

HP-UX Logical Volume Manager and MirrorDisk/UX Release Notes

HP-UX 11i v3 September 2008 (B.11.31)

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Logical Volume Manager and MirrorDisk/UX Release Notes

About this Document

This document provides information about the Logical Volume Manager (LVM) and MirrorDisk/UX products in the September 2008 release of HP-UX 11i v3.

LVM and MirrorDisk/UX Overview

Logical Volume Manager (bundle BaseLVM) is the HP-UX default Volume Manager. It provides the user with flexibility in configuring and managing mass storage resources. In HP-UX 11i v3, the LVM kernel and commands are bundled with the core HP-UX product.

MirrorDisk/UX (bundle B2491BA) is an optionally purchased HP-UX product to enable LVM mirroring functionality.

Overview of Changes

The initial HP-UX 11i v3 release of LVM and MirrorDisk/UX was integrated with the new mass storage stack, delivering significant performance, scalability, availability, and usability enhancements. LVM was enhanced to support larger logical volumes, temporary quiescing of volume groups, and striping with mirroring. Volume group availability was improved: resizing a LUN and modifying volume group characteristics no longer required the volume group to be recreated, and replacing a disk could be done online.

The September 2008 release of LVM and MirrorDisk/UX continues to extend the limits of mass storage, supporting a larger number of volume groups, logical volumes, and physical volumes. This release also allows a volume group to take advantage of LUN expansion *online*, detects and corrects problems with the boot disk's hardware path, and displays additional information.

New and Changed Features in This Release

New Features

The following LVM features are new with the September 2008 release of HP-UX 11i v3:

Version 2.1 Volume Groups

LVM and MirrorDisk/UX now support three versions of volume groups.

Version 1.0 is the version supported on all current and previous versions of HP-UX 11i. The procedures and command syntax for managing Version 1.0 volume groups are unchanged from previous releases, except for the enhancements described in “Changed Features” (page 7). When creating a new volume group, `vgcreate` defaults to Version 1.0.

Version 2.0, introduced in the March 2008 release of HP-UX 11i v3, enables the configuration of larger volume groups, logical volumes, physical volumes, and other parameters. Version 2.1, introduced in this release, is similar to Version 2.0, but allows an even greater number of volume groups, physical volumes, and logical volumes. Version 2.1 volume groups can coexist with Version 2.0 and Version 1.0 volume groups on a server, and are managed exactly like Version 2.0 volume groups, with the following exceptions:

- Version 2.1 volume groups are not recognized on previous releases of HP-UX, including versions of HP-UX 11i v3 before September 2008.
- Version 2.1 supports up to 2048 volume groups. However, this limit is shared between Version 2.0 and Version 2.1 volume groups.*

Table 1 compares the configuration limits of Version 1.0, Version 2.0, and Version 2.1 volume groups. These limits are independent — for example, a server can be configured with 256 Version 1.0 volume groups and 512 Version 2.0 volume groups at the same time.

Table 1 LVM Volume Group Version Limits

	Version 1.0 Volume Groups	Version 2.0 Volume Groups	Version 2.1 Volume Groups
Maximum number of volume groups on a system	256	512*	2048*
Maximum number of physical volumes in a volume group	255	511	2048
Maximum number of logical volumes in a volume group	255	511	2047
Maximum size of a physical volume	2 TB	16 TB	16 TB
Maximum size of a volume group	510 TB	2048 TB	2048 TB
Maximum size of a logical volume	16 TB	256 TB	256 TB
Maximum size of a physical extent	256 MB	256 MB	256 MB
Maximum size of a stripe	32 MB	256 MB	256 MB
Maximum number of stripes	255	511	511
Maximum number of logical extents per logical volume	65535	33554432	33554432
Maximum number of physical extents per physical volume	65535	16777216	16777216
Number of mirror copies (MirrorDisk/UX product required)	0–2	0–5	0–5

* The limit of 2048 volume groups is shared between Version 2.0 and Version 2.1 volume groups. Volume groups of both versions can be created with volume group numbers ranging from 0-2047. However, the maximum number of Version 2.0 volume groups that can be created is 512.

You can display the volume group limits with the `lvmadm` command.

Boot Disk Configuration Self-Healing

If the device special file for your LVM boot disk changes because its hardware path changed, LVM scans for the boot disk during the boot process. After successfully booting, LVM automatically updates the LVM configuration files `/etc/lvmtab` and `/etc/lvmtab_p`, as well as the LVM metadata on each bootable disk in the root volume group, with the new boot path so that future system boots will not need to scan. This behavior is configurable, and is enabled by default. To disable it, edit `/etc/lvmrc` and change the `AUTO_BOOT_MIGRATE` flag to 0.

Changed Features

The following features have changed in the September 2008 release of LVM and MirrorDisk/UX:

Display Enhancements

The `vgdisplay`, `pvdisplay`, and `lvmdm` commands display additional information.

- `vgdisplay` with the `-V VG_vers` option displays the volume group information for all volume groups of the specified version. For example:

```
# vgdisplay -V 1.0
--- Volume groups ---
VG Name                /dev/vg00
VG Write Access        read/write
VG Status              available
Max LV                 255
Cur LV                7
Open LV                7
Max PV                 16
Cur PV                1
Act PV                1
Max PE per PV         4328
VGDA                   2
PE Size (Mbytes)      16
Total PE               4319
Alloc PE              4318
Free PE                1
Total PVG              0
Total Spare PVs       0
Total Spare PVs in use 0
VG Version             1.0
VG Max Size            1082g
VG Max Extents        69248
```

- `pvdisplay` with the new `-u` option displays the Data Start and End, and if the physical volume is bootable. This must be used with the existing `-l` option. For example:

```
# pvdisplay -l /dev/disk/disk34_p2
/dev/disk/disk34_p2:LVM_Disk=yes

# pvdisplay -l -u /dev/disk/disk34_p2
/dev/disk/disk34_p2:LVM_Disk=yes:Data_Start=2912:Data_End=34638688:Bootable=yes
```

In this example, physical extent 0 starts at block 2912 and the last physical extent ends at block 34638688, and the physical volume is bootable.

- `lvmdm` with the new `-l VG_vers` option displays the LVM configuration in the `/etc/lvmtab` and `/etc/lvmtab_p` files for the specified volume group version. For example:

```
# lvmdm -l 1.0
--- Version 1.0 volume groups ---
VG Name /dev/vg00
PV Name /dev/disk/disk34_p2
```

This is a supported replacement for running the command `strings /etc/lvmtab`.

pvmove Enhancements

The `pvmove` command has several new features.

- `pvmove` supports moving a range of extents. For example, to move extents 25 through 100 from `/dev/disk/disk32` to `/dev/disk/disk55`, use this command:

```
# pvmove /dev/disk/disk32:25-100 /dev/disk/disk55
```

- `pvmove` supports moving extents from the end of a physical volume. For example, to move the last 5 extents from `/dev/disk/disk32` to another physical volume, use this command:

```
# pvmove -e 5 /dev/disk/disk32
```

- `pvmmove` supports moving extents to a specific location on the target physical volume. For example, to move extents from `/dev/disk/disk32` to `/dev/disk/disk55`, starting at physical extent 50 on `/dev/disk/disk55`, use this command:
`pvmmove /dev/disk/disk32 /dev/disk/disk55:50`
- `pvmmove` supports striped logical volumes and striped mirrored logical volumes.
- `pvmmove` supports a new `-p` option to preview physical extent movement details *without* performing the move.

For more information, see `pvmmove(1M)`.

`vgmodify` Online LUN Expansion

The `vgmodify` command supports LUN expansion on a Version 1.0 volume group *without* deactivating the volume group. To reconfigure an activated volume group to take advantage of a physical volume size increase, use the `-E` and `-a` options to `vgmodify`. For example, if the physical volume `/dev/disk/disk32` in volume group `vg02` has been expanded, use the following command to add physical extents to it:

```
# vgmodify -a -E /dev/vg02 /dev/rdisk/disk32
```

For more information, see `vgmodify(1M)`.

Deprecated or Obsolete Features

No LVM or MirrorDisk/UX features are deprecated or obsolete in the September 2008 release of HP-UX 11i v3.

Known Problems Fixed in This Version

The following table lists the known LVM and MirrorDisk/UX problems fixed in the September 2008 release of HP-UX 11i v3.

Table 2 LVM Fixes in HP-UX 11i v3 September 2008

Defect ID	Description
QXCR1000809859	Running <code>vgchange -a y</code> on a volume group with a path that cannot be attached displays an erroneous message about missing software: Warning: Couldn't attach to the volume group physical volume " <code>pvname</code> ": The HP-UX kernel running on this system does not provide this feature. Install the appropriate kernel patch to enable it.

Known Problems and Limitations

This section provides a list of known problems and limitations as known to HP at time of publication. If workarounds are available, they are included.

LVM Messages Contain Extra Carriage Return in Traditional Chinese Locales

Defect ID: **QXCR1000833224**

Problem: Several LVM commands such as `vgdisplay` contain an extra carriage return character (control-M) at the end of all their localized messages in the `zh_TW.big5` and `zh_TW.eucTW` locales. For example, in English `vgdisplay` displays the following output:

```
--- Volume groups ---
VG Name                /dev/vg00
VG Write Access        read/write
VG Status               available
Max LV                 255
Cur LV                 8
Open LV                 8
Max PV                 16
...
```

However, after setting `LANG` to a Traditional Chinese locale, `vgdisplay` displays the following output:

```
--- 容體群組
---
VG 名稱                /dev/vg00
VG 寫入存取            讀/寫
VG 狀況                可用
最大 LV                255
現行的 LV              8
開啟 LV                8
最大 PV                16
```

In addition, under these locales the command `vgmodify -o -r vgroupname` displays output which reverses captions and numbers.

Severity: Medium.

Corrective Action: You can correct and rebuild the `zh_TW.big5` LVM message catalog by logging on as root and executing the following commands:

```
# ksh
# export LANG=zh_TW.big5
# mkdir /tmp/zh_TW.big5
# cp /usr/lib/nls/msg/zh_TW.big5/lvm.cat /tmp/zh_TW.big5/lvm.cat
# cd /tmp/zh_TW.big5
# /usr/bin/dumpmsg lvm.cat | /usr/bin/sed 's/\\r//g' > lvm.msg
# /usr/bin/genocat lvm_fixed.cat lvm.msg
```

```
# cp lvm_fixed.cat /usr/lib/nls/msg/zh_TW.big5/lvm.cat
# chmod 444 /usr/lib/nls/msg/zh_TW.big5/lvm.cat
# chown bin:bin /usr/lib/nls/msg/zh_TW.big5/lvm.cat
```

To correct the zh_TW.eucTW message catalog, repeat these steps, replacing all occurrences of zh_TW.big5 with zh_TW.eucTW.

vgchange -a n Displays Inconsistent Messages

Defect ID: **QXCR1000827038**

Problem: When running `vgchange -a n` to deactivate a volume group, the message displayed is different depending on whether the volume group is already deactivated or not. For example, if the volume group is activated, `vgchange -a n` displays the following output:

```
# vgchange -a n vg01
Volume group "vg01" has been successfully changed.
```

If the volume group is deactivated, `vgchange -a n` displays the following output:

```
# vgchange -a n vg01
vgchange: Volume group "vg01" has been successfully changed.
```

Severity: Medium.

Corrective Action: None. The volume group is deactivated in either case.

vgmodify Displays Incorrect Column Headings in Non-English Locales

Defect ID: **QXCR1000824855**

Problem: When running `vgmodify` in any locale other than English, the optimized setting columns are labeled incorrectly. For example, in English, `vgmodify` displays the following correct output:

```
Volume Group optimized settings (no PEs renumbered):
  max_pv (-p)      max_pe (-e)      Disk size (Mb)
  2                53756            1720193
  3                35836            1146753
  ...
```

However, after setting `LANG` to a non-English locale such as `fr_FR.iso88591`, `vgmodify` displays the following incorrect output:

```
Paramètres de groupe de volumes optimisés (aucune EP renumérotée) :

  Taille de      Taille de      Taille de disque (Mo)
  2              53756         1720193
  3              35836         1146753
  ...
```

Severity: Medium.

Corrective Action: None.

Installation Requirements

This section describes the installation requirements for this release.

Required Hardware

LVM and MirrorDisk/UX have no hardware requirements beyond the requirements of the HP-UX 11i v3 operating system. Both products run on all supported HP 9000 and HP Integrity servers.

Required Software

Since LVM is installed with the HP-UX 11i v3 operating environment, there are no software requirements beyond the requirements of the HP-UX 11i v3 operating system. MirrorDisk/UX requires the BaseLVM product.

Required Patches

For each of the following subsystems, you can download patches from the following website:

<http://www2.itrc.hp.com/service/patch/mainPage.do>

Mass Storage Critical Resource Analysis

The Mass Storage Critical Resource Analysis (MS CRA) tool checks for a maximum of two mirror copies of a logical volume. However, Version 2.x volume groups allow up to five mirror copies. To enable MS CRA to check for a maximum of five mirror copies of a volume, you must install the following patch, or a superseding patch:

- PHCO_37562

MS CRA checks for a maximum of 511 physical volumes in a volume group. However, Version 2.1 volume groups allow up to 2048 physical volumes. To enable MS CRA to check for a maximum of 2048 physical volumes in a volume group, you must install the following patch:

- PHCO_38145

PHCO_38145 supersedes PHCO_37562. Installing PHCO_38145 enables both checks.

mkfs and mkboot Commands

The `mkfs` and `mkboot` commands check whether a specified disk device is being used by LVM; if so, they display an error message. For these commands to correctly check whether a device is part of a Version 2.x volume group, you must install the following patches:

- PHCO_37328
- PHCO_37340
- PHCO_37394

These patches are delivered in the `FEATURE11i` bundle.

Serviceguard

To support Version 2.0 volume groups, Serviceguard 11.18 requires the April 2008 patch. Customers requiring Version 2.1 volume group support or Version 2.x cluster lock disks must install the Serviceguard September 2008 patch. For more information, see the *HP Serviceguard Version A.11.18 Release Notes*.

VxVM 4.1 Commands

Several VxVM 4.1 commands check whether a specified disk device is being used by LVM before overwriting it. For these commands to correctly check whether a device is part of a Version 2.x volume group, you must install the following patch:

- PHCO_37836

Required Disk Space

Since LVM is installed with the HP-UX 11i v3 operating environment, it consumes no additional disk space.

MirrorDisk/UX consumes no additional disk space aside from a license key.

Compatibility Issues

This release is specific for HP-UX 11i v3 (B.11.31). The following compatibility issues exist in the September 2008 release of HP-UX 11i v3.

Version 2.1 Volume Groups

- Version 2.1 volume groups are not recognized on previous releases of HP-UX, including previous versions of HP-UX 11i v3. Version 1.0 volume groups are supported on all supported versions of HP-UX, including 11i v1, 11i v2, and 11i v3.
- There is currently no method for converting a volume group *in place* from one version to another. To migrate a volume group to a different version, you must create a new volume group and copy the data.
- The following HP-UX products do not currently support Version 2.0 or Version 2.1 volume groups:
 - HP Process Resource Manager (HP PRM)
 - Encrypted Volume and File System (EVFS v1.0)

These products plan to add support of Version 2.x volume groups. For the most recent information on these products, see the IT Resource Center (ITRC) at <http://itrc.hp.com>, or consult the release notes for the specific product.

Moving from HP-UX 11i v2 to HP-UX 11i v3

If you are migrating a system from HP-UX 11i v2 to HP-UX 11i v3, please refer to the LVM migration white paper described in the “Related Documentation” section. It contains information on migrating an LVM configuration from the legacy naming model to the agile naming model.

Existing LVM configurations created on HP-UX 11i v2 continue to work on HP-UX 11i v3 under the legacy naming model. However, there is a change in behavior for **Alternate Links (PVLINKS)**:

In HP-UX 11i v3, management of multi-pathed devices is available outside of LVM using the next generation mass storage stack. By default, the next generation mass storage stack distributes I/O requests across all available paths to a multi-pathed disk, even when using legacy device special files. Using LVM with persistent or legacy device special files may cause I/O requests to be sent across alternate links, even if the links are not configured as PVLINKS; this should not introduce any errors, but it does differ from PVLINK behavior in previous releases.

HP recommends converting volume groups with multi-pathed disks to persistent device special files and native multi-pathing, as described in the migration white paper in “Related Documentation”.

However, if you want backward-compatible PVLINK behavior, you must use legacy device special files for physical volumes, and disable the mass storage stack multi-pathing for those physical volumes. To disable multi-pathing on legacy device special files, use the `scsimgr` command to configure a global device tunable called `leg_mpath_enable`.

For each multi-pathed disk, enter the following command:

```
# scsimgr save_attr -D /dev/rdisk/diskn -a leg_mpath_enable=false
```

Alternatively, you can disable multi-pathing for all legacy device files with this command:

```
# scsimgr save_attr -a leg_mpath_enable=false
```

Note that this has no effect on multi-pathing through persistent device special files. For more information, see `scsimgr(1M)`.

Moving Volume Groups from HP-UX 11i v3 to Previous HP-UX Releases

If a volume group used on HP-UX 11i v3 is accessed from a system running a previous release of HP-UX 11i, you may encounter these compatibility issues:

- **Version 2.x volume groups:** As noted in “Version 2.1 Volume Groups” (page 12), Version 2.x volume groups are not recognized on previous releases of HP-UX.
- **Logical volumes larger than 2 TB:** Releases prior to HP-UX 11i v3 can only access data within the first 2 TB of a logical volume. If a logical volume larger than 2 TB is created on HP-UX 11i v3, its use is not recommended on any previous HP-UX release. The volume group can be activated and the logical volume can be used, but any data in that logical volume beyond 2 TB will be inaccessible.



NOTE: Patches PHKL_36745, PHCO_36744, and PHCO_36746 resolve this compatibility issue for HP-UX 11i v2. Installing these patches enables the creation and use of logical volumes up to 16 TB.

- **Striped Mirrors:** Releases prior to HP-UX 11i v3 only support extent-based striping via the `-D` option to `lvcreate`. If a logical volume using simultaneous mirroring and non-extent-based striping is created on HP-UX 11i v3, attempts to import or activate its associated volume group will fail on a previous HP-UX release. To import the volume group, you must remove the incompatible logical volumes or reduce them to a single mirror.



NOTE: Patches PHKL_36745, PHCO_36744, and PHCO_36746 resolve this compatibility issue for HP-UX 11i v2. Installing these patches enables the creation and use of striped mirrors.

- **Mirror Write Cache (MWC):** When a volume group containing a logical volume using the Mirror Write Cache is activated on HP-UX 11i v3, its Mirror Write Cache format is converted to a new format. Importing or activating the volume group on a previous HP-UX release does not recognize the new format and triggers a full resynchronization of the mirrors.



NOTE: Patch PHKL_36244 adds support for the new MWC format to HP-UX 11i v2. Installing this patch avoids the unnecessary resynchronization.

Related Documentation

The latest documentation for LVM is available in English at <http://docs.hp.com> in the *HP-UX Operating Environment* collection. Available documents include:

- *HP-UX Logical Volume Manager and MirrorDisk/UX Release Notes* (this version and previous versions)
- *HP-UX System Administrator's Guide: Logical Volume Management* (this document is localized)
- *LVM 2.0 Volume Groups in HP-UX 11i v3*
- *LVM Limits*
- *LVM Migration from Legacy to Agile Naming Model: HP-UX 11i v3*
- *LVM Online Disk Replacement (LVM OLR)*
- *LVM Volume Group Dynamic LUN expansion (DLE) / `vgmodify`*
- *LVM Volume Group Quiesce/Resume*
- *SLVM Single-Node Online Reconfiguration (SLVM SNOR)*
- *When Good Disks Go Bad: Dealing with Disk Failures under LVM*

Software Availability in Native Languages

The commands delivered with LVM and MirrorDisk/UX support localized message catalogs. The kernel components which generate messages directly to the console and the system log are available only in the English language.

LVM and MirrorDisk/UX manpages are available in English and Japanese. The *HP-UX System Administrator's Guide: Logical Volume Management* is available in English, French, German, Italian, Japanese, Korean, Spanish, Simplified Chinese, and Traditional Chinese. These documents are on <http://docs.hp.com>.