

Dynamic Root Disk Administrator's Guide

HP-UX 11i v2, HP-UX 11i v3



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About This Guide

This document describes the Dynamic Root Disk (DRD) toolset, which you can use to perform software maintenance and recovery on an HP-UX operating system with minimum system downtime. DRD enables you to easily and safely clone a system image from a root disk to another disk on the same system.

Using DRD commands, you can perform software maintenance or make other modifications on the cloned system image without affecting the active system image. When ready, you can boot the cloned image on either the original system or a different system. The only downtime required for this process is while the system reboots.

Hewlett-Packard developed DRD to minimize the usual maintenance window during which you shut down the system to install patches. With DRD, the system keeps running while you clone the system image and apply patches to the cloned image. DRD tools can manage the two system images simultaneously. DRD also provides a fail-safe mechanism for returning the system to its original state, if necessary.

Intended Audience

This document is primarily for HP-UX system administrators who apply patches to HP-UX systems. To use DRD commands, you need to know how to use the command line to enter commands with appropriate options and how to interpret system messages. There is no graphical user interface for DRD.

Publishing History

This is the first edition of the *Dynamic Root Disk Administrator's Guide* (HP part number: 5992-5856) for the following versions:

- B.1123.A.3.3 — for HP-UX 11i v2 (11.23) systems
- B.1131.A.3.3 — for HP-UX 11i v3 (11.31) systems

Publication Date: January 2009

This guide supersedes the previous *Dynamic Root Disk Administrator's Guide* (HP part number: 5992-4873) for version A.3.2, which was published in September 2008.

Locating This Guide

This guide is available from the following sources:

- The HP Technical Documentation Web site: <http://docs.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>
- The March 2009 HP-UX Instant Information media (CD or DVD) that is included with both the March 2009 HP-UX Application Release (AR) media and March 2009 HP-UX Operating Environment (OE) media for both HP-UX 11i v2 and 11i v3.



IMPORTANT: Check the HP Technical Documentation Web site for the latest revision of this guide. The guide on the *January 2009 HP-UX Instant Information* media is an initial version and may contain outdated information.

Guide Organization

This guide is organized into the following chapters:

About Dynamic Root Disk

Use this chapter to understand: the overall DRD concepts, the set of DRD commands, and how to install DRD.

Cloning the Active System Image

Use this chapter to learn how to clone the active system image to another disk to create an inactive system image.

Maintaining Software on the Cloned Image

Use this chapter to learn how to use DRD-safe commands to install, remove, list, and verify software on the inactive system image.

Accessing the Inactive System Image

Use this chapter to learn how to mount and unmount the inactive system image.

Activating the Inactive System Image

Use this chapter to learn how to switch from the active system image to the inactive system image as the booted system image.

Rehosting and Unrehosting Systems

Use this chapter to learn how to rehost and unreshost systems using DRD commands.

Troubleshooting DRD

Use this chapter to learn how to identify and solve problems that might arise while using DRD commands.

DRD Commands

Use this appendix to understand the DRD-specific commands and options you use to perform DRD operations. This chapter provides a quick reference for users who are familiar with DRD concepts.

Typographic Conventions

This document uses the following typographic conventions:

`%, $, or #`

A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Bourne, Korn, and POSIX shells. A number sign represents the superuser prompt.

`audit(5)`

A manpage. The manpage name is *audit*, and it is located in Section 5.

Command

A command name or qualified command phrase.

Computer output

Text displayed by the computer.

Ctrl+x

A key sequence. A sequence such as **Ctrl+x** indicates that you must hold down the key labeled **Ctrl** while you press another key or mouse button.

ENVIRONMENT VARIABLE

The name of an environmental variable, for example, `PATH`.

[ERROR NAME]

The name of an error, usually returned in the `errno` variable.

Key

The name of a keyboard key. **Return** and **Enter** both refer to the same key.

Term

The defined use of an important word or phrase.

User input

Commands and other text that you type.

Variable

The name of a placeholder in a command, function, or other syntax display that you replace with an actual value.

[]

The contents are optional in syntax. If the contents are separated by |, you can only choose one of the items.

{}

The contents are required in syntax. If the contents are separated by |, you can only choose one of the items.

...

The preceding element can be repeated an arbitrary number of times.

Ⓢ

Indicates the continuation of a code example.

|

Separates items in a list of choices.

WARNING

A warning calls attention to important information that if not understood or followed will result in nonrecoverable system problems.

CAUTION

A caution calls attention to important information that if not understood or followed will result in data loss, data corruption, or damage to hardware or software.

IMPORTANT

An important alert provides essential information to explain a concept or to complete a task

NOTE

A note contains additional information to emphasize or supplement important points of the main text.

Related Information

- Dynamic Root Disk documentation — <http://docs.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>
- Software Distributor Administration Guide — <http://docs.fc.hp.com/en/oshpux11iv2.html#System%20Administration>

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1 About Dynamic Root Disk

1.1 Conceptual Overview

Dynamic Root Disk (DRD) is a software tool containing a set of commands that enable you to clone a system image to another hard disk and modify the image without shutting down the system. DRD significantly reduces system downtime and allows you to do software maintenance during normal business hours.

Using DRD, you can perform software updates and maintenance on the cloned (inactive) system image without affecting the active system image. When modifications are complete, you can boot the cloned system image on the original system or on a different system. If you do not want to use the cloned system image immediately, you can leave it in place to be utilized at a later time.

Other uses of DRD include using the clone for quick software recovery or using the clone to boot another system, which is referred to as *rehosting*. For details of rehosting, see [Rehosting and Unrehosting Systems](#).

1.2 Terminology

In this guide, “root group” refers to the LVM volume group or VxVM disk group that contains the root (“/”) file system. The term “logical volume” refers to an LVM logical volume or a VxVM volume.

1.3 Commands Overview

The `drd` command provides a command line interface to DRD tools. The `drd` command has nine major modes of operation:

- **activate** After using the DRD commands to create and optionally modify a clone, using `drd activate` invokes `setboot(1M)` and sets the primary boot path to the clone. After the clone is booted, using `drd activate` invokes `setboot(1M)` to set the primary boot path to the original system image. The `drd activate` command always sets the primary boot path to the inactive (not booted) system image.
- **clone** Clones a booted system to an inactive system image. The `drd clone` mode copies the LVM volume group or VxVM disk group, containing the volume on which the root file system (“/”) is mounted, to the target disk specified in the command.
- **deactivate** If the `drd activate` command (which invokes `setboot(1M)`) has previously been utilized and set the clone as the primary boot path, but the system has not yet been rebooted, the `drd deactivate` command can be used to “undo” the `drd activate` command. That is, the `drd deactivate` command will set the original system image to be the primary boot path. The `drd deactivate` command always sets the primary boot path to the active (currently booted) system image.
- **mount** Mounts all file systems in an inactive system image. The mount point of the root file system is either `/var/opt/drd/mnts/sysimage_000` or `/var/opt/drd/mnts/sysimage_001`. If the inactive system image was created by the most recent `drd clone` command, the mount point of the root file system is `/var/opt/drd/mnts/sysimage_001`. If the inactive system image was the booted system when the most recent `drd clone` command was run, the mount point of the root file system is `/var/opt/drd/mnts/sysimage_000`.
- **rehost** Copies the specified system information file—containing hostname, IP address, and other system-specific information—to `EFI/HPUX/SYSINFO.TXT` on the disk to be rehosted.

- **runcmd** Runs a command on an inactive system image. Only a select group of commands may be run by the `runcmd` mode. These are commands that have been verified to have no effect on the booted system when executed by `drd runcmd`. Such commands are referred to as *DRD-safe*. The commands `kctune`, `swinstall`, `swjob`, `swlist`, `swmodify`, `swremove`, `swverify`, `update-ux`, and `view` are currently certified DRD-safe. An attempt to execute any other command will result in a `runcmd` error. In addition, not every software package may safely be processed by the `sw*` and `update-ux` commands. The DRD-safe `update-ux` and `SW-DIST` commands are aware of running in a DRD session and will reject any unsafe packages. For more information about DRD-safe packages, see `drd-runcmd(1M)`.



NOTE: The `drd runcmd` command suppresses all reboots. The option `-x autoreboot` is ignored when an `swinstall`, `swremove`, or `update-ux` command is executed by `drd runcmd`.

- **status** Displays (system-specific) status information about the original disk and the clone disk, including which disk is currently booted and which disk is activated (that is, the disk that will be booted when the system is restarted).
- **umount** Unmounts all file systems in the inactive system image previously mounted by a `drd mount` command.
- **unrehost** Removes the system information file, `EFI/HPUX/SYSINFO.TXT`, from a disk that was rehosted, optionally preserving a copy in a file system on the booted system.

For details of DRD commands syntax, including all options and extended options, see [DRD Commands](#).

1.4 Downloading and Installing Dynamic Root Disk

For up-to-date detailed instructions about downloading and installing the DRD product, see <http://docs.hp.com/en/DRD/patch.html>.

2 Cloning the Active System Image

This chapter describes how to use the `drd clone` command to clone the active system image. It also describes where the cloned image is saved.



NOTE: You must be logged in as `root` to use any DRD command.

2.1 The Active System Image

The `drd clone` command creates a bootable disk that is a copy of the volume group containing the root file system (`/`). The source of the `drd clone` command is the LVM volume group or VxVM disk group containing the root (`/`) and boot (`/stand`) file systems. For a system with an LVM root, the source does not need to reside on a single physical disk. For a system with a VxVM root, all volumes in the root disk group must reside on every physical disk in the root group. Thus, each disk must be a mirror of every other disk. The target must be a single physical disk large enough to hold all volumes in the root group. In addition, a mirror for the target may be specified. For more details, see the *Using the Dynamic Root Disk Toolset* white paper, available at: <http://docs.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>

Because the `drd clone` operation clones a single group, systems with file systems to be patched must not reside in multiple volume groups. (For example, if `/stand` resides in `vg00` and `/var` resides in `vg01`, the system is not appropriate for DRD.)

For additional information about source and target disks, see the `drd-clone` (1M) manpage (`man drd-clone`) and the *Using the Dynamic Root Disk Toolset* white paper, available at: <http://docs.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>.



NOTE:

After creating a DRD clone, your system has two system images—the original and the cloned image. Throughout this document, the system image that is currently in use is called the *active* system image. The image that is not in use is called the *inactive* system image.

2.2 Locating Disks

The target of a `drd clone` operation must be a single disk or SAN LUN that is write-accessible to the system and not currently in use. Depending on your HP-UX operating system, refer to one of the following sections:

- [Locating Disks on HP-UX 11i v2](#)
- [Locating Disks on HP-UX 11i v3](#)

2.2.1 Locating Disks on HP-UX 11i v2 Systems

To help find and select the target disk on an HP-UX 11i v2 system, you can find out what disks are on the system with the `ioscan` command:

```
# /usr/sbin/ioscan -fnkC disk
```

The `ioscan` command displays a list of system disks with identifying information, location, and size. On a PA-RISC system, the output looks similar to [Example 2-1](#).

Example 2-1 The `ioscan -fnkC disk` Command Output on an HP-UX 11i v2 PA-RISC System

```
# /usr/sbin/ioscan -fnkC disk
Class I  H/W Path      Driver S/W State  H/W Type  Description
=====
disk  0   10/0/14/0.0.0    sdisk CLAIMED    DEVICE    TEAC CD-532E-B
        /dev/dsk/c0t0d0    /dev/rdisk/c0t0d0
disk  1   10/0/15/1.5.0    sdisk CLAIMED    DEVICE    HP 18.2GMAN3184MC
        /dev/dsk/clt2d0    /dev/rdisk/clt2d0
disk  2   10/0/15/1.6.0    sdisk CLAIMED    DEVICE    HP 18.2GMAN3184MC
        /dev/dsk/c2t3d0    /dev/rdisk/c2t3d0
```

On an Integrity system, the output looks similar to [Example 2-2](#).

Example 2-2 The `ioscan -fnkC disk` Command Output on an HP-UX 11i v2 Integrity System

```
# /usr/sbin/ioscan -fnkC disk
Class  I  H/W Path      Driver      S/W State  H/W Type      Description
=====
disk    0  0/0/2/0.0.0.0    sdisk      CLAIMED     DEVICE        TEAC      DV-28E-N
        /dev/dsk/c0t0d0    /dev/rdisk/c0t0d0
disk    1  0/1/1/0.0.0      sdisk      CLAIMED     DEVICE        HP 36.4GST336754LC
        /dev/dsk/c2t0d0    /dev/dsk/c2t0d0s3    /dev/rdisk/c2t0d0s2
        /dev/dsk/c2t0d0s1    /dev/rdisk/c2t0d0    /dev/rdisk/c2t0d0s3
        /dev/dsk/c2t0d0s2    /dev/rdisk/c2t0d0s1
disk    2  0/1/1/0.1.0      sdisk      CLAIMED     DEVICE        HP 36.4GST336754LC
        /dev/dsk/c2t1d0    /dev/dsk/c2t1d0s3    /dev/rdisk/c2t1d0s2
        /dev/dsk/c2t1d0s1    /dev/rdisk/c2t1d0    /dev/rdisk/c2t1d0s3
        /dev/dsk/c2t1d0s2    /dev/rdisk/c2t1d0s1
```



IMPORTANT:

The above output includes block device special files ending with `s1`, `s2`, or `s3`. These endings indicate an idisk partition on the disk. Do NOT use a partition as a clone target!

The first disk in the above list is a DVD drive, indicated by the `DV` in the description field. Do NOT use a DVD as a clone target!

Some device files are identified as `/dev/rdisk/...` following the block device special file designation. This identifies them as raw files. Do NOT use a raw file as a clone target!

If you have recently added a disk to your system you may need to run `ioscan` without the `-k` option to display the new disk. See the `ioscan(1M)` manpage for more information about `ioscan` options.

2.2.2 Locating Disks on HP-UX 11i v3 Integrity Systems

To help find and select the target disk on an Integrity system running HP-UX 11i v3 (11.31), you can find out what disks are on the system with the `ioscan` command:

```
# /usr/sbin/ioscan -fNnkC disk
```

The `ioscan` command displays a list of system disks with identifying information, location, and size. On an Integrity system running HP-UX 11i v3, the output looks similar to [Example 2-3](#).

Example 2-3 The `ioscan -fNnkC disk` Command Output on an HP-UX 11i v3 Integrity System

```
# /usr/sbin/ioscan -fNnkC disk
Class      I  H/W Path          Driver  S/W State  H/W Type  Description
=====
disk       4  64000/0xfa00/0x0  esdisk  CLAIMED    DEVICE     HP 36.4GMAN3367MC
           /dev/disk/disk4      /dev/rdisk/disk4
           /dev/disk/disk4_p1 /dev/rdisk/disk4_p1
           /dev/disk/disk4_p2 /dev/rdisk/disk4_p2
           /dev/disk/disk4_p3 /dev/rdisk/disk4_p3
disk       5  64000/0xfa00/0x1  esdisk  CLAIMED    DEVICE     HP 36.4GMAN3367MC
           /dev/disk/disk5      /dev/rdisk/disk5
           /dev/disk/disk5_p1 /dev/rdisk/disk5_p1
           /dev/disk/disk5_p2 /dev/rdisk/disk5_p2
           /dev/disk/disk5_p3 /dev/rdisk/disk5_p3
disk       6  64000/0xfa00/0x2  esdisk  CLAIMED    DEVICE     HP 36.4GMAN3367MC
           /dev/disk/disk6      /dev/rdisk/disk6
           /dev/disk/disk6_p1 /dev/rdisk/disk6_p1
           /dev/disk/disk6_p2 /dev/rdisk/disk6_p2
           /dev/disk/disk6_p3 /dev/rdisk/disk6_p3
disk       7  64000/0xfa00/0x3  esdisk  CLAIMED    DEVICE     TEAC      DW-28E
           /dev/disk/disk7      /dev/rdisk/disk7
```



IMPORTANT:

The above output includes block device special files ending with `_p1`, `_p2`, or `_p3`. These endings indicate an idisk partition on the disk. Do NOT use a partition as a clone target!

The last disk in the above list is a DVD drive, indicated by the DW in the description field. Do NOT use a DVD as a clone target!

Some device files are identified as `/dev/rdisk` following the block device special file designation. This identifies them as raw files. Do NOT use a raw file as a clone target!

Additionally, on HP-UX 11i v3 Integrity systems, you may find it useful to use the following `ioscan` command to identify persistent and legacy DSFs:

Example 2-4 The `ioscan -m dsf` Command Output on an HP-UX 11i v3 Integrity System

```
# /usr/sbin/ioscan -m dsf
Persistent DSF          Legacy DSF(s)
=====
/dev/rdisk/disk4        /dev/rdisk/c2t0d0
/dev/rdisk/disk4_p1     /dev/rdisk/c2t0d0s1
/dev/rdisk/disk4_p2     /dev/rdisk/c2t0d0s2
/dev/rdisk/disk4_p3     /dev/rdisk/c2t0d0s3
/dev/rdisk/disk5        /dev/rdisk/c2t1d0
/dev/rdisk/disk5_p1     /dev/rdisk/c2t1d0s1
/dev/rdisk/disk5_p2     /dev/rdisk/c2t1d0s2
/dev/rdisk/disk5_p3     /dev/rdisk/c2t1d0s3
/dev/rdisk/disk6        /dev/rdisk/c3t2d0
/dev/rdisk/disk6_p1     /dev/rdisk/c3t2d0s1
/dev/rdisk/disk6_p2     /dev/rdisk/c3t2d0s2
/dev/rdisk/disk6_p3     /dev/rdisk/c3t2d0s3
/dev/rdisk/disk7        /dev/rdisk/c0t0d0
```

For additional information about LVM volume group configurations from legacy to the agile naming model, see the *LVM Migration from Legacy to Agile Naming Model HP-UX 11i v3* white paper, located at http://docs.hp.com/en/LVMmigration1/LVM_Migration_to_Agile.pdf.

2.3 Choosing a Target Disk



CAUTION: It is the system administrator's responsibility to identify a target disk that is not currently in use! Cloning a disk removes all current data on the target disk.

In [Example 2-1](#), the disk with the active system image is `/dev/dsk/c2t3d0`. You need to choose a free disk to be the target of the `drd clone` command. Your system may have many more disks than [Example 2-1](#) shows.

The target disk must:

- Be a block device special file.
- Be writeable by the system.
- Not currently be in use by other applications.
- Be large enough to hold a copy of each logical volume in the root group.

The target's physical disk need not be as large as the disk allocated for the root group, as long as there is enough space for a copy of each logical volume in the root group. However, the disk needs to be larger than the used space in each logical volume because each logical volume will be created with the number of physical extents currently allocated to the corresponding root group logical volume.

[Example 2-1](#) shows three system disks: `/dev/dsk/c0t0d0`, `/dev/dsk/c1t2d0`, and `/dev/dsk/c2t3d0`. You need to determine which disks are available and large enough.

2.4 Using Other Utilities to Determine Disk Availability

You can determine which disks are in use with the *lvm*(7M) (Logical Volume Manager) and VxVM (Veritas Volume Manager) commands. For example, to see which disks are in use by *lvm*, enter this command:

```
# /usr/sbin/vgdisplay -v | /usr/bin/more
```

and look in the output for PV Name, which describes physical volumes.

This information is under the Physical Volumes heading. It looks similar to this:

```
--- Physical Volumes ---
PV Name           /dev/dsk/c2t3d0
PV Status          available
Total PE           4340
Free PE            428
Autoswitch         On
```

You can use the `vxdisk -o alldgs list` command to display information about all disks managed by VxVM. Do not specify any disk in use by VxVM as a clone target.

The `swapinfo` command can be used to display information about disks currently used for swap.

The HP System Management Homepage, *hpsmh*(1M), or System Administration Manager, *sam*(1M), can be used to investigate the disks on the system and their current usage.

2.5 Using DRD for Limited Disk Availability Checks

You can use `drd clone` with the `-p` option to get minimal availability information about a disk. (See the following section for an example.)

The `drd clone` command performs the following checks:

- If the disk is currently in use by the LVM Manager, it is rejected by the `drd clone` operation.
- If the disk is currently in use by the VxVM Manager, it will be accepted only if the following two conditions are met:
 - The disk is an inactive image managed by DRD
 - The extended option `-x overwrite=true` is specified on the `drd clone` command
- If the disk is not currently in use by LVM or VxVM, but contains LVM, VxVM, or boot records, it is only accepted as a `drd clone` target if `-x overwrite=true` is specified on the `drd clone` command.



NOTE: A selected target disk will not be overwritten if it is part of the root volume. However, the `drd clone` command will overwrite swap or raw data disks because it does not detect this type of usage. For example, any raw disks in use by databases would be overwritten if given as the target clone disk.

2.6 Using `drd clone` to Analyze Disk Size

A simple way to determine if a disk is large enough for a DRD clone is to run `drd clone` in preview mode:

Example 2-5 `drd clone` Preview Example on HP-UX 11i v2 or 11i v3

```
# /opt/drd/bin/drd clone -p -v -t /dev/dsk/cxtxdx
```

Example 2-6 `drd clone` Preview Example on HP-UX 11i v3 (using agile DSF)

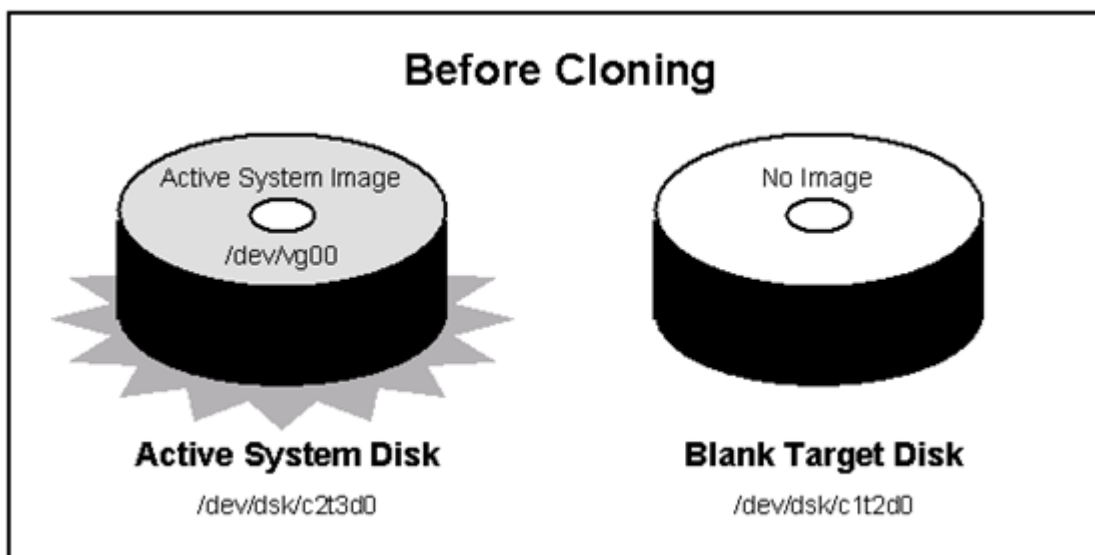
```
# /opt/drd/bin/drd clone -p -v -t /dev/disk/diskn
```

The preview operation includes disk space analysis that shows whether a target disk is large enough. If you prefer to investigate disk sizes before previewing the clone, you can use the `diskinfo` command.

2.7 Creating the Clone

After determining that sufficient disk space exists and that the target disk contains no data you want to keep, you are ready to run the `drd clone` command. [Figure 2-1](#) illustrates the content of the active system disk and the clone target disk before cloning happens.

Figure 2-1 Preparing to Clone the Active System Image



Use the following command to clone the system image, substituting your target disk identifier for the one shown in the command:

```
# /opt/drd/bin/drd clone -v -x overwrite=true -t /dev/dsk/c1t2d0
```

On HP-UX 11i v3 systems, you can also use the agile device file to the target disk, substituting your target disk identifier for the one shown in the following command:

```
# /opt/drd/bin/drd clone -v -x overwrite=true -t /dev/disk/disk10
```



NOTE: For descriptions of the `drd clone` command, see [The drd clone Command](#).

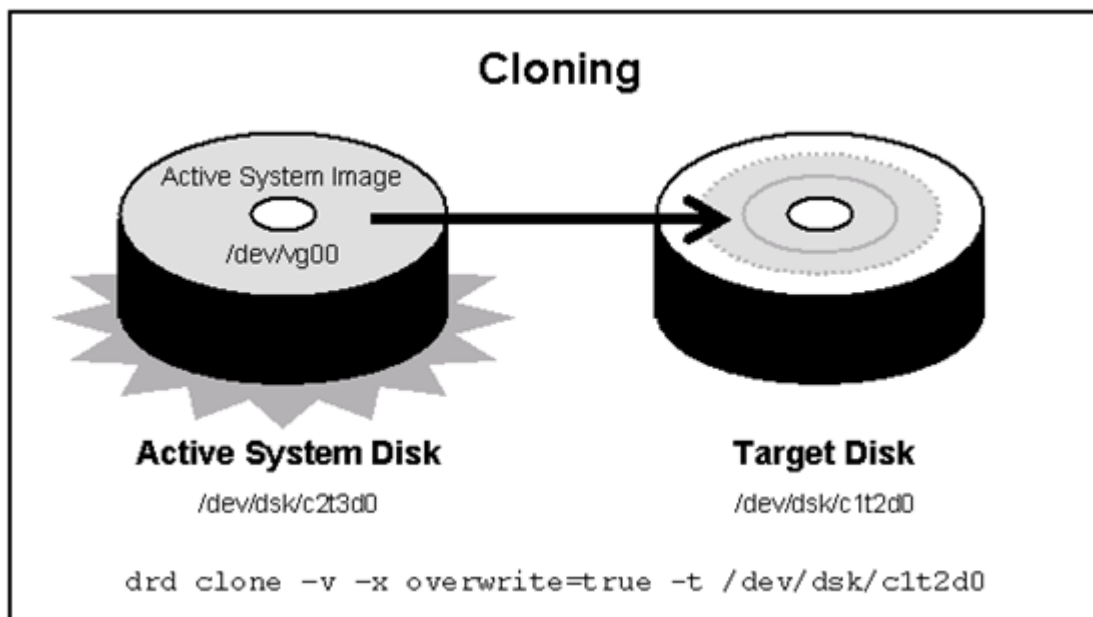
The `-x` option lets you choose whether to overwrite data on the target disk. The `-x overwrite=true` option tells the command to overwrite any data on the disk. The `-x overwrite=false` option tells the command not to write the cloned image if the disk appears to contain LVM, VxVM, or boot records. The default value is `false`.

Cloning creates an inactive system image on the target disk at `/dev/dsk/c1t2d0`. [Figure 2-2](#) shows the active system image being cloned to the target disk.



NOTE: The `drd clone` command does not write over a disk that is part of the root volume.

Figure 2-2 Cloning the Active System Image



The output you see as this command runs is similar to [Example 2-7](#).

When you see the message, `Copying File Systems to New System Image`, the active system image is being cloned. This operation can take quite a while, and you see no more messages until the file systems have been copied.

Example 2-7 The `drd clone` Command Output

```
===== 12/01/06 11:07:28 MST BEGIN Clone System Image (user=root)
(jobid=drdtest2)

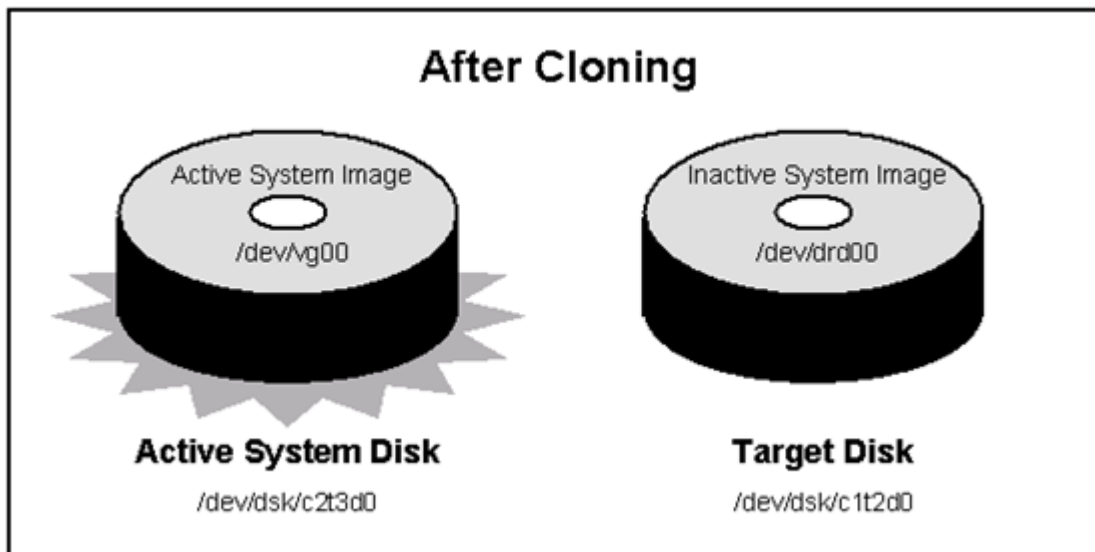
* Reading Current System Information
* Selecting System Image To Clone
* Selecting Target Disk
* Selecting Volume Manager For New System Image
* Analyzing For System Image Cloning
* Creating New File Systems
* Copying File Systems To New System Image
* Making New System Image Bootable
* Unmounting New System Image Clone
* System image: "sysimage_001" on disk "/dev/dsk/c1t2d0"

===== 12/01/06 11:38:19 MST END Clone System Image succeeded. (user=root)
(jobid=drdtest2)
```

Figure 2-3 shows the two disks after cloning. Both disks contain the system image. The image on the target disk is the inactive system image.

The DRD clone operation will have some impact on the booted system's I/O resources, particularly if the source disk is on the same SCSI chain as the target disk. DRD's performance is similar to system performance when using Ignite to create recovery images, which many system administrators find acceptable.

Figure 2-3 Disk Configurations After Cloning



After running `drd clone`, you have identical system images on the system disk and the target disk. The image on the system disk is the active system image. The image on the target disk is the inactive system image.

The `drd clone` command returns the following values:

- 0 Success
- 1 Error
- 2 Warning

For more details, you can examine messages written to the log file at `/var/opt/drd/drd.log`.

Here is an example of creating a clone from a HP-UX 11i v3 system to a storage area network (SAN) disk. First, [Example 2-8](#) displays the output of the following `drd clone` command:

```
# /opt/drd/bin/drd clone -t /dev/disk/disk14 -x overwrite=true
```

Example 2-8 The drd clone Command Output for SAN Disk

```
===== 06/24/08 11:55:58 MDT BEGIN Clone System Image (user=root) (jobid=drdtest14)

* Reading Current System Information
* Selecting System Image To Clone
* Selecting Target Disk
* The disk "/dev/disk/disk14" contains data which will be overwritten.
* Selecting Volume Manager For New System Image
* Analyzing For System Image Cloning
* Creating New File Systems
* Copying File Systems To New System Image
* Making New System Image Bootable
* Unmounting New System Image Clone

===== 06/24/08 12:06:00 MDT END Clone System Image succeeded. (user=root) (jobid=drdtest14)
```

Next, the `drd status` command is executed to verify the clone disk and the original disk.

[Example 2-9](#) displays the output of the following `drd status` command:

```
# /opt/drd/bin/drd status
```

Example 2-9 The drd status Command Output for SAN Disk

```
===== 06/24/08 12:09:46 MDT BEGIN Displaying DRD Clone Image Information (user=root) (jobid=drdtest14)

* Clone Disk: /dev/disk/disk14
* Clone EFI Partition: AUTO file present, Boot loader present, SYSINFO.TXT not present
* Clone Creation Date: 06/24/08 11:56:18 MDT
* Clone Mirror Disk: None
* Mirror EFI Partition: None
* Original Disk: /dev/disk/disk15
* Original EFI Partition: AUTO file present, Boot loader present, SYSINFO.TXT not present
* Booted Disk: Original Disk (/dev/disk/disk15)
* Activated Disk: Original Disk (/dev/disk/disk15)

===== 06/24/08 12:10:01 MDT END Displaying DRD Clone Image Information succeeded. (user=root)
(jobid=drdtest14)
```



NOTE: The elapsed time of the clone creation will vary, depending on the size of the root disk, independent of whether it's going to a SAN or an internal disk.

3 Updating and Maintaining Software on the Clone

After cloning the active system image, you can use `drd runcmd` to run a limited set of commands and to apply patches to the inactive system image. This chapter describes this process.

For details of the `drd runcmd` command, including available options and extended options, see [The `drd runcmd` Command](#).



NOTE: You must be logged in as `root` to run any DRD command.

3.1 DRD-Safe Commands and Packages

The `drd runcmd` operation runs a command on the inactive system image that does not make any changes to the booted system, the running kernel, or the process space. This enables a system administrator to make changes to the inactive system image without incurring any disruption to the currently booted system.



NOTE: The `drd runcmd` command suppresses all reboots. The option `-x autoreboot` is ignored when a `swinstall`, `swremove`, or `update-ux` command is executed by `drd runcmd`.

Not all commands can safely be executed by the `drd runcmd` operation. For example, commands that start or stop daemons or change dynamic kernel tuneables are disruptive to current processes and must be prevented by the `drd runcmd` operation.

Restrictions on commands executed by `drd runcmd` are:

- When calling `swinstall` and `update-ux`, `drd runcmd` supports installation from directory depots on the booted system and on remote servers. Note that installing from serial depots or from depots on the inactive system image is not supported.
- `drd runcmd` can also be used to `swlist`, `swverify`, `swremove`, and `swmodify` software that is installed on the inactive image. It cannot be used to list or modify any depot's contents. Using these commands outside of `drd runcmd` allows for depot listing and management.

Commands that are not disruptive to the booted system and perform appropriate actions on the inactive system are known as *DRD-safe*. For this release of DRD, a short list of commands is recognized by the `drd runcmd` operation to be DRD-safe. An attempt to use DRD to run commands that are not DRD-safe will terminate with an `ERROR` return code without executing the command.

A number of Software Distributor commands have been made safe at a sufficient maintenance level of `SW-DIST`. The DRD product has a package co-requisite on a minimum release of `SW-DIST`. (For details of the DRD product dependencies, see the following Web page: <http://docs.hp.com/en/DRD/patch.html>.)

Similarly, the DRD product has a run-time check for `SWManager`, which provides the DRD safe version of `update-ux`. This functionality supports updates on the clone from an older version of HP-UX 11i v3 (initial release, update 1, update 2, or update 3) to HP-UX 11i v3 update 4. (For details of the DRD product dependencies, see the following Web page: <http://docs.hp.com/en/DRD/patch.html>.)

The DRD-safe commands are the following:

- `swinstall`
- `swremove`
- `swlist`
- `swmodify`
- `swverify`
- `swjob`

- `kctune`
- `update-ux`
- `view`

See the *Software Distributor Administrator's Guide*, located at <http://docs.fc.hp.com/en/oshpux11iv2.html#System%20Administration>, as well as `swinstall(1M)`, `swremove(1M)`, `swlist(1M)`, `swmodify(1M)`, `swverify(1M)`, `swjob(1M)`, `kctune(1M)`, `update-ux(1M)`, and `view(1M)` for additional information about these commands.

The DRD-safe commands may be specified by their base names, such as `swinstall` or `swremove`, or their full paths, such as `/usr/sbin/swinstall` or `/usr/sbin/swremove`. However, paths that are symlinks to the DRD-safe commands are not supported.

If the inactive system image has not been mounted, the `drd runcmd` operation mounts it, executes the DRD-safe command, and then unmounts it. If the inactive system image is already mounted, the `drd runcmd` operation leaves it mounted.

When `swinstall`, `swremove`, and `update-ux` are used to manage software packages, SD control scripts included in the packages—such as pre-install, post-remove, and update-prep scripts—are executed. For management of such packages to be DRD-safe, the control scripts must not take any action that will affect the booted system. (The configure scripts are not executed.) A package satisfying this restriction is also known as DRD-safe. The `swlist`, `swmodify`, and `swverify` commands—without `-F` or `-x fix=true` options—may be invoked by `drd runcmd` for arbitrary packages. The `swlist` and `swmodify` commands do not call control scripts, and `verify` scripts do not change the system.

When executing the `drd runcmd kctune` command, the `kctune` command outputs the prompt:

```
==> Update the automatic 'backup' configuration first?
```

If the user types **y**, the following error is displayed:

```
WARNING: The backup behavior 'yes' is not supported in alternate
         root environments. The behavior 'once' will be used instead.
```

This message can be ignored.

3.2 Updating and Managing Patches with `drd runcmd`

3.2.1 DRD-Safe Patches and the `drd_unsafe_patch_list` File

An HP program was initiated in November 2004 to make all patches DRD-safe. Although most patches delivered after November 2004 are DRD-safe, a few are not. Patches that are not DRD-safe are listed in the file `/etc/opt/drd/drd_unsafe_patch_list`, which is delivered as a volatile file with the DRD product. The copy of this file on the inactive system image is used to filter patches that are selected for installation with `drd runcmd`.



IMPORTANT: When invoked by the `drd runcmd` operation, the `swinstall`, `swremove`, and `update-ux` commands reject any attempt to install or remove a patch included in the `drd_unsafe_patch_list` file on the inactive system image.

In the rare event that a new patch is determined not to be DRD-safe, a new version of the `drd_unsafe_patch_list` file is made available on HP's *IT Resource Center Web site*.

To determine if you need to update the `drd_unsafe_patch_list` files, see the *Update the drd_unsafe_patch_list File* procedure in the DRD Web site's *Downloads and Patches* page at: <http://docs.hp.com/en/DRD/patch.html>.

It is helpful during maintenance planning for system administrators to be able to determine which, if any, patches are not DRD-safe, and to make plans regarding these patches. See the *Managing Rare DRD-unsafe Patches* white paper, located at <http://docs.fc.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>, for information about identifying such patches and alternatives on how to manage them without using the `drd runcmd` operation.

3.2.2 Patches with Special Installation Instructions

Patches may include Special Installation Instructions, or SIIs, which contain specific tasks for the user to perform when they install certain patches. If you install patches with SIIs on an inactive DRD system image, ensure the following:

- You must not stop/kill or restart any processes or daemons. Because the patch is being installed on an inactive DRD system image, these actions are not needed, and in fact could leave the running system in an undesirable state. When the inactive system image is booted, all processes are stopped and restarted.
- Only make kernel changes by executing: `drd runcmd kctune`

3.3 Updating and Managing Products with `drd runcmd`

For non-patch products, a new fileset-level packaging attribute, `is_drd_safe`, has been introduced. The value of the attribute defaults to `false`, so any package created before the attribute was introduced will be rejected by `swinstall`, `swremove`, and `update-ux` commands invoked by the `drd runcmd` operation. Because the DRD product was not available at the initial release of 11i v2, relatively few non-patch products have the `is_drd_safe` attribute set to `true`. For HP-UX 11i v3, however, most products will have the `is_drd_safe` attribute set to `true`.

To determine if a non-patch product can be installed or removed using `drd runcmd`, execute the command:

```
# /usr/sbin/swlist -l fileset -a is_drd_safe _product_name_
```

and check that all filesets have `is_drd_safe` set to `true`.

3.4 Special Considerations for Firmware Patches

A firmware patch changes the firmware the next time the patched image is booted. Because the firmware is shared by both the active and inactive system images, there is no ability to have an unchanged copy of the firmware as a fail-safe mechanism. As a result, the benefit of DRD as a Hot Recovery mechanism cannot be provided with firmware patches. Firmware patches set the fileset attribute `is_drd_safe` to `false` to supply a `checkinstall` script that prevents installation in a DRD session.



IMPORTANT: System administrators need to be aware that any firmware change cannot be reversed by booting a different system image.

3.5 Restrictions on `update-ux` and `sw*` Commands Invoked by `drd runcmd`

Options on the Software Distributor commands that can be used with `drd runcmd` are limited by the need to ensure that operations are DRD-safe. The restrictions include the following:

- The `-F` and `-x fix=true` options are not supported for `drd runcmd swverify` operations. Use of these options could result in changes to the booted system.
- The use of double quotation marks and wild card symbols (`*`, `?`) in the command line must be escaped with a backslash character (`\`), as in the following example:

```
drd runcmd swinstall -s depot_server:/var/opt/patches \*
```
- Files referenced in the command line must both:
 - Reside in the inactive system image
 - Be referenced in the DRD-safe command by the path relative to the mount point of the inactive system image

This applies to files referenced as arguments for the `-C`, `-f`, `-S`, `-X`, and `-x logfile` options for an `sw` command run by `drd runcmd` and for the `update-ux` command `-f` option.

See *drd-runcmd*(1M) for further information about restrictions on Software Distributor commands invoked by `drd runcmd`.

3.6 Viewing Logs

When a `drd runcmd` operation executes a DRD-safe command, the DRD command runs on the booted system, and the DRD log, `/var/opt/drd/drd.log`, is created on the booted system. However, the DRD-safe command runs on the inactive system image, and its logs (if they exist), reside on the inactive system image.

Logs can be viewed on the inactive system image by using the `drd runcmd view` command. For example, to view the `swagent` log on the inactive image, execute the following command:

```
# /opt/drd/bin/drd runcmd view /var/adm/sw/swagent.log
```

For more information on viewing log files and on maintaining the integrity of system logs, see the *Using the Dynamic Root Disk Toolset* white paper, located at: <http://docs.fc.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>.

4 Accessing the Inactive System Image

This chapter describes how to mount and unmount the inactive system image.



IMPORTANT: If you choose to mount the inactive DRD system image, exercise caution to ensure that any actions taken do not impact the running system. You must:

- Not stop/kill or restart any processes or daemons.
- Only make kernel changes by executing: `drd runcmd kctune`.

For example, to change the value of the `maxfiles_lim` kernel tunable on the inactive system image to 8192, execute the command:

```
# /opt/drd/bin/drd runcmd kctune maxfiles_lim=8192
```

Using `drd runcmd` to change the value of `maxfiles_lim` on the inactive system image ensures that its value on the booted system is unchanged.



NOTE: Accessing the inactive system image is not always required; however, you may need to access the inactive system image prior to activating it.

You can mount DRD-cloned file systems to access them and:

- Check the logs of commands executed by `drd runcmd`.
- Create files on the inactive system image. In particular, you can create files that will be referenced by `swinstall` commands, executed by the `drd runcmd` command. (For an example of this type of file creation, see [Example 4-4](#).)
- Compare or update configurations that might have been updated on the booted system, such as `/etc/passwd`, since the inactive system image was created.
- Verify the integrity of certain files on the inactive system image. If a file is known to have changed during the `drd clone` operation, you might want to compute a checksum on the copy of the file on the booted system and the copy on the target system to validate the clone copy.



NOTE: You must be logged in as `root` to run any DRD command.

4.1 Mounting the Inactive System Image

For details of the `drd mount` command, including available options and extended options, see [The drd mount Command](#).

To mount the inactive system image, execute the `drd mount` command:

```
# /opt/drd/bin/drd mount
```

The command locates the inactive system image and mounts it.

The output of this command is similar to [Example 4-1](#).

Example 4-1 The drd mount Command Output

```
# /opt/drd/bin/drd mount

===== 12/08/06 22:19:31 MST BEGIN Mount Inactive System Image (user=root)
(jobid=dlkma1)

* Reading Current System Information
* Locating Inactive System Image
* Mounting Inactive System Image

===== 12/08/06 22:19:52 MST END Mount Inactive System Image succeeded.
(user=root) (jobid=dlkma1)
```

The `drd mount` command automatically chooses the mount point for the inactive system image. If the image was created by the `drd clone` command, the mount point is `/var/opt/drd/mnts/sysimage_001`. If the clone has been booted, `drd mount` mounts the original system at the mount point `/var/opt/drd/mnts/sysimage_000`. To see all mounted file systems, including those in the active and inactive system images, execute the following command:

```
# /usr/bin/bdf
```

The output of this command should look similar to [Example 4-2](#), if the `drd mount` command has been executed:

Example 4-2 The bdf Command Output

```
# /usr/bin/bdf
file system      kbytes    used      avail    %used    Mounted on
/dev/vg00/lvol3  1048576   320456    722432   31%      /
/dev/vg00/lvol1  505392    43560     411288   10%      /stand
/dev/vg00/lvol8  3395584   797064    2580088  24%      /var
/dev/vg00/lvol7  4636672   1990752    2625264  43%      /usr
/dev/vg00/lvol4   204800     8656     194680   4%      /tmp
/dev/vg00/lvol6  3067904   1961048    1098264  64%      /opt
/dev/vg00/lvol5   262144     9320     250912   4%      /home
/dev/drd00/lvol3  1048576   320504    722392   31%      /var/opt/drd/mnts/sysimage_001
/dev/drd00/lvol1  505392    43560     411288   10%      /var/opt/drd/mnts/sysimage_001/stand
/dev/drd00/lvol4   204800     8592     194680   4%      /var/opt/drd/mnts/sysimage_001/tmp
/dev/drd00/lvol5   262144     9320     250912   4%      /var/opt/drd/mnts/sysimage_001/home
/dev/drd00/lvol6  3067904   1962912    1096416  64%      /var/opt/drd/mnts/sysimage_001/opt
/dev/drd00/lvol7  4636672   1991336    2624680  43%      /var/opt/drd/mnts/sysimage_001/usr
/dev/drd00/lvol8  3395584   788256    2586968  23%      /var/opt/drd/mnts/sysimage_001/var
```

In this output, file systems identified as `dev/vg00/*` are the active system image file systems. Those identified as `/dev/drd00/*` are the inactive system image file systems.

4.2 Performing Administrative Tasks on the Inactive System Image

The following examples show some tasks you can perform on the inactive system image.



TIP: If you have made many changes to the active system image since using `drd clone` and you want to apply those same changes to the inactive system image, it is more efficient and robust to start fresh with a new `drd clone` command than to manually apply changes to the inactive system image.

Example 4-3 Checking a Warning Message

You verify software on the inactive system image with `drd runcmd swverify` and see a warning message.

Task: Find additional information about the message.

To see detailed information about the warning message supplied by the `swagent` log, execute the following command:

```
# /opt/drd/bin/drd runcmd view /var/adm/sw/swagent.log
```

Example 4-4 Creating a Patch Install File

Task: Create a file containing a list of patches to be applied to the inactive system image. You want to use the file as the argument of a `-f` option in a `swinstall` command run by `drd runcmd`. Follow this procedure:

1. Mount the inactive system image:

```
# /opt/drd/bin/drd mount
```

2. Enter the patches into a file such as

```
/var/opt/drd/mnts/sysimage_001/var/opt/drd/my_patch_list
```

with the following commands:

- a.

```
# /usr/bin/echo "PHCO_02201" > \
/var/opt/drd/mnts/sysimage_001/var/opt/drd/my_patch_list
```
- b.

```
# /usr/bin/echo "PHCO_12134" >> \
/var/opt/drd/mnts/sysimage_001/var/opt/drd/my_patch_list
```
- c.

```
# /usr/bin/echo "PHCO_56178" >> \
/var/opt/drd/mnts/sysimage_001/var/opt/drd/my_patch_list
```



NOTE: If the inactive system image is the original system image, and not the clone, the root file system mount point is `/var/opt/drd/mnts/sysimage_000`.

3. Apply the patches using `drd runcmd`, identifying the file by its path relative to the mount point of the inactive system image root file system:

```
# /opt/drd/bin/drd runcmd swinstall -s patch_server:/var/opt/patch_depot \
-f /var/opt/drd/my_patch_list
```



NOTE: Because the inactive system image was mounted when `drd runcmd` was executed, it is still mounted after `drd runcmd` completes. You can unmount it with the following command:

```
# /opt/drd/bin/drd umount
```

Example 4-5 Looking for Changes to `cron` Jobs

Task: Find out if any `cron` jobs have changed after cloning.

Use the following commands to determine if any `cron` jobs used by `root` have changed since the inactive system image was created:

1. `# /opt/drd/bin/drd mount`
2. `# /usr/bin/ls -l /var/spool/crontab/crontab.root \`
`/var/opt/drd/mnts/sysimage_001/var/spool/crontab.root`
3. `# /usr/bin/diff /var/spool/crontab/crontab.root \`
`/var/opt/drd/mnts/sysimage_001/var/spool/crontab/crontab.root`

The following is an example output of the `diff` command:

```
6,7c6,7 <
# log kernel diagnostic messages every 20 minutes
< 05,25 45 * * * * /usr/sbin/dmesg- >>/var/adm messages
---
> # log kernel diagnostic messages every 10 minutes
> 05,15,25,35,45,55 * * * * /usr/sbin/dmesg - >>/var/adm/messages
```

This output shows that the booted system was updated to run kernel diagnostics every 20 minutes. If you decide that when the clone is booted, diagnostics should run every 20 minutes, as they are on the booted system, you can:

1. Copy the `crontab` file from the booted system to the clone:
`# /usr/bin/cp /var/spool/crontab/crontab.root \`
`/var/opt/drd/mnts/sysimage_001/var/spool/crontab/crontab.root`
 2. Unmount the inactive system image:
`# /opt/drd/bin/drd umount`
-

Example 4-6 Editing symlinked Files

Task: You changed the value of `NUM_BK` in `/opt/VRTS/bin/vxconfigbackup` from 5 to 10 by editing the file. You want the change applied to the clone as well.

Execute the following commands:

1. Mount the inactive system image:

```
# /opt/drd/bin/drd mount
```
2. Compare `vxconfigbackup` with the clone copy:

```
# /usr/bin/diff /opt/VRTS/bin/vxconfigbackup \  
/var/opt/drd/mnts/sysimage_000/opt/VRTS/bin/vxconfigbackup
```

Surprisingly, the files are equal! What happened?

A long listing shows that the files are symlinks:

```
# /usr/bin/ll /opt/VRTS/bin/vxconfigbackup \  
/var/opt/drd/mnts/sysimage_000/opt/VRTS/bin/vxconfigbackup
```

The listing shows:

```
lrwxr-xr-x 1 bin bin 32 Apr 3 17:34  
/opt/VRTS/bin/vxconfigbackup -> /usr/lib/vxvm/bin/vxconfigbackup  
lrwxr-xr-x 1 bin bin 32 Nov 16 12:45  
/var/opt/drd/mnts/sysimage_000/opt/VRTS/bin/vxconfigbackup  
-> /usr/lib/vxvm/bin/vxconfigbackup
```

When the clone is booted, the target of the symlink on the clone resides on the clone. However, when the clone is mounted under the booted system, the target of the symlink resides on the booted system.

To change the data on the clone, edit the file that will be the target of the symlink when the clone is booted:

```
# /usr/bin/vi /var/opt/drd/mnts/sysimage_001/usr/lib/vxvm/vxconfigbackup  
and change the value of NUM_BK to 10.
```



CAUTION: Attempting to edit a path on the clone that is an absolute symlink results in changes on the booted system!

4.3 Unmounting the Inactive System Image

For details of the `drd umount` command, including available options and extended options, see [The drd umount Command](#).

To unmount the inactive system image, the command is:

```
# /opt/drd/bin/drd umount
```

The output is similar to [Example 4-7](#).

Example 4-7 The `drd umount` Command Output

```
===== 12/08/06 22:09:22 MST BEGIN Unmount Inactive System Image (user=root)  
(jobid=dlkma1)  
  
* Reading Current System Information  
* Locating Inactive System Image  
* Unmounting Inactive System Image  
  
===== 12/08/06 22:09:48 MST END Unmount Inactive System Image succeeded.  
(user=root) (jobid=dlkma1)
```

The `drd umount` command:

- Unmounts the file systems in the inactive system image.
- Inactivates the inactive system image's volume group.
- For an LVM-based system, exports the volume group.

If you run the `bdf` command after the `drd umount` command, you no longer see the inactive system image in the output.

5 Activating the Inactive System Image

This chapter describes how to set the inactive system image so it will become the active system image the next time the system boots.

For details of the `drd activate` command, including available options and extended options, see [The drd activate Command](#).



NOTE: You must be logged in as root to run any DRD command.

To make the inactive system image the active system image, run the following command:

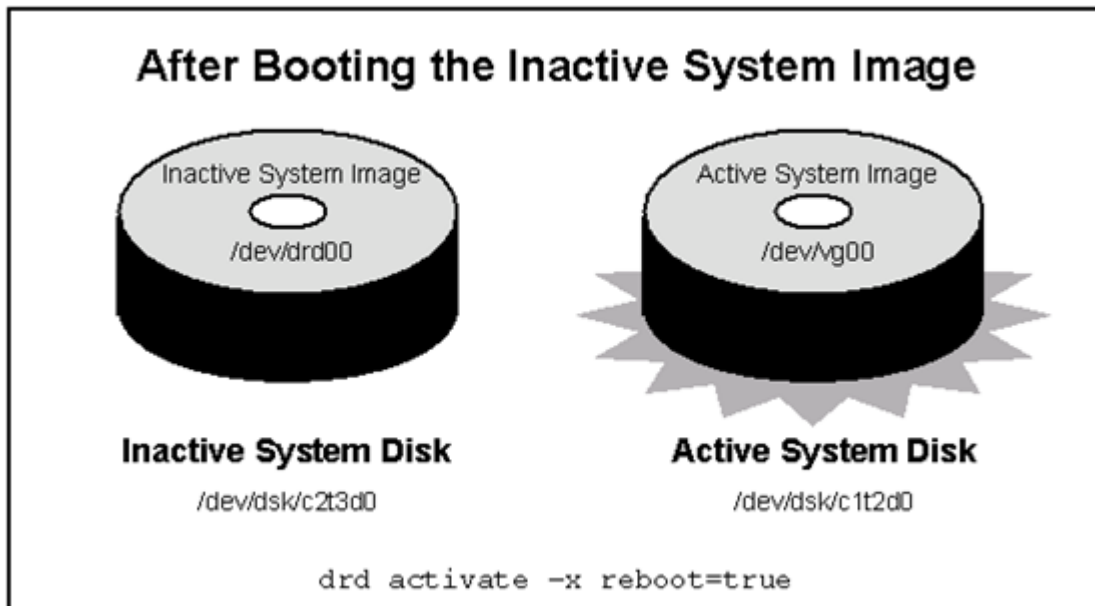
```
# /opt/drd/bin/drd activate -x reboot=true
```

This command:

1. Modifies stable storage to indicate that the inactive system image should become the active system image when the system boots.
2. It then reboots the system.
3. After the reboot, the formerly inactive system image is the active system image, and the formerly active system image is the inactive system image.

Figure 5-1 shows an example of using the `drd activate` command with the option `-x reboot=true`. Initially, `/dev/dsk/c2t3d0` was the active system disk and `drd clone` was used to create an inactive system disk on `/dev/dsk/c1t2d0`. By using the `drd activate` command noted above, `/dev/dsk/c2t3d0` has become the inactive system disk and `/dev/dsk/c1t2d0` has become the active system disk.

Figure 5-1 Disk Configurations After Activating the Inactive System Image





NOTE: The alternate boot path and the High Availability (HA) alternate boot path are not affected by the `drd activate` command. In addition, the value of the autoboot flag (set by `setboot -b`) is not affected by the `drd activate` command.

5.1 Preparing the Inactive System Image to Activate Later

If you do not want to make the inactive system image the active system image right away, you can configure the `drd activate` command so that it does not reboot the system. Because `-x reboot=false` is the default, the command is simply:

```
# /opt/drd/bin/drd activate
```

If you are not certain which system image is set to become the active system image when the system boots, execute the following command:

```
# /usr/sbin/setboot -v
```

For additional information, see the *setboot(1M)* manpage.

In the following example on an HP-UX 11i v2 system, a system administrator uses `/stand/bootconf`, `setboot`, and `ioscan` to determine that, currently, the primary boot disk (the one that will be booted on the next reboot) is the same as the currently booted disk. The system administrator is ready to boot to the clone, but wants to set the alternate boot disk to the current boot disk. (In the event of any problem booting the clone, the system will then fall back to booting the alternate, current disk.)

The system administrator issues the `drd activate` command shown below, then uses `setboot` to verify the settings.



NOTE: The following example does not correspond to any of the figures in this guide.

Example 5-1 Booting the Primary Boot Disk with an Alternate Boot Disk (HP-UX 11i v2)

```
# /usr/bin/more /stand/bootconf
1 /dev/dsk/c2t0d0s2
#
# /usr/sbin/setboot
Primary bootpath : 0/1/1/0.0.0
HA Alternate bootpath : 0/1/1/1.2.0
Alternate bootpath : 0/1/1/1.2.0

Autoboot is ON (enabled)

#
# /usr/sbin/ioscan -fnkC disk
Class      I  H/W Path      Driver      S/W State  H/W Type    Description
=====
disk       0  0/0/2/0.0.0.0  sdisk       CLAIMED    DEVICE      TEAC        DV-28E-N
              /dev/dsk/c0t0d0  /dev/rdisk/c0t0d0
disk       1  0/1/1/0.0.0    sdisk       CLAIMED    DEVICE      HP 36.4GST336754LC
              /dev/dsk/c2t0d0  /dev/dsk/c2t0d0s3  /dev/rdisk/c2t0d0s2
              /dev/dsk/c2t0d0s1 /dev/rdisk/c2t0d0  /dev/rdisk/c2t0d0s3
              /dev/dsk/c2t0d0s2 /dev/rdisk/c2t0d0s1
disk       2  0/1/1/0.1.0    sdisk       CLAIMED    DEVICE      HP 36.4GST336754LC
              /dev/dsk/c2t1d0  /dev/dsk/c2t1d0s3  /dev/rdisk/c2t1d0s2
              /dev/dsk/c2t1d0s1 /dev/rdisk/c2t1d0  /dev/rdisk/c2t1d0s3
              /dev/dsk/c2t1d0s2 /dev/rdisk/c2t1d0s1
disk       3  0/1/1/1.2.0    sdisk       CLAIMED    DEVICE      HP 36.4GST336706LC
              /dev/dsk/c3t2d0  /dev/dsk/c3t2d0s3  /dev/rdisk/c3t2d0s2
              /dev/dsk/c3t2d0s1 /dev/rdisk/c3t2d0  /dev/rdisk/c3t2d0s3
              /dev/dsk/c3t2d0s2 /dev/rdisk/c3t2d0s1

#
# /usr/bin/more /stand/bootconf
1 /dev/dsk/c2t0d0s2
#
# /opt/drd/bin/drd activate -x alternate_bootdisk=/dev/dsk/c2t0d0

===== 06/06/07 22:38:02 MDT BEGIN Activate Inactive System Image (user=root) (jobid=drd2)
* Checking for Valid Inactive System Image
* Reading Current System Information
* Locating Inactive System Image
* Determining Bootpath Status
* Primary bootpath : 0/1/1/0.0.0 [/dev/dsk/c2t0d0] before activate.
* Primary bootpath : 0/1/1/1.2.0 [/dev/dsk/c3t2d0] after activate.
* Alternate bootpath : 0/1/1/1.2.0 [/dev/dsk/c3t2d0] before activate.
* Alternate bootpath : 0/1/1/0.0.0 [/dev/dsk/c2t0d0] after activate.
* HA Alternate bootpath : 0/1/1/1.2.0 [/dev/dsk/c3t2d0] before activate.
* HA Alternate bootpath : 0/1/1/1.2.0 [/dev/dsk/c3t2d0] after activate.
* Activating Inactive System Image

===== 06/06/07 22:38:13 MDT END Activate Inactive System Image succeeded. (user=root) (jobid=drd2)

#
# /usr/sbin/setboot
Primary bootpath : 0/1/1/1.2.0
HA Alternate bootpath : 0/1/1/1.2.0
Alternate bootpath : 0/1/1/0.0.0

Autoboot is ON (enabled)
```

The `drd activate` and `drd deactivate` commands enable you to choose an image to be booted the next time the system is restarted. An image is considered to be *activated* if it will be booted at the next restart of the system. Executing the `drd activate` command activates the inactive system image. Executing the `drd deactivate` command activates the booted image. For more details about the use of `drd activate` and `drd deactivate`, see the *Using Dynamic Root Disk Activate and Deactivate Commands* white paper, at <http://docs.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>.

5.2 Undoing Activation of the Inactive System Image

If you run `drd activate` and then decide not to boot the inactive image on the next reboot, use the `drd deactivate` command to set the primary boot disk to the currently booted disk. For further information on the `drd deactivate` command, see [The `drd deactivate` Command](#) and the `drd-deactivate(1M)` manpage.



TIP: If you have already booted the (previously) inactive image, you can use `drd activate` to return to the (previously) active image.

Example 5-2 Using `drd deactivate` After Activating — Legacy DSF

In this example, `/dev/dsk/c2t3d0` contains your root volume group, and you use `drd clone` to create an inactive system disk at `/dev/dsk/c1t2d0`. Next, you execute `drd activate`. The results are:

- Disk set to become the active system disk after the next reboot: `/dev/dsk/c1t2d0`
- Disk set to become the inactive system disk after the next reboot: `/dev/dsk/c2t3d0`

The output of `drd status` is:

```
# /opt/drd/bin/drd status
```

```
===== 07/01/08 13:14:36 MDT BEGIN Displaying DRD Clone Image Information
        (user=root) (jobid=drdtest1)

* Clone Disk:                /dev/dsk/c1t2d0
* Clone LIF Area:            AUTO file present, Boot loader present
* Clone Creation Date:       07/01/08 09:37:58 MDT
* Clone Mirror Disk:         None
* Mirror LIF Area:           None
* Original Disk:             /dev/dsk/c2t3d0
* Original LIF Area:         AUTO file present, Boot loader present
* Booted Disk:               Original Disk (/dev/dsk/c2t3d0)
* Activated Disk:            Clone Disk (/dev/dsk/c1t2d0)

===== 07/01/08 13:14:42 MDT END Displaying DRD Clone Image Information
        succeeded. (user=root) (jobid=drdtest1)
```

If plans change prior to rebooting the system and you do not want to have `/dev/dsk/c1t2d0` become the active system disk, you can use `drd deactivate` to “undo” the previous `drd activate` command.

The results are:

- Disk set to become the active system disk after the next reboot: `/dev/dsk/c2t3d0`
- Disk set to become the inactive system disk after the next reboot: `/dev/dsk/c1t2d0`

The output of `drd status` is:

```
# drd status
```

```
===== 07/01/08 13:14:36 MDT BEGIN Displaying DRD Clone Image Information
        (user=root) (jobid=drdtest1)

* Clone Disk:                /dev/dsk/c1t2d0
* Clone LIF Area:            AUTO file present, Boot loader present
* Clone Creation Date:       07/01/08 09:37:58 MDT
* Clone Mirror Disk:         None
* Mirror LIF Area:           None
* Original Disk:             /dev/dsk/c2t3d0
* Original LIF Area:         AUTO file present, Boot loader present
* Booted Disk:               Original Disk (/dev/dsk/c2t3d0)
* Activated Disk:            Original Disk (/dev/dsk/c2t3d0)

===== 07/01/08 13:14:42 MDT END Displaying DRD Clone Image Information
        succeeded. (user=root) (jobid=drdtest1)
```

Example 5-3 Using drd deactivate After Activating — Agile DSF

In this example, `drd activate` is executed on a system without performing a reboot, followed by running `drd deactivate`, and the end result is no change. For example, if you have a system with the root volume group on `/dev/disk/disk11` and a clone created on `/dev/disk/disk10`, the output of `drd status` is:

```
# drd status
```

```
===== 07/01/08 13:20:04 MDT BEGIN Displaying DRD Clone Image Information
        (user=root) (jobid=drdtest1)

* Clone Disk:                /dev/disk/disk10
* Clone LIF Area:            AUTO file present, Boot loader present
* Clone Creation Date:       07/01/08 09:37:58 MDT
* Clone Mirror Disk:         None
* Mirror LIF Area:           None
* Original Disk:              /dev/disk/disk11
* Original LIF Area:          AUTO file present, Boot loader present
* Booted Disk:                Original Disk (/dev/disk/disk11)
* Activated Disk:             Original Disk (/dev/disk/disk11)

===== 07/01/08 13:20:10 MDT END Displaying DRD Clone Image Information
        succeeded. (user=root) (jobid=drdtest1)
```

If you use `drd activate` and do not perform a reboot, and then use `drd deactivate`, the output of `drd status` is:

```
# drd status
```

```
===== 07/01/08 13:20:04 MDT BEGIN Displaying DRD Clone Image Information
        (user=root) (jobid=drdtest1)

* Clone Disk:                /dev/disk/disk10
* Clone LIF Area:            AUTO file present, Boot loader present
* Clone Creation Date:       07/01/08 09:37:58 MDT
* Clone Mirror Disk:         None
* Mirror LIF Area:           None
* Original Disk:              /dev/disk/disk11
* Original LIF Area:          AUTO file present, Boot loader present
* Booted Disk:                Original Disk (/dev/disk/disk11)
* Activated Disk:             Original Disk (/dev/disk/disk11)

===== 07/01/08 13:20:10 MDT END Displaying DRD Clone Image Information
        succeeded. (user=root) (jobid=drdtest1)
```

6 Rehosting and Unrehosting Systems

A new feature of Dynamic Root Disk (DRD) version B.1131.A.3.2 is *rehosting*. Rehosting enables you to boot a DRD clone on a system other than the one where it was created. This new functionality is supported on LVM-managed root volumes running on Itanium® systems with HP-UX 11i v3. This capability enables a number of new uses for DRD clones. There are three main uses of rehosting:

- Provisioning of new systems, particularly Itanium BladeSystems (blades) and Integrity Virtual Machines
- Testing of new software before deploying it in a production environment
- Installing software on a clone by an alternative method, other than `drd runcmd`



IMPORTANT: For additional information on rehosting, including required software, see the *Exploring DRD Rehosting* white paper, located at <http://docs.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>.

The initial release of `drd rehost` has been tested on Integrity Virtual Machines and on blades with Virtual Connect. In addition, preliminary testing indicates that simple (single root volume group) standalone LVM-managed Itanium-based systems running a September 2008 HP-UX 11i v3 Operating Environment (OE) can be rehosted to another system with the exact same hardware. The benefit of the September 2008 HP-UX 11i v3 Operating Environment is the availability of “Self healing of boot disk configuration”, which is provided by LVM and described in the *September 2008 HP-UX 11i v3 Release Notes*, located at <http://docs.hp.com/en/oshpux11iv3.html#Release%20Notes>.

6.1 Rehosting Overview

For details of the `drd rehost` command, including available options and extended options, see [The `drd rehost` Command](#).

The common steps for rehosting are:

1. Create a system image using the `drd clone` command
2. Create a system information file for the new image, which contains information such as hostname, IP addresses, language, time zone, and other system information
3. Copy the system information file to the EFI partition using the `drd rehost` command
4. Unpresent the disk (new image) from the source system and present it to the target system that will boot the rehosted image.
5. Process the new system information file with the `auto_parms(1M)` utility during the boot of the rehosted image

In order to perform these steps, minimal revisions of Dynamic Root Disk and `auto_parms(1M)`, delivered in the `SystemAdmin.FIRST-BOOT` fileset are required. For details, see the *Exploring DRD Rehosting* white paper, located at <http://docs.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>.

6.2 Rehosting Examples

In the following examples you can substitute a hot-swappable disk for the SAN LUN. Refer to your Storage Area Network software documentation for information on presenting and unpresenting a LUN to a system.

Example 6-1 Provisioning a New System

In this example, you have a blade named SALES01 that is running all the correct releases of the correct OE software, and you have another blade (not yet running anything) that you want to set up as SALES02 (a hostname not yet in use), with the identical OE software as SALES01.

You would perform the following steps:

1. Clone the SALES01 system to a SAN LUN.
2. Create a system information file with `SYSINFO_HOSTNAME=SALES02`, and the `SYSINFO_MAC_ADDRESS`, `SYSINFO_IP_ADDRESS`, and `SYSINFO_SUBNET_MASK` for SALES02.
3. Execute the `drd rehost` command, specifying the system information file created in the previous step.
4. Create a Virtual Connect Profile for the second blade, SALES02.
5. Unpresent the LUN from the first blade, SALES01, and present it to the second blade, SALES02.
6. Choose the new LUN from the boot screens and boot the SALES02 blade.

In this example, no system with hostname SALES02 existed before you booted the new blade. *You must specify a unique hostname for the rehosted clone.*

Example 6-2 Updating a System to an Existing System's Maintenance Level

In the next example, you use cloning to bring a system up to the same maintenance level as another system. Support system DEVEL01 is running an HP-UX 11i v3 0803 maintenance level, and DEVEL02 is running an HP-UX 11i v3 0709 maintenance level. Rather than use `drd runcmd` to install 0803 on DEVEL02, you want to clone DEVEL01 and boot the clone on DEVEL02 (with hostname DEVEL02).

You would perform the following steps:

1. Clone DEVEL01 to a SAN LUN.
2. Create a system information file with `SYSINFO_HOSTNAME=DEVEL02`, and the `SYSINFO_MAC_ADDRESS`, `SYSINFO_IP_ADDRESS`, and `SYSINFO_SUBNET_MASK` for SALES02.
3. Execute the `drd rehost` command to copy the DEVEL02 system information file to the cloned disk. The system information file has `SYSINFO_HOSTNAME=DEVEL02` and the correct `SYSINFO_MAC_ADDRESS`, `SYSINFO_IP_ADDRESS`, and `SYSINFO_SUBNET_MASK` for DEVEL02.
4. Unpresent the SAN LUN from DEVEL01 and present it to DEVEL02
5. Use `setboot` to make the cloned disk on DEVEL02 the boot disk and then reboot DEVEL02; or you can simply reboot DEVEL02 and interrupt the boot to set the new LUN as the boot disk in the EFI interface.

In this example, DEVEL02 is a pre-existing hostname, but you are booting the same system, just using a different boot disk.

6.3 Unrehosting Overview

For details of the `drd unrehost` command, including available options and extended options, see [The drd unrehost Command](#).

The `drd unrehost` command removes `EFI/HPUX/SYSINFO.TXT`, and optionally preserves a copy of it in a file on the booted system.

You can execute the `drd unrehost` command after previously executing the `drd rehost` command, specifying the same target, if the disk should not be rehosted.

The format of the sysinfo file is defined in *sysinfo*(4). To determine the most recent patch that supplies *sysinfo*(4), see the DRD Web site, located at <http://docs.hp.com/en/DRD>.

7 Troubleshooting DRD

This chapter provides information about unexpected DRD situations and outcomes.

For the most recent troubleshooting information, check the DRD Web site's *Frequently Asked Questions* page at: <http://docs.hp.com/en/DRD/faq.html>.

7.7.1.1 Q: Why can't I see the inactive system image file systems when I run the `bdf` command?

A: You have to mount the inactive system image before you can see the file systems using `bdf`. Use the `drd mount` command to mount the inactive system image.

7.7.1.2 Q: I can't remember which disk was used as the target of my clone operation. How can I identify it?

A: Use the `drd status` command.

7.7.1.3 Q: I issued a `drd activate` command but changed my mind and do not want to boot the clone. How can I undo the `drd activate` command?

A: If you run `drd activate` and then decide not to boot the inactive image on the next reboot, use the `drd deactivate` command to set the primary boot disk to the currently booted disk. For further information on the `drd deactivate` command, see [The `drd deactivate` Command](#) and the `drd-deactivate(1M)` manpage.

7.7.1.4 Q: Can I change file system sizes when I create a clone?

A: This release of DRD does not provide a mechanism for resizing file systems during a `drd clone` operation. However, after the clone is created, you can manually change file system sizes on the inactive system without needing an immediate reboot. The *Using the Dynamic Root Disk Toolset* white paper describes resizing file systems other than `/stand`. The *Using the DRD toolset to extend the `/stand` file system in an LVM environment* white paper describes resizing the boot (`/stand`) file system on an inactive system image. You can access these white papers at: <http://docs.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk>.

A DRD Commands

term

para

This appendix describes the nine DRD commands you can use to clone an image and work with the cloned image. The commands are:

- *drd-activate*(1M)
- *drd-clone*(1M)
- *drd-deactivate*(1M)
- *drd-mount*(1M)
- *drd-rehost*(1M)
- *drd-runcmd*(1M)
- *drd-status*(1M)
- *drd-umount*(1M)
- *drd-unrehost*(1M)

Chapters 2 through 6 describe how to use these commands to perform DRD operations.

You must be logged in as *root* to use any DRD command.

A.1 DRD Command Syntax

This section explains DRD command syntax, including the options that are specific to certain commands.



NOTE: This section is intended for quick reference after you are familiar with using DRD. Chapters 2 through 6 explain how to perform operations with DRD commands.

A.1.1 The *drd activate* Command

The *drd activate* command causes the inactive system image to boot either immediately or the next time the system boots. Immediate or delayed booting is controlled by the *-x reboot={true|false}* extended option. The default is *false*.

The *drd-activate*(1M) command invokes the *setboot*(1M) command to set the primary boot disk to the target of the *drd clone* operation. It also optionally sets the alternate and High Availability alternate boot disks to values specified on the command line.

The *drd activate* command syntax is:

```
drd activate [-?] [-p] [-q] [-v] [-x extended option=value] [-x -?] [-X option_file]
```

Options

-?

Displays the usage message for a DRD command. This option cannot be used with other options.

-p

Sets *preview* mode. When run with the *-p* option, a DRD command performs analysis without running the command and reports any errors.

-q

Decreases the verbosity level by one each time it is specified. For example, *-qq* will reduce the verbosity from the default value of 4 to 2. If both *-x verbosity=5* and *-qqq* are included on the command line, the effective verbosity is 2. The minimum verbosity level is 0. (See also the *-x verbosity* option.)

-v

Increases the verbosity level by one each time it is specified. For example, -v will increase the effective verbosity from the default value of 4 to 5. If both -x verbosity=1 and -vv are included on the command line, the effective verbosity is 3. The maximum verbosity level is 5. (See also the -x verbosity option.)

-x *extended_option=value*

Sets the extended option to a value.

-x -?

Displays the list of possible -x (extended) options.

-X *option_file*

Gets the extended options from a file.

Extended options

The following extended options are available:

-x *alternate_bootdisk=block_device_special_file*

This is the alternate boot disk. The alternate boot disk must be specified as a block device special file.

-x *HA_alternate_bootdisk=block_device_special_file*

This is the High Availability alternate boot disk. The High Availability alternate boot disk must be specified as a block device special file. High Availability alternate boot disk is supported only on Itanium-based architecture and for PA-RISC systems that support hardware partitions.

-x *ignore_unmounted_fs={true|false}*

(Default is *false*) Controls whether a clone fails when an unmounted file system in the root volume group is detected.

-x *logfile=/var/opt/drd/drd.log*

This is the path to the log file for this command. Each time DRD is run, this file will grow larger. This can be changed, for example, to a month-specific location for easier archiving, off-host backup, and rotation.

-x *log_verbosity=4*

(Default.) Specifies the level of log verboseness. Replace 4 with the following values:

- 0 Only ERRORS and the starting/ending BANNER messages.
- 1 Adds WARNING messages.
- 2 Adds NOTE messages.
- 3 Adds INFO messages (informational messages preceded by the * character.)
- 4 (Default) Adds verbose INFO messages.
- 5 Adds additional detailed INFO messages.

-x *mirrordisk=block_device_special_file*

Specifies the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. This option requires that LVM mirroring is installed. The block device special file specified is used to mirror each logical volume in the target of the clone operation.

-x *overwrite={true|false}*

Specifies whether *drd clone* should overwrite existing information on the target disk. That is, it controls whether a disk containing boot, LVM, or VxVM records can be overwritten. The -x *overwrite=false* (default) prevents a disk that contains boot, LVM, or VxVM records from being overwritten. The -x *overwrite=true* allows a disk to be overwritten, even if it contains boot, LVM, or VxVM records. Note that DRD does not overwrite a disk associated with an active LVM volume group or VxVM disk group, regardless of the setting of the overwrite option. If a previously created clone is mounted, use the *drd umount* command to unmount it before attempting to create a new clone on the disk.

-x preview={true|false}

If true, run this command in preview mode only. That is, complete the analysis phase and exit; no changes are committed to disk. This option has the same effect as specifying -p on the command line. The default is false. This option is available on every DRD command except `drd runcmd`.

-x reboot={true|false}

If true, specifies the system is rebooted at the successful completion of a `drd activate` operation. The default is false.

-x verbosity=3 (Default.)

Specifies the level of stdout/stderr verbosity. Replace 3 with the following values:

- 0 Only ERRORS and the starting/ending BANNER messages.
- 1 Adds WARNING messages.
- 2 Adds NOTE messages.
- 3 (Default) Adds INFO messages (informational messages preceded by the * character.)
- 4 Adds verbose INFO messages.
- 5 Adds additional detailed INFO messages.

-X option_file

Gets the extended options from a file.

A.1.2 The `drd clone` Command

The `drd-clone(1M)` command creates a copy of the volume group containing the root file system (/). It does not clone the entire disk configuration.

The `drd clone` command:

- Creates Extensible Firmware Interface (EFI) partitions on HP-UX Integrity systems.
- Creates boot records.
- Creates a new LVM volume group, or VxVM disk group and a volume, in the new group for each volume in the root volume group. The volume management type of the clone matches that of the root group
- Configures swap and dump volumes.
- Copies the contents of each file system in the root volume group to the corresponding file system in the new group.
- Modifies particular files on the clone that identify the disk on which the volume group resides.
- For LVM-based systems, modifies volume group metadata on the clone so that the volume group name is the same as the original root volume group when the clone is booted.

The `drd clone` command performs the following checks:

- If the disk is currently in use by the LVM Manager, it is rejected by the `drd clone` operation.
- If the disk is currently in use by the VxVM Manager, it will be accepted only if the following two conditions are met:
 - The disk is an inactive image managed by DRD
 - The extended option `-x overwrite=true` is specified on the `drd clone` command
- If the disk is not currently in use by LVM or VxVM, but contains LVM, VxVM, or boot records, it is only accepted as a `drd clone` target if `-x overwrite=true` is specified on the `drd clone` command.



NOTE: A selected target disk will not be overwritten if it is part of the root volume. However, the `drd clone` command will overwrite swap or raw data disks—it does not detect this type of usage. For example, any raw disks in use by databases would be overwritten if given as the target clone disk.

When run with the `-x overwrite` extended option set to *true*, the `drd clone` command overwrites any existing data on the target disk. If the target disk contains a mounted inactive system image, run the `drd umount` command before attempting another clone operation with `-x overwrite=true`. If other volume groups (not related to DRD) reside on the target disk

and you want to overwrite them, use the `vgexport(1M)` command first to remove any knowledge of them from the booted system.

When run with the `-x mirror_disk=block_device_special_file`, you must specify the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. For a system with an LVM root, this option requires that LVM mirroring is installed. The block device special file specified will be used to mirror each logical volume in the target of the clone operation.

A log of the cloning operation is available at `/var/opt/drd/drd.log`. This log is written to the booted system. Because it is located in the `/var` file system, it is copied during the clone operation to the `/var` file system on the clone. However, because the clone file systems must be unmounted before the final ending banner message of the operation is written to the log, the record of the clone operation in the log on the clone is truncated at the message indicating that file systems are being copied. The next message in the log on the clone is issued by the next DRD command run on the clone itself after it is booted. The log on the booted system is complete, ending with the final banner message.

The `drd clone` command syntax is:

```
drd clone [-?] [-p] [-q] [-v] -t target_device_file [-x extended option=value] [-x -?] [-X option_file]
```

Options

`-?`

Displays the usage message for a DRD command. This option cannot be used with other options.

`-p`

Sets preview mode. When run with the `-p` option, a DRD command performs analysis without running the command and reports any errors.

`-q`

Decreases the verbosity level by one each time it is specified. For example, `-qq` will reduce the verbosity from the default value of 4 to 2. If both `-x verbosity=5` and `-qqq` are included on the command line, the effective verbosity is 2. The minimum verbosity level is 0. (See also the `-x verbosity` option.)

`-v`

Increases the verbosity level by one each time it is specified. For example, `-v` will increase the effective verbosity from the default value of 4 to 5. If both `-x verbosity=1` and `-vv` are included on the command line, the effective verbosity is 3. The maximum verbosity level is 5. (See also the `-x verbosity` option.)

`-t target_device_file`

The `-t target_device_file` option and parameter are required with the `drd clone` command. This option specifies the *block device special file* (for example, `/dev/dsk/c2t0d0`) of a single physical disk on which the cloned system image is to be written. The block device special file must exist on the system and be writeable. All data previously on a disk will be unavailable after a clone operation. (See the `-x overwrite` extended option.)

`-x extended_option=value`

Sets the extended option to a value.

`-x -?`

Displays the list of possible `-x` (extended) options.

`-X option_file`

Gets the extended options from a file.

Extended options

The following extended options are available:

- x `alternate_bootdisk=block_device_special_file`
This is the alternate boot disk. The alternate boot disk must be specified as a block device special file.
- x `HA_alternate_bootdisk=block_device_special_file`
This is the High Availability alternate boot disk. The High Availability alternate boot disk must be specified as a block device special file. High Availability alternate boot disk is supported only on Itanium-based architecture and for PA-RISC systems that support hardware partitions.
- x `ignore_unmounted_fs={true|false}`
(Default is *false*) Controls whether a clone fails when an unmounted file system in the root volume group is detected.
- x `logfile=/var/opt/drd/drd.log`
This is the path to the log file for this command. Each time DRD is run, this file will grow larger. This can be changed, for example, to a month-specific location for easier archiving, off-host backup, and rotation.
- x `log_verbosity=4`
(Default.) Specifies the level of log verboseness. Replace 4 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 Adds INFO messages (informational messages preceded by the * character.)
 - 4 (Default) Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- x `mirrordisk=block_device_special_file`
Specifies the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. This option requires that LVM mirroring is installed. The block device special file specified is used to mirror each logical volume in the target of the clone operation.
- x `overwrite={true|false}`
Specifies whether `drd clone` should overwrite existing information on the target disk. That is, it controls whether a disk containing boot, LVM, or VxVM records can be overwritten. The `-x overwrite=false` (default) prevents a disk that contains boot, LVM, or VxVM records from being overwritten. The `-x overwrite=true` allows a disk to be overwritten, even if it contains boot, LVM, or VxVM records. Note that DRD does not overwrite a disk associated with an active LVM volume group or VxVM disk group, regardless of the setting of the overwrite option. If a previously created clone is mounted, use the `drd umount` command to unmount it before attempting to create a new clone on the disk.
- x `preview={true|false}`
If true, run this command in preview mode only. That is, complete the analysis phase and exit; no changes are committed to disk. This option has the same effect as specifying `-p` on the command line. The default is *false*. This option is available on every DRD command except `drd runcmd`.
- x `reboot={true|false}`
If true, specifies the system is rebooted at the successful completion of a `drd activate` operation. The default is *false*.
- x `verbosity=3` (Default.)
Specifies the level of `stdout/stderr` verboseness. Replace 3 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 (Default) Adds INFO messages (informational messages preceded by the * character.)
 - 4 Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- x `option_file`
Gets the extended options from a file.

A.1.3 The drd deactivate Command

The *drd-deactivate*(1M) command invokes the *setboot*(1M) command to set the primary boot disk to the active (booted) system image the next time the system is booted.



NOTE: `drd deactivate` is a mechanism for “undoing” a `drd activate` command.

The `drd deactivate` command syntax is:

```
drd deactivate [-?] [-p] [-q] [-v] [-x extended_option=value] [-x -?]
[-x option_file]
```

Options

-?

Displays the usage message for a DRD command. This option cannot be used with other options.

-p

Sets preview mode. When run with the -p option, a DRD command performs analysis without running the command and reports any errors.

-q

Decreases the verbosity level by one each time it is specified. For example, -qq will reduce the verbosity from the default value of 4 to 2. If both -x `verbosity=5` and -qqq are included on the command line, the effective verbosity is 2. The minimum verbosity level is 0. (See also the -x `verbosity` option.)

-v

Increases the verbosity level by one each time it is specified. For example, -v will increase the effective verbosity from the default value of 4 to 5. If both -x `verbosity=1` and -vv are included on the command line, the effective verbosity is 3. The maximum verbosity level is 5. (See also the -x `verbosity` option.)

-x *extended_option=value*

Sets the extended option to a value.

-x -?

Displays the list of possible -x (extended) options.

-x *option_file*

Gets the extended options from a file.

Extended options

The following extended options are available:

-x *alternate_bootdisk=block_device_special_file*

This is the alternate boot disk. The alternate boot disk must be specified as a block device special file.

-x *HA_alterate_bootdisk=block_device_special_file*

This is the High Availability alternate boot disk. The High Availability alternate boot disk must be specified as a block device special file. High Availability alternate boot disk is supported only on Itanium-based architecture and for PA-RISC systems that support hardware partitions.

-x *ignore_unmounted_fs={true|false}*

(Default is *false*) Controls whether a clone fails when an unmounted file system in the root volume group is detected.

-x *logfile=/var/opt/drd/drd.log*

This is the path to the log file for this command. Each time DRD is run, this file will grow larger. This can be changed, for example, to a month-specific location for easier archiving, off-host backup, and rotation.

-x log_verbosity=4

(Default.) Specifies the level of log verbosity. Replace 4 with the following values:

- 0 Only ERRORS and the starting/ending BANNER messages.
- 1 Adds WARNING messages.
- 2 Adds NOTE messages.
- 3 Adds INFO messages (informational messages preceded by the * character.)
- 4 (Default) Adds verbose INFO messages.
- 5 Adds additional detailed INFO messages.

-x mirrordisk=*block_device_special_file*

Specifies the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. This option requires that LVM mirroring is installed. The block device special file specified is used to mirror each logical volume in the target of the clone operation.

-x overwrite={true|false}

Specifies whether `drd clone` should overwrite existing information on the target disk. That is, it controls whether a disk containing boot, LVM, or VxVM records can be overwritten. The `-x overwrite=false` (default) prevents a disk that contains boot, LVM, or VxVM records from being overwritten. The `-x overwrite=true` allows a disk to be overwritten, even if it contains boot, LVM, or VxVM records. Note that DRD does not overwrite a disk associated with an active LVM volume group or VxVM disk group, regardless of the setting of the overwrite option. If a previously created clone is mounted, use the `drd umount` command to unmount it before attempting to create a new clone on the disk.

-x preview={true|false}

If true, run this command in preview mode only. That is, complete the analysis phase and exit; no changes are committed to disk. This option has the same effect as specifying `-p` on the command line. The default is false. This option is available on every DRD command except `drd runcmd`.

-x reboot={true|false}

If true, specifies the system is rebooted at the successful completion of a `drd activate` operation. The default is false.

-x verbosity=3 (Default.)

Specifies the level of stdout/stderr verbosity. Replace 3 with the following values:

- 0 Only ERRORS and the starting/ending BANNER messages.
- 1 Adds WARNING messages.
- 2 Adds NOTE messages.
- 3 (Default) Adds INFO messages (informational messages preceded by the * character.)
- 4 Adds verbose INFO messages.
- 5 Adds additional detailed INFO messages.

-X *option_file*

Gets the extended options from a file.

A.1.4 The `drd mount` Command

The `drd-mount(1M)` command mounts all the file systems in the cloned system image.

If the booted volume group contains the file systems `/`, `/var`, `/usr`, `/tmp`, `/stand`, `/opt`, and `/home`, the cloned file systems are mounted at the mount points shown in [Example A-1](#).

Example A-1 File System Mount Points

```
/var/opt/drd/mnts/sysimage_001
/var/opt/drd/mnts/sysimage_001/var
/var/opt/drd/mnts/sysimage_001/usr
/var/opt/drd/mnts/sysimage_001/tmp
/var/opt/drd/mnts/sysimage_001/stand
/var/opt/drd/mnts/sysimage_001/opt
/var/opt/drd/mnts/sysimage_001/home
```

If the inactive system image was created by the `drd clone` command, the mount point for the root file system, chosen automatically by the `mount` command, is `/var/opt/drd/mnts/sysimage_001`. If the currently-booted system was created by the `drd clone` command, the mount point of the root file system of the original system (now inactive) is `/var/opt/drd/mnts/sysimage_000`.

The `drd mount` command syntax is:

```
drd mount [-?] [-p] [-q] [-v] [-x extended option=value] [-x -?] [-X option_file]
```

Options

-?

Displays the usage message for a DRD command. This option cannot be used with other options.

-p

Sets preview mode. When run with the `-p` option, a DRD command performs analysis without running the command and reports any errors.

-q

Decreases the verbosity level by one each time it is specified. For example, `-qq` will reduce the verbosity from the default value of 4 to 2. If both `-x verbosity=5` and `-qqq` are included on the command line, the effective verbosity is 2. The minimum verbosity level is 0. (See also the `-x verbosity` option.)

-v

Increases the verbosity level by one each time it is specified. For example, `-v` will increase the effective verbosity from the default value of 4 to 5. If both `-x verbosity=1` and `-vv` are included on the command line, the effective verbosity is 3. The maximum verbosity level is 5. (See also the `-x verbosity` option.)

-x *extended_option=value*

Sets the extended option to a value.

-x -?

Displays the list of possible `-x` (extended) options.

-X *option_file*

Gets the extended options from a file.

Extended options

The following extended options are available:

-x *alternate_bootdisk=block_device_special_file*

This is the alternate boot disk. The alternate boot disk must be specified as a block device special file.

-x *HA_alterate_bootdisk=block_device_special_file*

This is the High Availability alternate boot disk. The High Availability alternate boot disk must be specified as a block device special file. High Availability alternate boot disk is

- supported only on Itanium-based architecture and for PA-RISC systems that support hardware partitions.
- x ignore_unmounted_fs={true|false}
(Default is *false*) Controls whether a clone fails when an unmounted file system in the root volume group is detected.
 - x logfile=/var/opt/drd/drd.log
This is the path to the log file for this command. Each time DRD is run, this file will grow larger. This can be changed, for example, to a month-specific location for easier archiving, off-host backup, and rotation.
 - x log_verbosity=4
(Default.) Specifies the level of log verboseness. Replace 4 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 Adds INFO messages (informational messages preceded by the * character.)
 - 4 (Default) Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
 - x mirrordisk=*block_device_special_file*
Specifies the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. This option requires that LVM mirroring is installed. The block device special file specified is used to mirror each logical volume in the target of the clone operation.
 - x overwrite={true|false}
Specifies whether drd clone should overwrite existing information on the target disk. That is, it controls whether a disk containing boot, LVM, or VxVM records can be overwritten. The -x overwrite=false (default) prevents a disk that contains boot, LVM, or VxVM records from being overwritten. The -x overwrite=true allows a disk to be overwritten, even if it contains boot, LVM, or VxVM records. Note that DRD does not overwrite a disk associated with an active LVM volume group or VxVM disk group, regardless of the setting of the overwrite option. If a previously created clone is mounted, use the drd umount command to unmount it before attempting to create a new clone on the disk.
 - x preview={true|false}
If true, run this command in preview mode only. That is, complete the analysis phase and exit; no changes are committed to disk. This option has the same effect as specifying -p on the command line. The default is false. This option is available on every DRD command except drd runcmd.
 - x reboot={true|false}
If true, specifies the system is rebooted at the successful completion of a drd activate operation. The default is false.
 - x verbosity=3 (Default.)
Specifies the level of stdout/stderr verboseness. Replace 3 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 (Default) Adds INFO messages (informational messages preceded by the * character.)
 - 4 Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
 - X *option_file*
Gets the extended options from a file.

A.1.5 The drd rehost Command

The *drd-rehost*(1M) command copies new host information to EFI/HPUX/SYSINFO.TXT for processing by auto_parms during the boot of the disk.

The drd rehost command considerations are:

- Patches to the `auto_parms` utility are needed to process the `SYSINFO.TXT` file during the boot of the disk. Please refer to the DRD Web site, <http://docs.hp.com/en/DRD> for information about the appropriate patches to install.
- A system administrator can execute the `drd rehost` command after cloning a system image to setup the clone to run on another system.
- The initial implementation of `drd rehost` only supports rehosting of an LVM-managed root volume group on an Integrity virtual machine to another Integrity virtual machine, or an LVM-managed root volume group on a Blade with Virtual Connect I/O to another such Blade.
- The format of the `sysinfo` file is defined in `sysinfo(4)`, which is provided by a patch documented at the DRD Web site, <http://docs.hp.com/en/DRD>. Only files conforming to `sysinfo(4)` can be used for rehosting.
- The disk to be rehosted must be a bootable disk and may be specified as the argument of the `-t` option. If no `-t` option is specified, the disk to be rehosted is the inactive system image. The inactive system image is either a clone created by the `drd clone` command, or the original booted image that was cloned, whichever is not currently booted.
- If no `-t` option is specified, the inactive image chosen is checked to ensure that it is managed by LVM. However, if a disk is specified using the `-t` option, the volume management of the disk is not checked.
- If a preview operation is run—by specifying the `-p` option—the syntax of the system information file is checked, but the file is not copied to the target.

The `drd rehost` command syntax is:

```
drd rehost [-?] [-p] -f system_information_file [-q] -t
device_special_file [-v] [-x extended option=value] [-x -?] [-x
option_file]
```

Options

`-?`

Displays the usage message for a DRD command. This option cannot be used with other options.

`-p`

Sets preview mode. When run with the `-p` option, a DRD command performs analysis without running the command and reports any errors.

`-f system_information_file`

Specifies the file containing the system information (hostname, IP address, network information, etc.) to be copied to `EFI/HPUX/SYSINFO.TXT` on the disk specified by the `-t` option. See `sysinfo(4)` for the syntax of this file. If not specified, the file defaults to `/etc/opt/drd/default_sysinfo_file`.

`-q`

Decreases the verbosity level by one each time it is specified. For example, `-qq` will reduce the verbosity from the default value of 4 to 2. If both `-x verbosity=5` and `-qqq` are included on the command line, the effective verbosity is 2. The minimum verbosity level is 0. (See also the `-x verbosity` option.)

`-t device_special_file`

Specifies the block device special file of a single writeable physical disk. The file specified by the `-f` option will be written to `EFI/HPUX/SYSINFO.TXT` in the `EFI` partition of this disk. If no target is specified, the inactive system image is used as a target.

`-v`

Increases the verbosity level by one each time it is specified. For example, `-v` will increase the effective verbosity from the default value of 4 to 5. If both `-x verbosity=1` and `-vv` are included on the command line, the effective verbosity is 3. The maximum verbosity level is 5. (See also the `-x verbosity` option.)

- x *extended_option=value*
Sets the extended option to a value.
- x -?
Displays the list of possible -x (extended) options.
- X *option_file*
Gets the extended options from a file.

Extended options

The following extended options are available:

- x *alternate_bootdisk=block_device_special_file*
This is the alternate boot disk. The alternate boot disk must be specified as a block device special file.
- x *HA_alternate_bootdisk=block_device_special_file*
This is the High Availability alternate boot disk. The High Availability alternate boot disk must be specified as a block device special file. High Availability alternate boot disk is supported only on Itanium-based architecture and for PA-RISC systems that support hardware partitions.
- x *ignore_unmounted_fs={true|false}*
(Default is *false*) Controls whether a clone fails when an unmounted file system in the root volume group is detected.
- x *logfile=/var/opt/drd/drd.log*
This is the path to the log file for this command. Each time DRD is run, this file will grow larger. This can be changed, for example, to a month-specific location for easier archiving, off-host backup, and rotation.
- x *log_verbosity=4*
(Default.) Specifies the level of log verboseness. Replace 4 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 Adds INFO messages (informational messages preceded by the * character.)
 - 4 (Default) Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- x *mirrordisk=block_device_special_file*
Specifies the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. This option requires that LVM mirroring is installed. The block device special file specified is used to mirror each logical volume in the target of the clone operation.
- x *overwrite={true|false}*
Specifies whether *drd clone* should overwrite existing information on the target disk. That is, it controls whether a disk containing boot, LVM, or VxVM records can be overwritten. The *-x overwrite=false* (default) prevents a disk that contains boot, LVM, or VxVM records from being overwritten. The *-x overwrite=true* allows a disk to be overwritten, even if it contains boot, LVM, or VxVM records. Note that DRD does not overwrite a disk associated with an active LVM volume group or VxVM disk group, regardless of the setting of the overwrite option. If a previously created clone is mounted, use the *drd umount* command to unmount it before attempting to create a new clone on the disk.
- x *preview={true|false}*
If true, run this command in preview mode only. That is, complete the analysis phase and exit; no changes are committed to disk. This option has the same effect as specifying *-p* on the command line. The default is *false*. This option is available on every DRD command except *drd runcmd*.

- x reboot={true|false}
If true, specifies the system is rebooted at the successful completion of a `drd activate` operation. The default is false.
- x verbosity=3 (Default.)
Specifies the level of stdout/stderr verbosity. Replace 3 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 (Default) Adds INFO messages (informational messages preceded by the * character.)
 - 4 Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- X option_file
Gets the extended options from a file.

A.1.6 The `drd runcmd` Command

The `drd-runcmd(1M)` command runs a *DRD-safe* command, which is specified by *command* <args>, on the cloned (inactive) system image.

The `drd runcmd` command runs the designated command on the inactive system image. Several commands, known as DRD-safe commands, can be executed with `drd runcmd`. See [Maintaining Software on the Cloned Image](#) for more information about the DRD-safe commands.

The `drd runcmd` command mounts the inactive system image if it has not been mounted. Generally, when `drd runcmd` completes, it unmounts the inactive system image. However, if the inactive system image was mounted before the command, `drd runcmd` leaves it mounted after completion of `drd runcmd`.

The `drd runcmd` command returns the following error codes:

0 Success

1 Error

2 Warning

The `drd runcmd` operation involves two commands: `drd runcmd` and the HP-UX command that is its argument, but it returns only a single error code. The code reflects the worst result of the two commands. If both commands are successful, the error code is 0. If either command has an error or warning result, the error code is 1 or 2. To determine which command issued the error or warning, examine the messages.

For additional information, see the *drd-runcmd(1M)* manpage (`man drd-runcmd`)

The `drd runcmd` command syntax is:

```
drd runcmd [-?] [-q] [-v] [-x extended option=value] [-x -?] [-X option_file] command <args>
```

Options

-?

Displays the usage message for a DRD command. This option cannot be used with other options.

-q

Decreases the verbosity level by one each time it is specified. For example, -qq will reduce the verbosity from the default value of 4 to 2. If both -x verbosity=5 and -qqq are included on the command line, the effective verbosity is 2. The minimum verbosity level is 0. (See also the -x verbosity option.)

-v

Increases the verbosity level by one each time it is specified. For example, -v will increase the effective verbosity from the default value of 4 to 5. If both -x verbosity=1 and -vv are included on the command line, the effective verbosity is 3. The maximum verbosity level is 5. (See also the -x verbosity option.)

- x *extended_option=value*
Sets the extended option to a value.
- x -?
Displays the list of possible -x (extended) options.
- X *option_file*
Gets the extended options from a file.

Extended options

The following extended options are available:

- x *alternate_bootdisk=block_device_special_file*
This is the alternate boot disk. The alternate boot disk must be specified as a block device special file.
- x *HA_alternate_bootdisk=block_device_special_file*
This is the High Availability alternate boot disk. The High Availability alternate boot disk must be specified as a block device special file. High Availability alternate boot disk is supported only on Itanium-based architecture and for PA-RISC systems that support hardware partitions.
- x *ignore_unmounted_fs={true|false}*
(Default is *false*) Controls whether a clone fails when an unmounted file system in the root volume group is detected.
- x *logfile=/var/opt/drd/drd.log*
This is the path to the log file for this command. Each time DRD is run, this file will grow larger. This can be changed, for example, to a month-specific location for easier archiving, off-host backup, and rotation.
- x *log_verbosity=4*
(Default.) Specifies the level of log verboseness. Replace 4 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 Adds INFO messages (informational messages preceded by the * character.)
 - 4 (Default) Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- x *mirrordisk=block_device_special_file*
Specifies the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. This option requires that LVM mirroring is installed. The block device special file specified is used to mirror each logical volume in the target of the clone operation.
- x *overwrite={true|false}*
Specifies whether *drd clone* should overwrite existing information on the target disk. That is, it controls whether a disk containing boot, LVM, or VxVM records can be overwritten. The *-x overwrite=false* (default) prevents a disk that contains boot, LVM, or VxVM records from being overwritten. The *-x overwrite=true* allows a disk to be overwritten, even if it contains boot, LVM, or VxVM records. Note that DRD does not overwrite a disk associated with an active LVM volume group or VxVM disk group, regardless of the setting of the overwrite option. If a previously created clone is mounted, use the *drd umount* command to unmount it before attempting to create a new clone on the disk.
- x *preview={true|false}*
If true, run this command in preview mode only. That is, complete the analysis phase and exit; no changes are committed to disk. This option has the same effect as specifying *-p* on the command line. The default is *false*. This option is available on every DRD command except *drd runcmd*.

- x reboot={true|false}
If true, specifies the system is rebooted at the successful completion of a drd activate operation. The default is false.
- x verbosity=3 (Default.)
Specifies the level of stdout/stderr verbosity. Replace 3 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 (Default) Adds INFO messages (informational messages preceded by the * character.)
 - 4 Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- X option_file
Gets the extended options from a file.

A.1.7 The drd status Command

The *drd-status*(1M) command displays system-specific information about the clone (the inactive system image) and the original disk (the active system image). The *drd-status* command provides the following convenient information:

- Clone Disk – specifies the target disk used to create the clone of the original image.
- Clone Disk State – reports whether the boot loader, AUTO file, and SYSINFO.TXT file (Itanium® only) are present on the clone disk.
- Date Created – specifies when the clone image was created.
- Clone Mirror Disk – indicates “None” if the clone does not have a mirror, or lists the device special file of the mirror disk.
- Mirror Disk State – reports whether the boot loader, AUTO file, and SYSINFO.TXT file (Itanium® only) are present on the mirror disk.
- Original Disk – specifies which disk the original image is on.
- Original Disk State – reports whether the boot loader, AUTO file, and SYSINFO.TXT file (Itanium® only) are present on the original disk.
- Booted Disk – specifies which disk is currently booted.
- Activated Disk – upon reboot, the system will boot off this disk.



NOTE: Disk State varies depending on the system's architecture. The *drd status* command will list either LIF Area or EFI Partition instead of Disk State. For Itanium® systems, the Disk State will report whether the personality file, SYSINFO.TXT, exists on the specified disk. This file is used to rehost a disk. See the *drd-rehost*(1M) man page for more information.

Disk State varies depending on the system's architecture. The *drd status* command lists either Clone LIF Area or Clone EFI Partition.

The *drd status* command syntax is:

```
drd status [-?] [-q] [-v] [-x extended option=value] [-x -?] [-X option_file]
```

Options

- ?
Displays the usage message for a DRD command. This option cannot be used with other options.
- q
Decreases the verbosity level by one each time it is specified. For example, -qq will reduce the verbosity from the default value of 4 to 2. If both -x verbosity=5 and -qqq are included on the command line, the effective verbosity is 2. The minimum verbosity level is 0. (See also the -x verbosity option.)

- v
Increases the verbosity level by one each time it is specified. For example, -v will increase the effective verbosity from the default value of 4 to 5. If both -x verbosity=1 and -vv are included on the command line, the effective verbosity is 3. The maximum verbosity level is 5. (See also the -x verbosity option.)
- x *extended_option=value*
Sets the extended option to a value.
- x -?
Displays the list of possible -x (extended) options.
- x *option_file*
Gets the extended options from a file.

Extended options

The following extended options are available:

- x *alternate_bootdisk=block_device_special_file*
This is the alternate boot disk. The alternate boot disk must be specified as a block device special file.
- x *HA_alterate_bootdisk=block_device_special_file*
This is the High Availability alternate boot disk. The High Availability alternate boot disk must be specified as a block device special file. High Availability alternate boot disk is supported only on Itanium-based architecture and for PA-RISC systems that support hardware partitions.
- x *ignore_unmounted_fs={true|false}*
(Default is *false*) Controls whether a clone fails when an unmounted file system in the root volume group is detected.
- x *logfile=/var/opt/drd/drd.log*
This is the path to the log file for this command. Each time DRD is run, this file will grow larger. This can be changed, for example, to a month-specific location for easier archiving, off-host backup, and rotation.
- x *log_verbosity=4*
(Default.) Specifies the level of log verboseness. Replace 4 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 Adds INFO messages (informational messages preceded by the * character.)
 - 4 (Default) Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- x *mirrordisk=block_device_special_file*
Specifies the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. This option requires that LVM mirroring is installed. The block device special file specified is used to mirror each logical volume in the target of the clone operation.
- x *overwrite={true|false}*
Specifies whether drd clone should overwrite existing information on the target disk. That is, it controls whether a disk containing boot, LVM, or VxVM records can be overwritten. The -x overwrite=false (default) prevents a disk that contains boot, LVM, or VxVM records from being overwritten. The -x overwrite=true allows a disk to be overwritten, even if it contains boot, LVM, or VxVM records. Note that DRD does not overwrite a disk associated with an active LVM volume group or VxVM disk group, regardless of the setting of the overwrite option. If a previously created clone is mounted, use the drd umount command to unmount it before attempting to create a new clone on the disk.

- x `preview={true|false}`
If true, run this command in preview mode only. That is, complete the analysis phase and exit; no changes are committed to disk. This option has the same effect as specifying `-p` on the command line. The default is `false`. This option is available on every DRD command except `drd runcmd`.
- x `reboot={true|false}`
If true, specifies the system is rebooted at the successful completion of a `drd activate` operation. The default is `false`.
- x `verbosity=3` (Default.)
Specifies the level of stdout/stderr verbosity. Replace 3 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 (Default) Adds INFO messages (informational messages preceded by the * character.)
 - 4 Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- X `option_file`
Gets the extended options from a file.

A.1.8 The `drd umount` Command

The `drd-umount(1M)` command unmounts all the file systems in the cloned system image.

The `drd umount` command fails:

- If the inactive system image was created by a `drd clone` command and no file system is mounted at `/var/opt/drd/mnts/sysimage_001`.
- If the inactive system image was the original source system when a `drd clone` command was run and no file system is mounted at `/var/opt/drd/mnts/sysimage_000`.

If a cloned file system is mounted, `drd umount` unmounts the file systems, unmounting the root file system (`/`) last. For a system with an LVM root, `drd umount` uses `deactivate` and `vgexport` to export the inactive volume group from the system. This makes the unmounted inactive system image invisible to LVM management commands. For a system with a VxVM root, the inactive image must remain imported to ensure that it is bootable.

The `drd umount` command syntax is:

```
drd umount [-?] [-p] [-q] [-v] [-x extended option=value] [-x -?] [-X option_file]
```

Options

- ?
Displays the usage message for a DRD command. This option cannot be used with other options.
- p
Sets preview mode. When run with the `-p` option, a DRD command performs analysis without running the command and reports any errors.
- q
Decreases the verbosity level by one each time it is specified. For example, `-qq` will reduce the verbosity from the default value of 4 to 2. If both `-x verbosity=5` and `-qqq` are included on the command line, the effective verbosity is 2. The minimum verbosity level is 0. (See also the `-x verbosity` option.)
- v
Increases the verbosity level by one each time it is specified. For example, `-v` will increase the effective verbosity from the default value of 4 to 5. If both `-x verbosity=1` and `-vv` are included on the command line, the effective verbosity is 3. The maximum verbosity level is 5. (See also the `-x verbosity` option.)

- x *extended_option=value*
Sets the extended option to a value.
- x -?
Displays the list of possible -x (extended) options.
- X *option_file*
Gets the extended options from a file.

Extended options

The following extended options are available:

- x *alternate_bootdisk=block_device_special_file*
This is the alternate boot disk. The alternate boot disk must be specified as a block device special file.
- x *HA_alternate_bootdisk=block_device_special_file*
This is the High Availability alternate boot disk. The High Availability alternate boot disk must be specified as a block device special file. High Availability alternate boot disk is supported only on Itanium-based architecture and for PA-RISC systems that support hardware partitions.
- x *ignore_unmounted_fs={true|false}*
(Default is *false*) Controls whether a clone fails when an unmounted file system in the root volume group is detected.
- x *logfile=/var/opt/drd/drd.log*
This is the path to the log file for this command. Each time DRD is run, this file will grow larger. This can be changed, for example, to a month-specific location for easier archiving, off-host backup, and rotation.
- x *log_verbosity=4*
(Default.) Specifies the level of log verboseness. Replace 4 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 Adds INFO messages (informational messages preceded by the * character.)
 - 4 (Default) Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- x *mirrordisk=block_device_special_file*
Specifies the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. This option requires that LVM mirroring is installed. The block device special file specified is used to mirror each logical volume in the target of the clone operation.
- x *overwrite={true|false}*
Specifies whether *drd clone* should overwrite existing information on the target disk. That is, it controls whether a disk containing boot, LVM, or VxVM records can be overwritten. The *-x overwrite=false* (default) prevents a disk that contains boot, LVM, or VxVM records from being overwritten. The *-x overwrite=true* allows a disk to be overwritten, even if it contains boot, LVM, or VxVM records. Note that DRD does not overwrite a disk associated with an active LVM volume group or VxVM disk group, regardless of the setting of the overwrite option. If a previously created clone is mounted, use the *drd umount* command to unmount it before attempting to create a new clone on the disk.
- x *preview={true|false}*
If true, run this command in preview mode only. That is, complete the analysis phase and exit; no changes are committed to disk. This option has the same effect as specifying *-p* on the command line. The default is *false*. This option is available on every DRD command except *drd runcmd*.

- x reboot={true|false}
If true, specifies the system is rebooted at the successful completion of a drd activate operation. The default is false.
- x verbosity=3 (Default.)
Specifies the level of stdout/stderr verbosity. Replace 3 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 (Default) Adds INFO messages (informational messages preceded by the * character.)
 - 4 Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- X option_file
Gets the extended options from a file.

A.1.9 The drd unrehost Command

The *drd-unrehost*(1M) command removes EFI/HPUX/SYSINFO.TXT, and optionally preserves a copy of it in a file on the booted system.

A system administrator can execute the *drd unrehost* command after having previously issued the *drd rehost* command, specifying the same target, if the disk should not be rehosted.

The format of the sysinfo file is defined in *sysinfo*(4). To determine the most recent patch that supplies *sysinfo*(4), please refer to the DRD Web site, <http://docs.hp.com/en/DRD>.

The *drd unrehost* command syntax is:

```
drd unrehost[-?] [-p] -f system_information_file [-q] -t
device_special_file [-v] [-x extended_option=value] [-x -?] [-X
option_file]
```

Options

- ?
Displays the usage message for a DRD command. This option cannot be used with other options.
- p
Sets preview mode. When run with the -p option, a DRD command performs analysis without running the command and reports any errors.
- f *system_information_file*
Specifies the file containing the system information (hostname, IP address, network information, etc.) to be copied to EFI/HPUX/SYSINFO.TXT on the disk specified by the -t option. See *sysinfo*(4) for the syntax of this file. If not specified, the file defaults to /etc/opt/drd/default_sysinfo_file.
- q
Decreases the verbosity level by one each time it is specified. For example, -qq will reduce the verbosity from the default value of 4 to 2. If both -x verbosity=5 and -qqq are included on the command line, the effective verbosity is 2. The minimum verbosity level is 0. (See also the -x verbosity option.)
- t *device_special_file*
Specifies the block device special file of a single writeable physical disk. The file specified by the -f option will be written to EFI/HPUX/SYSINFO.TXT in the EFI partition of this disk. If no target is specified, the inactive system image is used as a target.
- v
Increases the verbosity level by one each time it is specified. For example, -v will increase the effective verbosity from the default value of 4 to 5. If both -x verbosity=1 and -vv are included on the command line, the effective verbosity is 3. The maximum verbosity level is 5. (See also the -x verbosity option.)

- x *extended_option=value*
Sets the extended option to a value.
- x -?
Displays the list of possible -x (extended) options.
- X *option_file*
Gets the extended options from a file.

Extended options

The following extended options are available:

- x *alternate_bootdisk=block_device_special_file*
This is the alternate boot disk. The alternate boot disk must be specified as a block device special file.
- x *HA_alternate_bootdisk=block_device_special_file*
This is the High Availability alternate boot disk. The High Availability alternate boot disk must be specified as a block device special file. High Availability alternate boot disk is supported only on Itanium-based architecture and for PA-RISC systems that support hardware partitions.
- x *ignore_unmounted_fs={true|false}*
(Default is *false*) Controls whether a clone fails when an unmounted file system in the root volume group is detected.
- x *logfile=/var/opt/drd/drd.log*
This is the path to the log file for this command. Each time DRD is run, this file will grow larger. This can be changed, for example, to a month-specific location for easier archiving, off-host backup, and rotation.
- x *log_verbosity=4*
(Default.) Specifies the level of log verboseness. Replace 4 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 Adds INFO messages (informational messages preceded by the * character.)
 - 4 (Default) Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- x *mirrordisk=block_device_special_file*
Specifies the target's block device special file of the mirror disk. The block device special file should refer to an entire disk, not to a partition. This option requires that LVM mirroring is installed. The block device special file specified is used to mirror each logical volume in the target of the clone operation.
- x *overwrite={true|false}*
Specifies whether *drd clone* should overwrite existing information on the target disk. That is, it controls whether a disk containing boot, LVM, or VxVM records can be overwritten. The -x *overwrite=false* (default) prevents a disk that contains boot, LVM, or VxVM records from being overwritten. The -x *overwrite=true* allows a disk to be overwritten, even if it contains boot, LVM, or VxVM records. Note that DRD does not overwrite a disk associated with an active LVM volume group or VxVM disk group, regardless of the setting of the overwrite option. If a previously created clone is mounted, use the *drd umount* command to unmount it before attempting to create a new clone on the disk.
- x *preview={true|false}*
If true, run this command in preview mode only. That is, complete the analysis phase and exit; no changes are committed to disk. This option has the same effect as specifying -p on the command line. The default is *false*. This option is available on every DRD command except *drd runcmd*.

- x reboot={true|false}
If true, specifies the system is rebooted at the successful completion of a drd activate operation. The default is false.
- x verbosity=3 (Default.)
Specifies the level of stdout/stderr verboseness. Replace 3 with the following values:
 - 0 Only ERRORS and the starting/ending BANNER messages.
 - 1 Adds WARNING messages.
 - 2 Adds NOTE messages.
 - 3 (Default) Adds INFO messages (informational messages preceded by the * character.)
 - 4 Adds verbose INFO messages.
 - 5 Adds additional detailed INFO messages.
- X *option_file*
Gets the extended options from a file.

Glossary

Booted System Environment	The system environment that is currently running — also known as the current, active, or running system environment.
CLI	Command line user interface
Clone	* (noun) - clone - a Cloned System Image . * (verb) - clone - to create a Cloned System Image.
Cloned System Image	A copy of the booted volume group from the system image of a booted system environment — produced by the <code>drd clone</code> command. A cloned system image may be inactive, or the cloned system image may be booted, in which case the system activities are started and the clone becomes the system image in the booted system environment. When a particular system image is booted, all other system images are inactive. A system administrator may modify a cloned system image by installing software on it using the <code>drd runcmd</code> command.
DRD	Dynamic Root Disk. The collection of utilities that manages creation, modification, and booting of system images.
DRD-chrooted Shell	The modification environment provided by the DRD utilities for managing (swinstalling, swremoving, and swverifying) software to and from an inactive system image while logged on to a booted system environment. Because the POSIX shell is running in an environment provided by the <code>chroot</code> command, modifications to the booted system environment's files are prevented. In addition, the file systems of the inactive system image, mounted under the <code>chroot</code> directory, are available for software management on the inactive system image.
DRD-safe	Refers to software packages for HP-UX, as well as to HP-UX commands. A package is DRD-safe if it can be swinstalled, swremoved, and swverified on an inactive system image without modifying any part of the booted system environment. There is no requirement that the package can be configured on an inactive system image. Examples of components of the booted system environment that cannot be changed are: the installed software, file systems, device configuration, process space, kernel definition, networking configuration, users and passwords, and auditing and security. A command is DRD-safe if it can be run in a DRD <code>runcmd</code> environment without modifying any part of the booted system environment. Further information on DRD-safe is available in the <i>Using the Dynamic Root Disk Toolset</i> white paper, which is available at: http://docs.hp.com/en/oshpux11iv2.html#Dynamic%20Root%20Disk .
Hot Backup	See Hot Recovery
Hot Maintenance	The ability to perform modifications to an inactive system image using commands issued on the booted system environment without affecting the booted system environment.
Hot Recovery	The ability to return to a known good system environment simply by booting. That is, have a backup system image standing by waiting to be used. Sometimes referred to as <i>hot backup</i> .
LVM	Logical Volume Manager. A subsystem that manages disk space — supplied at no charge with HP-UX.
Original System Environment	A booted system environment whose system image is cloned to create another system image. Each system image has exactly one original system environment. (That is, the booted system environment at the time the <code>drd clone</code> command was issued.)
Rehost	The capability to boot a DRD clone of an LVM-managed Itanium-based copy of HP-UX 11i v3 on a system other than the one where it was created. DRD provides the <code>drd rehost</code> command that copies the system information file—containing hostname, IP address, and other system-specific information—to <code>EFI/HPUX/SYSINFO.TXT</code> on the disk to be rehosted.
Root File System	The file system that must be mounted at <code>/</code> .
System Activities	All of the running processes that correspond to programs on a booted system. This includes the running kernel, all network processes, all daemons and all other processes — both system and user. System activities frequently access in-memory copies of data. Thus any change to in-memory data may affect system activities.
System Environment	The combination of the system image and the system activities that comprise a running installation of HP-UX.

System Image	The file systems and their contents that comprise an installation of HP-UX — residing on disk and therefore persisting across reboots.
System Recovery	See Hot Recovery
Unrehost	DRD command that removes the system information file, <code>EFI/HPUX/SYSINFO.TXT</code> , from a disk that was rehosted, optionally preserving a copy in a file system on the booted system.
VxVM	Veritas Volume Manager

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