86\jamgraph.exe
[...]
```

Note

You cannot sync files that are not in your workspace view. See "Configure workspace views" on page 57 for more information.

To sync revisions of files prior to the latest revision in the depot, use revision specifiers. For example, to sync the first revision of `Jamfile`, which has multiple revisions, issue the following command:

```
$ p4 sync //Acme/dev/jam/Jamfile#1
```

To sync groups of files or entire directories, use wildcards. For example, to sync everything in and below the `jam` folder, issue the following command:

```
$ p4 sync //Acme/dev/jam/...
```

The Helix server tracks which revisions you have synced. For maximum efficiency, Helix does not re-sync an already-synced file revision. To re-sync files you (perhaps inadvertently) deleted manually, specify the `-f` option when you issue the **`p4 sync`** command.

Add files

To add files to the depot, create the files in your workspace, then issue the **`p4 add`** command. The **`p4 add`** command opens the files for `add` in the default pending changelist. The files are added when you successfully submit the default pending changelist. You can open multiple files for add using a single **`p4 add`** command by using wildcards. You cannot use the Helix **`...`** wildcard to add files recursively.

To add files recursively, use the **`p4 reconcile`** command. See **`p4 reconcile`** in the *P4 Command Reference*.

Example 4.2. Add files

Bruno has created a couple of text files that he must add to the depot. To add all the text files at once, he uses the * wildcard when he issues the **`p4 add`** command.

```
C:\bruno_ws\Acme\dev\docs\manuals> p4 add *.txt
//Acme/dev/docs/manuals/installnotes.txt#1 - opened for add
//Acme/dev/docs/manuals/requirements.txt#1 - opened for add
```

Now the files he wants to add to the depot are open in his default changelist. The files are stored in the depot when the changelist is submitted.

Example 4.3. Submit a changelist to the depot.

Bruno is ready to add his files to the depot. He types **`p4 submit`** and sees the following form in a standard text editor:

```
Change: new
Client: bruno_ws
User:   bruno
Status: new
Description:
        <enter description here>
Type:   public
Files:
    //Acme/dev/docs/manuals/installnotes.txt   # add
    //Acme/dev/docs/manuals/requirements.txt   # add
```

Bruno changes the contents of the **`Description:`** field to describe his file updates. When he's done, he saves the form and exits the editor, and the new files are added to the depot.

You must enter a description in the **`Description:`** field. You can delete lines from the **`Files:`** field. Any files deleted from this list are moved to the next default changelist, and are listed the next time you submit the default changelist.

If you are adding a file to a directory that does not exist in the depot, the depot directory is created when you successfully submit the changelist.

For details on working with changelists, see "Changelist-related tasks" on page 37.

Add files outside of Helix and then use p4 reconcile -k

In certain situations, you may need to copy a very large number of files into your workspace from another user's workspace. Rather than doing this via Helix, you may, for performance reasons, choose to copy them directly — via a snapshot, for example — from the other user's workspace into yours.

Once you've done this, you will need to:

- Inform Helix that these files now exist on your client.

  That is, you want to update your client's *have list* to reflect the actual contents of your workspace. See the **`p4 have`** page in *P4 Command Reference* for details on have lists.

- Ensure that your workspace view contains mappings identical to those contained in the workspace view of the client you copied from

  This ensures that Helix doesn't think these files are new.

To do this, run the **`p4 reconcile -k`** command.

You can also ignore groups of files when adding. See "Ignoring groups of files when adding" on page 93 for details.

Edit files and check in changes

You must open a file for edit before you attempt to edit the file. When you open a file for edit — with the **`p4 edit`** command — Helix enables write permission for the file in your workspace and adds the files to a changelist. If the file is in the depot but not in your workspace, you must sync it before you open it for edit.

Example 4.4. Open a file for edit.

Bruno wants to make changes to `command.c`, so he syncs it and opens the file for edit.

```
C:\bruno_ws\dev> p4 sync //Acme/dev/command.c
//depot/dev/command.c#8 - added as c:\bruno_ws\dev\command.c

C:\bruno_ws\dev> p4 edit //Acme/dev/command.c
//Acme/dev/command.c#8 - opened for edit
```

He then edits the file with any text editor. When he's finished, he submits the file to the depot with **`p4 submit`**.

Delete files

To delete files from the depot, you open them for delete by issuing the **`p4 delete`** command, then submit the changelist in which they are open. When you delete a file from the depot, previous revisions remain, and a new head revision is added, marked as "deleted." You can still sync previous revisions of the file.

When you issue the **`p4 delete`** command, the files are deleted from your workspace but not from the depot. If you revert files that are open for delete, they are restored to your workspace. When you successfully submit the changelist in which they are open, the files are deleted from the depot.

Example 4.5. Delete a file from the depot.

Bruno deletes `vendor.doc` from the depot as follows:

```
C:\bruno_ws\dev> p4 delete //Acme/dev/docs/manuals/vendor.doc
//Acme/dev/docs/manuals/vendor.doc#1 - opened for delete
```

The file is deleted from the client workspace immediately, but it is not deleted from the depot until he issues the **`p4 submit`** command.

Revert files, to discard changes

To remove an open file from a changelist and discard any changes you made, issue the **`p4 revert`** command. When you revert a file, Helix restores the last version you synced to your workspace. If you revert a file that is open for add, the file is removed from the changelist but is not deleted from your workspace.

Example 4.6. Revert a file

Bruno decides not to add his text files after all.

```
C:\bruno_ws\dev> p4 revert *.txt
//Acme/dev/docs/manuals/installnotes.txt#none - was add, abandoned
//Acme/dev/docs/manuals/requirements.txt#none - was add, abandoned
```

To preview the results of a revert operation without actually reverting files, specify the **-n** option when you issue the **p4 revert** command.

Rename and move files

To rename or move files, you must first open them for add or edit, and then use the **p4 move** command:

```
C:\bruno_ws> p4 move source_file target_file
```

To move groups of files, use matching wildcards in the *source_file* and *target_file* specifiers. To move files, you must have Helix **write** permission for the specified files. For information about using wildcards with Helix files, see "Helix wildcards" on page 146.

For details about Helix permissions, see the *Helix Versioning Engine Administrator Guide: Fundamentals*.

When you rename or move a file using **p4 move**, the versioning service creates an integration record that links it to its deleted predecessor, preserving the file's history. Integration is also used to create branches and to propagate changes.

Diff files

Helix allows you to *diff* (compare) revisions of text files. By diffing files, you can display:

- Changes that you made after opening the file for edit
- Differences between any two revisions
- Differences between file revisions in different branches

To diff a file that is synced to your workspace with a depot revision, issue the **p4 diff *filename#rev*** command. If you omit the revision specifier, the file in your workspace is compared with the revision you last synced, to display changes you made after syncing it.

To diff two revisions that reside in the depot but not in your workspace, use the **p4 diff2** command. To diff a set of files, specify wildcards in the filename argument when you issue the **p4 diff2** command.

The **p4 diff** command performs the comparison on your computer, but the **p4 diff2** command instructs the Helix server to perform the diff and to send the results to you.

The following table lists some common uses for diff commands:

To diff	Against	Use this command
The workspace file	The head revision	**p4 diff *file*** or **p4 diff *file*#head**
The workspace file	Revision 3	**p4 diff *file*#3**
The head revision	Revision 134	**p4 diff2 *file file*#134**
File revision at changelist 32	File revision at changelist 177	**p4 diff2 *file*@32 *file*@177**

To diff	Against	Use this command
The workspace file	A file shelved in pending changelist 123	**p4 diff *file*@=123**
All files in release 1	All files in release 2	**p4 diff2 //Acme/rel1/... //Acme/rel2/...**

By default, the **p4 diff** command launches Helix's internal diff application. To use a different diff program, set the P4DIFF environment variable to specify the path and executable of the desired application. To specify arguments for the external diff application, use the **-d** option. For details, refer to the *P4 Command Reference*.

Resolve conflicts

When you and other users are working on the same set of files, conflicts can occur. Helix enables your team to work on the same files simultaneously and resolve any conflicts that arise.

Chapter 7, "Resolve conflicts" on page 77 explains in detail how to resolve file conflicts.

Other recurring tasks

This section describes other basic tasks you perform during the lifetime of your installation.

Changelist-related tasks

This section explains how to work with changelists.

To change files in the depot, you open them in a *changelist*, make any changes to the files, and then *submit* the changelist. A changelist contains a list of files, their revision numbers, and the operations to be performed on the files. Unsubmitted changelists are referred to as *pending changelists*.

Submission of changelists is an all-or-nothing operation; that is, either all of the files in the changelist are updated in the depot, or, if an error occurs, none of them are. This approach guarantees that code alterations that affect multiple files occur simultaneously.

Helix assigns numbers to changelists and also maintains a *default changelist*, which is numbered when you submit it. You can create multiple changelists to organize your work. For example, one changelist might contain files that are changed to implement a new feature, and another changelist might contain a bug fix. When you open a file, it is placed in the default changelist unless you specify an existing changelist number on the command line using the **-c** option. For example, to edit a file and submit it in changelist number 4, use **p4 edit -c 4 *filename***. To open a file in the default changelist, omit the **-c** option.

You can also shelve changelists in order to temporarily preserve work in progress for your own use, or for review by others. Shelving enables you to temporarily cache files in the shared server without formally submitting them to the depot.

The Helix server might renumber a changelist when you submit it, depending on other users' activities; if your changelist is renumbered, its original number is never reassigned to another changelist.

You can restrict a changelist from public view by changing the `Type:` field from `public` to `restricted`. In general, if a changelist is restricted, only those users with `list` access to at least one of the files in the changelist are permitted to see the changelist description.

To control what happens to files in a changelist when you submit the changelist to the depot, see "Configure submit options" on page 53.

Submit a pending changelist

To submit a pending changelist, issue the **`p4 submit`** command. When you issue the **`p4 submit`** command, a form is displayed, listing the files in the changelist. You can remove files from this list. The files you remove remain open in the default pending changelist until you submit them or revert them.

To submit specific files that are open in the default changelist, issue the **`p4 submit`** ***`filename`*** command. To specify groups of files, use wildcards. For example, to submit all text files open in the default changelist, type **`p4 submit "*".txt`**. (Use quotation marks as an escape code around the * wildcard to prevent it from being interpreted by the local command shell).

After you save the changelist form and exit the text editor, the changelist is submitted to the Helix server, and the files in the depot are updated. After a changelist has been successfully submitted, only a Helix administrator can change it, and the only fields that can be changed are the description and user name.

If an error occurs when you submit the default changelist, Helix creates a numbered changelist containing the files you attempted to submit. You must then fix the problems and submit the numbered changelist using the `-c` option.

Helix enables write permission for files that you open for edit and disables write permission when you successfully submit the changelist containing the files. To prevent conflicts with Helix's management of your workspace, do not change file write permissions manually.

Before committing a changelist, **`p4 submit`** briefly locks all files being submitted. If any file cannot be locked or submitted, the files are left open in a numbered pending changelist. By default, the files in a failed submit operation are left locked unless the `submit.unlocklocked` configurable is set. Files are unlocked even if they were manually locked prior to submit if submit fails when `submit.unlocklocked` is set.

Create numbered changelists

To create a numbered changelist, issue the **`p4 change`** command. This command displays the changelist form. Enter a description and make any desired changes; then save the form and exit the editor.

All files open in the default changelist are moved to the new changelist. When you exit the text editor, the changelist is assigned a number. If you delete files from this changelist, the files are moved back to the default changelist.

Example 4.7. Working with multiple changelists.

Bruno is fixing two different bugs, and needs to submit each fix in a separate changelist. He syncs the head revisions of the files for the first fix and opens the file for edit in the default changelist:

```
C:\bruno_ws> p4 sync //JamCode/dev/jam/*.c
[list of files synced...]

C:\bruno_ws> p4 edit //JamCode/dev/jam/*.c
[list of files opened for edit...]
```

Now he issues the **p4 change** command and enters a description in the changelist form. After he saves the file and exits the editor, Helix creates a numbered changelist containing the files.

```
C:\bruno_ws\dev\main\docs\manuals> p4 change

    [Enter description and save form]

Change 777 created with 33 open file(s).
```

For the second bug fix, he performs the same steps, **p4 sync**, **p4 edit**, and **p4 change**. Now he has two numbered changelists, one for each fix.

The numbers assigned to submitted changelists reflect the order in which the changelists were submitted. When a changelist is submitted, Helix might renumber it, as shown in the following example:

Example 4.8. Automatic renumbering of changelists

Bruno has finished fixing the bug that he's been using changelist 777 for. After he created that changelist, he submitted another changelist, and two other users also submitted changelists. Bruno submits changelist 777 with **p4 submit -c 777**, and sees the following message:

```
Change 777 renamed change 783 and submitted.
```

Submit a numbered changelist

To submit a numbered changelist, specify the **-c** option when you issue the **p4 submit** command. To submit the default changelist, omit the **-c** option. For details, refer to the **p4 submit** command description in the *P4 Command Reference*.

Note

Using parallel submits can significantly improve performance. For additional information see the description of the **p4 submit** command in the *P4 Command Reference*.

Undo a submitted change

One of the fundamental benefits of version control is the ability to undo an unwanted change, either to undo the effects of a bad changelist or to roll back to a known good changelist.

You use the **p4 undo** command to accomplish this. For details, refer to the **p4 undo** command description in the *P4 Command Reference*.

Shelve changelists

The Helix shelving feature enables you to temporarily make copies of your files available to other users without checking the changelist into the depot.

Shelving is useful for individual developers who are switching between tasks or performing cross-platform testing before checking in their changes. Shelving also enables teams to easily hand off changes and to perform code reviews.

Example 4.9. Shelving a changelist.

Earl has made changes to `command.c` on a UNIX platform, and now wants others to be able to view and test his changes.

```
$ p4 edit //Acme/dev/command.c
//Acme/dev/command.c#9 - opened for edit
...

$ p4 shelve
Change 123 created with 1 open file(s).
Shelving files for change 123.
edit //Acme/dev/command.c#9
Change 123 files shelved.
```

A pending changelist is created, and the shelved version of `command.c` is stored in the server. The file `command.c` remains editable in Earl's workspace, and Earl can continue to work on the file, or can revert his changes and work on something else.

Shelved files remain open in the changelist from which they were shelved. (To add a file to an existing shelved changelist, you must first open that file in that specific changelist.) You can continue to work on the files in your workspace without affecting the shelved files. Shelved files can be synced to other workspaces, including workspaces owned by other users. For example:

Example 4.10. Unshelving a changelist for code review

Earl has asked for code review and a cross-platform compatibility check on the version of `command.c` that he shelved in changelist 123. Bruno, who is using a Windows computer, types:

```
C:\bruno_ws\dev> p4 unshelve -s 123 //Acme/dev/command.c
//Acme/dev/command.c#9 - unshelved, opened for edit
```

and conducts the test in the Windows environment while Earl continues on with other work.

When you shelve a file, the version on the shelf is unaffected by commands that you perform in your own workspace, even if you revert the file to work on something else.

Example 4.11. Handing off files to other users.

Earl's version of `command.c` works on UNIX, but Bruno's cross-platform check of `command.c` has revealed a bug. Bruno can take over the work from here, so Earl reverts his workspace and works on something else:

```
$ p4 revert //Acme/dev/command.c
//Acme/dev/command.c#9 - was edit, reverted
```

The shelved version of `command.c` is still available from Earl's pending changelist 123, and Bruno opens it in a new changelist, changelist 124.

```
$ p4 unshelve -s 123 -c 124 //Acme/dev/command.c
//Acme/dev/command.c#9 - unshelved, opened for edit
```

When Bruno is finished with the work, he can either re-shelve the file (in his own changelist 124, not Earl's changelist 123) for further review — with the **`p4 reshelve`** command — or discard the shelved file and submit the version in his workspace by using **`p4 submit`**.

The **`p4 submit`** command has a `-e` option that enables the submitting of shelved files directly from a changelist. All files in the shelved change must be up to date and resolved. Other restrictions can apply in the case of files shelved to stream targets; see the *P4 Command Reference* for details. (To avoid dealing with these restrictions, you can always move the shelved files into a new pending changelist before submitting that changelist.)

Example 4.12. Discarding shelved files before submitting a change.

The Windows cross-platform changes are complete, and changelist 124 is ready to be submitted. Bruno uses **`p4 shelve -d`** to discard the shelved files.

```
C:\bruno_ws\dev> p4 shelve -d -c 124
Shelve 124 deleted.
```

All files in the shelved changelist are deleted. Bruno can now submit the changelist.

```
C:\bruno_ws\dev> p4 submit -c 124
Change 124 submitted.
```

Bruno could have shelved the file in changelist 124, and let Earl unshelve it back into his original changelist 123 to complete the check-in.

Display information about changelists

To display brief information about changelists, use the **`p4 changes`** command. To display full information, use the **`p4 describe`** command. The following table describes some useful reporting commands and options:

Command	Description
`p4 changes`	Displays a list of all pending, submitted, and shelved changelists, one line per changelist, and an abbreviated description.

Command	Description
p4 changes -m *count*	Limits the number of changelists reported on to the last specified number of changelists.
p4 changes -s *status*	Limits the list to those changelists with a particular status; for example, **p4 changes -s submitted** lists only already submitted changelists.
p4 changes -u *user*	Limits the list to those changelists submitted by a particular user.
p4 changes -c *workspace*	Limits the list to those changelists submitted from a particular client workspace.
p4 describe *changenum*	Displays full information about a single changelist. If the changelist has already been submitted, the report includes a list of affected files and the diffs of these files. (You can use the **-s** option to exclude the file diffs.)
p4 describe -O *changenum*	If a changelist was renumbered, describe the changelist in terms of its original change number. (For example, the changelist renumbered in the example on Example 4.8, "Automatic renumbering of changelists" on page 39 can be retrieved with either **p4 describe 783** or **p4 describe -O 777**.)

For more information, see "Changelist reporting" on page 121.

Move files between changelists

To move files from one changelist to another, issue the **p4 reopen -c *changenum filenames*** command, where *changenum* specifies the number of the target changelist. If you are moving files to the default changelist, use **p4 reopen -c default *filenames***.

Delete changelists

To delete a pending changelist, you must first remove all files and jobs associated with it and then issue the **p4 change -d *changenum*** command. Related operations include the following:

- To move files to another changelist, issue the **p4 reopen -c *changenum*** command.
- To remove files from the changelist and discard any changes, issue the **p4 revert -c *changenum*** command.

Changelists that have already been submitted can be deleted only by a Helix administrator. See the *Helix Versioning Engine Administrator Guide: Fundamentals* for more information.

Configure client behavior

You can configure many aspects of the behavior of both the client workspace and the client binary running on your computer.

Chapter 5, "Configure clients" on page 45 discusses client configuration in detail.

Configure stream behavior

You can configure a stream's characteristics — such as its location, its type, and the files in its view, among other things.

"Configure a stream" on page 65 discusses stream configuration in detail.

Branch and populate child streams

After populating the mainline — as described in "Populate the mainline stream" on page 29 — you can branch files for development and for release. For example, to create a development stream that is a clone of its mainline parent, issue the following command:

```
$ p4 stream -t development -P //Acme/main //Acme/dev
```

Helix displays the stream specification with the type set to development. Save the specification. To populate the stream with the files from the mainline, issue the following commands:

```
$ p4 populate -d "From main" -S //Acme/dev -r
$ p4 sync
```

Propagate changes

Streams enable you to isolate stable code from work in progress, and to work concurrently on various projects without impediment. Best practice is to periodically update less stable streams from streams that are more stable (by merging), then promote changes to the more stable stream (by copying). Merging and copying are streamlined forms of integration. In general, propagate change as follows:

- For copying and branching, use **`p4 copy`** or **`p4 populate`**.
- For merging, use **`p4 merge`**.
- For edge cases not addressed by **`p4 merge`** or **`p4 copy`**, use **`p4 integrate`**.

The preceding guidelines apply to classic Helix as well.

Merge changes from a more stable stream

To update a stream with changes from a more stable stream, issue the **`p4 merge -S source-stream`** command, resolve as required, and submit the resulting changelist. By default, you cannot copy changes to a more stable stream until you have merged any incoming changes from the intended target. This practice ensures that you do not inadvertently overwrite any of the contents of the more stable stream.

Assuming changes have been checked into the mainline after you started working in the development stream (and assuming your workspace is set to a development stream), you can incorporate the changes into the development stream by issuing the following commands:

```
$ p4 merge
$ p4 resolve
$ p4 submit -d "Merged latest changes"
```

Copy changes to a more stable stream

After merging, your stream is up to date with its more stable parent or child. Assuming you've finalized the changes you want to make in the development stream, you can now promote its new content with no danger of overwriting work in the target stream. The copy operation simply propagates a duplicate of the source to the target, with no resolve required. For example, (and assuming your workspace is set to a mainline parent stream) to promote changes from the development stream to its parent mainline, issue the following commands:

```
$ p4 copy --from //Acme/dev
$ p4 submit -d "Check my new feature in"
```

Compare changes between streams

Using the **`p4 interchanges`** command, you can compare changes between streams to look for outstanding merges. Suppose you have a mainline stream `//Acme/main` and its child, a development stream, `//Acme/dev`. The following command tells you which changes exist in `//Acme/dev` but not in its parent stream:

```
$ p4 interchanges -S //Acme/dev
```

The following command tells you which changes exist in the parent of `//Acme/dev` but not in `//Acme/dev`:

```
$ p4 interchanges -S -r //Acme/dev
```

Propagate change across the stream hierarchy

You might need to propagate a specific change between two streams that do not have a natural parent-child relationship, for example, to obtain an in-progress feature or bug fix from a peer development stream. To merge from or copy to such a stream, you can re-parent your stream by editing its specification and setting the `Parent:` field to the desired source or target. This practice is not considered optimal but might be necessary.

Alternatively, you can use the `-P` option with the **`p4 merge`** command to do a one-off merge of the streams.

Chapter 5

Configure clients

You can configure many aspects of the behavior of a command-line client — such as which server port it listens on, the current client workspace name, and how files are mapped from the depot to the client workspace, among other things.

In Helix, the word "client" can refer to one of the following:

- The client process — that is, the running client binary (**p4**)
- The *client workspace* — the location on your computer where you work on file revisions managed by Helix

This chapter discusses configuring both.

Configure the client process

This guide refers to client settings using environment variables (for example, **set P4CLIENT**), but you can specify settings such as port, user, and workspace names using the following methods, listed in order of precedence:

1. On the command line, using options
2. In a config file, if P4CONFIG is set
3. User environment variables (on UNIX or Windows)
4. System environment variables (on Windows, system-wide environment variables are not necessarily the same thing as user environment variables)
5. On Windows or OS X, in the user registry or settings (set by issuing the **p4 set** command)
6. On Windows or OS X, in the system registry or system settings (set by issuing the **p4 set -s** command)

To configure your computer to connect to the Helix server, you specify the name of the host where the server is running, and the port on which it is listening. The default host is perforce and default port is 1666. If the server is running on your own computer, specify localhost as the host name. If the server is running on port 1666, you can omit the port specification.

You can specify these settings as described in the sections below. For details about working offline (without a connection to a Helix server), see "Work offline" on page 93.

Using the command line

To specify these settings on the command line, use the -p option. For example:

```
$ p4 -p tcp:localhost:1776 sync //JamCode/dev/jam/Jambase
```

Settings specified on the command line override any settings specified in config files, environment variables, the Windows registry, or OS X system settings. For more details about command-line options, refer to the discussion of global options in the *P4 Command Reference*.

Using config files

Config files are text files containing settings that are in effect for files in and below the directory where the config file resides. Config files are useful if you have multiple client workspaces on the same computer. By specifying the settings in config files, you avoid the inconvenience of changing system settings every time you want to work with a different workspace.

To use config files, you define the `P4CONFIG` environment variable, specifying a file name (for example, `.p4config`). When you issue a command, Helix searches the current working directory and its parent directories for the specified file and uses the settings it contains (unless the settings are overridden by command-line options).

Each setting in the file must be specified on its own line, using the following format:

`setting=value`

The following settings can be specified in a config file:

Setting	Description
`P4CHARSET`	Character set used for translation of Unicode files.
`P4COMMANDCHARSET`	Non-UTF-16 or UTF-32 character set used by Command-Line Client when `P4CHARSET` is set to a UTF-16 or UTF-32 character set.
`P4CLIENT`	Name of the current client workspace.
`P4DIFF`	The name and location of the diff program used by **`p4 resolve`** and **`p4 diff`**.
`P4EDITOR`	The editor invoked by those Helix commands that use forms.
`P4HOST`	Hostname of the client computer. Only useful if the `Host:` field of the current client workspace has been set in the **`p4 client`** form.
`P4IGNORE`	A list of files to ignore when using the **`p4 add`** and **`p4 reconcile`** commands.
`P4LANGUAGE`	This environment variable is reserved for system integrators.
`P4MERGE`	The name and location of the third-party merge program to be used by **`p4 resolve`**'s merge option.
`P4PASSWD`	Supplies the current Helix user's password for any Helix command.
`P4PORT`	The protocol, host and port number of the Helix server (including proxies or brokers) with which to communicate.
`P4TRUST`	The location of a file of known (trusted) Helix servers. You manage the contents of this file with the **`p4 trust`** command. By default, this file is `.p4trust` in your home directory.
`P4USER`	Current Helix user name.

For details about these settings, refer to the *P4 Command Reference*.

Example 5.1. Using config files to handle switching between two workspaces.

Ona switches between two workspaces on the same computer. The first workspace is `ona-ash`. It has a client root of `/tmp/user/ona` and connects to the Helix server using SSL at `ssl:ida:1818`. The second workspace is called `ona-agave`. Its client root is `/home/ona/p4-ona`, and it uses a plaintext connection to a Helix server at `tcp:warhol:1666`.

Ona sets the `P4CONFIG` environment variable to `.p4settings`. She creates a file called `.p4settings` in `/tmp/user/ona` containing the following text:

```
P4PORT=ssl:ida:1818
P4CLIENT=ona-ash
```

She creates a second `.p4settings` file in `/home/ona/p4-ona`. It contains the following text:

```
P4PORT=tcp:warhol:1666
P4CLIENT=ona-agave
```

Any work she does on files under `/tmp/user/ona` is managed by the Helix server at `ssl:ida:1818` and work she does on files under `/home/ona/p4-ona` is managed by the Helix server at `tcp:warhol:1666`.

Using environment variables

To configure connection settings using environment variables, set `P4PORT` to *`protocol:host:port`*, as in the following examples:

If the server runs on	and listens to port	supports encryption protocol	set P4PORT to
your computer	`1666`	nothing (plaintext)	`localhost:1666`
`perforce`	`1666`	SSL	`ssl:perforce:1666`
`houston`	`3435`	nothing (plaintext)	`tcp:houston:3435`
`example.com`	`1818`	SSL	`ssl:example.com:1818`

If you do not specify a protocol in your `P4PORT` setting, `tcp:` (plaintext communication over TCP/IP) is assumed. If the Helix server has been configured to support SSL, you can encrypt your connection to Helix by using `ssl:` as the desired protocol.

Other protocols (for example, `tcp4:` to require a plaintext IPv4 connection, or `ssl64:` to require an encrypted connection, but to prefer the use of the IPv6 transport instead of IPv4) are available for use in mixed networking environments.

See "Configure for IPv6 networks" on page 48, and the *Helix Versioning Engine Administrator Guide: Fundamentals*, for details.

Using the Windows registry or OS X system settings

On Windows and OS X computers, you can store connection settings in the registry (or system settings) by using the **p4 set** command. For example:

```
$ p4 set P4PORT=ssl:tea.example.com:1667
```

There are two ways you can configure client settings in the registry:

- **p4 set *setting=value***: for the current local user.
- **p4 set -s *setting=value***: for all users on the local computer. Can be overridden by any registry settings made for the local user. Requires administrative privileges.

To see which settings are in effect, use the **p4 set** command without arguments. For details about the **p4 set** command, see the *P4 Command Reference*.

Configure for IPv6 networks

Helix supports connectivity over IPv6 networks as well as over IPv4 networks.

Depending on the configuration of your LAN or WAN, your system administrator may recommend different port settings. Your administrator may also recommend that you set the `net.rfc3484` configurable to `1`, either from the command line or in a `P4CONFIG` file:

```
$ p4 configure set net.rfc3484=1
```

Doing so ensures RFC3484-compliant behavior if the protocol value is not explicitly specified; that is, if the client-side configurable `net.rfc3484` is set to `1`, and `P4PORT` is set to `example.com:1666`, or `tcp:example.com:1666`, or `ssl:example.com:1666`, the user's operating system automatically determines, for any given connection, whether to use IPv4 or IPv6 when communicating with the versioning server.

Further information is available in the *Helix Versioning Engine Administrator Guide: Fundamentals*.

Configure for Unicode

The Helix server can be run in Unicode mode to activate support for file names or directory names that contain Unicode characters, and Helix identifiers (for example, user names) and specifications (for example, changelist descriptions or jobs) that contain Unicode characters.

In Unicode mode, the Helix server also translates Unicode files and metadata to the character set configured on the user's computer, and verifies that the Unicode files and metadata contain valid UTF-8 characters.

Note	If you only need to manage textual files that contain Unicode characters, but do not need the features listed under "Configure for Unicode" on page 48, you do not

> need to run Helix in Unicode mode. Your system administrator will tell you if your site is using Unicode mode or not. For these installations, assign the Helix `utf16` file type to textual files that contain Unicode characters. You do not have to set the `P4CHARSET` or `P4COMMANDCHARSET` environment variables. See "Assigning file types for Unicode files" on page 138 for details.

To correctly inter-operate in Unicode mode, and to ensure that such files are translated correctly by the Helix server when the files are synced or submitted, you must set `P4CHARSET` to the character set that corresponds to the format used on your computer by the applications that access them, such as text editors or IDEs. These formats are typically listed when you save the file using the **Save As...** menu option.

Values of `P4CHARSET` that begin with `utf16` or `utf32` further require that you also set `P4COMMANDCHARSET` to a non `utf16` or `utf32` character set in which you want server output displayed. "Server output" includes informational and error messages, diff output, and information returned by reporting commands.

For a complete list of valid `P4CHARSET` values, issue the command **`p4 help charset`**.

For further information, see the *Helix Versioning Engine Administrator Guide: Fundamentals*.

Setting P4CHARSET on Windows

To set `P4CHARSET` for all users on a computer, you need Windows administrator privileges. Issue the following command:

```
C:\bruno_ws> p4 set -s P4CHARSET=character_set
```

To set `P4CHARSET` for the user currently logged in:

```
c:\bruno_ws> p4 set P4CHARSET=character_set
```

Your computer must have a compatible TrueType or OpenType font installed.

Setting P4CHARSET on UNIX

You can set `P4CHARSET` from a command shell or in a startup script such as `.kshrc`, `.cshrc`, or `.profile`. To determine the proper value for `P4CHARSET`, examine the setting of the `LANG` or `LOCALE` environment variable. Common settings are as follows

If LANG is...	Set P4CHARSET to
en_US.ISO_8859-1	iso8859-1
ja_JP.EUC	eucjp
ja_JP.PCK	shiftjis

In general, for a Japanese installation, set `P4CHARSET` to `eucjp`, and for a European installation, set `P4CHARSET` to `iso8859-1`.

Configure a client workspace

A Helix *client workspace* is a set of directories on your computer where you work on file revisions that are managed by Helix. Each workspace is given a name that identifies the client workspace to the Helix server. If no workspace name is specified (by setting the `P4CLIENT` environment variable) the default workspace name is the name of your computer. To specify the effective workspace name, set the `P4CLIENT` environment variable. You can have multiple workspaces on your computer.

All files within a Helix client workspace share a root directory, called the *client workspace root*. The workspace root is the highest-level directory of the workspace under which the managed source files reside.

If you configure multiple workspaces on the same computer, keep workspace locations separate to avoid inadvertently overwriting files. Ensure that client roots are located in different folders and that their workspace views do not map depot files to overlapping locations on your computer.

Although Windows-based systems do not have a root directory, Helix supports — via the concept of a null root — workspaces spread across multiple drives and/or a disjoint folder with only `c:\` as the root.

How Helix manages files in a workspace

Helix manages the files in a client workspace as follows:

- Files in the workspace are created, updated, and deleted as determined by your changes.
- Write permission is enabled when you edit a file, and disabled when you submit your changes.

The state of your workspace is tracked and managed by Helix. To avoid conflicts with the file management performed by Helix applications, do not manually change read-only permission settings on files. Helix has commands that help you determine whether or not the state of your client workspace corresponds to Helix's record of that state; see "Work offline" on page 93 for details.

Files in the workspace that you have not put under Helix control are ignored by Helix. For example, compiled objects, libraries, executables, and developers' temporary files that are created while developing software but not added to the depot are not affected by Helix commands.

By default, when you create a client workspace, the entire depot is mapped to your workspace. You can refine this mapping to view only a portion of the depot and to change the correspondence between depot and workspace locations, by refining the *workspace view*, as described in "Configure workspace views" on page 57.

Define a client workspace

To define a client workspace:

1. **Specify the workspace name by setting `P4CLIENT`; for example, on a UNIX system:**

```
$ export P4CLIENT=bruno_ws
```

2. **Issue the `p4 client` command.**

Important	Stream users must pass in the `S _streamname` option to the **`p4 client`** command to specify the name of the stream to which Helix should bind the workspace.

Helix displays the client specification form in your text editor. (For details about Helix forms, see "Using Helix forms" on page 152.)

1. **Specify (at least the minimum) settings and save the specification.**

No files are synced when you create a client specification. To find out how to sync files from the depot to your workspace, see "Sync files" on page 32. For details about relocating files on your computer, see "Change the location and/or layout of your workspace" on page 55.

The minimum settings you must specify to configure a client workspace are:

- **Workspace name**

  The workspace name defaults to your computer's hostname, but your computer can contain multiple workspaces. To specify the effective workspace, set `P4CLIENT`.

- **Workspace root**

  The client workspace root is the top directory of your client workspace, where Helix stores your working copies of depot files. Be sure to set the workspace root, or you might inadvertently sync files to your computer's root directory.

Note	For Windows users: when specifying a workspace root, you must include the drive letter. In addition, root is null on Windows when the client workspace is either on a disjoint drive with only `c:\` as the root and/or is spread over multiple drives.

If the workspace root directory does not exist, you must create it before the Helix application can make use of it.

The `@`, `#`, `*`, and `%` characters have specific meaning to Helix; if you have file or folder names that use these characters, see "Restrictions on filenames and identifiers" on page 147 for details.

- **Workspace view**

By default, the entire depot is mapped to your workspace. You can define a *workspace view* (also referred to as a *client view*) to determine which files in the depot are mapped to your workspace; this enables Helix to construct a one-to-one mapping between individual depot and workspace files. You can map files to have different names and locations in your workspace than they have in the depot.

For users of streams, Helix *generates* the workspace view from the contents of the stream spec's `Paths:` field. Users of classic Helix branches configure the workspace view by editing the contents of the client spec's `View:` field.

For details on configuration of workspace views, see "Configure workspace views" on page 57.

Configure workspace options

The following table describes the client spec `Options:` in detail:

Option	Description	Default
`[no]allwrite`	Specifies whether unopened files are always writable. By default, Helix makes unopened files read-only. To avoid inadvertently overwriting changes or causing syncs to fail, specify `noallwrite`. A setting of `allwrite` leaves unopened files writable by the current user; it does not set filesystem permissions to ensure that files are writable by any user of a multiuser system. If `allwrite` and `noclobber` are both set, Helix performs a safe sync, comparing the content in your client workspace against what was last synced. If the file was modified outside of Helix control, an error message is displayed and the file is not overwritten.	`noallwrite`
`[no]clobber`	Specifies whether **`p4 sync`** overwrites writable but unopened workspace files. (By default, Helix does not overwrite unopened files if they are writable.) If `allwrite` and `noclobber` are both set, Helix performs a safe sync, comparing the content in your client workspace against what was last synced. If the file was modified outside of Helix control, an error message is displayed and the file is not overwritten.	`noclobber`
`[no]compress`	Specifies whether data is compressed when it is sent between your computer and the Helix server.	`nocompress`
`[un]locked`	Specifies whether other users can use, edit, or delete the client workspace specification. A Helix administrator can override the lock with the `-f` (force) option. If you lock your client specification, be sure to set a password for the workspace's owner using the **`p4 passwd`** command.	`unlocked`
`[no]modtime`	For files *without* the `+m` (modtime) file type modifier, if `modtime` is set, the modification date (on the local filesystem) of a newly synced file is the datestamp *on the file* when the file was submitted to the depot. If `nomodtime` is set, the modification date is the date and time of sync. For files *with* the `+m` (modtime) file type, the modification date (on the local filesystem) of a newly synced file is the datestamp on the file when the file was submitted to the depot, regardless of the setting of `modtime` or `nomodtime` on the client.	`nomodtime` (date and time of sync). Ignored for files with the `+m` file type modifier.
`[no]rmdir`	Specifies whether **`p4 sync`** deletes empty directories in a workspace if all files in the directory have been removed.	`normdir`

Configure submit options

To control what happens to files in a changelist when you submit the changelist to the depot, set the `SubmitOptions:` field. Valid settings are as follows.

Option	Description
`submitunchanged`	All open files (with or without changes) are submitted to the depot. This is the default behavior of Helix.
`submitunchanged+reopen`	All open files (with or without changes) are submitted to the depot, and all files are automatically reopened in the default changelist.
`revertunchanged`	Only those files with content, type, or resolved changes are submitted to the depot. Unchanged files are reverted.
`revertunchanged+reopen`	Only those files with content, type, or resolved changes are submitted to the depot and reopened in the default changelist. Unchanged files are reverted and *not* reopened in the default changelist.
`leaveunchanged`	Only those files with content, type, or resolved changes are submitted to the depot. Any unchanged files are moved to the default changelist.
`leaveunchanged+reopen`	Only those files with content, type, or resolved changes are submitted to the depot. Unchanged files are moved to the default changelist, and changed files are reopened in the default changelist. This option is similar to `submitunchanged+reopen`, except that no unchanged files are submitted to the depot.

View a stream as of a specific changelist

The `StreamAtChange` option in the client spec lets you use the version of the stream specified as of a particular changelist to generate a workspace view. This is helpful when you want to see what the stream view was at a particular point in time, especially if your stream spec changes a lot (for example, if you frequently change what you're importing or what you're deciding to share). When you use the `StreamAtChange` option, you cannot submit changes to the files in the stream, since your workspace view is not up to date.

To set a stream workspace to use the version of the stream specified as of a particular changelist, do the following:

1. **Open the stream's workspace specification form for editing**.

   ```
   $ p4 client
   ```

2. **Use one of the following alternatives**:

   a. Edit the form to set `StreamAtChange:` to the changelist you want to view the stream as of. Or,

b. Issue this command:

```
$ p4 client -S //Ace/main@12546
```

For more information, see the *P4 Command Reference*.

Alternatively, you can issue the following command to sync a stream using the stream's view as of a specific changelist:

```
$ p4 switch [-r -v] stream@change
```

This command both sets the `StreamAtChange` value and syncs to the same change.

Configure line-ending settings

To specify how line endings are handled when you sync text files, set the `LineEnd:` field. Valid settings are as follows:

Option	Description
`local`	Use mode native to the client (default)
`unix`	UNIX-style (and Mac OS X) line endings: `LF`
`mac`	Mac pre-OS X: `CR` only
`win`	Windows- style: `CR`, `LF`
`share`	The `share` option normalizes mixed line-endings into UNIX line-end format. The `share` option does not affect files that are synced into a client workspace; however, when files are submitted back to the Helix server, the share option converts all Windows-style `CR/LF` line-endings and all Mac-style `CR` line-endings to the UNIX-style `LF`, leaving lone `LF`s untouched. When you sync your client workspace, line endings are set to `LF`. If you edit the file on a Windows computer, and your editor inserts `CR`'s before each `LF`, the extra `CR`'s do not appear in the archive file. The most common use of the `share` option is for users of Windows computers who mount their UNIX home directories as network drives; if you sync files from UNIX, but edit the files on a Windows computer. The `share` option implicitly edits the file(s) during a submit. As a consequence, if you have set the `LineEnd` field to `share` in your client spec, the **`p4 resolve`** command may prompt you to edit the file before resolving.

For detailed information about how Helix uses the line-ending settings, see "CR/LF Issues and Text Line-endings" in the Helix knowledge base:

http://answers.perforce.com/articles/KB_Article/CR-LF-Issues-and-Text-Line-endings

Change the location and/or layout of your workspace

To change the location of files in your workspace, issue the **`p4 client`** command and change either or both of the **`Root:`** and **`View:`** fields. Before changing these settings, ensure that you have no files checked out (by submitting or reverting open files).

If you're using streams, you must change the **`Paths:`** field in the stream spec, rather than the **`View:`** field, in the client spec.

If you intend to modify both fields, perform the following steps to ensure that your workspace files are located correctly:

1. To remove the files from their old location in the workspace, issue the **`p4 sync …#none`** command.
2. Change the **`Root:`** field. (The new client workspace root directory must exist on your computer before you can retrieve files into it.)
3. To copy the files to their new locations in the workspace, perform a **`p4 sync`**. (If you forget to perform the **`p4 sync …#none`** before you change the workspace view, you can always remove the files from their client workspace locations manually).
4. Users of streams, change the **`Paths:`** field in the stream spec. Users of classic Helix branches, change the **`View:`** field in the client spec.
5. Again, perform a **`p4 sync`**. This time, syncing changes the layout of the workspace. The files in the client workspace are synced to their new locations.

Manage workspaces

This section discusses various approaches to managing your stream workspaces.

Using one workspace for multiple streams

When working with multiple streams, you have two choices:

- Switch one workspace between multiple streams; the workspace is appropriately populated whenever you switch from one stream to another. While this requires some extra processing, it is the right choice when you don't need to work on different streams at the same time and you don't want to have multiple streams on disk at the same time.
- Establish a distinct workspace for each stream. This is the right choice if you want to move quickly between different streams or if you want to have multiple streams on disk at the same time.

  Note that distinct workspaces must have distinct workspace roots — that is, distinct local folders.

To change the stream associated with a workspace, issue the following command:

```
$ p4 switch streamname
```

To get a workspace view and a set of files as of a specific changelist, issue the following command:

```
$ p4 switch stream@change
```

Narrowing the scope of workspaces with virtual streams

For large projects, even consistently-organized streams may not sufficiently restrict workspace views. In large organizations, there are often many groups who are concerned with only a small subset of a project's files. In classic Helix, these users would manually restrict their workspace's view to include only the desired subset. Streams offer an analog; use a virtual stream as a filter:

For example, if ongoing development work is occurring in an `//Ace/dev` stream:

```
Stream:     //Ace/dev
Parent:     //Ace/main
Type:       development
Paths:
        share ...
```

Then a user who is working only with the documentation for the product (rather than all of the assets associated with the project) could create a virtual stream that includes only those files under `//Ace/dev/docs/...`, as follows:

```
Stream:     //Ace/devdocs
Parent:     //Ace/dev
Type:       virtual
Paths:
        share docs/...
```

The user can then can switch his or her workspace to the `devdocs` virtual stream with the following command:

```
$ p4 switch //Ace/devdocs
```

When using the `devdocs` workspace, the user's workspace view is automatically updated to include only the material in `//Ace/dev/docs/...` and any changes he or she makes in `//Ace/devdocs` are automatically made directly in the original `//Ace/dev` codeline without the need to manually run **`p4 copy`** or **`p4 merge`**.

For details on virtual streams, see "Virtual streams" on page 70.

Delete a client workspace

To delete a workspace, issue the **`p4 client -d clientname`** command. Deleting a client workspace removes Helix's record of the workspace but does not remove files from the workspace or the depot.

When you delete a workspace specification:

1. Revert (or submit) any pending or shelved changelists associated with the workspace.
2. Delete existing files from a client workspace (**`p4 sync ...#none`**). (optional)
3. Delete the client spec.

If you delete the client spec before you delete files in the workspace, you can delete workspace files using your operating system's file deletion command.

Configure workspace views

By default, when you create a client workspace, the entire depot is mapped to your workspace. You can refine this mapping to view only a portion of the depot and to change the correspondence between depot and workspace locations.

Helix generates workspace views automatically, from the stream spec, for all workspaces bound to that stream. When you bind a workspace to a stream, Helix generates the workspace view based on the structure of the stream. Specifically, it bases it on the depot mapping entries in the stream spec's `Paths:` field. If the structure of the stream changes, Helix updates the views of workspaces associated with the stream on an as-needed basis.

For details on all stream spec fields, see "Configure a stream" on page 65.

Note	Classic users update the workspace view manually, by editing the `View:` field in the client spec (invoked with the **`p4 client`** command.)

To modify a workspace view, issue the **`p4 stream`** command. Helix displays the stream specification form, which lists mappings in the `Paths:` field.

Suppose your stream spec contains the following entries under `Paths:`:

```
Paths:
import ...
isolate apps/bin/...
share apps/xp/...
exclude tests/...
```

Switching your workspace to this stream gives you this workspace view:

```
//Acme/XProd/apps/bin/... //bruno_ws/apps/bin/...

//Acme/XProd/apps/xp/...  //bruno_ws/apps/xp/...

-//Acme/XProd/tests/...   //bruno_ws/tests/...
```

The sections below provide details about specifying the workspace view. For more information, see the description of views in the *P4 Command Reference*.

Specify mappings

Views consist of multiple *mappings*. Each mapping has two parts.

- The left-hand side specifies one or more files in the depot and has the form: `//depotname/file_specification`
- The right-hand side specifies one or more files in the client workspace and has the form: `//clientname/file_specification`

The left-hand side of a workspace view mapping is called the *depot side*, and the right-hand side is the *client side*.

To determine the location of any workspace file on your computer, substitute the client workspace root for the workspace name on the client side of the mapping. For example, if the workspace root is `C:\bruno_ws`, the file `//JamCode/dev/jam/Jamfile` resides in `C:\bruno_ws\dev\jam\Jamfile`.

Later mappings override earlier ones. In the example below, the second line overrides the first line, mapping the files in `//Acme/dev/docs/manuals/` up two levels. When files in `//Acme/dev/docs/manuals/` are synced, they reside in `c:\bruno_ws\docs\`.

```
View:
    //Acme/dev/...            //bruno_ws/dev/...
    //Acme/dev/docs/...       //bruno_ws/docs/...
```

Use wildcards in workspace views

To map groups of files in workspace views, you use Helix wildcards. Any wildcard used on the depot side of a mapping must be matched with an identical wildcard in the mapping's client side. You can use the following wildcards to specify mappings in your client workspace:

Wildcard	Description
`*`	Matches anything except slashes. Matches only within a single directory. Case sensitivity depends on your platform.
`...`	Matches anything including slashes. Matches recursively (everything in and below the specified directory).
`%%1 - %%9`	Positional specifiers for substring rearrangement in filenames.

In the following simple workspace view, all files in the depot's `dev` stream are mapped to the corresponding locations in the client workspace:

```
//JamCode/dev/... //bruno_ws/dev/...
```

For example, the file `//JamCode/dev/jam/Makefile` is mapped to the workspace file `C:\bruno_ws\dev\jam\Makefile`.

Note	To avoid mapping unwanted files, always precede the `...` wildcard with a forward slash.

The mappings in workspace views always refer to the locations of files and directories in the depot; you cannot refer to specific revisions of a file in a workspace view.

Map part of the depot

If you are interested only in a subset of the depot files, map that portion. Reducing the scope of the workspace view also ensures that your commands do not inadvertently affect the entire depot. To restrict the workspace view, change the left-hand side of the `View:` field to specify the relevant portion of the depot.

Example 5.2. Mapping part of the depot to the client workspace.

Dai is working on the Jam project and maintaining the web site, so she sets the `View:` field as follows:

```
View:
    //JamCode/dev/jam/...       //dai-beos-locust/jam/...
    //JamCode/www/live/...      //dai-beos-locust/www/live/...
```

Map files to different locations in the workspace

Views can consist of multiple mappings, which are used to map portions of the depot file tree to different parts of the workspace file tree. If there is a conflict in the mappings, later mappings have precedence over the earlier ones.

Example 5.3. Multiple mappings in a single workspace view.

The following view ensures that Microsoft Word files in the manuals folder reside in the workspace in a top-level folder called `wordfiles`:

```
View:
    //depot/...                         //bruno_ws/...
    //Acme/dev/docs/manuals/*.doc       //bruno_ws/wordfiles/*.doc
```

Map files to different filenames

Mappings can be used to make the filenames in the workspace differ from those in the depot.

Example 5.4. Files with different names in the depot and the workspace

The following view maps the depot file `RELNOTES` to the workspace file `rnotes.txt`:

```
View:
    //depot/...                   //bruno_ws/...
    //JamCode/dev/jam/RELNOTES //bruno_ws/dev/jam/rnotes.txt
```

Rearrange parts of filenames

Positional specifiers `%%0` through `%%9` can be used to rearrange portions of filenames and directories.

Example 5.5. Using positional specifiers to rearrange filenames and directories.

The following view maps the depot file `//depot/allfiles/readme.txt` to the workspace file `filesbytype/txt/readme`:

```
View:
    //depot/allfiles/%%1.%%2  //bruno_ws/filesbytype/%%2/%%1
```

Exclude files and directories

Exclusionary mappings enable you to explicitly exclude files and directories from a workspace. To exclude a file or directory, precede the mapping with a minus sign (`-`). White space is not allowed between the minus sign and the mapping.

Example 5.6. Using views to exclude files from a client workspace.

Earl, who is working on the Jam project, does not want any HTML files synced to his workspace. His workspace view looks like this:

```
View:
    //JamCode/dev/jam/...        //earl-dev-beech/jam/...
    -//JamCode/dev/jam/....html  //earl-dev-beech/jam/....html
```

Map a single depot path to multiple locations in a workspace

Helix includes a "one-to-many" mapping feature, with which you can map a single depot path to multiple locations in a client workspace.

Important This feature is currently only available for users of classic Helix branches; one-to-many mapping is *not* available for streams.

Consider the following scenario: A company has a website whose content is divided into categories such as products, documentation, and technical support. The content for each of these categories is managed in its own location in the workspace.

However, all of these websites display the same logo. Consequently, all three of the locations in the workspace must contain the same image file for the logo.

You might try to map the depot path like this:

```
View:
    //Acme/images/logo.png  //bruno_ws/products/images/logo.png
    //Acme/images/logo.png  //bruno_ws/documentation/images/logo.png
    //Acme/images/logo.png  //bruno_ws/support/images/logo.png
```

When you sync the client, the depot file will only be mapped to the `support` location in the workspace. By default, in a situation in which a workspace view maps a depot path to multiple locations in a client, only the last location in the list is the one to which the depot files are actually mapped.

To enable Helix's one-to-many mapping feature, prepend `&` to the mapping line for each additional client location you want to map to, as in the following example:

```
View:
    //Acme/images/logo.png  //bruno_ws/products/images/logo.png
   &//Acme/images/logo.png  //bruno_ws/documentation/images/logo.png
   &//Acme/images/logo.png  //bruno_ws/support/images/logo.png
```

This time when you sync the client, the depot file will be mapped to all three locations. However, note that `bruno_ws/documentation`, and `bruno_ws/support` are read only-because *all mapping line prepended with `&` are read-only*.

Restrict access by changelist

You can restrict access to depot paths to a particular point in time by providing the depot path names and changelist numbers in the `ChangeView` field of the client specification. Files specified for the `ChangeView` field are read-only: they can be opened but not submitted. For example:

```
ChangeView:
      //depot/path/...@1000
```

In this example, revisions of the files in `//depot/path/...` are not visible if they were submitted after changelist 1000. Files submitted up to and including changelist 1000 are visible but read-only. You can specify multiple paths.

You may specify `ChangeView` entries in either depot syntax or client syntax.

Avoid mapping conflicts

When you use multiple mappings in a single view, a single file can inadvertently be mapped to two different places in the depot or workspace. When two mappings conflict in this way, the later mapping overrides the earlier mapping.

Example 5.7. Erroneous mappings that conflict.

Joe has constructed a view as follows:

```
View:
    //Acme/proj1/...    //joe/project/...
    //Acme/proj2/...    //joe/project/...
```

The second mapping `//Acme/proj2/...` maps to `//joe/project` and conflicts with the first mapping. Because these mappings conflict, the first mapping is ignored; no files in `//Acme/proj1` are mapped into the workspace: `//Acme/proj1/file.c` is not mapped, even if `//Acme/proj2/file.c` does not exist.

Automatically prune empty directories from a workspace

By default, Helix does not remove empty directories from your workspace. To change this behavior, issue the **`p4 client`** command and in the **`Options:`** field, change the option **`normdir`** to **`rmdir`**.

For more about changing workspace options, see "Configure workspace options" on page 52.

Map different depot locations to the same workspace location

Overlay mappings enable you to map files from more than one depot directory to the same place in a workspace. To overlay the contents of a second directory in your workspace, use a plus sign (**+**) in front of the mapping.

Example 5.8. Overlaying multiple directories in the same workspace.

Joe wants to combine the files from his projects when they are synced to his workspace, so he has constructed a view as follows:

```
View:
    //Acme/proj1/...    //joe/project/...
    +//Acme/proj2/...   //joe/project/...
```

The overlay mapping **`//Acme/proj2/...`** maps to **`//joe/project`**, and overlays the first mapping. Overlay mappings do not conflict. Files (even deleted files) in **`//Acme/proj2`** take precedence over files in **`//Acme/proj1`**. If **`//Acme/proj2/file.c`** is missing (as opposed to being present, but deleted), then **`//Acme/proj1/file.c`** is mapped into the workspace instead.

Overlay mappings are useful for applying sparse patches in build environments.

Deal with spaces in filenames and directories

Use quotation marks to enclose files or directories that contain spaces.

Example 5.9. Dealing with spaces in filenames and directories.

Joe wants to map files in the depot into his workspace, but some of the paths contain spaces:

```
View:
    "//Acme/Release 2.0/..."   //joe/current/...
    "//Acme/Release 1.1/..."   "//joe/Patch Release/..."
    //Acme/webstats/2011/...   "//joe/2011 Web Stats/..."
```

By placing quotation marks around the path components on the server side, client side, or both sides of the mappings, Joe can specify file names and/or directory components that contain spaces.

For more information, see "Spaces in filenames, pathnames, and identifiers" on page 147.

Map Windows workspaces across multiple drives

To specify a workspace that spans multiple Windows drives, use a `Root:` of `null` and specify the drive letters (in lowercase) in the workspace view. For example:

```
Client:     bruno_ws
Update:     2011/11/29 09:46:53
Access:     2011/03/02 10:28:40
Owner:      bruno
Root:       null
Options:    noallwrite noclobber nocompress unlocked nomodtime normdir
SubmitOptions: submitunchanged
LineEnd:    local
View:
    //Acme/dev/...      "//bruno_ws/c:/Current Release/..."
    //Acme/release/...  "//bruno_ws/d:/Prior Releases/..."
    //Acme/www/...      //bruno_ws/d:/website/...
```

Use the same workspace from different computers

By default, you can only use a workspace on the computer that is specified by the `Host:` field. If you want to use the same workspace on multiple computers with different platforms, delete the `Host:` entry and set the `AltRoots:` field in the client specification. You can specify a maximum of two alternate workspace roots. The locations must be visible from all computers that will be using them, for example through NFS or Samba mounts.

Helix compares the current working directory against the main `Root:` first, and then against the two `AltRoots:` if specified. The first root to match the current working directory is used. If no roots match, the main root is used.

Note

If you are using a Windows directory in any of your workspace roots, specify the Windows directory as your main client `Root:` and specify your other workspace root directories in the `AltRoots:` field.

In the example below, if user `bruno`'s current working directory is located under `/usr/bruno`, Helix uses the UNIX path as his workspace root, rather than `c:\bruno_ws`. This approach allows `bruno` to use the same client specification for both UNIX and Windows development.

```
Client: bruno_ws
Owner:  bruno
Description:
        Created by bruno.
Root:   c:\bruno_ws
AltRoots:
        /usr/bruno/
```

To find out which client workspace root is in effect, issue the **`p4 info`** command and check the `Client root:` field.

If you edit text files in the same workspace from different platforms, ensure that the editors and settings you use preserve the line endings. For details about line-endings in cross-platform settings, see "Configure line-ending settings" on page 54.

Chapter 6

Streams

This chapter describes how to configure streams, how to propagate changes between them, and how to update them.

Note	If you are an existing user of Helix branches and would like to use streams instead, see the Streams Migration Guide.

Configure a stream

To configure a stream you edit its associated *stream spec*. A stream spec names a path in a stream depot to be treated as a stream. A spec defines the stream's location, its type, its parent stream, the files in its view, and other configurable behaviors. It is created when you create a stream with the **`p4 stream`** command. You can update the spec's entries — as described in "Update streams" on page 75 — to change the stream's characteristics.

The following is a sample stream spec:

```
$ p4 stream -o //Acme/dev
# A Perforce Stream Specification.
#
# Use *'p4 help stream'* to see more about stream specifications and command.

Stream:  //Acme/dev

Update:  2015/02/06 10:57:04

Access:  2015/02/06 10:57:04

Owner:   bruno

Name:    //Acme/dev

Parent:  //Acme/main

Type:    development

Options: allsubmit unlocked toparent fromparent mergeany

Description:
         Our primary development stream for the project.

Paths:
         share ...
         import boost/... //3rd_party/boost/1.53.0/artifacts/original/...
         import boost/lib/linux26x86_64/... //3rd_party/boost/1.53.0/artifacts/original/lib/
linuxx86_64/gcc44libc212/...
         import boost/lib/linux26x86/... //3rd_party/boost/1.53.0/artifacts/original/lib/
linuxx86/gcc44libc212/...
         import protobuf/... //3rd_party/protobuf/2.4.1/artifacts/patch-1/...
         import gtest/... //3rd_party/gtest/1.7.0/artifacts/original/...
         import icu/... //3rd_party/icu/53.1/artifacts/original/...
         import p4-bin/lib.ntx64/vs11/p4api_vs2012_dyn.zip //builds/p15.1/p4-bin/bin.ntx64/
p4api_vs2012_dyn.zip
         import p4/... //depot/p15.1/p4/...
         exclude p4/lbr/...
         exclude p4/server/...

Remapped:
         p4/doc/... p4/relnotes/...

Ignored:
         .../~tmp.txt
```

The following table describes the stream spec in more detail:

Entry	Meaning
`Stream`	The `Stream` field is unique and specifies the depot path where the stream files live. All streams in a single stream depot must have the same number of forward slashes in their name; your administrator specifies this number in the

Entry	Meaning
	`StreamDepth` field of the stream depot spec. If you try to create a stream with a different number of forward slashes than those specified in the `StreamDepth` field, you'll get an error message like the following: `Error in stream specification. Stream streamname does not reflect depot depth-field streamdepth.`
`Update`	The date the stream specification was last changed.
`Access`	The date the specification was originally created.
`Owner`	The user or group who has specific and unique permissions to access to this stream.
`Name`	An alternate name of the stream, for use in display outputs. Defaults to the *streamname* portion of the stream path.
`Parent`	The parent of this stream. Can be `none` if the stream type is `mainline`, otherwise must be set to an existing stream identifier, of the form `//depotname/streamname`.
`Type`	Type of stream provides clues for commands run between stream and parent. The five types include `mainline`, `release`, `development` (default), `virtual` and `task`.
`Description`	A short description of the stream (optional).
`Options`	Stream Options: `allsubmit/ownersubmit [un]locked [no]toparent [no]fromparent mergedown/mergeany`
`Paths`	Identify paths in the stream and how they are to be generated in resulting workspace views of this stream. Path types are `share/isolate/import/import +/exclude`, which are discussed further in "Stream paths" on page 71. `p4d` uses the `Paths` entry to generate a workspace view. See "Configure workspace views" on page 57. **Note** Files don't actually have to be branched to appear in a stream. Instead, they can be *imported* from the parent stream or from other streams in the system.
`Remapped`	Remap a stream path in the resulting workspace view.
`Ignored`	Ignore a stream path in the resulting workspace view. Note that Perforce recommends that you use `p4 ignore` in lieu of this entry, to accomplish the same thing.

More on options

The following table summarizes the meaning of each of the options available in the stream spec:

Option	Meaning
`allsubmit`	All users can submit changes to the stream.
`ownersubmit`	Only the stream owner can submit changes to the stream.
`locked`	The stream spec cannot be deleted and only the stream owner can modify it.
`unlocked`	All users can edit or delete the stream spec.
`toparent`	Merges from the stream to its parent are expected.
`notoparent`	Merges from the stream to the parent are not expected.
`fromparent`	Merges to the stream from the parent are expected.
`nofromparent`	Merges to the stream from the parent are not expected.
`mergedown`	Enforces the best practice of merge down, copy up.
`mergeany`	Allows you to merge the stream's content both up and down.

This section discusses some key concepts related to streams.

Stream types

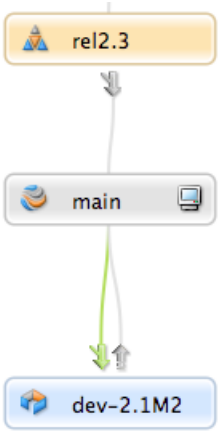
You assign stream types according to the stream's expected usage, stability and flow of change:

- Development streams are used for code that changes frequently; they they enable you to experiment without destabilizing the mainline stream.
- Mainline streams contain code that changes somewhat frequently, but is more stable than code in development streams.
- Release streams contain the most stable code, as this is the code closest to being released. Release streams enable you to finalize existing features while working on new features in the mainline.

There is also a *virtual* stream type and a *task* stream type. See "Task streams" on page 69 and "Virtual streams" on page 70, respectively.

On a scale of stability, a development stream is considered less stable than its mainline stream parent, while a release stream is considered more stable than its mainline stream parent. Change is expected to flow down by merging, and up by copying. This "merge down, copy up" practice assures that merging is done only when necessary, and always in the more forgiving of the two streams involved.

Merging means incorporating another stream's changes into your stream, and can require you to resolve conflicts. Copy propagates a duplicate of the source stream to the target. The following diagram shows a basic stream hierarchy: changes are merged down (to streams of lesser stability) and copied up (to streams of greater stability):



The following table summarizes these qualities of stream types:

Stream Type	Stability	Merge	Copy
`mainline`	Stable per your policy (for example, all code builds)	from child (from release, or to development)	to child (to release, or from development)
`virtual`	N/A; used to filter streams	N/A	N/A
`development`	Unstable	from parent	to parent
`task`	Unstable	from parent	to parent
`release`	Highly stable	to parent	from parent

Task streams

Task streams are lightweight short-lived streams used for bug fixing or new features that only modify a small subset of the stream data. Since branched (copied) files are tracked in a set of shadow tables that are later removed, repository metadata is kept to a minimum when using this type of stream and server performance is optimized.

They are branches that work just like development streams, but task streams remain semi-private until branched back to the parent stream. Designed as lightweight branches, they are most effective when anticipated work in the branch will only affect a small number of files relative to the number of files in the branch.

Task streams are intended to be deleted or unloaded after use. Because you cannot re-use task stream names even after the stream has been deleted, most sites adopt a naming convention that is likely to be unique for each task, such as *user-date-jobnumber*.

Working within task streams is just like working in a development stream:

1. **Create the task stream (in this example, as a child of a development stream).**

```
$ p4 stream -t task -P //projectX/dev //Tasks/mybug123
```

2. **Populate the stream.**

```
$ p4 populate -d "Fix bug 123" -S //Tasks/mybug123 -r
```

3. **Make changes to files in the stream and submit the changes**.

4. **Merge down any required changes from the parent stream, resolving as necessary**.

```
$ p4 merge
```

5. **Copy up the changes you made into the parent stream**.

```
$ p4 copy --from //Tasks/mybug123
```

6. **Delete or unload the task stream**.

```
$ p4 stream -d //Tasks/mybug123
```

   Alternatively, use **`p4 unload`** to unload it:

```
$ p4 unload -s //Tasks/mybug123
```

   Use unload if you think you might to work on the task stream again.

Only workspaces associated with the task stream can see all the files in the stream; the stream appears as a sparse branch to other workspaces, which see only those files and revisions that you changed within the task stream. Most other metadata for the task stream remains private.

Task streams can quickly accumulate in a depot until they are deleted or unloaded; to keep a project depot uncluttered by task streams, your Helix administrator or project lead may choose to establish certain streams depots as dedicated holding areas for task streams. In this case, create your stream in the task streams depot as a child of a parent in the project depot.

Task streams are unique in that they can live in different depots from their children or parents. However, the best practice is to have them reside in the same depot as their children or parents.

Virtual streams

Virtual streams can be used to create alternative views of real streams. Virtual streams differ from other stream types in that a virtual stream is not a separate set of files, but instead a filtered view of its parent stream. A virtual stream can have child streams, and its child streams inherit its views.

Stream paths

Stream paths control the files and paths that compose a stream and define how those files are propagated. Except for the mainline, each stream inherits its structure from its parent stream. To modify the structure of the child, you specify the paths as follows:

Type	Sync?	Submit?	Integrate to/from Parent?	Remarks
`share`	Y	Y	Y	(Default) For files that are edited and propagated between parent and child streams. All files in a shared path are branched and, in general, shared paths are the least restricted.
`isolate`	Y	Y	N	For files that must not be propagated outside the stream but can be edited within it, such as binary build results.
`import`	Y	N	N	For files that must be physically present in the stream but are never changed. Example: third-party libraries. Import paths can reference a specific changelist (or a label that aliases a changelist) to limit the imported files to the revisions at that change or lower. Use the syntax *@changelist#*, as in: `//depot/lib3.0/…@455678`.
`import+`	Y	Y	N	Functions like an import path, in that it can reference an explicitly-defined depot path, but unlike a standard import path, you *can* submit changes to the files in an `import+` path.
`exclude`	N	N	N	Files in the parent stream that must never be part of the child stream.

In the following example, files in the `src` path are not submittable (and are imported from the parent stream's view), files in the `lib` path are not submittable (and are imported from an explicitly-specified location in the depot), and files in the `db` path can be edited and submitted in the stream, but can never be copied to the parent:

```
Paths:
        share ...
        import src/...
        import lib/... //depot/lib3.0/...
        isolate db/...
```

The paths are used to generate the mappings for workspaces that are associated with the stream. If the stream structure changes, the workspace views are updated automatically and in fact cannot be altered manually. If the stream is locked, only the stream owner (or stream owners, if the `Owner:` field of the stream is set to a group) can edit the stream specification.

Stream specification can also remap file locations (so that a file in specified depot location is synced to a different location in the workspace) and screen out files according to file type. For example, to ensure that object files and executables are not part of the stream, add the following entries to the stream specification:

```
Ignored:
        .o
        .exe
```

Stream paths and inheritance between parents and children

Child streams inherit folder paths and behavioral rules from their parents. When we talk about inheritance between parents and children, it helps to think in the following terms:

- *Permissiveness*: what actions (submit, sync, etcetera) are permitted on a path?

  Path types are inherited from parent streams, and you cannot override the effects of the path types assigned by parent streams. In other words, child streams are always as permissive or less permissive than their parents, but never more permissive. For example, if a parent stream defines a path as `isolate`, its child streams cannot redefine the path as `share` to enable integrations.

- *Inclusiveness*: what paths are included in the stream?

  Since children cannot, by definition, be more inclusive than their parents, you cannot include a folder path in a child that is not also included in its parent. This means, for example, that you cannot add an `isolate` path to a child if the folders in that path are not also included in the parent.

  In the example in the table below, the incorrectly defined `Dev` stream, which is a child of `Main`, contains an `isolate` path that does not work, because it includes folders that are not included in the parent. In order to isolate the `config/` folder in the `Dev` stream, that folder has to be included as a `share` or `isolate` path in `Main`:

Incorrect	Correct

`Stream: //Acme/Main`
`Parent: none`
`Paths: share apps/...`
`Paths: share tests/...`
 	
`Stream: //Acme/Dev`
`Parent: //Acme/Main`
`Paths: share apps/...`
`share tests/...`
`isolate config/...`
	`Stream: //Acme/Main`
	`Parent: none`
	`Paths: share apps/...`
	`share tests/...`
	`share config/...`
	
	`Stream: //Acme/Dev`
	`Parent: //Acme/Main`
	`Paths: share apps/...`
	`share tests/...`
	`isolate config/...`

Example 6.1. Simple share

Let's start with a simple case: two streams, `//Ace/main` and its child `//Ace/dev`.

```
Stream: //Ace/main
Parent: none
Paths:  share ...

Stream: //Ace/dev
Parent: //Ace/main
Paths:  share ...
```

In this case, the entire stream path is shared. When you switch your workspace to the `//Ace/main` stream, the workspace view looks like this:

```
//Ace/main/... //bruno_ws/...
```

The workspace view maps the root of the `//Ace/main` stream to your workspace. When you you switch your workspace to the `//Ace/dev` stream, the workspace view is this:

```
//Ace/dev/... //bruno_ws/...
```

And the branch view for `//Ace/dev/` looks like this:

```
//Ace/dev/... //Ace/main/...
```

In other words, the entire `dev` stream can be synced to workspaces, and the entire stream can be branched, merged, and copied.

Example 6.2. Share and import

Let's look at an example where software components are housed in three separate depots: `//Acme`, `//Red`, and `//Tango`.

The `Acme` mainline is configured like this:

```
Stream: //Acme/Main
Parent: none
Paths:  share apps/...
        share tests/...
        import stuff/... //Red/R6.1/stuff/...
        import tools/... //Tango/tools/...
```

If you switch your workspace to the `//Acme/Main` stream, this would be your workspace view:

```
//Acme/Main/apps/...  //bruno_ws/apps/...
//Acme/Main/tests/... //bruno_ws/tests/...
//Red/R6.1/stuff/...  //bruno_ws/stuff/...
//Tango/tools/...     //bruno_ws/tools/...
```

The stream's `Paths` field lists folders relative to the root of the stream. Those are the folders you get in your workspace, beneath your workspace root. The shared folders are mapped to the `//Acme/Main` path, and the imported paths are mapped to their locations in the `//Red` and `//Tango` depots.

Example 6.3. Share, isolate, exclude, and import

Let's say that your team doesn't want to do actual development in the mainline. In this example, XProd feature team has a development stream of their own, defined like this:

```
Stream: //Acme/XProd
Parent: //Acme/Main
Paths:  import ...
        isolate apps/bin/...
        share apps/xp/...
        exclude tests/...
```

Switching your workspace to the `//Acme/XProd` stream gives you this view:

```
//Acme/Main/apps/...      //bruno_ws/apps/...
//Acme/XProd/apps/bin/... //bruno_ws/apps/bin/...
//Acme/XProd/apps/xp/...  //bruno_ws/apps/xp/...
//Red/R6.1/stuff/...      //bruno_ws/stuff/...
//Tango/tools/...         //bruno_ws/tools/...
-//Acme/XProd/tests/...   //bruno_ws/tests/...
```

Here we see workspace view inheritance at work. The contents of imported paths are mapped into your workspace. The shared and isolated paths are mapped to the child stream; these contain the files the XProd team is working on and will be submitting changes to. And the excluded path (marked with a minus sign in the view) doesn't appear in the workspace at all.

Because the `//Acme/XProd` stream has a parent, it has a branch mapping that can be used by the copy and merge commands. That branch view consists of the following, with just one path shared by the child and parent.

```
-//Acme/XProd/apps/...     //Acme/Main/apps/...
-//Acme/XProd/apps/bin/... //Acme/Main/apps/bin/...
//Acme/XProd/apps/xp/...   //Acme/Main/apps/xp/...
-//Acme/XProd/stuff/...    //Acme/Main/stuff/...
-//Acme/XProd/tests/...    //Acme/Main/tests/...
-//Acme/XProd/tools/...    //Acme/Main/tools/...
```

When you work in an `//Acme/XProd` workspace, it feels as if you're working in a full branch of `//Acme/Main`, but the actual branch is quite small.

Example 6.4. Child that shares all of the above parent

Let's suppose that Lisa, for example, creates a child stream from `//Acme/XProd`. Her stream spec looks like this:

```
Stream: //Acme/LisaDev
Parent: //Acme/XProd
Paths:  share ...
```

Lisa's stream has the default view template. Given that Lisa's entire stream path is set to **share**, you might expect that her entire workspace will be mapped to her stream. But it is not, because inherited behaviors always take precedence; sharing applies only to paths that are shared in the parent as well. A workspace for Lisa's stream, with its default view template, has this client view:

```
//Acme/Main/apps/...        //bruno_ws/apps/...
-//Acme/LisaDev/tests/...   //bruno_ws/tests/...
//Acme/LisaDev/apps/bin/... //bruno_ws/apps/bin/...
//Acme/LisaDev/apps/xp/...  //bruno_ws/apps/xp/...
//Red/R6.1/stuff/...        //bruno_ws/stuff/...
//Tango/tools/...           //bruno_ws/tools/...
```

A workspace in Lisa's stream is the same as a workspace in the XProd stream, with one exception: the paths available for submit are rooted in **//Acme/LisaDev**. This makes sense; if you work in Lisa's stream, you expect to submit changes to her stream. By contrast, the branch view that maps the **//Acme/Dev** stream to its parent maps only the path that is designated as shared in both streams:

```
-//Acme/Main/apps/...        //XProd/apps/...
-//Acme/LisaDev/tests/...    //XProd/tests/...
-//Acme/LisaDev/apps/bin/... //XProd/apps/bin/...
//Acme/LisaDev/apps/xp/...   //bruno_ws/apps/xp/...
-//Red/R6.1/stuff/...        //XProd/stuff/...
-//Tango/tools/...           //XProd/tools/...
```

The default template allows Lisa to branch her own versions of the paths her team is working on, and have a workspace with the identical view of non-branched files that she would have in the parent stream.

Update streams

As part of maintaining your version control application, you will likely update streams over time, by changing any of the fields listed above, to do such things as:

- modify the paths the stream consumes when the stream proves to be too narrow or too wide, in order to:
  - change the version of an included library by modifying the target of an **import** path
  - change the scope of a path to widen or narrow the scope included
- Change restrictions on who can submit to the stream

To do this, you modify stream specifications directly via the **p4 stream** command, automatically and immediately updating all workspace views derived from that stream.

Make changes to a stream spec and associated files atomically

Alternatively, you can isolate edits to the stream spec to the editing client prior to making them available to other clients as part of an atomic changelist submission. This works just as edits to files do: they are made locally on a single client and then submitted to make them available to other clients.

This functionality has a couple of important benefits:

- You can stage a stream spec in your workspace and test it before submitting it.
- You can submit the spec atomically in a changelist along with a set of files. Since the stream structure dictates the workspace view, this means that when users sync, they obtain the new view and the new files together.

You open and submit changes to the stream spec using the following three commands:

- **`p4 stream edit`** puts the client's current stream spec into the **`opened`** state, isolating any edits made to fields that affect view generation. While the spec is open, those fields are marked with the comment **`#open`** to indicate that they are open and isolated to your client. Changes made to these fields affect your workspace view normally, but other clients are not affected.
- **`p4 stream resolve`** resolves changes that have been submitted to the stream spec by other users since you opened it. You may not submit changes to the stream spec until newer changes have been resolved.
- **`p4 stream revert`** reverts any pending changes made to the open spec, returning your client to the latest submitted version of the stream.

For details on all three of these commands, see the **`p4 stream`** page in the *P4 Command Reference*.

By default, the open stream spec is included along with files that are shelved or submitted in a changelist. Conversely, when unshelving a change that contains an open stream spec, the current stream is opened and the shelved version becomes the opened version. If the stream is already open when attempting to unshelve, a warning is generated and the unshelve operation aborts. The stream may be omitted from any of these operations by using the **`-Af`** flag to specify that only files should be acted upon.

See the **`p4 submit`**, **`p4 shelve`**, and **`p4 unshelve`** commands in the *P4 Command Reference* for details.

Chapter 7

Resolve conflicts

In settings where multiple users are working on the same set of files, conflicts can occur. Helix enables your team to work on the same files simultaneously and resolve any conflicts that arise. For example, conflicts occur if two users change the same file (the primary concern in team settings) or you edit a previous revision of a file rather than the head revision.

When you attempt to submit a file that conflicts with the head revision in the depot, Helix requires you to resolve the conflict.

Merging changes from a development stream to a release stream is another typical task that requires you to resolve files.

To prevent conflicts, Helix enables you to lock files when they are edited. However, locking can restrict team development. Your team needs to choose the strategy that maximizes file availability while minimizing conflicts. For details, see "Locking files" on page 95.

How conflicts occur

Conflicts can occur in a number of ways, for example:

1. Bruno opens `//JamCode/dev/jam/command.c#8` for edit.
2. Gale subsequently opens the same file for edit in her own client workspace.
3. Bruno and Gale both edit `//Jamcode/dev/jam/command.c#8`.
4. Bruno submits a changelist containing `//JamCode/dev/jam/command.c`, and the submit succeeds.
5. Gale submits a changelist with her version of `//Acme/dev/jam/command.c`. Her submit fails.

If Helix accepts Gale's version into the depot, her changes will overwrite Bruno's changes. To prevent Bruno's changes from being lost, Helix rejects the changelist and schedules the conflicting file to be resolved. If you know of file conflicts in advance and want to schedule a file for resolution, sync it. Helix detects the conflicts and schedules the file for resolution.

How to resolve conflicts

To resolve a file conflict, you determine the contents of the files you intend to submit by issuing the **`p4 resolve`** command and choosing the desired method of resolution for each file. After you resolve conflicts, you submit the changelist containing the files.

Note	If you open a file for edit, then sync a subsequently submitted revision from the depot, Helix requires you to resolve to prevent your own changes from being overwritten by the depot file.

By default, Helix uses its diff program to detect conflicts. You can configure a third-party diff program. For details, see "Diff files" on page 36.

To resolve conflicts and submit your changes, perform the following steps:

1. Sync the files (for example **p4 sync //Acme/dev/jam/...**). Helix detects any conflicts and schedules the conflicting files for resolve.
2. Issue the **p4 resolve** command and resolve any conflicts. See "Options for resolving conflicts" on page 78 for details about resolve options.
3. Test the resulting files (for example, compile code and verify that it runs).
4. Submit the changelist containing the files.

Note

If any of the three file revisions participating in the merge are binary instead of text, a three-way merge is not possible. Instead, **p4 resolve** performs a two-way merge: the two conflicting file versions are presented, and you can choose between them or edit the one in your workspace before submitting the changelist.

Your, theirs, base, and merge files

The **p4 resolve** command uses the following terms during the merge process:

File revision	Description
yours	The revision of the file in your client workspace, containing changes you made.
theirs	The revision in the depot, edited by another user, that **yours** conflicts with. (Usually the head revision, but you can schedule a resolve with another revision using **p4 sync**.)
base	The file revision in the depot that *yours* and theirs were edited from (the closest common ancestor file).
merge	The file generated by Helix from *theirs*, *yours*, and *base*.
result	The final file resulting from the resolve process.

Options for resolving conflicts

To specify how a conflict is to be resolved, you issue the **p4 resolve** command, which displays a dialog for each file scheduled for resolve. The dialog describes the differences between the file you changed and the conflicting revision. For example:

```
C:\bruno_ws> p4 resolve //Acme/dev/jam/command.c
c:\bruno_ws\dev\main\jam\command.c - merging //Acme/dev/jam/command.c#9

Diff chunks: 4 yours + 2 theirs + 1 both + 1 conflicting
Accept(a) Edit(e) Diff(d) Merge (m) Skip(s) Help(?) e:
```

The differences between each pair of files are summarized by **p4 resolve**. Groups of lines (chunks) in the **yours**, **theirs**, and **base** files can differ in various ways. Chunks can be:

- **Diffs**: different between two of the three files: *yours*, *theirs*, or *base*
- **Conflicts**: different in all three files

In the preceding example:

- Four chunks are identical in *theirs* and *base* but are different in *yours*.
- Two chunks are identical in *yours* and *base* but are different in *theirs*.
- One chunk was changed identically in *yours* and *theirs*.
- One chunk is different in *yours*, *theirs*, and *base*.

Helix's recommended choice is displayed at the end of the command line. Pressing **Enter** or choosing **Accept** performs the recommended choice.

You can resolve conflicts in three basic ways:

- Accept a file without changing it (see "Accepting yours, theirs, or merge" on page 79)
- Edit the merge file with a text editor (see "Editing the merge file" on page 80)
- Merge changes selectively using a merge program (see "Merging to resolve conflicts" on page 80)

The preceding options are interactive. You can also specify resolve options on the **`p4 resolve`** command line, if you know which file you want to accept. For details, see "Resolve command-line options" on page 84. To re-resolve a resolved but unsubmitted file, specify the `-f` option when you issue the **`p4 resolve`** command. You cannot re-resolve a file after you submit it. The following sections describe the resolve options in more detail:

Accepting yours, theirs, or merge

To accept a file without changing it, specify one of the following options:

Option	Description	Remarks
`a`	Accept recommended file	• If *theirs* is identical to *base*, accept *yours*. • If *yours* is identical to *base*, accept *theirs*. • If *yours* and *theirs* are different from *base*, and there are no conflicts between *yours* and *theirs*; accept *merge*. • Otherwise, there are conflicts between *yours* and *theirs*, so skip this file.
`ae`	Accept edit	If you edited the *merge* file (by selecting `e` from the **`p4 resolve`** dialog), accept the edited version into the client workspace. The version in the client workspace is overwritten.

Option	Description	Remarks
`am`	Accept *merge*	Accept *merge* into the client workspace as the resolved revision. The version in the client workspace is overwritten.
`at`	Accept *theirs*	Accept *theirs* into the client workspace as the resolved revision. The version in the client workspace is overwritten.
`ay`	Accept *yours*	Accept *yours* into the client workspace as the resolved revision, ignoring changes that might have been made in *theirs*.

Accepting *yours*, *theirs*, *edit*, or *merge* overwrites changes, and the generated merge file might not be precisely what you want to submit to the depot. The most precise way to ensure that you submit only the desired changes is to use a merge program or edit the merge file.

Editing the merge file

To resolve files by editing the merge file, choose the `e` option. Helix launches your default text editor, displaying the merge file. In the merge file, diffs and conflicts appear in the following format:

```
>>>> ORIGINAL file#n
(text from the original version)
==== THEIR file#m
(text from their file)
==== YOURS file
(text from your file)
<<<<
```

To locate conflicts and differences, look for the difference marker `>>>>` and edit that portion of the text. Examine the changes made to *theirs* to make sure that they are compatible with your changes. Make sure you remove all conflict markers before saving. After you make the desired changes, save the file. At the **`p4 resolve`** prompt, choose `ae`.

By default, only the conflicts between the *yours* and *theirs* files are marked. To generate difference markers for all differences, specify the `-v` option when you issue the **`p4 resolve`** command.

Merging to resolve conflicts

A merge program displays the differences between yours, theirs, and the base file, and enables you to select and edit changes to produce the desired result file. To configure a merge program, set `P4MERGE` to the desired program. To use the merge program during a resolve, choose the `m` option. For details about using a specific merge program, consult its online help.

After you merge, save your results and exit the merge program. At the **`p4 resolve`** prompt, choose `am`.

Full list of resolve options

The **`p4 resolve`** command offers the following options:

Option	Action	Remarks
`?`	Help	Display help for **`p4 resolve`**.
`a`	Accept automatically	Accept the auto-selected file: • If *theirs* is identical to *base*, accept *yours*. • If *yours* is identical to *base*, accept *theirs*. • If *yours* and *theirs* are different from *base*, and there are no conflicts between *yours* and *theirs*; accept *merge*. • Otherwise, there are conflicts between *yours* and *theirs*, so skip this file.
`ae`	Accept edit	If you edited the *merge* file (by selecting `e` from the **`p4 resolve`** dialog), accept the edited version into the client workspace. The version in the client workspace is overwritten.
`am`	Accept *merge*	Accept *merge* into the client workspace as the resolved revision. The version in the client workspace is overwritten.
`at`	Accept *theirs*	Accept *theirs* into the client workspace as the resolved revision. The version in the client workspace is overwritten.
`ay`	Accept *yours*	Accept *yours* into the client workspace as the resolved revision, ignoring changes that might have been made in *theirs*.
`d`	Diff	Show diffs between *merge* and *yours*.
`dm`	Diff *merge*	Show diffs between *merge* and *base*.
`dt`	Diff *theirs*	Show diffs between *theirs* and *base*.
`dy`	Diff *yours*	Show diffs between *yours* and *base*.
`e`	Edit merged	Edit the preliminary merge file generated by Helix.
`et`	Edit *theirs*	Edit the revision in the depot that the client revision conflicts with (usually the head revision). This edit is read-only.
`ey`	Edit *yours*	Edit the revision of the file currently in the workspace.
`m`	Merge	Invoke the command `P4MERGE` *base theirs yours merge*. To use this option, you must set `P4MERGE` to the name of a third-party program that merges the first three files and writes the fourth as a result.
`s`	Skip	Skip this file and leave it scheduled for resolve.

Note

The *merge* file is generated by the Helix server, but the differences displayed by `dy`, `dt`, `dm`, and `d` are generated by your computer's diff program. To configure another

> diff program to be launched when you choose a **d** option during a resolve, set **P4DIFF**. For more details, see "Diff files" on page 36.

Example 7.1. Resolving file conflicts

To resolve conflicts between his work on a Jam **README** file and Gale's work on the same file, Bruno types **p4 resolve //Acme/dev/jam/README** and sees the following:

```
Diff chunks: 0 yours + 0 theirs + 0 both + 1 conflicting
Accept(a) Edit(e) Diff(d) Merge (m) Skip(s) Help(?) e: e
```

Bruno sees that he and Gale have made a conflicting change to the file. He types **e** to edit the merge file and searches for the difference marker **>>>>**. The following text is displayed:

```
Jam/MR (formerly "jam - make(1) redux")
/+\
>>>> ORIGINAL README#26
    +\ Copyright 1993, 1997 Christopher Seiwald.
==== THEIRS README#27
    +\ Copyright 1993, 1997, 2004 Christopher Seiwald.
==== YOURS README
    +\ Copyright 1993, 1997, 2005 Christopher Seiwald.
<<<<
    \+/
```

Bruno and Gale have updated the copyright date differently. Bruno edits the merge file so that the header is correct, exits from the editor and types **am**. The edited merge file is written to the client workspace, and he proceeds to resolve the next file.

When a version of the file is accepted during a resolve, the file in the workspace is overwritten, and the new client file must still be submitted to the depot. New conflicts can occur if new versions of a file are submitted after you resolve but before you submit the resolved files. This problem can be prevented by locking the file before you perform the resolve. For details, see "Locking files" on page 95.

Resolving branched files, deletions, moves and filetype changes

Beyond reconciling changes to the contents of related files after integration, you can also determine how other kinds of changes are handled. Consider this example:

- You edit **header.cc** in the mainline while a coworker deletes it in the release branch (or vice versa). You integrate fixes in the release branch back to main. During resolve, you can decide whether **header.cc** is deleted from the mainline or the action in the release branch is ignored, preserving **header.cc** in the mainline.

- A developer implements RCS keywords in source files in a development branch, and changes their Helix filetype from **text** to **text+k**. The release manager wants to integrate new features from the development branch to the mainline, but does not want to enable keyword expansion in the mainline. During resolve, the release manager can choose to ignore the filetype change.

- The file `header.cc` is branched from `main` to `rel`. Subsequently, it's renamed to `headerx.cc` in main, and moved in the release branch to the `headers` subfolder.

Following are simple cases describing how you can resolve non-content changes to related files. After a source file is branched to a target file, changes are made as describe below, then you integrate the source to the target. To choose the outcome, you specify the resolve options `at` ("Accept Theirs") or `ay` ("Accept Yours") as follows:

- **The source is edited and target is deleted**: the `at` option re-adds the source in the target branch. The `ay` option causes the file to remain deleted in the target branch.
- **The source is deleted and the target is edited**: the `at` option causes the file to be deleted in the target branch. The `ay` option retains the edited content in the target branch.
- **The target file was moved after being branched**: the `at` option moves the target file to the source file name and location. The `ay` option retains the target file name and location.
- **The filetype of the source file was changed after it was branched**: the `at` option propagates the change to the target. The `ay` option leaves the filetype of the target unchanged. If the differing filetypes do not conflict, you have the option of combining them.
- **Files have been moved or renamed in conflicting ways**: you are prompted to choose a path and filename. Example:

```
Resolving move to //Acme/rel/headerx.cc
Filename resolve:
at: //Acme/rel/headerx.cc
ay: //Acme/rel/headers/header.cc
am: //Acme/rel/headers/headerx.cc
```

By default, the **`p4 resolve`** command resolves all types of change, content and non-content. To constrain the type of actions that you want to resolve, specify the `-A` option as follows:

Option	What is Resolved
`-Aa`	Resolve attributes set by **`p4 attribute`**.
`-Ab`	Integrations where the source is edited and the target is deleted.
`-Ac`	Resolve file content changes as well as actions.
`-Ad`	Integrations where the source is deleted and target is edited.
`-Am`	Renames and moves.
`-At`	Filetype changes.
`-AQ`	Charset changes.

To perform more than one type of resolve, combine the options (for example: `-Abd`). By default, resolving is performed file by file, interactively. To specify the same outcome for a particular action

(for example, propagate all moves), and avoid the prompting, include the desired option on the command line. For example: **p4 resolve -Am -at**

Resolve command-line options

The **p4 resolve** options described below enable you to resolve directly instead of interactively. When you specify one of these options in the **p4 resolve** command, files are resolved as described in the following table:

Option	Description
`-a`	Accept the auto-selected file.
`-ay`	Accept *yours*.
`-at`	Accept *theirs*. Use this option with caution, because the file revision in your client workspace is overwritten with the head revision from the depot, and you cannot recover your changes.
`-am`	Accept the recommended file revision according to the following logic: • If *theirs* is identical to *base*, accept *yours*. • If *yours* is identical to *base*, accept *theirs*. • If *yours* and *theirs* are different from *base*, and there are no conflicts between *yours* and *theirs*, accept *merge*. • Otherwise, there are conflicts between *yours* and *theirs*, so skip this file, leaving it unresolved.
`-af`	Accept the recommended file revision, even if conflicts remain. If this option is used, edit the resulting file in the workspace to remove any difference markers.
`-as`	Accept the recommended file revision according to the following logic: • If *theirs* is identical to *base*, accept *yours*. • If *yours* is identical to *base*, accept *theirs*. • Otherwise skip this file.

Example 7.2. Automatically accepting particular revisions of conflicting files

Bruno has been editing the documentation files in `/doc` and knows that some of them require resolving. He types **p4 sync doc/*.guide**, and all of these files that conflict with files in the depot are scheduled for resolve.

He then types **p4 resolve -am** and the merge files for all scheduled resolves are generated, and those merge files that contain no line set conflicts are written to his client workspace. He'll still need to manually resolve any conflicting files, but the amount of work he needs to do is substantially reduced.

Resolve reporting commands

The following reporting commands are helpful when you are resolving file conflicts:

Command	Meaning
p4 diff [*filenames*]	Diffs the file revision in the workspace with the last revision you synced, to display changes you have made.
p4 diff2 *file1 file2*	Diffs two depot files. The specified files can be any two file revisions and different files. When you diff depot files, Helix server uses its own diff program, not the diff program configured by setting `P4DIFF`.
p4 sync -n [*filenames*\]	Previews the specified sync, listing which files have conflicts and need to be resolved.
p4 resolved	Reports files that have been resolved but not yet submitted.

Chapter 8 Codeline management

This chapter describes the tasks required to maintain groups of files in your depot. The following specific issues are addressed:

- Depot directory structure and how to best organize your repository
- Moving files and file changes among stream and project directories
- Identifying specific sets of files using either labels or changelists

This chapter focuses on maintaining a software codebase, but many of the tasks are relevant to managing other groups of files, such as a web site. For advice about best practices, see the white papers on the Perforce web site.

Organizing the depot

You can think of a depot as a top-level directory. Consider the following factors as you decide how to organize your depot:

- **Type of content**: create depots or mainline streams according to the nature of your projects and their relationships (for example, applications with multiple components developed on separate schedules).
- **Release requirements**: within a project, create streams for each release and merge changes between branches to control the introduction of features and bug fixes.
- **Build management**: use labels and changelists to control the file revisions that are built; use client specifications and views to ensure clean build areas.

A basic and logical way to organize the depot is to create one subdirectory (stream) for each project. For example, if your company is working on Jam, you might devote one stream to the release presently in development, another to already-released software, and perhaps one to your corporate web site. Your developers can modify their workspace views to map the files in their project, excluding other projects that are not of interest. For example, if Earl maintains the web site, his workspace view might look like this:

```
//JamCode/www/dev/...     //earl-web-catalpa/www/development/...
//JamCode/www/review/...  //earl-web-catalpa/www/review/...
//JamCode/www/live/...    //earl-web-catalpa/www/live/...
```

And Gale, who's working on Jam, sets up her workspace view as:

```
//Jamcode/dev/jam/... //gale-jam-oak/jam/...
```

You can organize according to projects or according to the purpose of a stream. For example, to organize the depot according to projects, you can use a structure like the following:

```
//Acme/project1/main/
//Acme/project1/release 1.0/
//Acme/project1/release 1.1/
```

Or, to organize the depot according to the purpose of each stream, you can use a structure like the following:

```
//Acme/main/project1/
//Acme/main/project2/
//Acme/release1.0/project1/
//Acme/release1.0/project2/
//Acme/release2.0/project1/
//Acme/release2.0/project2/
```

Another approach is to create one depot for each project. Choose a structure that makes branching and merging as simple as possible, so that the history of your activities makes sense to you.

Branching streams

If you are branching from a stream that has no history, use the **p4 add** command to add files to it, then use **p4 copy** to create the branched streams. For example, to create the mainline structure shown in the previous section, perform the following steps:

1. **Create a local folder your workspace for the mainline files; for example:**

```
$ mkdir c:\p4clients\myworkspace\depot\main\
```

2. **Copy the files for Project1 and Project2 to the newly created folder.**

3. **Add the files to the depot:**

```
$ p4 add //Acme/main/project1/...
$ p4 add //Acme/main/project2/...
$ p4 submit
```

4. **Create release streams:**

```
$ p4 copy //Acme/main/project1/... //Acme/release1.0/project1/...
$ p4 copy //Acme/main/project2/... //Acme/release1.0/project2/...
$ p4 submit
```

Now you can use the **p4 copy** and **p4 merge** commands to propagate changes between main and release streams. (You can also seed a stream from another stream using the **p4 integrate** command, if there is a historical relationship between the source and target that you need to preserve.)

A shortcut: p4 populate

If a target stream is completely empty (no files present, not even deleted files), Helix offers a command that automates the process of copying the files from an existing source stream submitting the associated changelist.

For example, instead of populating a **release1.0** branch with the following two commands:

```
$ p4 copy //Acme/main/project1/... //Acme/release1.0/project1/...
$ p4 submit
```

you can use the **p4 populate** command to populate the stream:

```
$ p4 populate //Acme/main/project1/... //Acme/release1.0/project1/...
```

Branching streams

Branching is a method of maintaining the relationship between sets of related files. Branches can evolve separately from their ancestors and descendants, and you can propagate (merge) changes from one branch to another as desired.

To create a stream, use the **p4 merge** command. The **p4 merge** command is also used to propagate changes between existing sets of files. For details about merging changes, refer to "Merge changes" on page 90.

When to branch

Create a branch when two sets of files have different submission policies or need to evolve separately. For example:

- *Problem* : the development group wants to submit code to the depot whenever their code changes, regardless of whether it compiles, but the release engineers don't want code to be submitted until it's been debugged, verified, and approved.

  Solution: create a release branch by branching the development codeline. When the development codeline is ready, it is merged into the release codeline. Patches and bug fixes are made in the release code and merged back into the development code.

- *Problem*: a company is writing a driver for a new multi-platform printer. The UNIX device driver is done and they are beginning work on an OS X driver, using the UNIX code as their starting point.

  Solution: create an OS X branch from the existing UNIX code. These two codelines can evolve separately. If bugs are found in one codeline, fixes can be merged to the other.

One basic strategy is to develop code in a mainline stream and create streams for releases. Make release-specific bug fixes in the release streams and, if required, merge them back into the mainline stream.

Branching streams

To branch a stream, use the **p4 branch** command. When you branch a stream, Helix records the relationships between the branched files and their ancestors.

You can create branches using file specifications or branch specifications. For simple branches, use file specifications. For branches that are based on complex sets of files or to ensure that you have a record

of the way you defined the branch, use branch specifications. Branch specifications can also be used in subsequent integrations. Branch specifications also can serve as a record of codeline policy.

Using branch specifications

To map a set of files from source to target, you can create a *branch mapping* and use it as an argument when you issue the **p4 integrate** command. To create a branch mapping, issue the **p4 branch *branchname*** command and specify the desired mapping in the **View:** field, with source files on the left and target files on the right. Make sure that the target files and directories are in your client view. Creating or altering a branch mapping has no effect on any files in the depot or client workspace. The branch mapping merely maps source files to target files.

To use the branch mapping to create a branch, issue the **p4 integrate -b *branchname*** command; then use **p4 submit** to submit the target files to the depot.

Branch specifications can contain multiple mappings and exclusionary mappings, just as client views can. For example, the following branch mapping branches the **Jam 1.0** source code, excluding test scripts, from the main codeline:

```
Branch:   jamgraph-1.0-dev2release

View:
    //depot/dev/main/jamgraph/...       //depot/release/jamgraph/1.0/...
    -//depot/dev/main/jamgraph/test/... //depot/release/jamgraph/1.0/test/...
    //depot/dev/main/bin/glut32.dll     //depot/release/jamgraph/1.0/bin/glut32.dll
```

To create a branch using the preceding branch mapping, issue the following command:

```
$ p4 integrate -b jamgraph-1.0-dev2release
```

and use **p4 submit** to submit the changes.

To delete a branch mapping, issue the **p4 branch -d *branchname*** command. Deleting a branch mapping has no effect on existing files or branches.

As with workspace views, if a filename or path in a branch view contains spaces, make sure to quote the path:

```
//depot/dev/main/jamgraph/... "//depot/release/Jamgraph 1.0/..."
```

Merge changes

After you create branches, you might need to propagate changes between them. For example, if you fix a bug in a release branch, you probably want to incorporate the fix back into your main codeline. To propagate selected changes between branched files, you use the **p4 merge** and **p4 resolve** commands, as follows:

1. Issue the **p4 merge** command to schedule the files for resolve.
2. Issue the **p4 resolve** command to propagate changes from the source files to the target files.

   To propagate individual changes, edit the merge file or use a merge program. The changes are made to the target files in the client workspace.
3. Submit the changelist containing the resolved files.

Example 8.1. Propagating changes between branched files

Bruno has fixed a bug in the release 2.2 branch of the Jam project and needs to integrate it back to the main codeline. From his home directory, Bruno types the following:

```
$ p4 merge //JamCode/release/jam/2.2/src/Jambase //JamCode/dev/jam/Jambase
```

He sees the following message:

```
//JamCode/dev/jam/Jambase#134 - merge from ////JamCode/release/jam/2.2/src/Jambase#9
```

The file has been scheduled for resolve. He types **p4 resolve**, and the standard merge dialog appears on his screen.

```
//JamCode/dev/jam/Jambase - merging depot/release/jam/2.2/src/Jambase#9
Diff chunks: 0 yours + 1 theirs + 0 both + 0 conflicting
Accept(a) Edit(e) Diff(d) Merge (m) Skip(s) Help(?) [at]:
```

He resolves the conflict. When he's done, the result file overwrites the file in his workspace. The changelist containing the file must be submitted to the depot.

To run the **p4 merge** or **p4 copy** commands, you must have Helix **write** permission on the target files, and **read** access on the source files. (See the *Helix Versioning Engine Administrator Guide: Fundamentals* for information on Helix permissions.)

By default, a file that has been newly created in a client workspace by **p4 merge** cannot be edited before being submitted. To edit a newly merged file before submission, resolve it, then issue the **p4 edit** command.

If the range of revisions being merged includes deleted revisions (for example, a file was deleted from the depot, then re-added), you can specify how deleted revisions are merged using the **-Di** option. For details, refer to the *P4 Command Reference*.

Merging between unrelated files

If the target file was not branched from the source, there is no *base* (common ancestor) revision, and Helix uses the first (most recently added) revision of the source file as its base revision. This operation is referred to as a *baseless merge*.

Merging specific file revisions

By default, the **p4 merge** command merges all the revisions following the last-merged source revision into the target. To avoid having to manually delete unwanted revisions from the merge file while editing, you can specify a range of revisions to be merged. The *base* file is the revision with the most edits in common.

Example 8.2. Merging specific file revisions

Bruno has made two bug fixes to `//JamCode/dev/jam/scan.c` in the development stream, and Earl wants to merge the change into the release 1.0 branch. Although `scan.c` has gone through several revisions since the fixes were submitted, Earl knows that the bug fixes he wants were made to the 30th revision of `scan.c`. He types:

```
$ p4 integrate -b jamgraph-1.0-dev2release depot/release/jam/1.0/scan.c#30,30
```

The target file (`//depot/release/jam/1.0/scan.c`) is given as an argument, but the file revisions are applied to the source. When Earl runs **p4 resolve**, only the 30th revision of Bruno's file is scheduled for resolve. That is, Earl sees only the changes that Bruno made to `scan.c` at revision 30.

Re-merging and re-resolving files

After a revision of a source file has been merged into a target, that revision is skipped in subsequent merges to the same target. To force the merging of already-merged files, specify the `-f` option when you issue the **p4 merge** command.

A target that has been resolved but not submitted can be resolved again by specifying the `-f` option to **p4 resolve**. When you re-resolve a file, *yours* is the new client file, the result of the original resolve.

Reporting branches and merges

The reporting commands below provide useful information about the status of files being branched and merged. Note the use of the preview option (`-n`) for reporting purposes.

To display this information	Use this command
Preview of the results of an integration	**p4 integrate -n [*filepatterns*]**
Files that are scheduled for resolve	**p4 resolve -n [*filepatterns*]**
Files that have been resolved but not yet submitted.	**p4 resolved**
List of branch specifications	**p4 branches**
The integration history of the specified files.	**p4 integrated *filepatterns***
The revision histories of the specified files, including the integration histories of files from which the specified files were branched.	**p4 filelog -i [*filepatterns*]**

Chapter 9

Less common tasks

This chapter discusses less common tasks.

Work offline

The preferred method of working offline (without access to the Helix server) is to use DVCS (distributed versioning) features. For details, refer to *Using Helix for Distributed Versioning*.

If you work offline, you must manually reconcile your work with the Helix service when you regain access to it. The following method for working detached assumes that you work on files in your workspace or update the workspace with your additions, changes, and deletions before you update the depot:

To work offline:

1. Work on files without issuing **p4** commands. Instead, use operating system commands to change the permissions on files.
2. After the network connection is re-established, use **p4 status** or **p4 reconcile** to find all files in your workspace that have changed.
3. Submit the resulting changelist(s).

To detect changed files, issue the **p4 status** or **p4 reconcile** commands. The commands perform essentially the same function, but differ in their default behavior and output format.

Command	Description
p4 reconcile	When called without arguments, **p4 reconcile** opens the files in a changelist. To preview an operation, you must either use the **-n** option with **p4 reconcile**, or use the **p4 status** command.
p4 status	When called without arguments, **p4 status** only previews the results of the workspace reconciliation. You must use either **p4 status -A** (or some combination of the **-e**, **-a**, or **-d** options) to actually open the files in a changelist.

Ignoring groups of files when adding

Sometimes development processes result in the creation of extraneous content that should not be submitted to the depot. Compilers produce object files and executables during development, text editors and word processors produce backup files, and you may have your own personal conventions for notes on work in progress.

To ignore files (or groups of files) when adding, create a file with a list of file specifications you wish to ignore, and set the **P4IGNORE** environment variable to point to this file.

When you add files, the full local path and parent directories of any file to be added are searched for **P4IGNORE** files. If any **P4IGNORE** files exist, their rules are added to a list, with greater precedence given to **P4IGNORE** rules closest to the file being added.

The syntax for `P4IGNORE` files is *not* the same as Helix syntax. Instead, it is similar to that used by other versioning systems: files are specified in local syntax, a `#` character at the beginning of a line denotes a comment, a `!` character at the beginning of a line excludes the file specification, and the * wildcard matches substrings. The Helix wildcard of `...` is not permitted.

Character	Meaning in P4IGNORE files
*	Matches anything except slashes. Matches only within a single directory. Case sensitivity depends on your client platform.
!	Exclude the file specification from consideration.
#	Comment character; this line is ignored.

Example 9.1. Ignoring groups of files when adding.

Bruno unit tests his code before submitting it to the depot and does not want to accidentally add any object files or generated executables when reconciling his workspace.

Bruno first sets `P4IGNORE` to point to the correct file:

```
$ export P4IGNORE=.p4ignore
```

He then creates the following file and stores it as `.p4ignore` in the root of his workspace:

```
# Ignore .p4ignore files
.p4ignore
# Ignore object files, shared libraries, executables
*.dll
*.so
*.exe
*.o
# Ignore all text files except readme file
*.txt
!readme.txt
```

The next time he runs a command (such as **`p4 add *.*`**), the rules are applied across the entire workspace.

To override (or ignore) the `P4IGNORE` file, use the `-I` option with the **`p4 add`**, **`p4 reconcile`**, or **`p4 status`** commands.

Reporting ignored files

The **`p4 ignores`** command reports the ignore mappings in effect. Specifically, it displays the ignore mappings computed from the rules in the `P4IGNORE` file.

If you add the `-i` option, it reports whether a particular file or set of files will be ignored.

For more information on **`p4 ignores`**, see the **`p4 ignores`** page in the *P4 Command Reference*.

Locking files

After you open a file, you can lock it to prevent other users from submitting it before you do. The benefit of locking a file is that conflicts are prevented, but when you lock a file, you might prevent other team members from proceeding with their work on that file.

Preventing multiple resolves by locking files

Without file locking, there is no guarantee that the resolve process ever ends. The following scenario demonstrates the problem:

1. Bruno opens file for edit.
2. Gale opens the same file in her client for edit.
3. Bruno and Gale both edit their client workspace versions of the file.
4. Bruno submits a changelist containing that file, and his submit succeeds.
5. Gale submits a changelist with her version of the file; her submit fails because of file conflicts with the new depot's file.
6. Gale starts a resolve.
7. Bruno edits and submits a new version of the same file.
8. Gale finishes the resolve and attempts to submit; the submit fails and must now be merged with Bruno's latest file.

   …and so on.

To prevent such problems, you can lock files, as follows.

1. Before scheduling a resolve, lock the file.
2. Sync the file (to schedule a resolve).
3. Resolve the file.
4. Submit the file.
5. Helix automatically unlocks the file after successful changelist submission.

To list open locked files on UNIX, issue the following command:

```
$ p4 opened | grep "*locked*"
```

Preventing multiple checkouts

To ensure that only one user at a time can work on the file, use the `+l` (exclusive-open) file type modifier. For example:

```
$ p4 reopen -t binary+l file
```

Although exclusive locking prevents concurrent development, for some file types (binary files), merging and resolving are not meaningful, so you can prevent conflicts by preventing multiple users from working on the file simultaneously.

Your Helix administrator can use the **`p4 typemap`** command to ensure that all files of a specified type (for instance, `//depot/.../*.gif` for all `.gif` files) can only be opened by one user at a time. See the *P4 Command Reference*.

The difference between **`p4 lock`** and `+l` is that **`p4 lock`** allows anyone to open a file for edit, but only the person who locked the file can submit it. By contrast, a file of type `+l` prevents more than one user from opening the file.

Chapter 10

Security

For security purposes, your Helix administrator can configure the Helix server to require SSL-encrypted connections, user passwords, and to limit the length of time for which your login ticket is valid. The following sections provide details:

SSL-encrypted connections

If your installation requires SSL, make sure your `P4PORT` is of the form `ssl:hostname:port`. If you attempt to communicate in plaintext with an SSL-enabled Helix server, the following error message is displayed:

```
Failed client connect, server using SSL.
Client must add SSL protocol prefix to P4PORT.
```

Set `P4PORT` to `ssl:hostname:port`, and attempt to reconnect to the server.

The first time you establish an encrypted connection with an SSL-enabled server, you are prompted to verify the server's fingerprint:

```
The authenticity of '10.0.0.2:1818' can't be established,
this may be your first attempt to connect to this P4PORT.
The fingerprint for the key sent to your client is
CA:BE:5B:77:14:1B:2E:97:F0:5F:31:6E:33:6F:0E:1A:E9:DA:EF:E2
```

Your administrator can confirm whether the displayed fingerprint is correct or not. If (and only if) the fingerprint is correct, use the **`p4 trust`** command to add it to your `P4TRUST` file. If `P4TRUST` is unset, this file is assumed to be `.p4trust` in your home directory:

```
$ p4 trust
The fingerprint of the server of your P4PORT setting
'ssl:example.com:1818' (10.0.0.2:1818) is not known.
That fingerprint is
CA:BE:5B:77:14:1B:2E:97:F0:5F:31:6E:33:6F:0E:1A:E9:DA:EF:E2
Are you sure you want to establish trust (yes/no)?
Added trust for P4PORT 'ssl:example.com:1818' (10.0.0.2:1818)
```

If the fingerprint is accurate, enter `yes` to trust this server. You can also install a fingerprint directly into your trust file from the command line. Run:

```
$ p4 trust -p ssl:hostname:port -i fingerprint
```

where `ssl:hostname:port` corresponds to your `P4PORT` setting, and *fingerprint* corresponds to a fingerprint that your administrator has verified.

From this point forward, any SSL connection to `ssl:example.com:1818` is trusted, so long as the server at `example.com:1818` continues to report a fingerprint that matches the one recorded in your `P4TRUST` file.

If the Helix server ever reports a different fingerprint than the one that you have trusted, the following error message is displayed:

```
******* WARNING P4PORT IDENTIFICATION HAS CHANGED! *******
It is possible that someone is intercepting your connection
to the Perforce P4PORT '10.0.50.39:1667'
If this is not a scheduled key change, then you should contact
your Perforce administrator.
The fingerprint for the mismatched key sent to your client is
18:FC:4F:C3:2E:FA:7A:AE:BC:74:58:2F:FC:F5:87:7C:BE:C0:2D:B5
To allow connection use the 'p4 trust' command.
```

This error message indicates that the server's fingerprint has changed from one that you stored in your `P4TRUST` file and indicates that the server's SSL credentials have changed.

Although the change to the fingerprint may be legitimate (for example, your administrator controls the length of time for which your server's SSL credentials remain valid, and your server's credentials may have expired), it can also indicate the presence of a security risk.

Warning

If you see this error message, and your Helix administrator has not notified you of a change to your server's key and certificate pair, it is imperative that you *independently* verify the accuracy of the reported fingerprint.

Unless you can independently confirm the veracity of the new fingerprint (by some out-of-band means ranging from the company's intranet site, or by personally contacting your administrator), do not trust the changed fingerprint.

Connecting to services that require plaintext connections

If your Helix installation requires plaintext (in order to support older Helix applications), set `P4PORT` to `tcp:`*`hostname`*`:`*`port`*`.` If you attempt to use SSL to connect to a service that expects plaintext connections, the following error message is displayed:

```
Perforce client error:
    SSL connect to ssl:_host_:_port_ failed (Connection reset by peer).
    Remove SSL protocol prefix from P4PORT.
```

Set `P4PORT` to `tcp:`*`hostname`*`:`*`port`* (or, if you are using applications at release 2011.1 or earlier, set `P4PORT` to *`hostname`*`:`*`port`*), and attempt to reconnect to the service.

Passwords

Depending on the security level at which your Helix installation is running, you might need to log in to Helix before you can run Helix commands. Without passwords, any user can assume the identity of any other Helix user by setting `P4USER` to a different user name or specifying the `-u` option when you issue a **`p4`** command. To improve security, use passwords.

Setting passwords

To create a password for your Helix user, issue the **p4 passwd** command.

Passwords may be up to 1,024 characters in length. Your system administrator can configure Helix to require "strong" passwords, the minimum length of a password, and if you have been assigned a default password, your administrator can further require that you change your password before you first use Helix.

By default, the Helix server defines a password as strong if it is at least eight characters long and contains at least two of the following:

- Uppercase letters
- Lowercase letters
- Non-alphabetic characters

In an environment with a minimum password length of eight characters, for example, `a1b2c3d4`, `A1B2C3D4`, `aBcDeFgH` would be considered strong passwords.

To reset or remove a password (without knowing the password), Helix superuser privilege is required. If you need to have your password reset, contact your Helix administrator. See the *Helix Versioning Engine Administrator Guide: Fundamentals* for details.

Using your password

If your Helix user has a password set, you must use it when you issue **p4** commands. To use the password, you can:

- Log into Helix by issuing the **p4 login** command, before issuing other commands.
- Set `P4PASSWD` to your password, either in the environment or in a config file.
- Specify the `-P` *password* option when you issue **p4** commands (for instance, **p4 -P *mypassword* submit**).
- Windows or OS X: store your password by using the **p4 set -s** command. Not advised for sites where security is high. Helix administrators can disable this feature.

Connection time limits

Your Helix administrator can configure the Helix server to enforce time limits for users. Helix uses ticket-based authentication to enforce time limits. Because ticket-based authentication does not rely on environment variables or command-line options, it is more secure than password-based authentication.

Tickets are stored in a file in your home directory. After you have logged in, your ticket is valid for a limited period of time (by default, 12 hours).

Logging in and logging out

If time limits are in effect at your site, you must issue the **p4 login** command to obtain a ticket. Enter your password when prompted. If you log in successfully, a ticket is created for you in the ticket file in your home directory, and you are not prompted to log in again until either your ticket expires or you log out by issuing the **p4 logout** command.

To see how much time remains before your login expires, issue the following command:

```
$ p4 login -s
```

If your ticket is valid, the length of time remaining is displayed. To extend a ticket's lifespan, use **p4 login** while already logged in. Your ticket's lifespan is extended by 1/3 of its initial timeout setting, subject to a maximum of your ticket's initial timeout setting.

To log out of Helix, issue the following command:

```
$ p4 logout
```

Working on multiple computers

By default, your ticket is valid only for the IP address of the computer from which you logged in. If you use Helix from multiple computers that share a home directory (typical in many UNIX environments), log in with:

```
$ p4 login -a
```

Using **p4 login -a** creates a ticket in your home directory that is valid from all IP addresses, enabling you to remain logged into Helix from more than one computer.

To log out from all computers simultaneously, issue the following command:

```
$ p4 logout -a
```

For more information about the **p4 login** and **p4 logout** commands, see the *P4 Command Reference*.

Chapter 11

Labels

A Helix *label* is a set of tagged file revisions. For example, you might want to tag the file revisions that compose a particular release with the label `release2.0.1`. In general, you can use labels to:

- Keep track of all the file revisions contained in a particular release of software.
- Distribute a particular set of file revisions to other users (for example, a standard configuration).
- Populate a clean build workspace.
- Specify a set of file revisions to be branched for development purposes.
- Sync the revisions as a group to a client workspace.

Labels and changelist numbers both refer to particular sets of file revisions but differ as follows:

- A label can refer to any set of file revisions. A changelist number refers to the contents of all the files in the depot at the time the changelist was submitted. If you need to refer to a group of file revisions from different points in time, use a label. If there is a point in time at which the files are consistent for your purposes, use a changelist number.
- You can change the contents of a label. You cannot change the contents of a submitted changelist.
- You can assign your own names to labels. Changelist numbers are assigned by Helix.

Changelists are suitable for many applications that traditionally use labels. Unlike labels, changelists represent the state of a set of files at a specific time. Before you assume that a label is required, consider whether simply referring to a changelist number might fulfill your requirements.

Tagging files with a label

To tag a set of file revisions (in addition to any revisions that have already been tagged), use **`p4 tag`**, specifying a label name and the desired file revisions.

For example, to tag the head revisions of files that reside under `//JamCode/release/jam/2.1/src/` with the label `jam-2.1.0`, issue the following command:

```
$ p4 tag -l jam-2.1.0 //JamCode/release/jam/2.1/src/...
```

To tag revisions other than the head revision, specify a changelist number in the file pattern:

```
$ p4 tag -l jam-2.1.0 //JamCode/release/jam/2.1/src/...@1234
```

Only one revision of a given file can be tagged with a given label, but the same file revision can be tagged by multiple labels.

Untagging files

You can untag revisions with:

```
$ p4 tag -d -l labelname filepattern
```

This command removes the association between the specified label and the file revisions tagged by it. For example, if you have tagged all revisions under `//JamCode/release/jam/2.1/src/...` with `jam-2.1.0`, you can untag only the header files with:

```
$ p4 tag -d -l jam-2.1.0 //JamCode/release/jam/2.1/src/*.h
```

Previewing tagging results

You can preview the results of **p4 tag** with **p4 tag -n**. This command lists the revisions that would be tagged, untagged, or re-tagged without actually performing the operation.

Listing files tagged by a label

To list the revisions tagged with *labelname*, use **p4 files**, specifying the label name as follows:

```
$ p4 files @labelname
```

All revisions tagged with *labelname* are listed, with their file type, change action, and changelist number. (This command is equivalent to **p4 files //...@*labelname***).

Listing labels that have been applied to files

To list all labels that have been applied to files, use the command:

```
p4 labels filepattern
```

Using a label to specify file revisions

You can use a label name anywhere you can refer to files by revision (`#1`, `#head`), changelist number (`@7381`), or date (`@2011/07/01`).

If you omit file arguments when you issue the **p4 sync @*labelname*** command, all files in the workspace view that are tagged by the label are synced to the revision specified in the label. All files in the workspace that do not have revisions tagged by the label are deleted from the workspace. Open files or files not under Helix control are unaffected. This command is equivalent to **p4 sync //...@*labelname***.

If you specify file arguments when you issue the **p4 sync** command (**p4 sync *files*@*labelname***), files that are in your workspace and tagged by the label are synced to the tagged revision.

Example 11.1. Retrieving files tagged by a label into a client workspace

To retrieve the files tagged by Earl's **jam-2.1.0** label into his client workspace, Bruno issues the following command:

```
$ p4 sync @ jam-2.1.0
```

and sees:

```
//JamCode/dev/jam/Build.com#5 - updating c:\bruno_ws\dev\jam\Build.com
//JamCode/dev/jam/command.c#5 - updating c:\bruno_ws\dev\jam\command.c
//JamCode/dev/jam/command.h#3 - added as c:\bruno_ws\dev\jam\command.h
//JamCode/dev/jam/compile.c#12 - updating c:\bruno_ws\dev\jam\compile.c
//JamCode/dev/jam/compile.h#2 - updating c:\bruno_ws\dev\jam\compile.h
...
```

Deleting labels

To delete a label, use the following command:

```
$ p4 label -d labelname
```

Deleting a label has no effect on the tagged file revisions (though, of course, the revisions are no longer tagged).

Creating a label for future use

To create a label without tagging any file revisions, issue the **p4 label *labelname*** command. This command displays a form in which you describe and specify the label. After you have created a label, you can use **p4 tag** or **p4 labelsync** to apply the label to file revisions.

Label names cannot be the same as client workspace, branch, or depot names.

For example, to create **jam-2.1.0**, issue the following command:

```
$ p4 label jam-2.1.0
```

The following form is displayed:

```
Label:  jam-2.1.0
Update: 2011/03/07 13:07:39
Access: 2011/03/07 13:13:35
Owner:  earl
Description:
        Created by earl.
Options:     unlocked noautoreload
View:
        //depot/...
```

Enter a description for the label and save the form. (You do not need to change the **View:** field.)

After you create the label, you are able to use the **p4 tag** and **p4 labelsync** commands to apply the label to file revisions.

Restricting files that can be tagged

The **View:** field in the **p4 label** form limits the files that can be tagged with a label. The default label view includes the entire depot (**//depot/...**). To prevent yourself from inadvertently tagging every file in your depot, set the label's **View:** field to the files and directories to be taggable, using depot syntax.

Example 11.2. Using a label view to control which files can be tagged

Earl wants to tag the revisions of source code in the release 2.1 branch, which he knows can be successfully compiled. He types **p4 label jam-2.1.0** and uses the label's **View:** field to restrict the scope of the label as follows:

```
Label:  jam-2.1.0
Update: 2011/03/07 13:07:39
Access: 2011/03/07 13:13:35
Owner:  earl
Description:
        Created by earl.
Options:     unlocked noautoreload
View:
        //JamCode/release/jam/2.1/src/...
```

This label can tag only files in the release 2.1 source code directory.

Using static labels to archive workspace configurations

You can use static labels to archive the state of your client workspace (meaning the currently synced file revisions) by issuing the **p4 labelsync** command. The label you specify must have the same view as your client workspace.

For example, to record the configuration of your current client workspace using the existing **ws_config** label, use the following command:

```
$ p4 labelsync -l ws_config
```

All file revisions that are synced to your current workspace and visible through both the workspace view and the label view (if any) are tagged with the `ws_config` label. Files that were previously tagged with `ws_config`, then subsequently removed from your workspace (`p4 sync #none`), are untagged.

To sync the files tagged by the `ws_config` label (thereby recreating the workspace configuration), issue the following command:

```
$ p4 sync @ws_config
```

Note

You can control how static labels are stored using the `autoreload` or `noautoreload` options:

- `autoreload` stores the labels in the unload depot. This storage option can improve performance on sites that make heavy use of labels.
- `noautoreload` stores the labels in the `db.label` table.

These storage options do not affect automatic labels.

Using automatic labels as aliases for changelists or other revisions

You can use automatic labels to specify files at certain revisions without having to issue the **`p4 labelsync`** command.

To create an automatic label, fill in the `Revision:` field of the **`p4 label`** form with a revision specifier. When you sync a workspace to an automatic label, the contents of the `Revision:` field are applied to every file in the `View:` field.

Example 11.3. Using an automatic label as an alias for a changelist number.

Earl is running a nightly build process, and has successfully built a product as of changelist 1234. Rather than having to remember the specific changelist for every night's build, he types **`p4 label nightly20111201`** and uses the label's `Revision:` field to automatically tag all files as of changelist 1234 with the `nightly20111201` label:

```
Label:  nightly20111201
Owner:  earl
Description:
        Nightly build process.
Options:     unlocked noautoreload
View:
        //depot/...
Revision:
        @1234
```

The advantage to this approach is that it is highly amenable to scripting, takes up very little space in the label table, and provides a way to easily refer to a nightly build without remembering which changelist number was associated with the night's build process.

Example 11.4. Referring specifically to the set of files submitted in a single changelist.

A bug was fixed by means of changelist 1238, and requires a patch label that refers to only those files associated with the fix. Earl types **`p4 label patch20111201`** and uses the label's `Revision:` field to automatically tag only those files submitted in changelist 1238 with the `patch20111201` label:

```
Label:  patch20111201
Owner:  earl
Description:
        Patch to 2011/12/01 nightly build.
Options:     unlocked noautoreload
View:
        //depot/...
Revision:
        @1238,1238
```

This automatic label refers only to those files submitted in changelist 1238.

Example 11.5. Referring to the first revision of every file over multiple changelists.

You can use revision specifiers other than changelist specifiers; in this example, Earl is referring to the first revision (#1) of every file in a branch. Depending on how the branch was populated, these files could have been created through multiple changelists over a long period of time:

```
Label:  first2.2
Owner:  earl
Description:
        The first revision in the 2.2 branch
Options:     unlocked noautoreload
View:
        //JamCode/release/jam/2.2/src/...
Revision:
        "#1"
```

Because Helix forms use the `#` character as a comment indicator, Earl has placed quotation marks around the `#` to ensure that it is parsed as a revision specifier.

Preventing inadvertent tagging and untagging of files

To tag the files that are in your client workspace and label view (if set) and untag all other files, issue the **`p4 labelsync`** command with no arguments. To prevent the inadvertent tagging and untagging of files, issue the **`p4 label`** ***`labelname`*** command and lock the label by setting the `Options:` field of the label form to `locked`. To prevent other users from unlocking the label, set the `Owner:` field. For details about Helix privileges, refer to the *Helix Versioning Engine Administrator Guide: Fundamentals*.

Using labels on edge servers

You can user the Helix Versioning Engine in a *distributed*, multi-site environment using central and edge servers. With a distributed Helix server architecture, users typically connect to an edge server and execute commands just as they would with a *classic* Helix server. For more information, refer to *Helix Versioning Engine Administrator Guide: Multi-site Deployment*.

When connected to an edge server, the commands **`p4 label`**, **`p4 labelsync`**, and **`p4 tag`** operate on labels local to the edge server. Global labels can be manipulated by using the `-g` option. For details, refer to the *P4 Command Reference*.

Note	Using the `-g` option with **`p4 labelsync`** only works with a global client. To manipulate a global label, use **`p4 tag`**.

Chapter 12

Jobs

A *job* is a numbered (or named) work request managed by Helix. Helix jobs enable you to track the status of bugs and enhancement requests and associate them with changelists that implement fixes and enhancements. You can search for jobs based on the contents of fields, the date the job was entered or last modified, and many other criteria.

Your Helix administrator can customize the job specification for your site's requirements. For details on modifying the job specification, see the *Helix Versioning Engine Administrator Guide: Fundamentals*.

To integrate Helix with your in-house defect tracking system, or to develop an integration with a third-party defect tracking system, use P4DTG, the Perforce Defect Tracking Gateway. P4DTG is an integrated platform that includes both a graphical configuration editor and a replication engine. For more information, see:

http://www.perforce.com/product/components/defect_tracking_gateway

Creating, editing, and deleting a job

To create a job using Helix's default job-naming scheme, issue the **`p4 job`** command. To assign a name to a new job (or edit an existing job), issue the **`p4 job`** ***`jobname`*** command.

Example 12.1. Creating a job

Gale discovers a problem with Jam, so she creates a job by issuing the **`p4 job`** command and describes it as follows:

```
Job:    job000006

Status: open

User:   gale

Date:   2011/11/14 17:12:21

Description:
        MAXLINE can't account for expanded cmd buffer size.
```

The following table describes the fields in the default job specification:

Field Name	Description	Default
`Job`	The name of the job (white space is not allowed). By default, Helix assigns job names using a numbering scheme (`job`*`nnnnnn`*).	Last job number + 1
`Status`	• `open:` job has not yet been fixed. • `closed:` job has been completed.	`open`

Field Name	Description	Default
	• `suspended:` job is not currently being worked on.	
`User`	The user to whom the job is assigned, usually the person assigned to fix this particular problem.	Helix user name of the job creator.
`Date`	The date the job was last modified.	Updated by Helix when you save the job.
`Description`	Describes the work being requested, for example a bug description or request for enhancement.	None. You must enter a description.

To edit existing jobs, specify the job name when you issue the **`p4 job`** command: **`p4 job`** ***`jobname`***. Enter your changes in the job form, save the form and exit.

To delete a job, issue the **`p4 job -d`** ***`jobname`*** command.

Searching jobs

To search Helix jobs, issue the **`p4 jobs -e`** ***`jobview`*** command, where *jobview* specifies search expressions described in the sections that below. For more details, issue the **`p4 help jobview`** command.

Searching job text

You can use the expression '***`word1 word2 ... wordN`***' to find jobs that contain all of *word1* through *wordN* in any field (excluding date fields). Use single quotes on UNIX and double quotes on Windows.

When searching jobs, note the following restrictions:

- When you specify multiple words separated by whitespace, Helix searches for jobs that contain *all* the words specified. To find jobs that contain *any* of the terms, separate the terms with the pipe (`|`) character.
- Field names and text comparisons in expressions are not case-sensitive.
- Only alphanumeric text and punctuation can appear in an expression. To match the following characters, which are used by Helix as logical operators, precede them with a backslash: `=^&|()<>`.
- You cannot search for phrases, only individual words.

Example 12.2. Searching jobs for specific words

Bruno wants to find all jobs that contain the words `filter`, `file`, and `mailbox`. He types:

```
$ p4 jobs -e 'filter file mailbox'
```

Example 12.3. Finding jobs that contain any of a set of words in any field

Bruno wants to find jobs that contain any of the words `filter`, `file` or `mailbox`. He types:

```
$ p4 jobs -e 'filter|file|mailbox'
```

You can use the * wildcard to match one or more characters. For example, the expression `fieldname=string*` matches `string`, `strings`, `stringbuffer`, and so on.

To search for words that contain wildcards, precede the wildcard with a backslash in the command. For instance, to search for `*string` (perhaps in reference to `char *string`), issue the following command:

```
$ p4 jobs -e '\*string'
```

Searching specific fields

To search based on the values in a specific field, specify *`field=value`*.

Example 12.4. Finding jobs that contain words in specific fields

Bruno wants to find all open jobs related to filtering. He types:

```
$ p4 jobs -e 'Status=open User=bruno filter.c'
```

This command finds all jobs with a `Status:` of `open`, a `User:` of `bruno`, and the word `filter.c` in any non-date field.

To find fields that do not contain a specified expression, precede it with ^, which is the NOT operator. The NOT operator ^ can be used only directly after an AND expression (space or `&`). For example, **`p4 jobs -e '^user=bruno'`** is not valid. To get around this restriction, use the * wildcard to add a search term before the ^ term; for example: **`p4 jobs -e 'job=* ^user=bruno'`** returns all jobs not owned by Bruno.

Example 12.5. Excluding jobs that contain specified values in a field

Bruno wants to find all open jobs he does not own that involve filtering. He types:

```
$ p4 jobs -e 'status=open ^user=bruno filter'
```

This command displays all open jobs that Bruno does not own that contain the word `filter`.

Using comparison operators

The following comparison operators are available: `=`, `>`, `<`, `>=`, `<=`, and ^ for Boolean NOT.

The behavior of these operators depends upon the type of the field in the expression. The following table describes the field types and how they can be searched:

Field Type	Description	Notes
`word`	A single word	The equality operator (`=`) matches the value in the word field exactly. The relational operators perform comparisons in ASCII order.
`text`	A block of text entered on the lines beneath the field name.	The equality operator (`=`) matches the job if the value is found anywhere in the specified field. The relational operators are of limited use here, because they'll match the job if *any* word in the specified field matches the provided value. For example, if a job has a text field `ShortDescription:` that contains only the phrase `gui bug`, and the expression is `'ShortDesc<filter'`, the job will match the expression, because `bug<filter`.
`line`	A single line of text entered on the same line as the field name.	Same as `text`
`select`	One of a set of values. For example, job status can be `open`, `suspended`, or `closed`.	The equality operator (`=`) matches a job if the value in the field is the specified word. Relational operators perform comparisons in ASCII order.
`date`	A date and optionally a time. For example, `2011/07/15:13:21:40`.	Dates are matched chronologically. If a time is not specified, the operators `=`, `<=`, and `>=` match the whole day.
`bulk`	Like `text`, but not indexed for searching.	These fields are not searchable with **`p4 jobs -e`**.

If you're not sure of a field's type, issue the **`p4 jobspec -o command`**, which displays your job specification. The field called `Fields:` lists the job fields' names and data types.

Searching date fields

To search date fields, specify the date using the format *`yyyy/mm/dd`* or *`yyyy/mm/dd:`*`hh:mm:`*`ss`*. If you omit time, the equality operator (`=`) matches the entire day.

Example 12.6. Using dates within expressions

Bruno wants to view all jobs modified on July 13, 2011. He enters:

```
$ p4 jobs -e 'ModifiedDate=2011/07/13'
```

Fixing jobs

To fix a job, you link it to a changelist and submit the changelist. Helix automatically changes the value of a job's status field to **closed** when the changelist is submitted.

Jobs can be linked to changelists in one of three ways:

- By setting the **JobView:** field in the **p4 user** form to an expression that matches the job.
- With the **p4 fix** command.
- By editing the **p4 submit** form.

You can modify job status directly by editing the job, but if you close a job manually, there's no association with the changelist that fixed the job. If you have altered your site's job specification by deleting the **Status:** field, jobs can still be linked to changelists, but status cannot be changed when the changelist is submitted. (In most cases, this is not a desired form of operation.) See the chapter on editing job specifications in the *Helix Versioning Engine Administrator Guide: Fundamentals* for more details.

To remove jobs from a changelist, issue the **p4 fix -d** command.

Linking automatically

You can modify your Helix user specification to automatically attach open jobs to any changelists you create. To set up automatic inclusion, issue the **p4 user** command and set the **JobView:** field value to a valid expression that locates the jobs you want attached.

Example 12.7. Automatically linking jobs to changelists

Bruno wants to see all open jobs that he owns in all changelists he creates. He types **p4 user** and adds the **JobView:** field:

```
User:     bruno
Update:   2011/06/02 13:11:57
Access:   2011/06/03 20:11:07
JobView:  user=bruno&status=open
```

All of Bruno's open jobs now are automatically attached to his default changelist. When he submits changelists, he must be sure to delete jobs that aren't fixed by the changelist he is submitting.

Linking manually

To link a job to a changelist manually, issue the **p4 fix -c *changenum jobname*** command. If the changelist has already been submitted, the value of the job's **Status:** field is changed to **closed**. Otherwise, the status is not changed.

Example 12.8. Manually linking jobs to changelists

You can use **p4 fix** to link a changelist to a job owned by another user.

Sarah has just submitted a job called **options-bug** to Bruno, but the bug has already been fixed in Bruno's previously submitted changelist 18. Bruno links the job to the changelist by typing:

```
$ p4 fix -c 18 options-bug
```

Because changelist 18 has already been submitted, the job's status is changed to **closed**.

Linking jobs to changelists

To link jobs to changelists when submitting or editing the changelist, enter the job names in the **Jobs:** field of the changelist specification. When you submit the changelist, the job is (by default) closed.

To unlink a job from a pending changelist, edit the changelist and delete its name from the **Jobs:** field. To unlink a job from a submitted changelist, issue the **p4 fix -d -c *changenum jobname*** command.

Chapter 13

Scripting and reporting

This chapter provides details about using **p4** commands in scripts and for reporting purposes. For a full description of any particular command, consult the *P4 Command Reference*, or issue the **p4 help** command.

Common options used in scripting and reporting

The command-line options described below enable you to specify settings on the command line and in scripts. For full details, refer to the description of global options in the *P4 Command Reference*.

Option	Description
`-b` *batchsize*	Specify a batch size (number of arguments) to use when processing a command from `-x` *argfile*. By default, 128 arguments are read at a time.
`-c` *client_workspace*	Specifies the client workspace name.
`-G`	Causes all output (and batch input for form commands with `-i`) to be formatted as marshaled Python dictionary objects.
`-p` *protocol*`:`*host*`:`*port*	Specifies the host and port number of the Helix server, as well as the protocol used to connect.
`-P` *password*	Specifies the user password if any. If you prefer your script to log in before running commands (instead of specifying the password every time a command is issued), use the **p4 login** command. For example: `$ echo 'mypassword' | p4 login`
`-s`	Prepends a descriptive field (for example, `text:`, `info:`, `error:`, `exit:`) to each line of output produced by a Helix command.
`-u` *user*	Specifies the Helix user name.
`-x` *argfile*	Reads arguments, one per line, from the specified file. If *argfile* is a single hyphen (`-`), then standard input is read.

Scripting with Helix forms

If your scripts issue **p4** commands that require the user to fill in a form, such as the **p4 client** and **p4 submit** commands, use the `-o` option to write the form to standard output and the `-i` option to read the edited form from standard input.

For example, to create a job using a script on UNIX:

1. **Write a blank job specification into a text file.**

```
$ p4 job -o > temp1
```

2. **Make the necessary changes to the job.**

   For example:

```
$ sed 's/<enter description here>/Crashes on exit./' temp1 > temp2
```

3. **Save the job.**

```
$ p4 job -i < temp2
```

To accomplish the preceding without a temporary file, issue the following command:

```
$ p4 job -o | sed 's/<enter description here>/Crashes on exit./' | p4 job -i
```

The commands that display forms are:

- **`p4 branch`**
- **`p4 change`**
- **`p4 client`**
- **`p4 job`**
- **`p4 label`**
- **`p4 submit`** (use **`p4 change -o`** to create changelist, or **`p4 submit -d "A changelist description"`** to supply a description to the default changelist during changelist submission.)
- **`p4 stream`**
- **`p4 user`**

File reporting

The sections below describe commands that provide information about file status and location. The following table lists a few basic and highly-useful reporting commands:

To display this information	Use this command
File status, including file type, latest revision number, and other information	**`p4 files`**
File revisions from most recent to earliest	**`p4 filelog`**

To display this information	Use this command
Currently opened files	**p4 opened**
Preview of **p4 sync** results	**p4 sync -n**
Summarize a **p4 sync** preview, estimate network traffic	**p4 sync -N**
Currently synced files	**p4 have**
The contents of specified files	**p4 print**
The mapping of files' depot locations to the corresponding workspace locations.	**p4 where**
A list of files and full details about the files	**p4 fstat**

Displaying file status

To display information about single revisions of files, issue the **p4 files** command. This command displays the locations of the files in the depot, the actions (`add`, `edit`, `delete`, and so on) performed on those files at the specified revisions, the changelists in which the specified file revisions were submitted, and the files' types. The following example shows typical output of the **p4 files** command:

```
//depot/README#5 - edit change 6 (text)
```

The **p4 files** command requires one or more *filespec* arguments. Regardless of whether you use local, client, or depot syntax to specify the filespec arguments, the **p4 file** command displays results using depot syntax. If you omit the revision number, information for the head revision is displayed. The output of **p4 files** includes deleted revisions.

The following table lists some common uses of the **p4 files** command:

To display the status of	Use this command
All files in the depot, regardless of your workspace view For depots containing numerous files, you can maximize performance by avoiding commands that refer to the entire depot (`//depot/...`) when not required. For best performance, specify only the directories and files of interest.	**p4 files //depot/...**
The files currently synced to the specified client workspace.	**p4 files @*workspacename***
The files mapped by your workspace view.	**p4 files //*workspacename*/...**
Specified files in the current working directory	**p4 files *filespec***

To display the status of	Use this command
A specified file revision	**p4 files *filespec#rev***
Specified files at the time a changelist was submitted, regardless of whether the files were submitted in the changelist	**p4 files *filespec@changenum***
Files tagged with a specified label	**p4 files *filespec@labelname***

Displaying file revision history

To display the revision history of a file, issue the **p4 filelog *filespec*** command. The following example shows how **p4 filelog** displays revision history:

```
$ p4 filelog //JamCode/dev/jam/jam.c
//JamCode/dev/jam/jam.c
... #35 change 627 edit on 2011/11/13 by earl@earl-dev-yew (text)
'Handle platform variants better'
... #34 change 598 edit on 2011/10/24 by raj@raj-althea (text)
'Reverse previous attempt at fix'
... ... branch into //JamCode/release/jam/2.2/src/jam.c#1
... #33 change 581 edit on 2011/10/03 by gale@gale-jam-oak (text)
'Version strings & release notes'
```

To display the entire description of each changelist, specify the `-l` option.

Listing open files

To list the files that are currently opened in a client workspace, issue the **p4 opened *filespec*** command. The following line is an example of the output displayed by the **p4 opened** command:

```
//JamCode/dev/jam/fileos2.c- edit default change (text)
```

The following table lists some common uses of the **p4 opened** command:

To list	Use this command
Opened files in the current workspace	**p4 opened**
Opened files in all client workspaces	**p4 opened -asp4 opened -a**
Files in a numbered pending changelist	**p4 opened -c *changelist***
Files in the default changelist	**p4 opened -c default**
Whether a specific file is opened by you	**p4 opened *filespec***

To list	Use this command
Whether a specific file is opened by anyone	**p4 opened -a *filespec***

Displaying file locations

To display information about the locations of files, use the **p4 where**, **p4 have**, and **p4 sync -n** commands:

- To display the location of a file in depot, client, and local syntax, issue the **p4 where** command.
- To list the location and revisions of files that you last synced to your client workspace, issue the **p4 have** command.
- To see where files will be synced in your workspace, preview the sync by issuing the **p4 sync -n** command.

You can use these commands with or without *filespec* arguments.

The following table lists some useful location reporting commands:

To display	Use this command
The revision number of a file that you synced to your workspace	**p4 have *filespec***
How a particular file in the depot maps to your workspace	**p4 where //depot/*filespec***

Displaying file contents

To display the contents of a file in the depot, issue the **p4 print *filespec*** command. This command prints the contents of the file to standard output or to a specified output file, with a one-line banner that describes the file. To suppress the banner, specify the **-q** option. By default, the head revision is displayed, but you can specify a file revision.

To display the contents of files	Use this command
At the head revision	**p4 print *filespec***
Without the banner	**p4 print -q *filespec***
At a specified changelist number	**p4 print *filespec*@*changenum***

Displaying annotations (details about changes to file contents)

To find out which file revisions or changelists affected lines in a text file, issue the **p4 annotate** command.

By default, **p4 annotate** displays the file line by line, with each line preceded by a revision number indicating the revision that made the change. To display changelist numbers instead of revision numbers, specify the **-c** option.

Example 13.1. Using p4 annotate to display changes to a file.

A file is added (**file.txt#1**) to the depot, containing the following lines:

```
This is a text file.
The second line has not been changed.
The third line has not been changed.
```

The third line is deleted and the second line edited so that **file.txt#2** reads:

```
This is a text file.
The second line is new.
```

The output of **p4 annotate** and **p4 annotate -c** look like this:

```
$ p4 annotate file.txt
//Acme/files/file.txt#3 - edit change 153 (text)
1: This is a text file.
2: The second line is new.

$ p4 annotate -c file.txt
//Acme/files/file.txt#3 - edit change 153 (text)
151: This is a text file.
152: The second line is new.
```

The first line of **file.txt** has been present since revision 1, which was submitted in changelist 151. The second line has been present since revision 2, which was submitted in changelist 152.

To show all lines (including deleted lines) in the file, use **p4 annotate -a** as follows:

```
$ p4 annotate -a file.txt
//Acme/files/file.txt#3 - edit change 12345 (text)
1-3: This is a text file.
1-1: The second line has not been changed.
1-1: The third line has not been changed.
2-3: The second line is new.
```

The first line of output shows that the first line of the file has been present for revisions 1 through 3. The next two lines of output show lines of **file.txt** present only in revision 1. The last line of output shows that the line added in revision 2 is still present in revision 3.

You can combine the **-a** and **-c** options to display all lines in the file and the changelist numbers (rather than the revision numbers) at which the lines existed.

Monitoring changes to files

The following table lists commands that display information about the status of files, changelists, and users:

To list	Use this command
The users who review specified files	**p4 reviews *filespec***
The users who review files in a specified changelist	**p4 reviews -c *changenum***
A specified user's email address	**p4 users *username***

Changelist reporting

The **p4 changes** command lists changelists that meet search criteria, and the **p4 describe** command lists the files and jobs associated with a specified changelist. These commands are described below.

Listing changelists

To list changelists, issue the **p4 changes** command. By default, **p4 changes** displays one line for every public changelist known to the system, as well as for any restricted changelists to which you have access. The following table lists command-line options that you can use to filter the list.

To list changelists	Use this command
With the first 31 characters of the changelist descriptions	**p4 changes**
With full descriptions	**p4 changes -l**
The last *n* changelists	**p4 changes -m *n***
With a specified status	**p4 changes -s pending** **p4 changes -s submitted** **p4 changes -s shelved**
From a specified user	**p4 changes -u *user***
From a specified workspace	**p4 changes -c *workspace***
That affect specified files	**p4 changes *filespec***
That affect specified files, including changelists that affect files that were later integrated with the named files	**p4 changes -i *filespec***
That affect specified files, including only those changelists between revisions *m* and *n* of these files	**p4 changes *filespec*`#*m*,#*n*`**
That affect specified files at each revision between the revisions specified in labels *label1* and *label2*	**p4 changes *filespec*@*label1*,@*label2***

To list changelists	Use this command
Submitted between two dates	**p4 changes @*date1*,@*date2***
Submitted on or after a specified date	**p4 changes @*date1*,@*now***

Listing files and jobs affected by changelists

To list files and jobs affected by a specified changelist, along with the diffs of the changes, issue the **p4 describe** command. To suppress display of the diffs (for shorter output), specify the **-s** option. The following table lists some useful changelist reporting commands:

To list	Use this command
Files in a pending changelist	**p4 opened -c *changenum***
Files submitted and jobs fixed by a particular changelist, including diffs	**p4 describe *changenum***
Files submitted and jobs fixed by a particular changelist, suppressing diffs	**p4 describe -s *changenum***
Files and jobs affected by a particular changelist, passing the context diff option to the underlying diff program	**p4 describe -dc *changenum***
The state of particular files at a particular changelist, regardless of whether these files were affected by the changelist	**p4 files *filespec*@*changenum***

For more commands that report on jobs, see "Job reporting" on page 123.

Label reporting

To display information about labels, issue the **p4 labels** command. The following table lists some useful label reporting commands:

To list	Use this command
All labels, with creation date and owner	**p4 labels**
All labels containing a specific file revision (or range)	**p4 labels file#*revrange***
Files tagged with a specified label	**p4 files @*labelname***
A preview of the results of syncing to a label	**p4 sync -n @*labelname***

Branch and integration reporting

The following table lists commonly used commands for branch and integration reporting:

To list	Use this command
All branch specifications	**p4 branches**
Files in a specified branch	**p4 files *filespec***
The revisions of a specified file	**p4 filelog *filespec***
The revisions of a specified file, recursively including revisions of the files from which it was branched	**p4 filelog -i *filespec***
A preview of the results of a resolve	**p4 resolve [*args*] -n [*filespec*]**
Files that have been resolved but not yet submitted	**p4 resolved [*filespec*]**
Integrated, submitted files that match the *filespec* arguments	**p4 integrated *filespec***
A preview of the results of an integration	**p4 integrate [*args*] -n [*filespec*]**

Job reporting

Listing jobs

To list jobs, issue the **p4 jobs** command. The following table lists common job reporting commands:

To list	Use this command
All jobs	**p4 jobs**
All jobs, including full descriptions	**p4 jobs -l**
Jobs that meet search criteria (see "Searching jobs" on page 110 for details)	**p4 jobs -e *jobview***
Jobs that were fixed by changelists that contain specific files	**p4 jobs *filespec***
Jobs that were fixed by changelists that contain specific files, including changelists that contain files that were later integrated into the specified files	**p4 jobs -i *filespec***

Listing jobs fixed by changelists

Any jobs that have been linked to a changelist with **p4 change**, **p4 submit**, or **p4 fix** are referred to as *fixed* (regardless of whether their status is **closed**). To list jobs that were fixed by changelists, issue the **p4 fixes** command.

The following table lists useful commands for reporting fixes:

To list	Use this command
all changelists linked to jobs	**p4 fixes**
all changelists linked to a specified job	**p4 fixes -j *jobname***
all jobs linked to a specified changelist	**p4 fixes -c *changenum***
all fixes associated with specified files	**p4 fixes *filespec***
all fixes associated with specified files, including changelists that contain files that were later integrated with the specified files	**p4 fixes -i *filespec***

System configuration reporting

The commands described in this section display Helix users, client workspaces, and depots.

Displaying users

The **p4 users command** displays the user name, an email address, the user's "real" name, and the date that Helix was last accessed by that user, in the following format:

```
bruno <bruno@bruno_ws> (bruno) accessed 2011/03/07
dai <dai@dai_ws> (Dai Sato) accessed 2011/03/04
earl <earl@earl_ws> (Earl Ashby) accessed 2011/03/07
gale <gale@gale_ws> (Gale Beal) accessed 2011/06/03
hera <hera@hera_ws> (Hera Otis) accessed 2011/10/03
ines <ines@ines_ws> (Ines Rios) accessed 2011/02/02
jack <jack@submariner> (jack) accessed 2011/03/02
mei <mei@mei_ws> (Mei Chang) accessed 2011/11/14
ona <ona@ona_ws> (Ona Birch) accessed 2011/10/23
quinn <quinn@quinn_ws> (Quinn Cass) accessed 2011/01/27
raj <raj@ran_ws> (Raj Bai) accessed 2011/07/28
vera <vera@vera_ws> (Vera Cullen) accessed 2011/01/15
```

Displaying workspaces

To display information about client workspaces, issue the **p4 clients** command, which displays the client workspace name, the date the workspace was last updated, the workspace root, and the description of the workspace, in the following format:

```
Client bruno_ws 2011/03/07 root c:\bruno_ws ''
Client earl-dev-beech 2011/10/26 root /home/earl ''
Client earl-dev-guava 2011/09/08 root /usr/earl/development ''
Client earl-dev-yew 2011/11/19 root /tmp ''
Client earl-win-buckeye 2011/03/21 root c:\src ''
Client earl-qnx-elm 2011/01/17 root /src ''
Client earl-tupelo 2011/01/05 root /usr/earl ''
```

Listing depots

To list depots, issue the **`p4 depots`** command. This command lists the depot's name, its creation date, its type (`local`, `remote`, `archive`, `spec`, or `stream`), its host name or IP address (if `remote`), the mapping to the local depot, and the system administrator's description of the depot.

For details about defining multiple depots on a single Helix installation, see the *Helix Versioning Engine Administrator Guide: Fundamentals*.

Sample script

The following sample script parses the output of the **`p4 fstat`** command to report files that are opened where the head revision is not in the client workspace (a potential problem):

Example 13.2. Sample shell script showing parsing of p4 fstat command output.

```
#!/bin/sh
# Usage: opened-not-head.sh files
# Displays files that are open when the head revision is not
# on the client workspace

echo=echo
exit=exit
p4=p4
sed=sed

if [ $# -ne 1 ]
then
     $echo "Usage: $0 files"
     $exit 1
fi

$p4 fstat -Ro $1 | while read line
do
     name=`$echo $line | $sed 's/^[\. ]\+\([^ ]\+\) .*$/\1/'`
     value=`$echo $line | $sed 's/^[\. ]\+[^ ]\+ \(.*\)$/\1/'`

     if [ "$name" = "depotFile" ]
     then
         depotFile=$value

     elif [ "$name" = "headRev" ]
     then
         headRev=$value

     elif [ "$name" = "haveRev" ]
     then
         haveRev=$value

         if [ $headRev != $haveRev ]
         then
             $echo $depotFile
         fi
     fi
done
```

Appendix

Glossary

Term	Definition
access level	A permission assigned to a user to control which Helix commands the user can execute. See *protections*.
admin access	An access level that gives the user permission to run Helix commands that override *metadata* but do not affect the state of the service.
apple file type	Helix file type assigned to files that are stored using AppleSingle format, permitting the data fork and resource fork to be stored as a single file.
atomic change transaction	Grouping operations affecting a number of files in a single transaction. If all operations in the transaction succeed, all the files are updated. If any operation in the transaction fails, none of the files are updated.
base	The file revision on which two newer, conflicting file revisions are based.
binary file type	Helix file type assigned to a non-text file. By default, the contents of each revision are stored in full, and the file is stored in compressed format.
branch	(*noun*) A set of related files created by copying files, as opposed to adding files. A group of related files is often referred to as a *codeline*. (*verb*) To create a stream by copying another stream with **`p4 copy`** or **`p4 populate`**.
branch form	The Helix form you use to modify a branch.
branch mapping	Specifies how a branch is to be created by defining the location of the original codeline and the branch. The branch mapping is used by the integration process to create and update branches. Client workspaces, labels, and branch specifications cannot share the same name.
branch view	A specification of the branching relationship between two codelines in the depot. Each branch view has a unique name and defines how files are mapped from the originating codeline to the target codeline. See *branch*.
changelist	An atomic change transaction in Helix. The changes specified in the changelist are not stored in the depot until the changelist is submitted to the depot.
changelist form	The Helix form you use to modify a changelist.
changelist number	The unique numeric identifier of a changelist.
change review	The process of sending email to users who have registered their interest in changes made to specified files in the depot.
checkpoint	A copy of the underlying metadata at a particular moment in time. See *metadata*.

Term	Definition
classic depot	The depot name that is assumed when no name is specified. The default depot name is `depot`. See also *default depot* and *stream depot*.
client form	The Helix form you use to define a client workspace.
client name	A name that uniquely identifies the current client workspace.
client root	The root directory of a client workspace. If two or more client workspaces are located on one machine, they cannot share a root directory.
client side	The right-hand side of a mapping within a client view, specifying where the corresponding depot files are located in the client workspace.
workspace view	A set of mappings that specifies the correspondence between file locations in the depot and the client workspace.
client workspace	Directories on your machine where you work on file revisions that are managed by Helix. By default this name is set to the name of the machine on which your client workspace is located; to override the default name, set the `P4CLIENT` environment variable. Client workspaces, labels, and branch specifications cannot share the same name.
codeline	A set of files that evolve collectively. One codeline can be branched from another, allowing each set of files to evolve separately.
conflict	One type of conflict occurs when two users open a file for edit. One user submits the file, after which the other user can't submit because of a conflict. The cause of this type of conflict is two users opening the same file. The other type of conflict is when users try to merge one file into another. This type of conflict occurs when the comparison of two files to a common base yields different results, indicating that the files have been changed in different ways. In this case, the merge can't be done automatically and must be done by hand. The type of conflict is caused by non-matching diffs. See *file conflict*.
counter	A numeric variable used by Helix to track changelist numbers in conjunction with the review feature.
default changelist	The changelist used by Helix commands, unless a numbered changelist is specified. A default pending changelist is created automatically when a file is opened for edit.
default depot	The depot name that is assumed when no name is specified. The default depot name is `depot`.
deleted file	In Helix, a file with its head revision marked as deleted. Older revisions of the file are still available.

Term	Definition
delta	The differences between two files.
depot	A file repository hosted on the Helix server. It contains all versions of all files ever submitted to the depot. There can be multiple depots on a single installation.
depot root	The root directory for a depot.
depot side	The left side of any client view mapping, specifying the location of files in a depot.
depot syntax	Helix syntax for specifying the location of files in the depot.
detached	A machine that cannot connect to the Helix server.
diff	(*noun*) A set of lines that don't match when two files are compared. A *conflict* is a pair of unequal diffs between each of two files and a common third file. (*verb*) To compare the contents of files or file revisions.
donor file	The file from which changes are taken when propagating changes from one file to another.
exclusionary mapping	A view mapping that excludes specific files.
exclusionary access	A permission that denies access to the specified files.
file conflict	In a three-way file merge, a situation in which two revisions of a file differ from each other and from their base file. Also: an attempt to submit a file that is not an edit of the head revision of the file in the depot; typically occurs when another user opens the file for edit after you have opened the file for edit.
file pattern	Helix command line syntax that enables you to specify files using wildcards.
file repository	The master copy of all files; shared by all users. In Helix, this is called the *depot*.
file revision	A specific version of a file within the depot. Each revision is assigned a number, in sequence. Any revision can be accessed in the depot by its revision number, for example: `testfile#3`.
file tree	All the subdirectories and files under a given root directory.
file type	An attribute that determines how Helix stores and diffs a particular file. Examples of file types are `text` and `binary`.
fix	A job that has been linked to a changelist.

Term	Definition
form	Screens displayed by certain Helix commands. For example, you use the Helix change form to enter comments about a particular changelist and to verify the affected files.
full-file storage	The method by which Helix stores revisions of binary files in the depot: every file revision is stored in full. Contrast this with *reverse delta storage*, which Helix uses for `text` files.
get	An obsolete Helix term: replaced by *sync*.
group	A list of Helix users.
have list	The list of file revisions currently in the client workspace.
head revision	The most recent revision of a file within the depot. Because file revisions are numbered sequentially, this revision is the highest-numbered revision of that file.
integrate	To compare two sets of files (for example, two codeline branches) and: • Determine which changes in one set apply to the other. • Determine if the changes have already been propagated. • Propagate any outstanding changes.
Inter-File Branching	Helix's branching mechanism.
job	A user-defined unit of work tracked by Helix. The job template determines what information is tracked. The template can be modified by the Helix system administrator.
job specification	A specification containing the fields and valid values stored for a Helix job.
job view	A syntax used for searching Helix jobs.
journal	A file containing a record of every change made to the Helix server's metadata since the time of the last checkpoint.
journaling	The process of recording changes made to the Helix server's metadata.
label	A named list of user-specified file revisions.
label view	The view that specifies which filenames in the depot can be stored in a particular label.
lazy copy	A method used by Helix to make internal copies of files without duplicating file content in the depot. Lazy copies minimize the consumption of disk space by storing references to the original file instead of copies of the file.

Term	Definition
license file	Ensures that the number of Helix users on your site does not exceed the number for which you have paid.
list access	A protection level that enables you to run reporting commands but prevents access to the contents of files.
local depot	Any depot located on the currently-specified Helix server.
local syntax	The operating-system-specific syntax for specifying a filename.
lock	A Helix file lock prevents other clients from submitting the locked file. Files are unlocked with the **`p4 unlock`** command or submitting the changelist that contains the locked file.
log	Error output from the Helix server. By default, error output is written to standard error. To specify a log file, set the `P4LOG` environment variable or use the **`p4d -L`** flag when starting the service.
mapping	A single line in a view, consisting of a left side and a right side that specify the correspondences between files in the depot and files in a client, label, or branch. The left side specifies the depot files, and the right side specifies the client files. (See also *workspace view*, *branch view*, *label view*).
MD5 checksum	The method used by Helix to verify the integrity of archived files.
merge	To create new files from existing files, preserving their ancestry (branching), or to propagate changes from one set of files to another. Also, the process of combining the contents of two conflicting file revisions into a single file, typically using a merge tool like P4Merge.
merge file	A file generated by Helix from two conflicting file revisions.
metadata	The data stored by the Helix server that describes the files in the depot, the current state of client workspaces, protections, users, labels, and branches. Metadata includes all the data stored in the service except for the actual contents of the files.
modification time	The time a file was last changed.
nonexistent revision	A completely empty revision of any file. Syncing to a nonexistent revision of a file removes it from your workspace. An empty file revision created by deleting a file and the `#none` revision specifier are examples of nonexistent file revisions.
numbered changelist	A pending changelist to which Helix has assigned a number.
open file	A file that you are changing in your client workspace.
owner	The Helix user who created a particular client, branch, or label.

Term	Definition
p4	The Helix Command Line program, and the command you issue to execute Helix commands from the operating system command line.
p4d	The program that runs the Helix server; **p4d** manages depot files and metadata.
P4Diff	A Helix application that displays the differences between two files. P4Diff is the default application used to compare files during the file resolution process.
pending changelist	A changelist that has not been submitted.
Helix server	The Helix depot and metadata; also, the program that manages the depot and metadata.
protections	The permissions stored in the Helix server's protections table.
RCS format	Revision Control System format. Used for storing revisions of text files. RCS format uses reverse delta encoding for file storage. Helix uses RCS format to store text files. See also *reverse delta storage*.
read access	A protection level that enables you to read the contents of files managed by Helix.
remote depot	A depot located on on a host other than that hosting the currently-specified Helix server.
reresolve	The process of resolving a file after the file is resolved and before it is submitted.
resolve	The process you use to reconcile the differences between two revisions of a file. You can choose to resolve conflicts by selecting a file to be submitted or by merging the contents of conflicting files.
resource fork	One fork of a Mac file. (These files are composed of a resource fork and a data fork.) You can store resource forks in Helix depots as part of an AppleSingle file by using Helix's `apple` file type.
reverse delta storage	The method that Helix uses to store revisions of text files. Helix stores the changes between each revision and its previous revision, plus the full text of the head revision.
revert	To discard the changes you have made to a file in the client workspace.
review access	A special protections level that includes `read` and `list` accesses and grants permission to run the **p4 review** command.
review daemon	Any daemon process that uses the **p4 review** command. See also *change review*.
revision number	A number indicating which revision of the file is being referred to.

Term	Definition
revision range	A range of revision numbers for a specified file, specified as the low and high end of the range. For example, `myfile#5,7` specifies revisions 5 through 7 of `myfile`.
revision specification	A suffix to a filename that specifies a particular revision of that file. Revision specifiers can be revision numbers, change numbers, label names, date/time specifications, or client names.
service	In Helix, the shared versioning service that responds to requests from Helix applications. The Helix server (**`p4d`**) maintains depot files and metadata describing the files and also tracks the state of client workspaces.
server root	The directory in which **`p4d`** stores its metadata and all the shared files. To specify the server root, set the `P4ROOT` environment variable.
shelving	The process of temporarily storing files in the Helix server without checking in a changelist.
status	For a changelist, a value that indicates whether the changelist is new, pending, or submitted. For a job, a value that indicates whether the job is open, closed, or suspended. You can customize job statuses.
stream	A stream is a *branch*, but with additional intelligence that determines what changes can be made and in what order they must be made.
submit	To send a pending changelist and changed files to the Helix server for processing.
subscribe	To register to receive email whenever changelists that affect particular files are submitted.
super access	An access level that gives the user permission to run *every* Helix command, including commands that set protections, install triggers, or shut down the service for maintenance.
symlink file type	A Helix file type assigned to symbolic links. On platforms that do not support symbolic links, symlink files appear as small text files.
sync	To copy a file revision (or set of file revisions) from the depot to a client workspace.
target file	The file that receives the changes from the donor file when you are integrating changes between a branched codeline and the original codeline.
text file type	Helix file type assigned to a file that contains only ASCII text. See also *binary file type*.
theirs	The revision in the depot with which the client file is merged when you resolve a file conflict. When you are working with branched files, *theirs* is the donor file.

Term	Definition
three-way merge	The process of combining three file revisions. During a three-way merge, you can identify where conflicting changes have occurred and specify how you want to resolve the conflicts.
tip revision	In Helix, the *head revision*. *Tip revision* is a term used by some other versioning systems.
trigger	A script automatically invoked by the Helix server when changelists are submitted.
two-way merge	The process of combining two file revisions. In a two-way merge, you can see differences between the files but cannot see conflicts.
typemap	A Helix table in which you assign Helix file types to files.
user	The identifier that Helix uses to determine who is performing an operation.
view	A description of the relationship between two sets of files. See *workspace view*, *label view*, *branch view*.
wildcard	A special character used to match other characters in strings. Helix wildcards are: • * matches anything except a slash • `...` matches anything including slashes • `%%0` through `%%9` used for parameter substitution in views
workspace	See *client workspace*.
write access	A protection level that enables you to run commands that alter the contents of files in the depot. `write` access includes `read` and `list` accesses.
yours	The edited version of a file in the client workspace when you resolve a file. Also, the target file when you integrate a branched file.

Appendix

Helix file types

Helix supports a set of file types that enable it to determine how files are stored by the Helix server and whether the file can be diffed. When you add a file, Helix attempts to determine the type of the file automatically: Helix first determines whether the file is a regular file or a symbolic link, and then examines the first part of the file to determine whether it's `text` or `binary`. If any non-text characters are found, the file is assumed to be `binary`; otherwise, the file is assumed to be `text`. (Files in Unicode environments are detected differently; see "Helix file type detection and Unicode" on page 140.

To determine the type of a file under Helix control, issue the **`p4 opened`** or **`p4 files`** command. To change the Helix file type, specify the **`-t`***`filetype`* option. For details about changing file type, refer to the descriptions of **`p4 add`**, **`p4 edit`**, and **`p4 reopen`** in the *P4 Command Reference*.

Helix supports the following file types:

Keyword	Description	Comments	Stored as
`apple`	Mac file	AppleSingle storage of Mac data fork, resource fork, file type and file creator. For full details, please see the Mac client release notes.	full file, compressed, AppleSingle format
`binary`	Non-text file	Synced as binary files in the workspace. Stored compressed within the depot.	full file, compressed
`resource`	Mac resource fork	(Obsolete) This type is supported for backward compatibility, but the `apple` file type is recommended.	full file, compressed
`symlink`	Symbolic link	Helix applications on UNIX, OS X, recent versions of Windows treat these files as symbolic links. On other platforms, these files appear as (small) text files.	delta
`text`	Text file	Synced as text in the workspace. Line-ending translations are performed automatically.	delta
`unicode`	Unicode file	Helix servers operating in Unicode mode support the `unicode` file type. These files are translated into the local character set specified by `P4CHARSET`. Helix servers not in Unicode mode do not support the `unicode` file type. For details, see the *Internationalization Notes*.	delta, UTF-8
`utf8`	Unicode file	Whether the service is in Unicode mode or not, files that are detected as UTF8 will be stored as UTF8 and synced as UTF8 without being translated by the `P4CHARSET` setting.	delta, UTF-8

Keyword	Description	Comments	Stored as
		For details, see the *Internationalization Notes*.	
`utf16`	Unicode file	Whether the service is in Unicode mode or not, files are transferred as UTF-8, and translated to UTF-16 (with byte order mark, in the byte order appropriate for the user's computer) in the client workspace. For details, see the *Internationalization Notes*.	delta, UTF-8

File type modifiers

You can apply file type modifiers to the base types of specific files to preserve timestamps, expand RCS keywords, specify how files are stored in the service, and more. For details about applying modifiers to file types, see "Specifying how files are stored in Helix" on page 138.

The following table lists the file type modifiers:

Modifier	Description	Comments
`+C`	Helix stores the full compressed version of each file revision	Default storage mechanism for `binary` files and newly-added `text`, `unicode`, or `utf16` files larger than 10MB.
`+D`	Helix stores deltas in RCS format	Default storage mechanism for `text` files.
`+F`	Helix stores full file per revision	For large ASCII files that aren't treated as text, such as PostScript files, where storing the deltas is not useful or efficient.

`+k`	RCS (Revision Control System) keyword expansion	Supported keywords are as follows:
		`$Id$`
		`$Header$`
		`$Date$` Date of submission
		`$DateUTC$` Date of submission in UTC time zone
		`$DateTime$` Date and time of submission
		`$DateTimeUTC$` Date and time of submission in UTC time zone.

Modifier	Description	Comments

		`$DateTimeTZ$` Date and time of submission in the server's time zone, but including the actual time zone in the result.
		`$Change$`
		`$File$`
		`$Revision$`
		`$Author$`
		RCS keywords are case-sensitive. A colon after the keyword (for example, `$Id:$`) is optional.

`+ko`	Limited keyword expansion	Expands only the `$Id$` and `$Header$` keywords. Primarily for backwards compatibility with versions of Helix prior to 2000.1, and corresponds to the `+k` (`ktext`) modifier in earlier versions of Helix.
`+l`	Exclusive open (locking)	If set, only one user at a time can open a file for editing. Useful for binary file types (such as graphics) where merging of changes from multiple authors is not possible.
`+m`	Preserve original modification time	The file's timestamp on the local file system is preserved upon submission and restored upon sync. Useful for third-party DLLs in Windows environments, because the operating system relies on the file's timestamp. By default, the modification time is set to the time you synced the file.
`+S`	Only the head revision is stored	Older revisions are purged from the depot upon submission of new revisions. Useful for executable or `.obj` files.
`+S`*n*	Only the most recent *n* revisions are stored, where *n* is a number from 1 to 10, or 16, 32, 64, 128, 256, or 512.	Older revisions are purged from the depot upon submission of more than *n* new revisions, or if you change an

Modifier	Description	Comments
		existing **+S*n*** file's ***n*** to a number less than its current value. For details, see the *P4 Command Reference*. Using an +S*n* file modifier results in special behavior when you delete and readd a file: no file reversions are deleted that were submitted before the add or delete. For example, if a file of type +S2 is marked as deleted in revision 5, and then re-added with the same file type and modifier, revisions 3 and 4 are not purged.
+w	File is always writable on client	Not recommended, because Helix manages the read-write settings on files under its control.
+x	Execute bit set on client	Used for executable files.
+X	Archive trigger required	The Helix server runs an **archive** trigger to access the file. See the *Helix Versioning Engine Administrator Guide: Fundamentals* for details.

Specifying how files are stored in Helix

File revisions of binary files are normally stored in full within the depot, but only changes made to text files since the previous revision are normally stored. This approach is called *delta storage*, and Helix uses RCS format to store its deltas. The file's type determines whether *full file* or *delta* storage is used.

Some file types are compressed to **gzip** format when stored in the depot. The compression occurs when you submit the file, and decompression happens when you sync (copy the file from the depot to your workspace). The client workspace always contains the file as it was submitted.

Warning

To avoid inadvertent file truncation, do not store binary files as **text**. If you store a binary file as text from a Windows computer and the file contains the Windows end-of-file character **^Z**, only the part of the file up to the **^Z** is stored in the depot.

Assigning file types for Unicode files

The Helix server can be run in Unicode mode to activate support for filenames and Helix metadata that contain Unicode characters, or in non-Unicode mode, where filenames and metadata must be ASCII, but textual files containing Unicode content are still supported.

If you need to manage textual files that contain Unicode characters, but do not need Unicode characters in Helix metadata, you do not need to run Helix in Unicode mode. Assign the Helix **utf16** file type to textual files that contain Unicode characters.

Your system administrator will be able to tell you which mode the service is using.

In either mode, Helix supports a set of file types that enable it to determine how a file is stored and whether the file can be diffed. The following sections describe the considerations for managing textual files in Unicode environments:

To assign file type when adding a file to the depot, specify the `-t` option. For example:

```
$ p4 add -t utf16 newfile.txt
```

To change the file type of files in the depot, open the file for edit, specifying the `-t` option. For example:

```
$ p4 edit -t utf16 myfile.txt
```

Choosing the file type

When assigning file types to textual files that contain Unicode, consider the following:

- Do you need to edit and diff the files?

  Many IDEs create configuration files that you never edit manually or diff. To ensure they are never translated, assign such files the `binary` file type.

- Is your site managing files that use different character sets?

  If so, consider storing them using a `utf16` file type, to ensure they are not translated but still can be diffed.

Unicode mode services translate the contents of Unicode files into the character set specified by `P4CHARSET`. The following table provides more details about how Unicode-mode services manage the various types of text files:

Text file type	Stored by Helix as (Unicode mode)	Validated?	Translated per `P4CHARSET`?	Translated per client platform
`text`	Extended ASCII	No	No	No
`unicode`	UTF-8	Yes (as UTF-16 and `P4CHARSET`)	Yes	No
`utf16`	UTF-8	Yes (as UTF-16)	No	No

Non-Unicode-mode services do not translate or verify the contents of `unicode` files. Instead, the UTF-8 data is converted to UTF-16 using the byte order appropriate to the client platform. To ensure that such files are not corrupted when you edit them, save them as UTF-8 or UTF-16 from within your editing software.

Text file type	Stored by Helix as (Unicode mode)	Validated?	Translated per P4CHARSET?	Translated per client platform
`text`	Extended ASCII	No	No	No
`unicode`	UTF-8	Yes (as UTF-16 and `P4CHARSET`)	No	No
`utf16`	UTF-8	Yes (as UTF-16)	No	Yes

Helix file type detection and Unicode

In both Unicode mode and non-Unicode mode, if you do not assign a file type when you add a file to the depot, Helix (by default) attempts to detect file type by scanning the first 65536 characters of the file. If non-printable characters are detected, the file is assigned the `binary` file type. (In Unicode mode, a further check is performed: if there are no non-printable characters, and there are high-ASCII characters that are translatable using the character set specified by `P4CHARSET`, the file is assigned the `unicode` file type.)

Finally (for services running in Unicode mode or non-Unicode mode), if a UTF-16 BOM is present, the file is assigned the `utf16` file type. Otherwise, the file is assigned the `text` file type. (In Unicode mode, a further check is performed: files with high-ASCII characters that are undefined in the character set specified by `P4CHARSET` are assigned the `binary` file type.)

In most cases, there is no need to override Helix's default file type detection. If you must override Helix's default file type detection, you can assign Helix file types according to a file's extension, by issuing the **`p4 typemap`** command. For more about using the typemap feature, refer to the *Helix Versioning Engine Administrator Guide: Fundamentals*, and the *P4 Command Reference*.

Overriding file types

Some file formats (for example, Adobe PDF files, and Rich Text Format files) are actually `binary` files, but they can be mistakenly detected by Helix as being `text`. To prevent this problem, your system administrator can use the **`p4 typemap`** command to specify how such file types are stored. You can always override the file type specified in the typemap table by specifying the **`-t filetype`** option.

Preserving timestamps

Normally, Helix updates the timestamp when a file is synced. The modification time (`+m`) modifier is intended for developers who need to preserve a file's original timestamp. This modifier enables you to ensure that the timestamp of a file synced to your client workspace is the time on your computer when the file was submitted.

Windows uses timestamps on third-party DLLs for versioning information (both within the development environment and also by the operating system), and the `+m` modifier enables you to preserve the original timestamps to prevent spurious version mismatches. The `+m` modifier overrides the client workspace `[no]modtime` setting (for the files to which it is applied). For details about this setting, refer to "File type modifiers" on page 136.

Expanding RCS keywords

RCS (Revision Control System), an early version control system, defined keywords that you can embed in your source files. These keywords are updated whenever a file is committed to the repository. Helix supports some RCS keywords.

To activate RCS keyword expansion for a file, use the **+k** modifier. RCS keywords are expanded as follows.

Keyword	Expands To	Example
`$Author$`	Helix user submitting the file	`$Author: bruno $`
`$Change$`	Helix changelist number under which file was submitted	`$Change: 439 $`
`$Date$`	Date of last submission in format *YYYY/MM/DD*	`$Date: 2011/08/18 $`
`$DateTime$`	Date and time of last submission in format *YYYY/MM/DD hh*:`*mm*`:`*ss*` Date and time are as of the local time on the Helix server at time of submission.	`$DateTime: 2011/08/18 23:17:02 $`
`$File$`	Filename only, in depot syntax (without revision number)	`$File: //depot/path/file.txt $`
`$Header$`	Synonymous with `$Id$`	`$Header: //depot/path/file.txt#3 $`
`$Id$`	Filename and revision number in depot syntax	`$Id: //depot/path/file.txt#3 $`
`$Revision$`	Helix revision number	`$Revision: #3 $`

To display a file without expanding its keywords, use **`p4 print -k` *`filename`***.

Appendix

Helix command syntax

This appendix provides basic information about **p4** commands, including command-line syntax, arguments, and options. For full details about command syntax, refer to the *P4 Command Reference*.

Certain commands require administrator or superuser permission. For details, consult the *Helix Versioning Engine Administrator Guide: Fundamentals*.

You have the option of applying aliases to personal server commands, to do such things as:

- abbreviation
- creating more complex commands
- automating simple multi-command sequences
- providing alternate syntax for difficult-to-remember commands

For more information, see the " Introduction" chapter of *P4 Command Reference*.

Command-line syntax

The basic syntax for commands is as follows:

```
p4 [global options] command [command-specific options] [command arguments]
```

The following options can be used with all **p4** commands:

Global options	Description and Example
`-c clientname`	Specifies the client workspace associated with the command. Overrides `P4CLIENT`. `$ p4 -c bruno_ws edit //JamCode/dev/jam/Jambase`
`-C charset`	Specifies the client workspace's character set. Overrides `P4CHARSET`. `$ p4 -C utf8 sync`
`-d directory`	Specifies the current directory, overriding the environment variable `PWD`. `C:\bruno_ws> p4 -d c:\bruno_ws\dev\main\jam\Jambase Jamfile`
`-G`	Format all output as marshaled Python dictionary objects (for scripting with Python). `$ p4 -G info`

Global options	Description and Example
`-H host`	Specifies the hostname of the client computer, overriding `P4HOST`. `$ p4 -H deneb print //JamCode/dev/jam/Jambase`
`-I`	Specify that progress indicators, if available, are desired. This option is not compatible with the `-s` and `-G` options. At present, the progress indicator is only supported by two commands: submitting a changelist with **`p4 -I submit`** and "quietly" syncing files with **`p4 -I sync -q`**.
`-L language`	Specifies the language to use for error messages from the Helix server. Overrides `P4LANGUAGE`. In order for this option to work, your administrator must have loaded support for non-English messages in the database. `$ p4 -L language info`
`-p port`	Specifies the protocol, host and port number used to connect to the Helix service, overriding `P4PORT`. `$ p4 -p ssl:deneb:1818 clients`
`-P password`	Supplies a Helix password, overriding `P4PASSWD`. Usually used in combination with the `-u username` option. `$ p4 -u earl -P secretpassword job`
`-r retries`	Specifies the number of times to retry a command (notably, **`p4 sync`**) if the network times out.
`-Q charset`	Specifies the character set to use for command input and output; if you have set `P4CHARSET` to a UTF-16 or UTF-32 value, you must set `P4COMMANDCHARSET` to a non-UTF-16 or -32 value in order to use the **`p4`** command-line client. `$ p4 -Q utf32 -C utf8 sync`
`-s`	Prepend a tag to each line of output (for scripting purposes). `$ p4 -s info`
`-u username`	Specifies a Helix user, overriding `P4USER`.

Global options	Description and Example
	`$ p4 -u bill user`
`-x filename`	Read arguments, one per line, from the specified file. To read arguments from standard input, specify `-x -`. `$ p4 -x myargs.txt`
`-z tag`	To facilitate scripting, displays the output of reporting commands in the format as that generated by **`p4 fstat`**. `$ p4 -z tag info`
`-q`	Quiet mode; suppress all informational message and report only warnings or errors.
`-V`	Displays the version of the **`p4`** executable.

To display the options for a specific command, issue the **`p4 help`** command. For example:

```
$ p4 help add

    add -- Open a new file to add it to the depot

    p4 add [ -c changelist# ] [ -d -f -I -n ] [ -t filetype ] file ...

     Open a file for adding to the depot.  If the file exists on the
     client, it is read to determine if it is text or binary. If it does
     not exist, it is assumed to be text.  To be added, the file must not
     already reside in the depot, or it must be deleted at the current
     head revision.  Files can be deleted and re-added.
[...]
```

For the full list of global options, commands, and command-specific options, see the *P4 Command Reference*.

Specifying filenames on the command line

Much of your everyday use of Helix consists of managing files. You can specify filenames in **`p4`** commands as follows:

- **Local syntax**: the file's name as specified in your local shell or operating system.

  Filenames can be specified using an absolute path (for example, `c:\bruno_ws\dev\main\jam\fileos2.c`) or a path that is relative to the current directory (for example, `.\jam\fileos2.c`).

Relative components (`.` or `..`) cannot be specified following fixed components. For example, `mysub/mydir/./here/file.c` is invalid, because the dot (`.`) follows the fixed `mysub/mydir` components.

- **Depot syntax**: use the following format: `//depotname/file_path`, specifying the pathname of the file relative to the depot root directory. Separate the components of the path using forward slashes. For example: `//JamCode/dev/jam/Jambase`.
- **Client syntax**: use the following format: `//workspacename/file_path`, specifying the pathname of the file relative to the client root directory. Separate the components of the path using forward slashes. For example: `//ona-agave/dev/main/jam/Jambase`.

Example 46. Using different syntaxes to refer to the same file

Local syntax:

```
C:\bruno_ws> p4 delete c:\bruno_ws\dev\main\jam\Jambase
```

Depot syntax:

```
C:\bruno_ws> p4 delete //JamCode/dev/jam/Jambase
```

Client syntax:

```
C:\bruno_ws> p4 delete //bruno_ws/dev/main/jam/Jambase
```

Helix wildcards

For commands that operate on sets of files, Helix supports two wildcards.

Wildcard	Description
*	Matches anything except slashes. Matches only within a single directory. Case sensitivity depends on your platform.
...	Matches anything including slashes. Matches recursively (everything in and below the specified directory).

Helix wildcards can be used with local or Helix syntax, as in the following examples:

Expression	Matches
`J*`	Files in the current directory starting with `J`.
`*/help`	All files called `help` in current subdirectories.
`./...`	All files under the current directory and its subdirectories.
`./....c`	All files under the current directory and its subdirectories, that end in `.c`.

Expression	Matches
`/usr/bruno/...`	All files under `/usr/bruno`.
`//bruno_ws/...`	All files in the workspace or depot that is named `bruno_ws`.
`//depot/...`	All files in the depot named `depot`.
`//...`	All files in all depots.

The * wildcard is expanded locally by the operating system before the command is sent to the Helix server. To prevent the local operating system from expanding the * wildcard, enclose it in quotes or precede it with a backslash.

Note

The `...` wildcard cannot be used with the **`p4 add`** command. The `...` wildcard is expanded by the Helix server, and, because the service cannot determine which files are being added, it can't expand the wildcard. The * wildcard can be used with **`p4 add`**, because it is expanded by the operating system shell and not by Helix.

Restrictions on filenames and identifiers

Spaces in filenames, pathnames, and identifiers

Use quotation marks to enclose files or directories that contain spaces. For example:

```
"//Acme/dev/docs/manuals/recommended configuration.doc"
```

If you specify spaces in names for other Helix objects, such as branch names, client names, label names, and so on, the spaces are automatically converted to underscores by the Helix server.

Length limitations

Names assigned to Helix objects such as branches, client workspaces, and so on, cannot exceed 1,024 characters.

Reserved characters

By default, the following reserved characters are not allowed in Helix identifiers or names of files managed by Helix:

Reserved Character	Reason
`@`	File revision specifier for date, label name, or changelist number
`#`	File revision numbers
`*`	Wildcard
`...`	Wildcard (recursive)
`%%1 - %%9`	Wildcard (positional)

Reserved Character	Reason
/	Separator for pathname components

These characters have conflicting and secondary uses. Conflicts include the following:

- UNIX separates path components with /, but many DOS commands interpret / as a command-line switch.
- Most UNIX shells interpret # as the beginning of a comment.
- Both DOS and UNIX shells automatically expand * to match multiple files, and the DOS command line uses % to refer to variables.

To specify these characters in filenames or paths, use the ASCII expression of the character's hexadecimal value, as shown in the following table:

Character	ASCII
@	%40
#	%23
*	%2A
%	%25

Specify the filename literally when you add it; then use the ASCII expansion to refer to it thereafter. For example, to add a file called `recommended@configuration.doc`, issue the following command:

```
$ p4 add -f //Acme/dev/docs/manuals/recommended@configuration.doc
```

When you submit the changelist, the characters are automatically expanded and appear in the change submission form as follows:

```
//Acme/dev/docs/manuals/recommended%40configuration.doc
```

After you submit the changelist with the file's addition, you must use the ASCII expansion to sync the file to your workspace or to edit it within your workspace. For example:

```
$ p4 sync //Acme/dev/docs/manuals/recommended%40configuration.doc
```

The requirement to escape the special characters `@`, `#`, `*`, or `%` also applies if you attempt to use them in the `Root:` or `AltRoots:` fields of your client specification; escape them with `%40`, `%23`, `%2A`, or `%25` respectively.

Filenames containing extended (non-ASCII) characters

Non-ASCII characters are allowed in filenames and Helix identifiers, but entering them from the command line might require platform-specific solutions. If you are using Helix in Unicode mode,

all users must have `P4CHARSET` set properly. For details about setting `P4CHARSET`, see the *P4 Command Reference* and the *Internationalization Notes*.

In international environments, use a common code page or locale setting to ensure that all filenames are displayed consistently across all computers in your organization. To set the code page or locale:

- Windows: use the **Regional Settings** applet in the **Control Panel**
- UNIX: set the `LOCALE` environment variable

Specifying file revisions

Each time you submit a file to the depot, its revision number is incremented. To specify revisions prior to the most recent, use the `#` revision specifier to specify a revision number, or `@` to specify a date, changelist, client workspace, or label corresponding to the version of the file you are working on. Revision specifications can be used to limit the effect of a command to specified file revisions.

Warning

Some operating system shells treat the Helix revision character `#` as a comment character if it starts a word. If your shell is one of these, escape the `#` when you use it in **`p4`** commands.

The following table describes the various ways you can specify file revisions:

Revision needed	Syntax and example
Revision number	*`file#n`* `$ p4 sync //JamCode/dev/jam/Jambase#3` Refers to revision 3 of file `Jambase`

The revision submitted as of a specified changelist	*`file@changelist_number`*
	`$ p4 sync //JamCode/dev/jam/Jambase@126`
	Refers to the version of `Jambase` when changelist 126 was submitted, even if it was not part of the change.
	`$ p4 sync //JamCode/dev/...@126`
	Refers to the state of the entire depot at changelist 126 (numbered changelists are explained in "Submit a numbered changelist" on page 39.

The revision in a specified label	*`file@label_name`* `$ p4 sync //JamCode/dev/jam/Jambase@beta`

Revision needed	Syntax and example
	The revision of `Jambase` in the label called `beta`. For details about labels, refer to Chapter 11, "Labels" on page 101.
The revision last synced to a specified client workspace	*`file@client_name`* `$ p4 sync //JamCode/dev/jam/Jambase@bruno_ws` The revision of `Jambase` last synced to client workspace `bruno_ws`.
Remove the file	*`file`*`#none` `$ p4 sync //JamCode/dev/jam/Jambase#none` Removes `Jambase` from the client workspace.
The most recent version of the file	*`file`*`#head` `$ p4 sync //JamCode/dev/jam/Jambase#head` Same as **`p4 sync //JamCode/dev/jam/Jambase`** (If you omit the revision specifier, the head revision is synced.)
The revision last synced to your workspace	*`file`*`#have` `$ p4 files //JamCode/dev/jam/Jambase#have`
The head revision of the file in the depot on the specified date	*`file@date`* `$ p4 sync //JamCode/dev/jam/Jambase@2011/05/18` The head revision of `Jambase` as of midnight May 18, 2011.
The head revision of the file in the depot on the specified date at the specified time	*`file`*`@"`*`date`*`[:`*`time`*`]"` `$ p4 sync //JamCode/dev/jam/Jambase@"2011/05/18"` Specify dates in the format *`YYYY/MM/DD`*. Specify time in the format *`HH:MM:SS`* using the 24-hour clock. Time defaults to `00:00:00`.

Revision needed	Syntax and example
	Separate the date and the time by a single space or a colon. (If you use a space to separate the date and time, you must also enclose the entire date-time specification in double quotes.)

Example 47. Retrieving files using revision specifiers

Bruno wants to retrieve all revisions that existed at changelist number 30. He types:

```
$ p4 sync //JamCode/dev/jam/Jambase@30
```

Another user can sync their workspace so that it contains the same file revisions Bruno has synced by specifying Bruno's workspace, as follows:

```
$ p4 sync @bruno_ws
```

Example 48. Removing all files from the client workspace

```
$ p4 sync ...#none
```

The files are removed from the workspace but not from the depot.

Date and time specifications

Date and time specifications are obtained from the time zone of the computer that hosts the Helix server. To display the date, time, offset from GMT, and time zone in effect, issue the **`p4 info`** command. The versioning service stores times as the number of seconds since 00:00:00 GMT Jan. 1, 1970), so if you move across time zones, the times stored in the service are correctly reported in the new time zone.

Revision ranges

Some commands can operate on a range of file revisions. To specify a revision range, specify the start and end revisions separated by a comma, for example, **`#3,4`**.

The commands that accept revision range specifications are:

`p4 annotate`	**`p4 files`**	**`p4 interchanges`**	**`p4 list`**	**`p4 sync`**
`p4 changes`	**`p4 fixes`**	**`p4 jobs`**	**`p4 merge`**	**`p4 tag`**
`p4 dirs`	**`p4 grep`**	**`p4 labels`**	**`p4 print`**	
`p4 filelog`	**`p4 integrate`**	**`p4 labelsync`**	**`p4 sizes`**	

For the preceding commands:

- If you specify a single revision, the command operates on revision #1 through the revision you specify (except for **`p4 sync`**, **`p4 print`**, and **`p4 files`**, which operate on the highest revision in the range).

- If you omit the revision range entirely, the command affects all file revisions.

Example 49. Listing changes using revision ranges

A release manager needs to see a quick list of all changes made to the jam project in July 2010. He types:

```
$ p4 changes //JamCode/dev/jam/...@2010/7/1,2010/8/1
```

The resulting list of changes looks like this:

```
Change 673 on 2010/07/31 by bruno@bruno_ws 'Final build for QA'
Change 633 on 2010/07/1 by bruno@bruno_ws 'First build w/bug fix'
Change 632 on 2010/07/1 by bruno@bruno_ws 'Started work'
```

Reporting commands

The following table lists some useful reporting commands:

To display	Use this command
A list of **p4** commands with a brief description	**p4 help commands**
Detailed help about a specific *command*	**p4 help *command***
Command line options common to all Helix commands	**p4 help usage**
Details about Helix view syntax	**p4 help views**
All the arguments that can be specified for the **p4 help** command	**p4 help**
The Helix settings configured for your environment	**p4 info**
The file revisions in the client workspace	**p4 have**
Preview the results of a **p4 sync** (to see which files would be transferred)	**p4 sync -n**
Preview the results of a **p4 delete** (to see which files would be marked for deletion)	**p4 delete -n *files***

Using Helix forms

Some Helix commands, for example **p4 client** and **p4 submit**, use a text editor to display a form into which you enter the information that is required to complete the command (for example, a description of the changes you are submitting). After you change the form, save it, and exit the editor, Helix parses the form and uses it to complete the command. (To configure the text editor that is used to display and edit Helix forms, set `P4EDITOR`.)

When you enter information into a Helix form, observe the following rules:

- Field names (for example, **`View:`**) must be flush left (not indented) and must end with a colon.
- Values (your entries) must be on the same line as the field name, or indented with tabs on the lines beneath the field name.

Some field names, such as the **`Client:`** field in the **`p4 client`** form, require a single value; other fields, such as **`Description:`**, take a block of text; and others, like **`View:`**, take a list of lines.

Certain values, like **`Client:`** in the client workspace form, cannot be changed. Other fields, like **`Description:`** in **`p4 submit`**, *must* be changed. If you don't change a field that needs to be changed, or vice versa, Helix displays an error. For details about which fields can be modified, see the *P4 Command Reference* or use **`p4 help command`**.

Appendix

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