Server Deployment Package

**User Guide (for Unix)**

Perforce Software, Inc.



Preface

This guide tells you how to set up a new Perforce installation using the Server Deployment Package. Recommendations for optimal system maintenance and performance are included as well. The Server Deployment Package (SDP) follows best practices for Perforce server configuration and administration. The SDP consists of standard configuration settings, scripts, and tools, which provide several key features.

* A volume layout designed for maximum data integrity and server performance.
* Automated offline checkpointing and backup procedures for server metadata.
* Replication to another server.
* Easy maintenance of user accounts, labels, workspaces, and other data.
* User authentication using LDAP or Active Directory.

This guide assumes some familiarity with Perforce, and does not duplicate the basic information in the Perforce user documentation. For basic information on Perforce, consult [Introducing Perforce](http://www.perforce.com/perforce/doc.current/manuals/intro/index.html). For system administrators, the [Perforce System Administrator’s Guide](http://www.perforce.com/perforce/doc.current/manuals/p4sag/index.html) is essential reading. All documentation is available from the Perforce web site at <http://www.perforce.com>.

**Please Give Us Feedback**

Perforce welcomes feedback from our users. Please send any suggestions for improving this document or the SDP to [consulting@perforce.com](mailto:consulting@perforce.com).

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# Overview

The SDP has four main components:

* Hardware and storage layout recommendations for Perforce.
* Scripts to automate offline [checkpoints](http://www.perforce.com/perforce/doc.current/manuals/p4sag/02_backup.html#1045865) and other critical maintenance activities.
* Scripts to replicate the Perforce [journal](http://www.perforce.com/perforce/doc.current/manuals/p4sag/02_backup.html#1047307) to another volume or server.
* Scripts to assist with user account maintenance and other routine administration tasks.

Each of these components is covered in detail in this guide.

The SDP should be versioned in a depot (e.g. //perforce) as part of the installation process.

The directory structure of the SDP is shown below in Figure 1: SDP Package Directory Structure. This includes all SDP files, including documentation and maintenance scripts. A subset of these files are deployed to server machines during the installation process.



Figure : SDP Package Directory Structure

# Configuring the Perforce Server

This chapter tells you how to configure a Perforce server machine and an instance of the Perforce Server. These topics are covered more fully in the [System Administrator’s Guide](http://www.perforce.com/perforce/doc.current/manuals/p4sag/07_perftune.html#1044128) and in the [Knowledge Base](http://kb.perforce.com/article/762/performance-tuning); this chapter covers the details most relevant to the SDP.

The SDP can be installed on multiple server machines, and each server machine can host one or more Perforce server instances. (In this guide, the term *server* refers to a Perforce server instance unless otherwise specified.) Each server instance is assigned a number. This guide uses instance number 1 in the example commands and procedures. Other instance numbers can be substituted as required.

Optionally, instances can be given a short tag name, such as ‘abc’, rather than a number. Manual configuration is required to use tag names rather than the default numeric values.

This chapter also describes the general usage of SDP scripts and tools.

## Volume Layout and Hardware

To ensure maximum data integrity and performance, use three different physical volumes for each server instance. Three volumes can be used for all instances hosted on one server machine, but using three volumes per instance reduces the chance of hardware failure affecting more than one instance.

* Perforce metadata (database files): Use the fastest volume possible, ideally RAID 1+0 on a dedicated controller with the maximum cache available on it. This volume is normally called /metadata.
* Journals and logs: Use a fast volume, ideally RAID 1+0 on its own controller with the standard amount of cache on it. This volume is normally called /logs. If a separate logs volume is not available, put the logs on the depotdata volume.
* Depot data, archive files, scripts, and checkpoints: Use a large volume, with RAID 5 on its own controller with a standard amount of cache or a SAN or NAS volume. This volume is the only volume that must be backed up. The backup scripts place the metadata snapshots on this volume. This volume can be backed up to tape or another long term backup device. This volume is normally called /depotdata.

For optimal performance on UNIX machines, use the XFS file system.

If three controllers are not available, put the logs and depotdata volumes on the same controller. Do not run anti-virus tools or back up tools against the metadata volume(s) or logs volume(s), because they can interfere with the operation of the Perforce server.



Back up everything on the depotdata volume(s). Avoid backing up the metadata volume directly, because doing so can interfere with the operation of a live Perforce server, potentially corrupting data. The checkpoint and journal process archive the metadata on the depotdata volume. Backing up the logs volume is optional.

The SDP assumes (but does not require) the three volumes described above. On Unix/Linux platforms, the SDP creates a convenience directory containing links to the three volumes for each instance. This convenience directory is called /p4. The volume layout is shown in Figure 2: SDP Runtime Structure and Volume Layout, including the links that constitute the /p4 directory for Unix/Linux platforms. (On Windows, the three volumes have their own drive letters, and there is no convenience directory.) The convenience directory enables easy access to the different parts of the file system for each instance. For instance, the directory /p4/1/root has the database for instance 1, /p4/1/logs has the logs for instance 1, /p4/1/bin has the binaries for instance 1, and /p4/common/bin contains the scripts common to all instances.

View Figure 2: SDP Runtime Structure and Volume Layout (below), viewed from tht top down, displays a Perforce *application* administrator’s view of the system, which shows how to navigate the directory structure to find databases, log files, and versioned files in the depots. Viewed from the bottom up, it displays a Perforce *system* administrator’s view, emphasizing the physical volume where Perforce data is stored.



Figure : SDP Runtime Structure and Volume Layout

## Memory and CPU

Make sure the server has enough memory to cache the db.rev database file and to prevent the server from paging during user queries. Maximum performance is obtained if the server has enough memory to keep all of the database files in memory.

Below are some approximate guidelines for allocating memory.

* 1.5 kilobyte of RAM per file stored in the server.
* 32 MB of RAM per user.

Use the fastest processors available with the fastest available bus speed. Faster processors with a lower number of cores provide better performance for Perforce. Quick bursts of computational speed are more important to Perforce's performance than the number of processors, but have a minimum of two processors so that the offline checkpoint and back up processes do not interfere with your Perforce server.

## General SDP Usage

This section presents an overview of the SDP scripts and tools. Details about the specific scripts are provided in later sections.

### Unix/Linux

Most scripts and tools reside in /p4/common/bin. The /p4/*instance*/bin directory contains scripts that are specific to that instance such as wrappers for the p4d executable.

Always run important administrative commands using the p4master\_run script, and specify fully qualified paths. This script loads environment information from /p4/common/bin/p4\_vars, the central environment file of the SDP, ensuring a controlled environment. Note that custom scripts you develop can also benefit from being called by p4master\_run.

In a clustered environment, the p4master\_run script performs a safety check to be sure that it is running on the active node in a cluster, rather than a cluster standby. This allows crontabs to be active on a cluster , as they can call scripts via p4master\_run, which ensures the scripts will not actually be called until the node becomes active.

When invoking a Perforce command directly on the server machine, use the p4\_*instance* wrapper that is located in /p4/*instance*/bin. This wrapper invokes the correct version of the p4 client for the instance. The use of these wrappers enables easy upgrades, because the wrapper is a link to the correct version of the p4 client. There is a similar wrapper for the p4d executable, called p4d\_*instance*.

Below are some usage examples for instance 1.

| *Example* | *Remarks* |
| --- | --- |
| /p4/common/bin/p4master\_run 1 /p4/1/bin/p4\_1 admin stop | Run p4 admin stop on instance 1 |
| /p4/common/bin/p4master\_run 1 /p4/common/bin/live\_checkpoint.sh | Take a checkpoint of the live database on instance 1 |
| /p4/common/bin/p4master\_run 1 /p4/common/bin/p4login | Log in as the p4admin user on instance 1. |

Some maintenance scripts can be run from any client workspace, if the user has administrative access to Perforce. For example, to run the script that archives old workspaces and branches, run:

/ws\_root/Perforce/sdp/Maintenance/archive\_clients\_and\_branches.py

If an error occurs due to the default Python interpreter used by the script, invoke Python first:

/bin/python /ws\_root/Perforce/sdp/Maintenance/archive\_clients\_and\_branches.py

In the receding example /ws\_root is the root of the client workspace, and the python interpreter is located in /usr/bin.

### Monitoring SDP activities

The important SDP maintenance and backup scripts generate email notifications when they complete.

For further monitoring, you can consider options such as:

* Making the SDP log files available via a password protected HTTP server.
* Directing the SDP notification emails to an automated system that interprets the logs.

# Installing the Perforce Server and the SDP

This chapter tells you how to install a Perforce server instance in the SDP framework. For more details about server installation, refer to the [Perforce System Administrator’s Guide](http://www.perforce.com/perforce/doc.current/manuals/p4sag/index.html).

Many companies use a single Perforce Server to manage their files, while others use multiple servers. The choice depends on network topology, the geographic distribution of work, and the relationships among the files being managed. If multiple servers are run, assign each instance a number and use that number as part of the name assigned to depots, to make the relationship of depots and servers obvious.

The default [P4PORT](http://www.perforce.com/perforce/doc.current/manuals/p4sag/01_install.html#1061702) setting used by the SDP is *instance*666. For example, instance 1 runs on port 1666. Each Perforce instance uses its hostname as an identifying name; this identification is used for replicated servers. This can easily be changed in /p4/common/bin/p4\_vars.

For any instances that are named rather than numbered, the must /p4/common/bin/p4\_vars file must be customized to assign a numeric P4PORT value to each named instance.

|  |  |
| --- | --- |
| info.png | To install the SDP, you must have root (super-user or administrator) access to the server machine. |

## Installing on Unix/Linux Machines

To install Perforce Server and the SDP, perform the following basic steps that are discussed below:

* Set up a user account, file system, and configuration scripts.
* Run the configuration script.
* Start the server and configure the required file structure for the SDP.

### Initial setup

Prior to installing the Perforce server, perform the following steps.

1. Create a user called perforce (It can be a different name if you prefer). Set the user's home directory to /p4 on a local disk.
2. Create a group called p4admin (Again, can be a different name) and make it the perforce user's primary group.
3. Create or mount the server file system volumes (/depotdata, /metadata, /logs).
4. Copy the SDP to the directory /depotdata/sdp. We will refer to this directory as $SDP. Make the entire $SDP directory writable.
5. Download the appropriate p4 and p4d binaries for your release and platform from ftp.perforce.com (log in as anonymous) and place them in $SDP/Server/Unix/p4/common/bin. ***Do not*** rename them to include the version number; this step is done automatically for you by the SDP.
6. cd to $SDP/Server/Unix/setup and edit mkdirs.sh - set all of the variables in the configuration variables section for your company.
7. As the root user, cd to $SDP/Server/Unix/setup, and run this:

mkdirs.sh 1

This script configures the first Perforce Server instance. To configure additional instances, run mkdirs.sh again, specifying the instance number each time. For example, to configure a second and third instance, issue the following commands:

mkdirs.sh 2

mkdirs.sh 3

1. Put the Perforce license file for the server into /p4/1/root

Make the Perforce server a system service that will start and stop automatically when the machine reboots. The following commands will work on RedHat, CentOS and SuSE. Ubuntu MacOS and other Unix derivatives use different mechanisms to services. If your Linux distribution does not have the chkconfig utility, consult your distribution’s documentation for information on installing init.d scripts. Run these commands the root user:

cd /etc/init.d

ln -s /p4/1/bin/p4d\_1\_init

chkconfig --add p4d\_1\_init

chkconfig p4d\_1\_init on

### Configuration script

The mkdirs.sh script, which resides in $SDP/Server/Unix/setup, sets up the basic directory structure used by the SDP. Carefully review the header of this script before running it, and adjust the values of the variables near the top of the script as required. The important parameters are as follows:

| ***Parameter*** | ***Description*** |
| --- | --- |
| MD | Name of the metadata volume |
| DD | Name of the depotdata volume |
| LG | Name of the logs volume |
| OSUSER | Operating system user that will run the Perforce instance |
| OSGROUP | Operating system group that OSUSER belongs to |
| SDP | Path to SDP distribution file tree |
| CASESENSITIVE | Indicates if server has special case sensitivity settings |
| CLUSTER | Indicates if server is running in cluster |
| P4ADMINPASS  P4SERVICEPASS | Password to use for Perforce superuser account  Service User’s password for replication |
| P4DNSNAME | Fully qualified DNS name of the Perforce master server machine |

For a detailed description of this script, see Appendix A – Directory Structure Configuration Script for Linux/Unix.

### Starting the server

Perforce provides its consulting customers with a set of start-up files, cron files, and log rotation files to help configure your sites. For Unix/Linux platforms, these files reside in your Perforce server in the following location:

$SDP/Server/Unix/p4/common/etc/cron.d - contains example crontab files

$SDP/Server/Unix/p4/common/etc/init.d - contains init scripts

To configure and start instance 1, follow these steps:

1. Create your Perforce administrator account, using the user name in /p4/common/bin/p4\_vars and password defined in /p4/common/bin/adminpass.
2. cd to /p4/sdp/Server/config and run

configure\_new\_server.sh

1. Initialize the perforce user’s crontab with one of these commands:

crontab /p4/crontab or crontab /p4/crontab.replica

To verify that your server installation is working properly:

1. Issue the [p4 info](http://www.perforce.com/perforce/doc.current/manuals/cmdref/info.html#1040665) command, after setting appropriate environment variables. If the server is running, it will display details about its settings.

Now that the server is running properly, copy the following configuration files to the depotdata volume for backup purposes:

* Any init scripts used in /etc/init.d.
* A copy of the crontab file, obtained using crontab –l.
* Any other relevant configuration scripts, such as cluster configuration scripts, failover scripts, or disk failover configuration files.

### Archiving configuration files

Now that the server is running properly, copy the following configuration files to the depotdata volume for backup:

* The scheduler configuration.
* Cluster configuration scripts, failover scripts, and disk failover configuration files.

## Configuring protections, file types, monitoring and security

After the server is installed and configured, most sites will want to modify server permissions (protections) and security settings. Other common configuration steps include modifying the file type map and enabling process monitoring. To configure permissions, perform the following steps:

1. To set up protections, issue the p4 protect command. The protections table is displayed.
2. Delete the following line:  
   write user \* \* //depot/...
3. Define protections for your server using groups. Perforce uses an inclusionary model. No access is given by default, you must specifically grant access to users/groups in the protections table. It is best for performance to grant users specific access to the areas of the depot that they need rather than granting everyone open access, and then trying to remove access via exclusionary mappings in the protect table even if that means you end up generating a larger protect table.
4. To set the server’s default file types, run the p4 typemap command and define typemap entries to override Perforce’s default behavior.

Add any file type entries that are specific to your site. Suggestions:

* For already-compressed file types (such as .zip, .gz, .avi, .gif), assign a file type of binary+Fl to prevent the server from attempting to compress them again before storing them.
* For regular binary files, add binary+l to make so that only one person at a time can check them out.
* A sample file is provided in $SDP/Server/config/typemap

1. For large, generated text files, assign the text+C file type, to avoid causing server memory issues.
2. To make your changelists default to restricted (for high security environments):

p4 configure set defaultChangeType=restricted

1. If authentication against LDAP or Active Directory is required[[1]](#footnote-2), use the [authentication](http://perforce.com/perforce/doc.current/manuals/p4sag/06_scripting.html#1059697) script AD\_auth.pl, available in $SDP/Server/Unix/p4/common/bin/triggers, as a starting point. (There is also a version of the script called AD\_auth\_debug.pl, which contains additional debugging information.) Note: Perforce provides most IT required password management practices internally. It is recommend to use internal passwords over LDAP/AD to avoid exposing LDAP/AD passwords to the Perforce admin via the auth trigger.

# Backup, Replication, and Recovery

Perforce servers maintain *metadata* and *versioned files*. The metadata contains all the information about the files in the depots. Metadata resides in database (db.\*) files in the server’s root directory (P4ROOT). The versioned files contain the file changes that have been submitted to the server. Versioned files reside on the depotdata volume.

This section assumes that you understand the basics of Perforce backup and recovery. For more information, consult the Perforce [System Administrator’s Guide](http://www.perforce.com/perforce/doc.current/manuals/p4sag/02_backup.html#1043336) and the Knowledge Base articles about [replication](http://kb.perforce.com/article/1371/perforce-replication).

### Typical Backup Procedure

The SDP’s maintenance scripts, run as *cron* tasks, periodically back up the metadata. The weekly sequence is described below.

Six nights a week, perform the following tasks.

1. Truncate the active journal.
2. Replay the journal to the offline database. (Refer to Figure 2: SDP Runtime Structure and Volume Layout for more information on the location of the live and offline databases.)
3. Create a checkpoint from the offline database.
4. Recreate the offline database from the last checkpoint.

Once a week, perform the following tasks.

1. Stop the live server.
2. Truncate the active journal.
3. Replay the journal to the offline database. (Refer to Figure 2: SDP Runtime Structure and Volume Layout for more information on the location of the live and offline databases.)
4. Archive the live database.
5. Move the offline database to the live database directory.
6. Start the live server.
7. Create a new checkpoint from the archive of the live database.
8. Recreate the offline database from the last checkpoint.
9. Verify all depots.

This normal maintenance procedure puts the checkpoints (metadata snapshots) on the depotdata volume, which contains the versioned files. Backing up the depotdata volume with a normal backup utility like *robocopy* or *rsync* provides you with all the data necessary to recreate the server.

To ensure that the backup does not interfere with the metadata backups (checkpoints), coordinate backup of the depotdata volume using the SDP maintenance scripts.

The preceding maintenance procedure minimizes server downtime, because checkpoints are created from offline or saved databases while the server is running.

|  |  |
| --- | --- |
| info.png | Be sure to back up the entire depotdata volume using a normal backup utility. |

With no additional configuration, the normal maintenance prevents loss of more than one day’s metadata changes. To provide an optimal [Recovery Point Objective](http://en.wikipedia.org/wiki/Recovery_point_objective) (RPO), the SDP provides additional tools for replication.

## Full One-Way Replication

Perforce supports a full one-way [replication](http://www.perforce.com/perforce/doc.current/manuals/p4sag/10_replication.html#1056059) of data from a master server to a replica, including versioned files. The [p4 pull](http://www.perforce.com/perforce/doc.current/manuals/cmdref/pull.html#1048868) command is the replication mechanism, and a replica server can be configured to know it is a replica and use the replication command. The p4 pull mechanism requires very little configuration and no additional scripting. As this replication mechanism is simple and effective, we recommend it as the preferred replication technique. Replica servers can also be configured to only contain metadata, which can be useful for reporting or offline checkpointing purposes. See the Distributing Perforce Guide for details on setting up replica servers.

If you wish to use the replica as a read-only server, you can use the [P4Broker](http://www.perforce.com/perforce/doc.current/manuals/p4sag/11_broker.html#1056059) to direct read-only commands to the replica or you can use a forwarding replica. The broker can do load balancing to a pool of replicas if you need more than one replica to handle your load. Use of the broker may require use of a [P4AUTH](http://www.perforce.com/perforce/doc.current/manuals/p4sag/03_superuser.html#1093066) server for authentication.

|  |  |
| --- | --- |
| info.png | Replication handles all server metadata and versioned file content, but not the SDP installation itself or other external scripts such as triggers. Use tools such as robocopy or rsync to replicate the rest of the depotdata volume. |

### Replication Setup

To configure a replica server, first configure a machine identical to the master server, then install the SDP on it to match the master server installation. Once the machine and SDP install is in place, you need to configure the master server for replication.

Perforce supports many types of replicas suited to a variety of purposes, such as:

* Real-time backup,
* Providing a disaster recovery solution,
* Load distribution to enhance performance,
* Distributed development,
* Dedicated resources for automated sysems, such as build servers, and more.

In the sample below, the replica name will be replica1, the service user name is svc\_replica1, and the master server’s name is master.

The following sample commands illustrate how to setup a simple read-only replica:

* p4 configure set journalPrefix=/p4/1/checkpoints/p4\_1
* p4 configure set replica1#P4PORT=1667
* p4 configure set replica1#P4TARGET=master:1667
* p4 configure set replica1#server=3
* p4 configure set "replica1#startup.1=pull -i 1"
* p4 configure set "replica1#startup.2=pull -u -i 1"
* p4 configure set "replica1#startup.3=pull -u -i 5"
* p4 configure set "replica1#db.replication=readonly"
* p4 configure set "replica1#lbr.replication=readonly"
* p4 configure set replica1#serviceUser=svc\_replica1
* p4 user -f svc\_replica1 (Add the Type: service field to the user form before saving)
* p4 passwd svc\_replica1 (Set the service user’s password)
* p4 group ServiceUsers (Add the service user svc\_replica1 to the Users: section and set the timeout value to unlimited.)
* p4 protect (Give the ServiceUsers group super access).

Now that the setttings are in the master server, you need to create a checkpoint to seed the replica. Run:

/p4/common/bin/p4master\_run 1 /p4/common/bin/daily\_backup.sh

When the checkpoint finishes, rsync the checkpoint plus the versioned files over to the replica:

rsync -avz /p4/1/checkpoints/p4\_1.ckp.###.gz perforce@replica:/p4/1/checkpoints/.

rsync -avz /p4/1/depots/ perforce@replica:/p4/1/depots/

(Assuming perforce is the OS user name and replica is the name of the replica server in the commands above, and that ### is the checkpoint number created by the daily backup.)

Once the rsync finishes, go to the replica machine run the following:

* /p4/1/bin/p4d\_1 -r /p4/1/root -jr -z /p4/1/checkpoints/p4\_1.ckp.###.gz
* /p4/common/bin/p4master\_run 1 /p4/1/bin/p4\_1 -p master:1667 -u service login (enter the service user’s password)
* /p4/1/bin/p4d\_1\_init start

Now, you can log into the replica server and run “p4 pull -lj” to check to see if replication is working. If you see any numbers with a negative sign in front of them, replication is not working. The most likely cause of this is that the service user is not logged in. Rerun the steps above to login the service user and check again. If replication still is not working, check /p4/1/logs/log on the replica.

The final steps for setting up the replica server are to set up the crontab for the replica server, and set up the rsync trust certificates so that the replica scripts can run rsync without passwords.

The replica crontab is in /p4/common/etc/init.d/crontab.replica.

To configure the rsync trust:

On both the master and replica servers, go to the perforce user’s home directory and run:

ssh-keygen -t rsa

Just use the defaults for the questions it asks.

Now from the master, run:

rsync -avz ~/.ssh/id\_rsa.pub perforce@replica:~/.ssh/authorized\_keys

and from the replica, run:

rsync -avz ~/.ssh/id\_rsa.pub perforce@master:~/.ssh/authorized\_keys

You can validate everything is working by manually running the replica crontab scripts:

/p4/common/bin/p4master\_run 1 /p4/common/bin/sync\_replica.sh

/p4/common/bin/p4master\_run 1 /p4/common/bin/weekly\_sync\_replica.sh

The log files will be in /p4/1/logs, so you can check for any errors from each script.

## Recovery Procedures

There are three scenarios that require you to recover server data:

| ***Metadata*** | ***Depotdata*** | ***Action required*** |
| --- | --- | --- |
| lost or corrupt | Intact | Recover metadata as described below |
| Intact | lost or corrupt | Call Perforce Support |
| lost or corrupt | lost or corrupt | Recover metadata as described below.  Recover the depotdata volume using your normal backup utilities. |

Restoring the metadata from a backup also optimizes the database files.

### Recovering from a checkpoint and journal(s)

The checkpoint files are stored in the /p4/instance/checkpoints directory, and the most recent checkpoint is named p4\_instance.ckp.number.gz. Recreating up-to-date database files requires the most recent checkpoint, from /p4/*instance*/checkpoints and the journal file from /p4/*instance*/logs.

To recover the server database manually, perform the following steps from the root directory of the server (/p4/*instance*/root).

1. Stop the Perforce Server by issuing the following command:

/p4/common/bin/p4master\_run instance /p4/instance/bin/p4\_1 admin stop

1. Delete the old database files in the /p4/*instance*/root/save directory
2. Move the live database files (db.\*) to the save directory.
3. Use the following command to restore from the most recent checkpoint.

/p4/instance/bin/p4d\_instance -r /p4/instance/root -jr -z

/p4/instance/checkpoints/p4\_instance.ckp.most recent\_#.gz

1. To replay the transactions that occurred after the checkpoint was created, issue the following command:

/p4/instance/bin/p4d\_*instance* -r /p4/instance/root -jr

/p4/instance/logs/journal

1. Restart your Perforce server.

If the Perforce service starts without errors, delete the old database files from /p4/instance/root/save.

If problems are reported when you attempt to recover from the most recent checkpoint, try recovering from the preceding checkpoint and journal. If you are successful, replay the subsequent journal. If the journals are corrupted, contact [Perforce Technical Support](mailto:support@perforce.com). For full details about back up and recovery, refer to the [Perforce System Administrator’s Guide](http://perforce.com/perforce/doc.current/manuals/p4sag/02_backup.html#1043336).

### Recovering from a tape backup

This section describes how to recover from a tape or other offline backup to a new server machine if the server machine fails. The tape backup for the server is made from the depotdata volume. The new server machine must have the same volume layout and user/group settings as the original server. In other words, the new server must be as identical as possible to the server that failed.

To recover from a tape backup, perform the following steps.

1. Recover the depotdata volume from your backup tape.
2. Create the /p4 convenience directory on the OS volume.
3. Create the directories /metadata/p4/*instance*/root/save and /metadata/p4/*instance*/offline\_db.
4. Change ownership of these directories to the OS account that runs the Perforce processes.
5. Switch to the Perforce OS account, and create a link in the /p4 directory to /depotadata/p4/*instance*.
6. Create a link in the /p4 directory to /depotdata/p4/common.
7. As a super-user, reinstall and enable the init.d scripts
8. Find the last available checkpoint, under /p4/*instance*/checkpoints
9. Recover the latest checkpoint by running:

/p4/*instance*/bin/p4d\_*instance* -r /p4/*instance*/root -jr -z *last\_ckp\_file*

1. Recover the checkpoint to the offline\_db directory:

/p4/*instance*/bin/p4d\_*instance* -r /p4/*instance*/offline\_db -jr -z *last\_ckp\_file*

1. Reinstall the Perforce server license to the server root directory.
2. Start the perforce service by running /p4/1/bin/p4d\_1\_init start
3. Verify that the server instance is running.
4. Reinstall the server crontab or scheduled tasks.
5. Perform any other initial server machine configuration.
6. Verify the database and versioned files by running the p4verify.sh script. Note that files using the [+k](http://perforce.com/perforce/doc.092/manuals/cmdref/o.ftypes.html#1040647) file type modifier might be reported as BAD! after being moved. Contact Perforce Technical Support for assistance in determining if these files are actually corrupt.

### Failover to a replicated standby machine

See DR-Failover-Steps-Linux.docx

# Server Maintenance

This section describes typical maintenance tasks and best practices for administering server machines. The directory $SDP/Maintenance contains scripts for several common maintenance tasks. A driver script called maintenance is available for Unix and Linux platforms. This script can be invoked from a *cron* utility weekly. Configure maintenance.cfg in the Maintenance directory for your site before attempting to run any of the scripts.

The user running the maintenance scripts must have administrative access to Perforce for most activities. Most of these scripts can be run from a client machine, but it is easiest to run them on the server via crontab.

### Server upgrades

Upgrading a server instance in the SDP framework is a simple process involving a few steps.

* Download the new p4 and p4d executables for your OS from [ftp.perforce.com](ftp://ftp.perforce.com) and place them in /p4/common/bin
* Run:
  + /p4/common/bin/p4master\_run *instance* /p4/common/bin/upgrade.sh
* If you are running replicas, upgrade the replicas first, and then the master.

### Database Modifications

Occasionally modifications are made to the Perforce database. For example, server upgrades and some recovery procedures modify the database.

When upgrading the server, replaying a journal patch, or performing any activity that modifies the db.\* files, you must restart the offline checkpoint process so that the files in the offline\_db directory match the ones in the live server directory. The easiest way to restart the offline checkpoint process is to run the live\_checkpoint script after modifying the db.\* files, as follows:

/p4/common/bin/p4master\_run *instance* /p4/common/bin/live\_checkpoint.sh

This script makes a new checkpoint of the modifed database files in the live root directory, then recovers that checkpoint to the offline\_db directory so that both directories are in sync. This script can also be used anytime to create a checkpoint of the live database.

This command must be run when an error occurs during offline checkpointing. It restarts the offline checkpoint process from the live database files to bring the offline copy back in sync. If the live checkpoint script fails, contact Perforce Consulting at [consulting@perforce.com](mailto:consulting@perforce.com).

### Listing inactive specifications

To list branch specifications, clients, labels and users that have been inactive for a specified number of weeks, run accessdates.py. This script generates four text files listing inactive specifications:

* branches.txt
* clients.txt
* labels.txt
* users.txt

### Unloading and Reloading labels

To use the unload and reload commands for archiving clients and labels, you must first create an unload depot using the “p4 depot” command. Run:

p4 depot unload

Set the type of the depot to unload and save the form. (This step has already been done if you ran the configure\_new\_server.sh script)

After the depot is created, you can use the following command to archive all the clients and labels that have been accessed since the given date:

p4 unload -f -L -z -a -d <date>

For example, to unload all cliens and labels that haven’t been access since Jan. 1, 2013, you would run:

p4 unload -f -L -z -a -d 2013/01/01

Users can reload their own clients/labels using the reload command. They can run:

p4 reload -c <clientname>

or

p4 reload -l <labelname>

As a super user, you can reload and unloaded item by adding the -f flag to the reload command as follows:

p4 reload -f -c|l <specname>

In addition, you can avoid having to unload/reload labels by creating a trigger to set the autoreload option as the default on all new labels. That will cause the server to use the unload depot for storing the labels rather than storing them in db.label. This helps with performance of the server by not increasing the size of the database for label storage.

You can automate these tasks with $SDP/Maintenance/unload\_clients.py and $SDP/Maintenance/unload\_labels.py

### **Deleting users**

To delete users, run python p4deleteuser.py, specifying the users to be deleted. The script deletes the users, any workspaces they own, and removes them from any groups they belong to.

To delete all users that have not accessed the server in the past 12 weeks, run python delusers.py. To change the number of weeks to a value other than 12, change the weeks variable in maintenance.cfg.

To remove a specified user from all groups it belongs to, run python removeuserfromgroups.py. Specify the user name or the name of a text file containing a list of users to be removed.

### Listing users

To display a list of users that are in a group but do not have an account on the server, run python checkusers.py.

### **Group management**

To duplicate a specified user’s group entries on behalf of another user, run python mirroraccess.py. The script adds the target user to all groups that the source user belongs to. Invoke the script as follows:

python mirroraccess.py sourceuser targetuser

To add users to a group, run

python addusertogroup.py user group

where:

* user = user name or a file containing a list of user names, one per line.
* group = name of Perforce group to which the users are added.

### Adding users

To add users to a server:

1. Create a text file, such as users.csv, containing the users to add, specifying one user name per line in this format:

user,email,full name

1. If you are using LDAP/AD authentication, edit createusers.py and comment out this line:

setpass.setpassword(user[0])

1. Run python createusers.py users.csv.

### Email functions

To send email to all of your Perforce users**:**

1. Create a file called message.txt that contains the body of your message.
2. Run email.bat or email.sh, specifying the email subject in quotes.

To list the email addresses of your Perforce users, run python make\_email\_list.py.

### Workspace management

The [form-out trigger](http://www.perforce.com/perforce/doc.current/manuals/p4sag/06_scripting.html#1062348) $SDP/Server/Unix/p4/common/bin/triggers/SetWsOptions.py contains default [workspace options](http://www.perforce.com/perforce/doc.current/manuals/p4guide/02_config.html#1067985), such as leaveunchanged instead of submitunchanged.

To use the trigger, first copy it to /p4/common/bin/triggers

To enable the trigger, first modify the OPTIONS variable in the script, providing the set of desired options. Then insert an entry in the trigger table like the following:

setwsopts form-out client "python /p4/common/bin/triggers/SetWsOptions.py %formfile%"

The [form-save trigger](http://www.perforce.com/perforce/doc.current/manuals/p4sag/06_scripting.html#1062348) $SDP/Server/Unix/p4/common/bin/triggers/PreventWsNonAscii.py enforces the policy that no workspaces may contain non-ASCII characters.

To use the trigger, first copy it to /p4/common/bin/triggers

To enable the trigger, insert an entry in the trigger table like the following:

nowsascii form-save client "python /p4/common/bin/triggers/PreventWsNonAscii.py %formfile%"

### **Removing empty changelists**

To delete empty pending changelists, run python remove\_empty\_pending\_changes.py.

Maximizing Server Performance

The following sections provide some guidelines for maximizing the performance of the Perforce Server, using tools provided by the SDP. More information on this topic can be found in the [System Administrator’s Guide](http://www.perforce.com/perforce/doc.current/manuals/p4sag/07_perftune.html#1044128) and in the [Knowledge Base](http://kb.perforce.com/article/762/performance-tuning).

### Optimizing the database files

The Perforce Server’s database is composed of b-tree files. The server does not fully rebalance and compress them during normal operation. To optimize the files, you must checkpoint and restore the server. The weekly checkpoint script used as part of the normal server maintenance automates this task.

To minimize the size of back up files and maximize server performance, minimize the size of the db.have and db.label files. The scripts for Unloading and Reloading labels, and Deleting users, help achieve this goal. For best server performance, run these scripts weekly via /p4/sdp/Maintenance/maintenance

## Proactive Performance Maintenance

This section describes some things that can be done to proactively to enhance scalability and maintain performance.

### Limiting large requests

To prevent large requests from overwhelming the server, you can limit the amount of data and time allowed per query by setting the maxresults, maxscanrows and maxlocktime parameters to the lowest setting that does not interfere with normal daily activities. As a good starting point, set maxscanrows to maxresults \* 3; set maxresults to slightly larger than the maximum number of files the users need to be able to sync to do their work; and set maxlocktime to 30000 milliseconds. These values must be adjusted up as the size of your server and the number of revisions of the files grow. To simplify administration, assign limits to groups rather than individual users.

To prevent users from inadvertently accessing large numbers of files, define their client view to be as narrow as possible, considering the requirements of their work. Similarly, limit users’ access in the protections table to the smallest number of directories that are required for them to do their job.

Finally, keep triggers simple. Complex triggers increase load on the server.

### Offloading remote syncs

For remote users who need to sync large numbers of files, Perforce offers a [proxy server](http://perforce.com/perforce/doc.current/manuals/p4sag/09_p4p.html#1056059). P4P, the Perforce Proxy, is run on a machine that is on the remote users’ local network. The Perforce Proxy caches file revisions, serving them to the remote users and diverting that load from the main server.

P4P is included in the Windows installer. To launch P4P on Unix machines, copy the /p4/common/etc/init.d/p4p\_1\_init script to /p4/1/bin/p4p\_1\_init. Then review and customize the script to specify your server volume names and directories.

P4P does not require special hardware but it can be quite CPU intensive if it is working with binary files, which are CPU-intensive to attempt to compress. It doesn’t need to be backed up. If the P4P instance isn’t working, users can switch their port back to the main server and continue working until the instance of P4P is fixed.

### P4V performance settings

At large sites with hundreds or thousands of simultaneous users, the P4V data retrieval settings can help prevent P4V requests from impacting server performance. As of the 2010.1 release, P4V settings that affect performance can be centrally managed for all users or specific groups of users, using the [JavaScript API](http://www.perforce.com/perforce/doc.current/manuals/p4jsapi/index.html) (P4JsApi).

The SDP includes a sample P4V settings file, along with the P4JsApi centralsettings file that enables it. In the following example, the SDP is versioned as //Perforce/sdp.

Follow these steps to provide P4V performance settings for your users.

1. Determine whether you want P4V settings common to all users, or different settings for different groups. If the latter, make a unique copy of //Perforce/sdp/JsApi/p4vsettings.xml for each group of users. For example, you may create //Perforce/sdp/JsApi/p4vsettings\_dev.xml for developers and //Perforce/sdp/JsApi/p4vsettings\_qa.xml for QA.
2. Review and set the performance limits in //Perforce/sdp/JsApi/p4vsettings.xml, or in each copy of this file. (The file contains suggested default values.) The available settings are:
   1. The ServerRefresh interval in minutes, which defines how often P4V attempts to get updated information from the server.
   2. The MaxFiles that P4V will retrieve for one fetch command.
   3. The MaxFilePreviewSize in kilobytes.
   4. The FetchCount, which affects the number of forms fetched for some operations.
3. If using common settings for all users, proceed with this step; otherwise proceed to the next step. Install the centralsettings file by adding a line to the protections table like:

list group AllUsers centralsettings //Perforce/sdp/JsApi/centralsettings.js

(This line assumes that you have a group called AllUsers that represents all users.)

1. (Skip this step if using common settings for all users.) If using different settings for different groups, create a copy of //Perforce/sdp/JsApi/centralsettings.js for each group of users. For example, you may create //Perforce/sdp/JsApi/centralsettings\_dev.js for developers and //Perforce/sdp/JsApi/centralsettings\_qa.js for QA. Modify the line that references p4vsettings.xml to reference the copy for the group.
2. (Skip this step if using common settings for all users.) Install each copy of centralsettings.js in the protections table. In our example with separate copies for developers and QA, we would use lines like:

list group Dev centralsettings //Perforce/sdp/JsApi/centralsettings\_dev.js

list group QA centralsettings //Perforce/sdp/JsApi/centralsettings\_qa.js

1. Each P4V user must follow the instructions in the P4JsApi manual to enable P4V extensions.

Of course, the P4JsApi provides many other valuable features. If you choose to use these features, you can use the same centralsettings files for your groups to enable them. Refer to the P4JsApi manual for details.

# Tools and Scripts

This section describes the various scripts and files provided as part of the SDP package. To run main scripts, the machine must have Python 2.7, and a few scripts require Perl 5. The Maintenance scripts can be run from the server machine or from client machines.

The following various scripts.

## Core Scripts

The core SDP scripts are those related to checkpoints and other scheduled operations, and all run from /p4/common/bin.

### p4\_vars

Defines the environment variables required by the Perforce server. This script uses a specified instance number as a basis for setting environment variables. For example, the port numbers for each instance are defined as {instance}666.

This script also sets server logging options and configurables.

Location: /p4/common/bin

### p4master\_run

This is the wrapper script to other SDP scripts. This ensures that the shell environment is loaded from p4\_vars. It provides a ‘-c’ flag for silent opereation, used in many crontab so that email is sent from the scripts themselves).

Location: /p4/common/bin

### live\_checkpoint

Stops the server, creates a checkpoint from the live database files, recovers from that checkpoint to rebalance and compress the files, then recovers the checkpoint in the offline\_db directory to ensure that the database files are optimized.

Run this script when creating the server and if an error occurs while replaying a journal during the off-line checkpoint process.

Location:

* /p4/common/bin

### daily\_backup

This script is configured to run six days a week using crontab or the Windows scheduler. The script truncates the journal, replays it into the offline\_db directory, creates a new checkpoint from the resulting database files, then recreates the offline\_db directory from the new checkpoint.

This procedure rebalances and compresses the database files in the offline\_db directory, which are rotated into the live database directory once a week by the weekly\_checkpoint script.

Location:

* /p4/common/bin

### weekly\_backup

Performs the weekly checkpoint process. This script stops your server for a few minutes to rotate your database files with those in the offline\_db directory. Specifically, this script does the following:

1. Stops the server.
2. Truncates the journal.
3. Replays the journal to offline\_db.
4. Deletes last week’s database files from save.
5. Moves the database files from the server root to the save directory.
6. Moves the db files from the offline\_db directory to the root directory
7. Restarts the server
8. Creates a checkpoint from the database files in the save directory.
9. Recreates the database files in offline\_db from the new checkpoint.

Location:

* /p4/common/bin

### p4verify

Verifies the integrity of the depot files. This script is run by crontab.

Location:

* /p4/common/bin

### p4review.py

Sends out email containing the change descriptions to users who are configured as reviewers for affected files (done by setting the Reviews: field in the user specification). This script is a version of the p4review.py script that is available on the Perforce Web site, but has been modified to use the server instance number. It relies on a configuration file in the same location, called p4review.cfg. On Windows, a driver called run\_p4review.cmd, located in the same directory, allows you to run the review daemon through the [Windows scheduler](http://en.wikipedia.org/wiki/Task_Scheduler).

Location:

* /p4/common/bin

### p4login

Executes a p4 login command, using the password configured in mkdirs.bat and stored in a text file.

Location:

* /p4/common/bin

### p4d\_instance\_init

Starts the Perforce server.

This script sources /p4/common/bin/p4\_vars, then /p4/common/bin/p4d\_base.

Note: In clustered environments, put this script in the /p4/*instance*/bin directory and configure your cluster software to launch it from this location.

Location: /p4/*instance*/bin with a symlink to it from /etc/init.d (or a copy in /etc/init.d in a clustered environments). Templates for init scripts for other Perforce server products exist in /p4/common/etc/init.d

## More Server Scripts

These scripts are helpful components of the SDP that run on the server, but are not included in the default crontab schedules.

### p4verify\_incremental

Verifies the integrity of the depot files. This version incrementally verifies one directory at a time, which may reduce the load that verification places on the server at large sites. It uses the p4verify.pl script.

Location:

* /p4/common/bin

### upgrade.sh

Runs a typical upgrade process, once new p4 and p4d binaries are available in /p4/common/bin.

Location: /p4/common/bin

### mirror\_ldap\_groups.pl

This script can be used to mirror selected groups from an LDAP server in Perforce. It may require customization for some environments.

Detailed documentation is available in the file /p4/common/bin/mirror\_ldap\_groups.pl.htm.

Location: /p4/common/bin

### p4.crontab

Contains crontab entries to run the server maintenance scripts. The p4.crontab.solaris script is for Solaris.

Location: /p4/sdp/Server/Unix/p4/common/etc/cron.d

## Maintenance Scripts

There are many useful scripts in /p4/sdp/Maintenance that are not set up to run automatically as part of the SDP installation. The scripts provide maintenance tools, and various scripts to provide reports or a useful one off activity you may need done. Each script has comments at the top indicating what it does and how to run it. Most of the scripts can be run on the server or client machines.

## Other Files

The following table describes other files in the SDP distribution. These files are usually not invoked directly by you; rather, they are invoked by higher-level scripts.

| ***File*** | ***Location*** | ***Remarks*** |
| --- | --- | --- |
| dummy\_ip.txt | $SDP/Server/config | Instructions for using a license on more than one machine. Typically used to enable a standby server. Contact [Perforce Licensing](mailto:licensing@perforce.com) before using. |
| backup\_functions.sh | /p4/common/bin | Unix/Linux only. Utilities for maintenance scripts. |
| p4admin\_verify\_client.bat | /p4/common/bin | Unix/Linux only. Used by p4verify.sh. |
| p4d\_base | /p4/common/bin | Unix/Linux only. Template for Unix/Linux init.d scripts. |
| template.(pl|sh) | /p4/common/bin | Sample script templates for Bash and Perl scripts. |
| mirror\_ldap\_groups.pl | /p4/common/bin | Script to mirror selected groups from an LDAP server (e.g. Active Directory). |
| Perl Modules (\*.pm files) | /p4/common/lib | Modules used by some Perl scripts. |
| change.txt | $SDP/Maintenance | Template for new pending changelist. |

# Appendix A – Directory Structure Configuration Script for Linux/Unix

This script describes the steps performed by the mkdirs.sh script on Linux/Unix platforms. Please review this appendix carefully before running these steps manually. Assuming the three-volume configuration described in the Volume Layout and Hardware section are used, the following directories are created. The following examples are illustrated with “1” as the server instance number.

| *Directory* | *Remarks* |
| --- | --- |
| /p4 | Must be under / on the OS volume |
| /depotdata/p4/1/bin | Files in here are generated by the mkdirs.sh script. |
| /depotdata/p4/1/depots |  |
| /depotdata/p4/1/tmp |  |
| /depotdata/p4/common/bin | Files from $SDP/Server/Unix/p4/common/bin. |
| /depotdata/p4/common/etc | Contains init.d and cron.d. |
| /logs/p4/1/logs/old |  |
| /metadata/p4/1/offline\_db | Contains offline copy of main server databases. |
| /metadata/p4/1/root/save | Used only during weekly\_backup.sh for extra redundancy. |

Next, mkdirs.sh creates the following symlinks in the /depotdata/p4/1 directory:

|  |  |  |
| --- | --- | --- |
| ***Link source*** | ***Link target*** | ***Command*** |
| /metadata/p4/1/root | /p4/1/root | ln –s /metadata/p4/1/root |
| /metadata/p4/1/offline\_db | /p4/1/offline\_db | ln –s /metadata/p4/1/offline\_db |
| /logs/p4/1/logs | /p4/1/logs | ln –s /logs/p4/1/logs |

Then these symlinks are created in the /p4 directory:

|  |  |  |
| --- | --- | --- |
| ***Link source*** | ***Link target*** | ***Command*** |
| /depotdata/p4/1 | /p4/1 | ln –s /depotdata/p4/1 |
| /depotdata/p4/common | /p4/common[[2]](#footnote-3) | ln –s /depotdata/p4/common |

Next, mkdirs.sh renames the Perforce binaries to include version and build number, and then creates appropriate symlinks.

The structure is shown in this example, illustrating values for two instances, with instance #1 using Perforce 2013.1 and instance #2 using 2013.2. Files are shown in red and symlinks in green.

In /p4/common/bin:

p4\_2013.1\_bin 🡪 p4\_2013.1.685046

p4d\_2013.1\_bin 🡪 p4d\_2013.1.685046

p4\_2013.2\_bin 🡪 p4\_2013.2.700949

p4d\_2013.2\_bin 🡪 p4d\_2013.2.700949

p4\_1\_bin 🡪 p4\_2013.1\_bin

p4d\_1\_bin 🡪 p4d\_2013.1\_bin

p4\_2\_bin 🡪 p4\_2013.2\_bin

p4d\_2\_bin 🡪 p4d\_2013.2\_bin

In /p4/1/bin:

p4\_1 🡪 /p4/common/bin/p4\_1\_bin

p4d\_1 🡪 /p4/common/bin/p4d\_1\_bin[[3]](#footnote-4)

In /p4/2/bin:

p4\_2 🡪 /p4/common/bin/p4\_2

p4d\_2 🡪 /p4/common/bin/p4d\_2



When upgrading Perforce, adjust only the symlinks in /p4/common/bin; those in /p4/2/bin do not change.

Optionally you can create a p4 manually in /p4/common/bin:

p4 🡪 p4\_2013.1\_bin

p4d 🡪 p4\_2013.1\_bin

The p4d convenience symlink is not recommended in environments that have a mix of case-sensitive and case-insensitive modes of Perforce operation, or environments in which policy permits concurrent operation of different server versions for different instances. In those situations, refer to the p4d link for a specific instance, such as p4d\_1 or p4d\_2. If you operate a single instance of Perforce and if all instances follow the same case behavior, then using a convenience symlink for p4d makes sense.

# Appendix B – P4Web and P4FTP

The SDP offers some support for running [P4Web](http://perforce.com/perforce/doc.current/manuals/p4web/help/index.html) and [P4FTP](http://perforce.com/perforce/doc.current/manuals/p4ftp/index.html) on Linux/Unix platforms. The p4\_vars script contains parameters for P4Web and P4FTP, which can be customized for the server environment. (In particular, you should provide a password or [ticket](http://kb.perforce.com/article/1036/p4web-and-external-authentication-triggers) for P4Web if running it in non-authenticating browse mode.) There are also init.d scripts located at:

/p4/common/etc/init.d/p4web\_1\_init

/p4/common/etc/init.d/p4ftpd\_1\_init

The init.d scripts can be installed similarly to the init.d scripts for P4D. These scripts use driver functions from /p4/common/bin, called p4web\_base and p4ftpd\_base.

To either P4Web or P4FTP, download the binary appropriate for the server hardware platform from [ftp.perforce.com](ftp://ftp.perforce.com), which allows anonymous login. Place the binary in /p4/common/bin. Rename the binary to include the version number, and create a link for the primary version. Next create a link for each instance. Then, in /p4/<instance>/bin, create a link to the link in /p4/common/bin. For example, assuming we are using P4Web version 2012.1/251161 for instance 1, run the following instructions:

cd /p4/common/bin

mv p4web p4web\_2012.1.610342

ln –s p4web\_2012.1.610342 p4web\_2012.1\_bin

ln –s p4web\_2012.1\_bin p4web\_1\_bin

cd /p4/1/bin

ln –s /p4/common/bin/p4web\_1\_bin p4web\_1

# Appendix C – Frequently Asked Questions

This appendix lists common questions and problems encountered by SDP users. Do not hesitate to contact [consulting@perforce.com](mailto:consulting@perforce.com) if additional assistance is required.

### Journal out of sequence

This error is encountered when the offline and live databases are no longer in sync, and will cause the offline checkpoint process to fail. This error can be fixed by running the live\_checkpoint script, as described in Server upgrades.

1. The trigger must be customized for your LDAP/AD environment, and then installed in the trigger table; instructions are contained in the script header. Carefully consider the implications of using external authentication, including the fact that users will have to authenticate with the [p4 login](http://www.perforce.com/perforce/doc.current/manuals/cmdref/login.html#1040665) command. Optionally, the script can be modified to recognize purely local accounts. Ask Perforce Consulting for assistance in this area if necessary. [↑](#footnote-ref-2)
2. If you are in a clustered environment, create /p4/common/bin on the OS volume of each node and place the p4master\_run script and the p4\_vars files in that directory. Then create links from all of the other files in /depotdata/p4/common/bin to the /p4/common/bin directory on each node. The p4master\_run and p4\_vars scripts have to be on each node in order to keep the cron jobs from generating errors, since cron is active on both nodes. [↑](#footnote-ref-3)
3. To run the server in case-insensitive mode, copy the p4d\_1 script from $SDP/Server/Unix/p4/1/bin/p4d\_1 to the /p4/1/bin directory, and make sure that script calls the appropriate link /p4/common/bin/p4\_*instance*\_bin. [↑](#footnote-ref-4)