

Novell Linux Volume Manager Reference

Open Enterprise Server 11 SP1

December 2013

Novell.

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About This Guide

The Novell Linux Volume Manager (NLVM) allows you to use NetWare partitions on a Novell Open Enterprise Server (OES) 11 Support Pack 1 (SP1) server. This guide describes NLVM and how to use it with Novell Storage Services (NSS) file systems, Linux POSIX file systems, and Novell Cluster Services.

- ♦ Chapter 1, “Overview of NLVM,” on page 9
- ♦ Chapter 2, “What’s New or Changed in Novell Linux Volume Manager,” on page 11
- ♦ Chapter 3, “Installing or Upgrading NLVM,” on page 19
- ♦ Chapter 4, “Using NLVM in a Virtualized Environment,” on page 21
- ♦ Chapter 5, “Planning for NLVM,” on page 23
- ♦ Chapter 6, “NLVM Commands,” on page 29
- ♦ Chapter 7, “NLVM Examples for the NSS File System,” on page 81
- ♦ Chapter 8, “NLVM Examples for Clustering with Novell Cluster Services,” on page 85
- ♦ Chapter 9, “Troubleshooting NLVM,” on page 101
- ♦ Chapter 10, “Security Considerations,” on page 113
- ♦ Appendix A, “Configuring Settings for the NLVM Library,” on page 115
- ♦ Appendix B, “Documentation Updates,” on page 117

Audience

This guide is intended for storage and cluster administrators.

Feedback

We want to hear your comments and suggestions about this manual and the other documentation included with this product. Please use the User Comments feature at the bottom of each page of the online documentation.

Documentation Updates

For the most recent version of the *OES 11 SP1: NLVM Reference*, visit the [OES 11 SP1 Web site \(http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html\)](http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).

Additional Documentation

For documentation on OES 11, see the [OES 11 SP1 Documentation Web site \(http://www.novell.com/documentation/oes11/\)](http://www.novell.com/documentation/oes11/).

1 Overview of NLVM

The Novell Linux Volume Manager (NLVM) provides management of Novell Storage Services (NSS) storage objects in Novell Open Enterprise Server (OES) 11 Support Pack 1 (SP1). The command line interface (CLI) commands can be used in a Linux console or in a script. The NSS management tools use the NLVM library of APIs to create and manage NSS storage objects. NLVM also provides options to create Linux POSIX file systems, such as Btrfs, Ext2, Ext3, ReiserFS, and XFS.

This command reference describes how to use command line commands to manage the following storage objects:

- ♦ [Devices and Partitions](#)
- ♦ [Linux POSIX Volumes](#)
- ♦ [NSS Pools](#)
- ♦ [NSS Pool Snapshots](#)
- ♦ [NSS Software RAIDs](#)
- ♦ [NSS Volumes](#)

2 What's New or Changed in Novell Linux Volume Manager

This section describes the changes made to Novell Linux Volume Manager (NLVM) since the Novell Open Enterprise Server (OES) 11 release.

- ♦ [Section 2.1, “What’s New \(OES 11 April 2013 Patches\),” on page 11](#)
- ♦ [Section 2.2, “What’s New \(OES 11 SP1 Jan 2013 Patches\),” on page 11](#)
- ♦ [Section 2.3, “What’s New \(OES 11 Jan 2013 Patches\),” on page 12](#)
- ♦ [Section 2.4, “What’s New \(OES 11 SP1 Nov 2012 Patches\),” on page 14](#)
- ♦ [Section 2.5, “What’s New \(OES 11 Nov 2012 Patches\),” on page 14](#)
- ♦ [Section 2.6, “What’s New \(OES 11 SP1 September 2012 Patches\),” on page 15](#)
- ♦ [Section 2.7, “What’s New \(OES 11 September 2012 Patches\),” on page 15](#)
- ♦ [Section 2.8, “What’s New \(OES 11 SP1\),” on page 15](#)
- ♦ [Section 2.9, “What’s New \(OES 11\),” on page 17](#)

2.1 What’s New (OES 11 April 2013 Patches)

Upgrade to eDirectory 8.8.7

An upgrade to Novell eDirectory 8.8 SP7 is available in the April 2013 Scheduled Maintenance for OES 11. For information about the eDirectory upgrade, see [TID 7011599 \(http://www.novell.com/support/kb/doc.php?id=7011599\)](http://www.novell.com/support/kb/doc.php?id=7011599) in the Novell Knowledgebase.

There will be no further eDirectory 8.8 SP6 patches for the OES platform. Previous patches for Novell eDirectory 8.8 SP6 are available on [Novell Patch Finder \(http://download.novell.com/patch/finder/#familyId=112&productId=29503\)](http://download.novell.com/patch/finder/#familyId=112&productId=29503).

For information about configuring and managing eDirectory servers, see the [Novell eDirectory 8.8 SP7 documentation Web site \(http://www.netiq.com/documentation/edir887\)](http://www.netiq.com/documentation/edir887).

2.2 What’s New (OES 11 SP1 Jan 2013 Patches)

Upgrade to Novell iManager 2.7.6

The January 2013 Scheduled Maintenance for OES 11 SP1 includes a channel upgrade from Novell iManager 2.7.5 to Novell iManager 2.7.6.

Novell iManager 2.7.6 provides the following enhancements:

- ♦ Microsoft Internet Explorer 10 certification in the desktop user interface view on Windows 8 (excluding Windows 8 RT) and Windows Server 2012.
- ♦ Apple Safari 6.0 certification on Mac OSX Mountain Lion (version 10.8).
- ♦ iManager Workstation certification on Windows 8 Enterprise Edition (32-bit and 64-bit).
- ♦ Manager 2.7.6 support for Tomcat 7.0.32. and Java 1.7.0_04 versions.

iManager documentation links in this guide have been updated to reflect this change.

iManager 2.7.6 documentation is available at <http://www.netiq.com/documentation/imanager27/>. For earlier iManager versions, see “Previous Releases” (<https://www.netiq.com/documentation/imanager27/#prev>).

Novell Client Support for Windows 8 and Server 2012

The January 2013 Scheduled Maintenance for OES 11 SP1 announces the availability of Novell Client 2 SP3 for Windows with support for:

- ♦ Windows 8 (32-bit and 64-bit) excluding Windows 8 RT
- ♦ Windows Server 2012 (64-bit)

Novell Client 2 documentation links in this guide have been updated to reflect the release of SP3.

Novell Client 2 SP3 for Windows documentation is available on the [Web \(http://www.novell.com/documentation/windows_client/\)](http://www.novell.com/documentation/windows_client/). Documentation for earlier versions is available under [Previous Releases \(http://www.novell.com/documentation/windows_client/#previous\)](http://www.novell.com/documentation/windows_client/#previous).

NLVM

In addition to bug fixes, the following changes and enhancements were made in the January 2013 Scheduled Maintenance for OES 11 SP1:

- ♦ **Unmounting a pool:** The `nlvm unmount <poolname>` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/unmount.html) command has been modified to additionally remove the Device Mapper object for the pool, the link to the Device Mapper object, and the mount point for the pool. This allows you to gracefully log out the server from an iSCSI device that contains a pool. For information, see “Logging Out of an iSCSI Device that Contains an NSS Pool” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/b13pzljl.html) in the *OES 11 SP1: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).
- ♦ **Unmounting a volume:** NCP Server has been modified to automatically log dismounts of NSS volumes and NCP volumes.

2.3 What’s New (OES 11 Jan 2013 Patches)

Upgrade to Novell iManager 2.7.6

The January 2013 Scheduled Maintenance for OES 11 includes a channel upgrade from Novell iManager 2.7.5 to Novell iManager 2.7.6.

Novell iManager 2.7.6 provides the following enhancements:

- ♦ Microsoft Internet Explorer 10 certification in the desktop user interface view on Windows 8 (excluding Windows 8 RT) and Windows Server 2012.
- ♦ Apple Safari 6.0 certification on Mac OSX Mountain Lion (version 10.8).
- ♦ iManager Workstation certification on Windows 8 Enterprise Edition (32-bit and 64-bit).
- ♦ Manager 2.7.6 support for Tomcat 7.0.32. and Java 1.7.0_04 versions.

iManager documentation links in this guide have been updated to reflect this change.

iManager 2.7.6 documentation is available at <http://www.netiq.com/documentation/imanager27/>. For earlier iManager versions, see “Previous Releases” (<https://www.netiq.com/documentation/imanager27/#prev>).

Novell Client Support for Windows 8 and Server 2012

The January 2013 Scheduled Maintenance for OES 11 announces the availability of Novell Client 2 SP3 for Windows with support for:

- ♦ Windows 8 (32-bit and 64-bit) excluding Windows 8 RT
- ♦ Windows Server 2012 (64-bit)

Novell Client 2 documentation links in this guide have been updated to reflect the release of SP3.

Novell Client 2 SP3 for Windows documentation is available on the [Web \(http://www.novell.com/documentation/windows_client/\)](http://www.novell.com/documentation/windows_client/). Documentation for earlier versions is available under [Previous Releases \(http://www.novell.com/documentation/windows_client/#previous\)](http://www.novell.com/documentation/windows_client/#previous).

New Novell Cluster Services Plug-in for iManager 2.7.5 and Later

The Clusters plug-in for Novell iManager 2.7.5 or later was introduced in OES 11 SP1. It supports the management of OES and NetWare clusters and resources. The availability of different cluster management features depends on the version of Novell Cluster Services and the server platform that are installed on the cluster being managed. A comparison of the old and new interface is available in “What’s New (January 2013 Patches)” (http://www.novell.com/documentation/oes2/clus_admin_lx/data/ncs_new_jan2013.html) in the *OES 2 SP3: Novell Cluster Services 1.8.8 Administration Guide for Linux* (http://www.novell.com/documentation/oes2/clus_admin_lx/data/h4hgu4hs.html).

NLVM

In addition to bug fixes, the following changes and enhancements were made in the January 2013 Scheduled Maintenance for OES 11:

- ♦ **Unmounting a pool:** The `nlvm unmount <poolname>` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/unmount.html) command has been modified to additionally remove the Device Mapper object for the pool, the link to the Device Mapper object, and the mount point for the pool. This allows you to gracefully log out the server from an iSCSI device that contains a pool. For information, see “Logging Out of an iSCSI Device that Contains an NSS Pool” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/b13pzlj1.html) in the *OES 11 SP1: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).
- ♦ **Unmounting a volume:** NCP Server has been modified to automatically log dismounts of NSS volumes and NCP volumes.

2.4 What's New (OES 11 SP1 Nov 2012 Patches)

In addition to bug fixes, the following changes and enhancements were made in the November 2012 Scheduled Maintenance for OES 11 SP1:

- ♦ **Mirroring a Partition:** The following options have been modified for the `nlvm create raid` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/create RAID.html) command:
 - ♦ The `name` option is optional when you mirror an existing SBD partition. If you specify a name (which should be the cluster name), the RAID 1 is given that name. If the name is not specified, the RAID1 name defaults to the SBD partition's name.
 - ♦ The `type` option is optional when you mirror an existing NSS or SBD partition. It uses the type of the existing partition.
- ♦ **Mirroring Devices:** The `nlvm create raid` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/create RAID.html) command has been modified to transparently accommodate the metadata size differences required by GPT and MSDOS partitioned devices. When mirroring a pool that consumes an entire MSDOS partitioned disk, you can use an MSDOS or GPT partitioned device of the same size. Previously, the GPT device had to be at least 4 MB larger than the MSDOS partitioned device.
- ♦ **Enforcing Name Restrictions for NCP Enabled LVM Volumes:** For NCP enabled LVM volume names, the `nlvm create linux volume` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/create_lxvol.html) command has been modified to enforce the name length restriction of 14 characters and to use uppercase letters for the NCP volume name in Novell Cluster Services cluster resource scripts for a shared volume.
- ♦ **Viewing Error Code Messages:** The NSS utility now provides an `/err` switch that can be used from the command prompt. You can use this option to view an error message if a failed NLVM command line operation provides an error code without a corresponding message.

```
nss /err=<error_code_number>
```

For information about error codes, see "NLVM Error Codes" (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/nlvm_ec.html) in the *OES 11 SP1: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).

2.5 What's New (OES 11 Nov 2012 Patches)

In addition to bug fixes, the following changes and enhancements were made in the November 2012 Scheduled Maintenance for OES 11:

- ♦ **Mirroring a Partition:** The following options have been modified for the `nlvm create raid` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/create RAID.html) command:
 - ♦ The `name` option is optional when you mirror an existing SBD partition. If you specify a name (which should be the cluster name), the RAID 1 is given that name. If the name is not specified, the RAID1 name defaults to the SBD partition's name.
 - ♦ The `type` option is optional when you mirror an existing NSS or SBD partition. It uses the type of the existing partition.
- ♦ **Mirroring Devices:** The `nlvm create raid` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/create RAID.html) command has been modified to transparently accommodate the metadata size differences required by GPT and MSDOS partitioned devices. When mirroring a pool that consumes an entire MSDOS partitioned disk, you can use an MSDOS or GPT partitioned device of the same size. Previously, the GPT device had to be at least 4 MB larger than the MSDOS partitioned device.

2.6 What's New (OES 11 SP1 September 2012 Patches)

In addition to bug fixes, the following changes and enhancements were made in the September 2012 Scheduled Maintenance for OES 11 SP1:

- ♦ **Rename Raid:** The `nlvm rename raid` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/rename RAID.html) command is new. Use this command to rename a specified NSS software RAID device.
- ♦ **Creating Linux POSIX Volumes:** Linux POSIX file systems should not be created on NSS software RAID devices. The NSSMU and NLVM management tools have been modified to block NSS software RAID devices from being presented or accepted as device options when you create a Linux POSIX volume.

2.7 What's New (OES 11 September 2012 Patches)

In addition to bug fixes, the following changes and enhancements were made in the September 2012 Scheduled Maintenance for OES 11:

- ♦ **Rename Raid:** The `nlvm rename raid` command is new. Use this command to rename a specified NSS software RAID device. For information, see “Rename RAID” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/rename RAID.html) in the *OES 11 SP1: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).
- ♦ **Creating Linux POSIX Volumes:** Linux POSIX file systems should not be created on NSS software RAID devices. The NSSMU and NLVM management tools have been modified to block NSS software RAID devices from being presented or accepted as device options when you create a Linux POSIX volume.

2.8 What's New (OES 11 SP1)

Novell Linux Volume Manager (NLVM) supports OES 11 SP1 file systems running on 64-bit SUSE Linux Enterprise Server (SLES) 11 SP2. In addition to bug fixes, the following changes and enhancements were made in the OES 11 SP1 release:

- ♦ **Sizes:** The following enhancements are available for the `size` option:
 - ♦ The default multiplier for sizes was changed from M (megabytes) to G (gigabytes). If no multiplier is provided, the value is assumed to be in gigabytes. For example:

```
size=20 (20 gigabytes is used)
```
 - ♦ Use the T multiplier to specify sizes in terabytes (TB).
 - ♦ All sizes can be entered as whole numbers or with fractional parts such as 200.45G and 3.98T.
- ♦ **Multiple Devices:** You can specify multiple devices for the following commands:
 - ♦ **Init:** You can specify multiple devices to be initialized at the same time. Each device is formatted with the same specified partitioning scheme and share state.
 - ♦ **Share:** You can specify multiple devices to be shared at the same time.
 - ♦ **Unshare:** You can specify multiple devices to be unshared at the same time.

- ♦ **Multiple Device and Size Instances:** You can specify multiple device and size instances for the following commands. Each device entry must have a corresponding size entry.
 - ♦ **Create Pool:** You can specify multiple device and size instances to be used for a new pool.
 - ♦ **Expand Pool:** You can specify multiple device and size instances to be added to an existing pool.
- ♦ **Confirmation Prompt:** You are automatically prompted to confirm actions for certain commands that destroy data, such as when you initialize a device or delete Linux POSIX volumes, pool moves, partitions, pools, RAIDs, RAID segments, snapshots, and NSS volumes.
- ♦ **No Prompt:** The `--no-prompt` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/nlvmopt.html#nlvmopt_noprompt) NLVM option can be used with certain commands to prevent a confirmation message from being displayed, such as when you initialize a device or delete Linux POSIX volumes, pool moves, partitions, pools, RAIDs, RAID segments, snapshots, and NSS volumes.
- ♦ **Create Linux Volume:** The following enhancements were made for the `nlvm create linux volume` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/create_lxvol.html) command:
 - ♦ **Btrfs:** Support was added for the Btrfs file system. The Btrfs file system is now available as an alternative to other supported file systems (Ext2, Ext3, Reiserfs, and XFS) when you create a Linux volume. The `btrfsprogs` package is required. You can use NSSMU or NLVM to manage the Btrfs volumes as you would manage other Linux data volumes. Btrfs volumes can also be configured for NCP file access and for clustering with Novell Cluster Services.
 - ♦ **NCP option:** The `ncp` option for the `nlvm create linux volume` command can be used to enable the Linux POSIX file system on the volume to be accessed with the NetWare Core Protocol (NCP).

When you enable NCP for a Linux volume, an NCP volume of the same name (using all capital letters) is created. An NCP share is created at the root of the Linux volume. For clustered LVM volumes, the NCP Virtual Server object is automatically created and the NCP mount, dismount, and status commands are added to scripts for the LVM volume group cluster resource.
- ♦ **Create Pool:** The following enhancements were made for the `nlvm create pool` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/create_pool.html) command:
 - ♦ **Device and Size:** You can specify multiple device and size instances to be used for a new pool. Each device entry must have a corresponding size entry.
 - ♦ **CIFS Virtual Server Name:** When creating a cluster enabled NSS pool, the default CIFS virtual server name is based on the NCP virtual server name.
- ♦ **Delete Move:** The following enhancements were made for the `nlvm delete move` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/delete_move.html) command:
 - ♦ You can alternatively specify the pool name instead of the pool move name.
 - ♦ The `abort` option has been deprecated.

The `nlvm delete move` command deletes the move request, returns the pool to its original location, and removes the new location. You can delete the move at any time while the move is in progress, even if it is pending only the `nlvm complete move` command to be finalized.
- ♦ **Expand Pool:** The `nlvm expand pool` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/expand_pool.html) command allows you to specify multiple device and size instances to be added to an existing pool. Each device entry must have a corresponding size entry.

- ♦ **List Linux Volumes:** The `nlvm list linux volumes` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/list_lxvol.html) command displays `NCP` if the Linux volume is enabled for `NCP`.
- ♦ **List Move:** The following enhancements have been made to the `nlvm list move` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/list_move.html) command:
 - ♦ You can alternatively specify the pool name instead of the pool move name.
 - ♦ The display includes the names of the devices that are being used in the move with the `from` parameter and `to` parameter.
 - ♦ The concept of *move blocks* has been renamed as *regions*.
 - ♦ The `complete` parameter (formerly the percentage parameter) displays the number of regions moved so far and the percentage of regions moved so far.
- ♦ **Rename Volume:** You can use the `nlvm rename volume` (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/rename_volume.html) command to rename a specified NSS volume. This option is new.

2.9 What's New (OES 11)

The Novell Linux Volume Manager (NLVM) replaces the Enterprise Volume Management System (EVMS) for the management of Novell Storage Services (NSS) storage objects in Novell Open Enterprise Server (OES) 11. NLVM provides the same media management functionality that was used by NSS in EVMS, and makes the following enhancements for OES 11:

- ♦ **Initialize a Device with a DOS or GPT Partitioning Scheme:** The `nlvm init` command allows you to specify partitioning scheme format of MS-DOS (the default) or GPT. MS-DOS has a 2 TB size limit. Devices of any size can be configured with GPT. For information, see “Init Device” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/init_device.html) in the *OES 11: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).
- ♦ **8 TB Device Size for Pools:** The `nlvm create pool` command allows you to use devices up to 8 TB in size. The maximum pool size is 8 TB. Previously, pools could use devices of up to 2 TB in size. For information, see “Create Pool” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/create_pool.html) in the *OES 11: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).
- ♦ **Move a Pool:** The `nlvm move` command allows you to move an NSS pool from one location to a new location on the same system. For information, see “Move” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/move_pool.html) in the *OES 11: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).

See also the related commands:

- ♦ “Complete Move” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/complete_move.html)
- ♦ “Delete Move” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/delete_move.html)
- ♦ “List Move” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/list_move.html)
- ♦ “List Moves” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/list_moves.html)

- ♦ **Rescan:** The `nlvm rescan` command performs a rescan of the storage objects (such as partitions, NSS pools, and NSS software RAIDs) on known devices, and creates or updates any Device Mapper device or partition objects as needed. For information, see “Rescan” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/rescan.html) in the *OES 11: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).
- ♦ **Expand a Partition:** The `nlvm expand partition` command allows you to expand a partition by using free contiguous space that follows the partition. For information, see “Expand Partition” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/expand_part.html) in the *OES 11: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).
- ♦ **Create a Linux POSIX File System Volume:** The `nlvm create linux volume` command allows you to create a volume with a Linux POSIX file system. The volume can be created as a traditional Linux volume or as a Linux Logical Volume Manager 2 (LVM2) volume on an LVM2 volume group. If the device is shared with nodes in a Novell Cluster Services cluster, you can cluster-enable the LVM2 volume group. For information, see “Create Linux Volume” (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/create_lxvol.html) in the *OES 11: NLVM Reference* (http://www.novell.com/documentation/oes11/stor_nlvm_lx/data/bookinfo.html).

3 Installing or Upgrading NLVM

The Novell Linux Volume Manager command line tool and libraries are installed and upgraded by default whenever you install or upgrade Novell Storage Services (NSS) on your Novell Open Enterprise Server (OES) 11 (or later) server. No action is required.

For information about installing NSS on your OES 11 (or later) server, see [“Installing and Configuring Novell Storage Services”](#) in the *OES 11 SP1: NSS File System Administration Guide for Linux*.

For general information about installing, upgrading, and patching OES Services on your OES 11 (or later) server, see the *OES 11 SP1: Installation Guide*.

4 Using NLVM in a Virtualized Environment

The Novell Linux Volume Manager (NLVM) utility runs in a virtualized environment just as it does on a physical server running Novell Open Enterprise Server 11 and later, and requires no special configuration or other changes.

- ♦ For information on setting up virtualized OES 11, see “[Installing, Upgrading, or Updating OES on a VM](#)” in the *OES 11 SP1: Installation Guide*.
- ♦ To get started with Xen virtualization, see the [Virtualization with Xen documentation](http://www.suse.com/documentation/sles11/book_xen/data/book_xen.html) (http://www.suse.com/documentation/sles11/book_xen/data/book_xen.html).
- ♦ To get started with KVM virtualization, see the [Virtualization with KVM documentation](http://www.suse.com/documentation/sles11/book_kvm/data/book_kvm.html) (http://www.suse.com/documentation/sles11/book_kvm/data/book_kvm.html).

For information about using the Novell Linux Volume Manager for Novell Storage Services (NSS) volumes in a virtualized environment with Novell Open Enterprise Server 11 and later, refer to the guidelines and requirements in “[Using NSS in a Virtualization Environment](#)” in the *OES 11 SP1: NSS File System Administration Guide for Linux*.

5 Planning for NLVM

Consider the requirements and caveats in this section when planning to use Novell Linux Volume Manager (NLVM) command line commands on Novell Open Enterprise Server (OES) 11 Support Pack 1 (SP1) servers.

- ♦ [Section 5.1, “Root User,” on page 23](#)
- ♦ [Section 5.2, “Naming Conventions for Storage Objects,” on page 23](#)
- ♦ [Section 5.3, “NSS Pools on the System Device,” on page 25](#)
- ♦ [Section 5.4, “NSS Pools Created on NetWare Servers,” on page 26](#)
- ♦ [Section 5.5, “NSS Pools Created on OES 2 Servers and OES 1 Servers,” on page 26](#)
- ♦ [Section 5.6, “Linux LVM Volume Group,” on page 26](#)
- ♦ [Section 5.7, “Linux LVM Volume Group Cluster Resources,” on page 26](#)
- ♦ [Section 5.8, “Using NLVM with NSS Software RAID5,” on page 26](#)
- ♦ [Section 5.9, “Using NLVM with Linux Software RAID5,” on page 27](#)
- ♦ [Section 5.10, “Using iSCSI Devices with NSS Software RAID5,” on page 28](#)
- ♦ [Section 5.11, “Using Antivirus Software with NCP Volumes,” on page 28](#)

5.1 Root User

The Linux system root user privileges are required to use the NLVM commands.

5.2 Naming Conventions for Storage Objects

Consider the naming conventions in this section when you create or rename storage objects with NLVM.

- ♦ [Section 5.2.1, “NSS Pool and Volume Names,” on page 23](#)
- ♦ [Section 5.2.2, “NSS Pool Snapshot Names,” on page 24](#)
- ♦ [Section 5.2.3, “NSS Software RAID Names,” on page 24](#)
- ♦ [Section 5.2.4, “NCP Volume Names,” on page 24](#)
- ♦ [Section 5.2.5, “Linux LVM Volume Group and Logical Volume Names,” on page 25](#)

5.2.1 NSS Pool and Volume Names

Novell Storage Services (NSS) pool names and volume names must be unique from other pools and volumes on the server. In a cluster, the names of shared pools and volumes must be unique across all nodes in the cluster.

Pool and volume names can be 2 to 15 characters.

Uppercase letters A to Z, number characters 0 to 9, and underscore (`_`) are valid characters for all pools and volumes. Names cannot start or end in an underscore, and cannot contain double underscores. When you create an NSS pool or volume, the name you specify is automatically converted to uppercase.

If the pool is not shared, the pool name or volume name can also contain special characters:

`!@#$%&()`

Names that contain special characters must be enclosed in quotation marks in all commands and scripts.

The names cannot be reserved names such as `con`, `com`, `lpt`, `pipe`, `all`, and so on.

5.2.2 NSS Pool Snapshot Names

An NSS pool snapshot name must be a unique snap name on the server.

Pool snapshot names are 2 to 15 characters.

The naming conventions for a pool snapshot are the same as for NSS pools and volumes. When you create an NSS pool snapshot, the name you specify is automatically converted to uppercase.

5.2.3 NSS Software RAID Names

An NSS software RAID name must be unique from other devices on the server. In a cluster, the names of shared software RAID names must be unique across all nodes in the cluster.

RAID names are 2 to 58 characters.

Names are preferred to use characters A to Z, a to z, 0 to 9, and underscore (`_`). Names cannot start or end in underscore, and cannot contain double underscores. Printable ASCII characters (see decimal codes 33 to 122 in a code chart) are valid. The name is case sensitive; it can contain uppercase and lowercase characters.

RAID names can contain special characters such as:

`!@#$%&()`

Names that contain special characters must be enclosed in quotation marks in all commands and scripts. On the BASH command line, each special character must be escaped by preceding it with a backslash character (`\`).

The RAID names cannot be reserved names such as `con`, `com`, `lpt`, `pipe`, `all`, and so on.

5.2.4 NCP Volume Names

NCP volume names can be up to 14 alphanumeric characters, using uppercase letters A through Z and numbers 0 through 9. Underscores (`_`) are allowed.

If you NCP enable a Linux volume as you create it with NSSMU or the `nlvm create linux volume` command, the NCP volume name is based on the specified Linux volume name, but all letters are capitalized. Ensure that the specified Linux volume name does not exceed 14 characters and does not use special characters. Letters A-Z, letters a-z, numbers 0-9, and underscores are supported.

5.2.5 Linux LVM Volume Group and Logical Volume Names

Consider the following conventions for naming Linux Logical Volume Manager (LVM) volume groups and logical volumes:

- ♦ [“NLVM Requirements for LVM Names” on page 25](#)
- ♦ [“LVM2 Requirements for LVM Names” on page 25](#)
- ♦ [“Clustered LVM Requirements for LVM Names” on page 25](#)

NLVM Requirements for LVM Names

NLVM requires that Linux LVM volume group names and logical volume names be unique from any volume, device, pool, RAID, and other Device Mapper name. The LVM group name is limited to 128 characters. The LVM logical volume name is limited to 64 characters.

When you create a Linux LVM logical volume without specifying an LVM volume group name, NLVM assigns the volume name to the volume group.

LVM2 Requirements for LVM Names

LVM2 allows volume group names and logical volume names to contain characters A to Z, a to z, 0 to 9, underscore (_), hyphen (-), dot (.), and plus (+). The names cannot begin with a hyphen.

Reserved names and character strings that are used internally by LVM cannot be used as volume group names or logical volume names. A volume group cannot be called anything that exists in /dev/ at the time of creation. It cannot be named '.' (a single dot) or '..' (double dot).

A logical volume cannot be named the following reserved words:

```
. (a single dot)
.. (double dot)
snapshot
pvmove
```

The logical volume name also cannot contain the following strings:

```
_mlog
_mimage
```

Clustered LVM Requirements for LVM Names

In a Novell Cluster Services cluster, the names of clustered LVM volume groups and logical volumes must be unique across all nodes in the cluster.

5.3 NSS Pools on the System Device

You can create an NSS pool on the system device where you installed the SUSE Linux Enterprise Server (SLES) 11 SP2 operating system if there is free space available on the device. This capability is not supported at install time. When you create the pool, select the system device (such as sda) and specify the amount of free space to use for the pool.

5.4 NSS Pools Created on NetWare Servers

NLVM is compatible with NSS pools that were created on NetWare servers.

For information about relocating a pool from a standalone NetWare server to an OES 11 SP1 server, see “[Migrating NSS Devices to OES 11 SP1](#)” in the *OES 11 SP1: NSS File System Administration Guide for Linux*.

For information about cluster migrating a shared pool cluster resource to an OES 11 SP1 node during a rolling cluster conversion, see the *OES 11 SP1: Novell Cluster Services 2.1 NetWare to Linux Conversion Guide*.

5.5 NSS Pools Created on OES 2 Servers and OES 1 Servers

NLVM is compatible with NSS pools that were created on OES 2 servers and OES 1 servers.

For information about relocating a pool from a standalone OES 2 server or OES 1 server to an OES 11 SP1 server, see “[Migrating NSS Devices to OES 11 SP1](#)” in the *OES 11 SP1: NSS File System Administration Guide for Linux*.

For information about cluster migrating a shared pool cluster resource to an OES 11 SP1 node during a rolling cluster upgrade, see “[Upgrading Clusters from OES 2 SP3 to OES 11x](#)” in the *OES 11 SP1: Novell Cluster Services 2.1 for Linux Administration Guide*.

5.6 Linux LVM Volume Group

NLVM uses the Linux Logical Volume Manager to create volume groups. LVM requires that the devices you use to create a volume group are already initialized and contain no partitions. LVM uses the entire device for the volume group.

5.7 Linux LVM Volume Group Cluster Resources

Novell Cluster Services 2.0, NLVM, and NSSMU use the Clustered Logical Volume Manager (CLVM) to manage LVM volume group cluster resources. CLVM requires the Linux kernel 2.6.32.45-0.3 or later. You can get the latest kernel version by using the SLES 11 SP2 update channel.

When you create clustered LVM volume groups on shared storage, all of the nodes in the cluster must have shared physical access to the devices that you want to use to create the volume group. A quorum of nodes must be present in the cluster. The volume group cluster resource is brought online on only one node at a time.

LVM requires that the devices you use to create a volume group are already initialized and contain no partitions. In a cluster, a device should be physically attached to all nodes in a cluster. The device must not be marked as Shareable for Clustering because that adds a 4 KB partition on the device to store the shared state. LVM uses the entire device for the volume group.

5.8 Using NLVM with NSS Software RAIDs

NSS software RAIDs are supported for use with NSS pools. You can use the `nlvm create raid` command with `type=sbd` to mirror an SBD partition on two shared LUN devices for the Novell Cluster Services SBD (split-brain-detector). The `sbd` type for a software RAID1 is also used by the Novell Cluster Services SBD Utility (`sbdutil`) to mirror the SBD partition.

IMPORTANT: Do not create linux partitions (or any non-Novell type partition) on an NSS software RAID device. Doing so causes all pool creations on that RAID device to fail.

5.9 Using NLVM with Linux Software RAIDs

Linux Software RAIDs are intended to be used with Linux tools and file systems. Consider the caveats in this section before implementing Linux Software RAIDs on your OES 11 SP1 server.

- ♦ [Section 5.9.1, “Linux Software RAIDs,” on page 27](#)
- ♦ [Section 5.9.2, “Linux Software RAIDs Are Not Cluster Aware,” on page 27](#)
- ♦ [Section 5.9.3, “Linux Software RAIDs Are Not Recommended for the System Device,” on page 27](#)

5.9.1 Linux Software RAIDs

We recommend that you do not use Linux software RAIDs (such as MD RAIDs and Device Mapper RAIDs) for devices that you plan to use for storage objects that are managed by NSS management tools. The Novell Linux Volume Manager (NLVM) utility and the NSS Management Utility (NSSMU) list Linux software RAID devices that you have created by using Linux tools. Beginning with Linux Kernel 3.0 in OES 11 SP1, NLVM and NSSMU can see these devices, initialize them, and allow you to create storage objects on them. However, this capability has not yet been fully tested.

IMPORTANT: In OES 11, a server hang or crash can occur if you attempt to use a Linux software RAID when you create storage objects that are managed by NSS management tools.

For NSS pools, you can use hardware RAID devices or NSS Software RAID devices to achieve disk fault tolerance.

For Linux POSIX volumes, LVM volume groups, and cLVM volume groups, you can use hardware RAID devices on your storage subsystem to achieve disk fault tolerance.

5.9.2 Linux Software RAIDs Are Not Cluster Aware

Do not use Linux Software RAIDs for devices that you plan to use for shared storage objects. Linux Software RAID devices do not support concurrent activation on multiple nodes; that is, they are not cluster aware. They cannot be used for shared-disk storage objects, such as the OCFS2 file system, cLVM volume groups, and Novell Cluster Services SBD (split-brain-detector) partitions.

For shared disks, you can use hardware RAID devices on your storage subsystem to achieve fault tolerance.

5.9.3 Linux Software RAIDs Are Not Recommended for the System Device

We recommend that you do not use Linux software RAIDs (such as MD RAIDs and Device Mapper RAIDs) on the system device if you plan to use free space on the device later for storage objects managed by NSS tools. During the SLES and OES installation, if you create a Linux software RAID device to use as the system device for the root (/) file system, the free space on the system device cannot be used later for NSS pools because the configuration of NSS storage objects on Linux software RAIDs has not yet been fully tested.

IMPORTANT: In OES 11, a server hang or crash can occur if you attempt to use a Linux software RAID when you create storage objects that are managed by NSS management tools.

For the Linux system device, you can use a hardware RAID device to achieve fault tolerance. This allows NSS tools to see and use any available free space on the system device for unshared NSS pools.

5.10 Using iSCSI Devices with NSS Software RAID5

Using iSCSI devices on the iSCSI initiator server to create NSS software RAID5 devices can cause poor performance. If you would like RAID5 protection, create the RAID5 on the target server and present that RAID device to the initiator as a single iSCSI device.

5.11 Using Antivirus Software with NCP Volumes

For information about using antivirus software with NCP volumes, see “[McAfee Antivirus Requires Additional Configuration](#)” in the *OES 11 SP1: Planning and Implementation Guide*.

6 NLVM Commands

The Novell Linux Volume Manager (NLVM) command line interface (CLI) for Novell Open Enterprise Server (OES) 11 Support Pack 1 (SP1) provides commands that can be used in a Linux console or in a script. The Novell Storage Services (NSS) management tools use NLVM to create and manage NSS storage objects. NLVM provides options to create Linux POSIX file systems, such as Btrfs, Ext2, Ext3, ReiserFS, and XFS.

This section describes the syntax and usage for NLVM commands.

- ♦ [All NLVM Commands \(A to Z\)](#)
- ♦ [General Options](#)
- ♦ [Devices and Partitions](#)
- ♦ [Linux POSIX Volumes](#)
- ♦ [NSS Pools](#)
- ♦ [NSS Pool Snapshots](#)
- ♦ [NSS Software RAIDs](#)
- ♦ [NSS Volumes](#)

General Options

- ♦ [Section 6.1, “Syntax Overview,” on page 32](#)
- ♦ [Section 6.2, “NLVM Options,” on page 34](#)

Devices and Partitions

- ♦ [Section 6.5, “Create Partition,” on page 39](#)
- ♦ [Section 6.12, “Delete Partition,” on page 49](#)
- ♦ [Section 6.18, “Expand Partition,” on page 53](#)
- ♦ [Section 6.21, “Init Device,” on page 56](#)
- ♦ [Section 6.22, “Label,” on page 57](#)
- ♦ [Section 6.23, “List Device,” on page 58](#)
- ♦ [Section 6.24, “List Devices,” on page 59](#)
- ♦ [Section 6.28, “List Partition,” on page 63](#)
- ♦ [Section 6.29, “List Partitions,” on page 64](#)
- ♦ [Section 6.40, “RAID,” on page 73](#)
- ♦ [Section 6.44, “Rescan,” on page 77](#)
- ♦ [Section 6.45, “Share,” on page 77](#)
- ♦ [Section 6.47, “Unshare,” on page 78](#)

Linux POSIX Volumes

- ♦ [Section 6.4, “Create Linux Volume,” on page 35](#)
- ♦ [Section 6.10, “Delete Linux Volume,” on page 48](#)
- ♦ [Section 6.25, “List Linux Volumes,” on page 61](#)

NSS Pools

- ♦ [Section 6.3, “Complete Move,” on page 35](#)
- ♦ [Section 6.6, “Create Pool,” on page 41](#)
- ♦ [Section 6.11, “Delete Move,” on page 49](#)
- ♦ [Section 6.13, “Delete Pool,” on page 50](#)
- ♦ [Section 6.19, “Expand Pool,” on page 54](#)
- ♦ [Section 6.26, “List Move,” on page 61](#)
- ♦ [Section 6.27, “List Moves,” on page 63](#)
- ♦ [Section 6.30, “List Pool,” on page 65](#)
- ♦ [Section 6.31, “List Pools,” on page 66](#)
- ♦ [Section 6.36, “Mount,” on page 71](#)
- ♦ [Section 6.37, “Move,” on page 71](#)
- ♦ [Section 6.38, “Pool Activate,” on page 72](#)
- ♦ [Section 6.39, “Pool Deactivate,” on page 73](#)
- ♦ [Section 6.41, “Rename Pool,” on page 75](#)
- ♦ [Section 6.44, “Rescan,” on page 77](#)
- ♦ [Section 6.46, “Unmount,” on page 78](#)

NSS Pool Snapshots

- ♦ [Section 6.8, “Create Snap,” on page 46](#)
- ♦ [Section 6.16, “Delete Snap,” on page 52](#)
- ♦ [Section 6.32, “List Snap,” on page 68](#)
- ♦ [Section 6.33, “List Snaps,” on page 68](#)

NSS Software RAIDs

- ♦ [Section 6.7, “Create RAID,” on page 43](#)
- ♦ [Section 6.14, “Delete RAID,” on page 51](#)
- ♦ [Section 6.15, “Delete RAID Segment,” on page 51](#)
- ♦ [Section 6.20, “Expand RAID,” on page 55](#)
- ♦ [Section 6.40, “RAID,” on page 73](#)
- ♦ [Section 6.42, “Rename RAID,” on page 76](#)

NSS Volumes

- ♦ [Section 6.9, “Create Volume,” on page 47](#)
- ♦ [Section 6.17, “Delete Volume,” on page 53](#)
- ♦ [Section 6.34, “List Volume,” on page 69](#)
- ♦ [Section 6.35, “List Volumes,” on page 70](#)

- ♦ [Section 6.43, “Rename Volume,” on page 76](#)
- ♦ [Section 6.48, “Volume Mount,” on page 79](#)
- ♦ [Section 6.49, “Volume Unmount,” on page 80](#)

All NLVM Commands (A to Z)

- ♦ [Section 6.1, “Syntax Overview,” on page 32](#)
- ♦ [Section 6.2, “NLVM Options,” on page 34](#)
- ♦ [Section 6.3, “Complete Move,” on page 35](#)
- ♦ [Section 6.4, “Create Linux Volume,” on page 35](#)
- ♦ [Section 6.5, “Create Partition,” on page 39](#)
- ♦ [Section 6.6, “Create Pool,” on page 41](#)
- ♦ [Section 6.7, “Create RAID,” on page 43](#)
- ♦ [Section 6.8, “Create Snap,” on page 46](#)
- ♦ [Section 6.9, “Create Volume,” on page 47](#)
- ♦ [Section 6.10, “Delete Linux Volume,” on page 48](#)
- ♦ [Section 6.11, “Delete Move,” on page 49](#)
- ♦ [Section 6.12, “Delete Partition,” on page 49](#)
- ♦ [Section 6.13, “Delete Pool,” on page 50](#)
- ♦ [Section 6.14, “Delete RAID,” on page 51](#)
- ♦ [Section 6.15, “Delete RAID Segment,” on page 51](#)
- ♦ [Section 6.16, “Delete Snap,” on page 52](#)
- ♦ [Section 6.17, “Delete Volume,” on page 53](#)
- ♦ [Section 6.18, “Expand Partition,” on page 53](#)
- ♦ [Section 6.19, “Expand Pool,” on page 54](#)
- ♦ [Section 6.20, “Expand RAID,” on page 55](#)
- ♦ [Section 6.21, “Init Device,” on page 56](#)
- ♦ [Section 6.22, “Label,” on page 57](#)
- ♦ [Section 6.23, “List Device,” on page 58](#)
- ♦ [Section 6.24, “List Devices,” on page 59](#)
- ♦ [Section 6.25, “List Linux Volumes,” on page 61](#)
- ♦ [Section 6.26, “List Move,” on page 61](#)
- ♦ [Section 6.27, “List Moves,” on page 63](#)
- ♦ [Section 6.28, “List Partition,” on page 63](#)
- ♦ [Section 6.29, “List Partitions,” on page 64](#)
- ♦ [Section 6.30, “List Pool,” on page 65](#)
- ♦ [Section 6.31, “List Pools,” on page 66](#)
- ♦ [Section 6.32, “List Snap,” on page 68](#)
- ♦ [Section 6.33, “List Snaps,” on page 68](#)
- ♦ [Section 6.34, “List Volume,” on page 69](#)
- ♦ [Section 6.35, “List Volumes,” on page 70](#)
- ♦ [Section 6.36, “Mount,” on page 71](#)

- ♦ [Section 6.37, “Move,” on page 71](#)
- ♦ [Section 6.38, “Pool Activate,” on page 72](#)
- ♦ [Section 6.39, “Pool Deactivate,” on page 73](#)
- ♦ [Section 6.40, “RAID,” on page 73](#)
- ♦ [Section 6.41, “Rename Pool,” on page 75](#)
- ♦ [Section 6.42, “Rename RAID,” on page 76](#)
- ♦ [Section 6.43, “Rename Volume,” on page 76](#)
- ♦ [Section 6.44, “Rescan,” on page 77](#)
- ♦ [Section 6.45, “Share,” on page 77](#)
- ♦ [Section 6.46, “Unmount,” on page 78](#)
- ♦ [Section 6.47, “Unshare,” on page 78](#)
- ♦ [Section 6.48, “Volume Mount,” on page 79](#)
- ♦ [Section 6.49, “Volume Unmount,” on page 80](#)

6.1 Syntax Overview

Novell Linux Volume Manager can be used to manage NSS file systems or Linux POSIX file systems on your OES 11 SP1 server. This section describes the general syntax and conventions for NLVM.

- ♦ [Section 6.1.1, “Syntax,” on page 32](#)
- ♦ [Section 6.1.2, “Syntax Conventions,” on page 32](#)
- ♦ [Section 6.1.3, “Documentation Conventions,” on page 33](#)
- ♦ [Section 6.1.4, “Files,” on page 33](#)

6.1.1 Syntax

Using commands for the NLVM program requires root user privileges. NLVM options must follow immediately after `nlvm`.

```
nlvm [nlvm_options] <command> <command_options>
```

6.1.2 Syntax Conventions

When issuing NLVM commands, consider the following general syntax conventions:

- ♦ [“NSS Pool and Volume Names” on page 32](#)
- ♦ [“NSS Software RAID Names” on page 33](#)
- ♦ [“NCP Volume Names” on page 33](#)
- ♦ [“Order of Command Options” on page 33](#)
- ♦ [“Sizes” on page 33](#)
- ♦ [“Name Format” on page 33](#)

NSS Pool and Volume Names

All NSS pool names and NSS volume names are automatically converted to uppercase.

NSS Software RAID Names

NSS software RAID names are case sensitive.

NCP Volume Names

When you create an NCP volume, the name is automatically converted to uppercase.

Order of Command Options

Command options can be specified in any order except where it is otherwise noted. Options with an equal sign (=) can be in any order.

Sizes

All sizes are in bytes and can be specified with one of the following multipliers: K, M, G, and T. Multipliers are case insensitive and are multiples of 1024. If no multiplier is specified, it is assumed to be G by default. If 'max' is entered, all of the free unpartitioned space on the device is used. All sizes can be entered as whole numbers or with fractional parts such as 200.45G and 3.98T.

Examples for common command options:

`size=20` (If no multiplier is used, it is assumed to be G (gigabytes).)

`size=20G` (You can also specify max instead of a value and multiplier.)

`size=3.98T` (You can specify a value with decimal places.)

Name Format

Examples for common name formats used in command options:

`device=sdb` (You can specify the leaf node name of the device, including multipath names.)

`device=/dev/mapper/mpatha` (You can specify the full Linux path of the device.)

`device=anydisk` (You can specify anydisk or anyshared keywords if the command allows it.)

`part=sdcl.1` (You can specify only the partition node name, not the full Linux path.)

`part=cluster1.sbd`

`name=MYPPOOL1` (All NSS pool names and NSS volume names are converted to uppercase.)

6.1.3 Documentation Conventions

In the command syntax for NLVM, the mandatory command options are surrounded by angle brackets (<>). The optional command options are surrounded by square brackets ([]). The brackets are not used when you issue the command. For example, the command syntax conventions are:

`nlvm command <mandatory_command> [optional_command]`

6.1.4 Files

The following are key files used by NLVM:

`/etc/opt/novell/nss/nlvm.conf`

Location of the NLVM configuration file.

`/opt/novell/nss/sbin/nlvm`

Location of the NLVM utility. It also has a link in the `sbin` directory so that it is in the search path.

`/var/opt/novell/nss/debug`

Location of the debug log files.

6.2 NLVM Options

The NLVM options can be used as needed with any command, except where it is otherwise noted. NLVM options must immediately follow `nlvm` in the command:

```
nlvm [nlvm_option] <command> [command_options]
```

- ♦ `-d, --debug`
- ♦ `-f, --force`
- ♦ `-l, --getlock`
- ♦ `-m`
- ♦ `--no-prompt`
- ♦ `-r, --rescan`
- ♦ `-s, --share`

`-d, --debug`

This option causes a `/var/opt/novell/log/nss/debug/nlvm_debug.log` file to be created so that the operations can be reviewed. This is helpful in diagnosing problems in running the NLVM utility. Up to 10 debug files can be created; they are numbered automatically.

NOTE: The debug can be turned on always by using the `/etc/opt/novell/nss/nlvm.conf` file.

`-f, --force`

This option can be used with certain commands to force the command to complete. Support for this NLVM option is indicated in the individual commands.

`-l, --getlock`

This option forces the command to get the `nlvm` lock. The lock protects multiple users from modifying things at the same time.

Use with caution! This option is to be used only if the lock does not get released properly due to a segment fault or other operation aborts.

`-m`

This option prevents pools that have been unmounted from being mounted.

Pools are by design auto mounted. Therefore, running the `nssmu` utility, or running most `nlvm` commands without the `-m` option can cause an unmounted pool to be remounted if underlying devices and partitions still exist. To execute an `nlvm` command without mounting the unmounted pools, you must include the `-m` option. The `nlvm mount` command internally sets the `-m` flag, so only the specified pool is mounted.

--no-prompt

This option can be used with certain commands to prevent a confirmation message from being displayed, such as when you initialize a device or delete Linux POSIX volumes, pool moves, partitions, pools, RAIDs, RAID segments, snapshots, and NSS volumes. Support for this NLVM option is indicated in the individual commands.

-r, --rescan

This option forces a fresh rescan of the system before executing a command to update the device and partition objects. Use this if something changed the information outside the NSSMU, Novell iManager, or `nlvm` utility.

-s, --share

This option sets the shared override bit for the command being executed.

In a Novell Cluster Services cluster, NLVM uses the cluster's SBD to detect if a node is a cluster member and to lock against concurrent changes to physically shared storage. Without an SBD, NLVM cannot detect whether a node is a member of the cluster and cannot acquire the locks it needs to execute tasks. In this state, you can use the `-s` option with NLVM commands to prepare a device and create an SBD partition. To minimize the risk of corruption, you must ensure that nobody else is changing any storage on any nodes at the same time.

6.3 Complete Move

complete move *<move_name>*

Check to see if an NSS pool move is complete. If the move is complete, the old location is deleted. If the move is not completed, it will return an error 11 (EAGAIN).

If a pool is cluster-enabled, issue the command on the node where its pool cluster resource is currently online.

```
nlvm [nlvm_options] complete move <move_name>
```

Command Option

move_name

Mandatory. Specify the name of the move object to check. The move name typically looks like `POOLNAME_move`.

Command Example

```
nlvm complete move MYPPOOL1_move
```

Verify that the move `MPOOL1_move` is complete. If it is, delete the old location of the pool.

6.4 Create Linux Volume

create linux volume *<type>* *<device>* *<size>* [*mp*] [*mkopt*] [*mntopt*] [*lvm*] [*name*] [*group*] [*shared*] [*ip*] [*ncp*]

Create a Linux POSIX volume on a device.

```
nlvm [nlvm_options] create linux volume <type> <device> <size> [mp] [mkopt]
[mntopt] [lvm] [name] [group] [shared] [ip] [ncp]
```

For a cluster-enabled LVM volume, issue the command from the master node in the cluster.

Command Options

type=fstype

Mandatory. Specify the type of Linux POSIX file system to use for `mkfs`.

Supported file system types are `btrfs` (in OES 11 SP1 and later; requires the `btrfsprogs` package), `ext2`, `ext3`, `reiserfs`, and `xfs`.

Example

```
type=ext3
type=reiserfs
```

device=<devicename|anydisk>

Mandatory. Specify the device to use for the Linux POSIX volume, or specify the keyword `anydisk`.

IMPORTANT: NLVM does not support using Linux software RAID devices and NSS software RAID devices with Linux POSIX file systems. You can use a hardware RAID device to achieve device fault tolerance for Linux POSIX volumes.

If the device is seen by a single server, or a single node in a cluster, do not use the `shared` option.

If the device is seen by multiple nodes in a Novell Cluster Services cluster, you must specify the *devicename* and use the `shared`, `ip`, `name`, `lvm`, and `group` (optional) options to create the Linux volume group cluster resource. The device should already be initialized but do not mark it as shareable. The cluster-enabled LVM volume group uses the entire device. Novell Cluster Services mounts the cluster resource exclusively on one node at a time.

Examples

```
device=sdb
device=/dev/sdb
device=anydisk
device=mpatha
device=/dev/mapper/mpatha
```

size=<value[K|M|G|T]|max>

Mandatory if the `shared` option is not used; optional if the `shared` option is used. Specify a size of the partition to create for the Linux volume, or specify `max` to use all of the free unpartitioned space for the volume. The minimum allowed size is 1 megabyte.

If the `shared` option is used, the entire device is dedicated to the LVM volume group. If the `size` option is specified, it is ignored.

Examples

```
size=20G
size=100m
size=max
```

mp=</mount_path>

Specify the path of the mount point where the volume is to be mounted. If the path does not currently exist, it will be created.

For LVM volumes, the `name` option must be used with the `lvm` option to specify a volume name. The full mount point path can specify a directory path that is the same or different than the specified volume name. If a mount path is not specified for an LVM volume or a clustered LVM volume, the utility assigns a default mount path of `/usr/novell/<volume_name>`.

For Linux POSIX volumes, the final directory of the full mount point path is used as the volume name. For example, if the mount point is /home/users/bob, the volume name is bob. The final directory name must be unique as a volume name on the server. If a mount path is not specified for a Linux POSIX volume, the utility assigns a default mount path of /usr/novell/<file_system_type>_<next_available_number>.

For example, if the file system type is ext3, the default mount path is /usr/novell/ext3_0. If that path is not available, the path is /usr/novell/ext3_1, and so forth until a unique volume name is achieved.

Example

```
mp=/home
```

mkopt=<option1[,option2,...]>

Specify the options to use when running `mkfs`. For a list of available options, see the `mkfs(8)` man page. No default option is specified.

Example

```
mkopt=-v
```

mntopt=<option1[option2[...]]>

Specify the options to use when mounting the volume. For a list of available options, see the `mount(8)` man page. The default `mntopt` value is `rw`.

Example

```
mntopt=rw
```

lvm

Used to specify that an LVM volume and volume group is to be created.

If the `lvm` option is used, the `name` option must be provided to specify a name for the LVM volume. Specifying a different name for the LVM volume group is optional.

Example

```
lvm
```

name=<lvm_volume_name>

Used with the `lvm` option to specify a name for the LVM volume.

If you do not specify the `group` option, this name is also used as the LVM volume group name.

For LVM logical volume naming conventions, see [Section 5.2.5, “Linux LVM Volume Group and Logical Volume Names,”](#) on page 25.

If the `lvm` option is not specified, this option is ignored.

Example

```
name=mylvmvol1
```

group=<lvm_volume_group_name>

Optional. Used with the `lvm` option to specify a name for the LVM volume group. If the `group` option is not specified, the volume group name is the same as the LVM volume name.

For LVM volume group naming conventions, see [Section 5.2.5, “Linux LVM Volume Group and Logical Volume Names,”](#) on page 25.

If the `lvm` option is not specified, this option is ignored.

Example

```
group=myclustervg01
```

shared

Used to cluster-enable an LVM volume group. This creates an LVM volume group cluster resource, including its load, unload, and monitoring scripts, for use in an existing Novell Cluster Services cluster. The cluster resource name is the LVM volume group name plus `_resource`; that is, `<lvm_vg_name>_resource`. For example, `mylvmvg01_resource`. The resource is created and set to an Offline state. You can use the Clusters plug-in in iManager to modify the scripts and resource settings as needed, then use iManager or cluster commands to online the resource.

If the `shared` option is used, the `ip`, `name`, and `lvm` options must also be provided. You can use the `group` option to specify a different name for the LVM volume group.

The device should already be initialized but do not mark the device as shareable. The LVM volume group uses the entire device. Use Novell Cluster Services tools or commands to online the cluster resource exclusively on one node at a time.

Example

```
shared lvm ip=10.10.10.101 name=mylvmvol1
shared lvm ip=10.10.10.101 name=mylvmvol1 group=mylvmvg1
```

`ip=<IP_address_for_LVM_volgroup_cluster_resource>`

Used with the `shared` option to specify the IP address to use for the Linux volume group cluster resource. This is required for cluster-enabled Linux volume groups on Novell Cluster Services clusters. Specify the IP address in IPv4 format.

If the `shared` option is not specified, this option is ignored.

Example

```
ip=10.10.10.101
```

ncp

Used to enable the Linux POSIX file system on the volume to be accessed with the NetWare Control Protocol (NCP).

If you use the `ncp` option, the volume name used for the `name` option must comply with the name limitations described in [Section 5.2.4, “NCP Volume Names,” on page 24](#).

Command Examples

```
nlvm create linux volume type=ext3 device=sdf size=10G mp=/home/bob mntopt=rw
```

Create a 10 gigabyte Linux POSIX volume using the Ext3 file system on the `/dev/sdf` device. Mount the volume on path `/home/bob` with the Read/Write mount option.

```
nlvm create linux volume type=ext3 device=/dev/sdf mp=/home/bob mntopt=rw lvm
shared ip=10.10.10.101 name=myclustervolbob group=myclustervgbob
```

Create and cluster-enable an LVM volume group on the `/dev/sdf` device with a resource IP address of 10.10.10.101, an LVM volume name of “myclustervolbob”, and an LVM volume group name of “myclustervgbob”. Create a Linux POSIX volume on the LVM volume using the Ext3 file system. The entire device is dedicated to the LVM volume. The new cluster resource is set to offline, and waits to be brought online by using the cluster commands.

This command automatically creates an LVM volume group cluster resource called `myclustervgbob_resource` in a Novell Cluster Services cluster where the node is a member. It creates its resource load, unload, and monitoring scripts, then sets the resource to offline. You manage the resource by using Novell Cluster Services tools and commands.

6.5 Create Partition

create partition <type> <device> <size> [label] [dm]

Create a partition on a disk.

```
nlvm [nlvm_options] create partition <type> <device> <size> [label] [dm]
```

The number of partitions per device can be limited by the device partitioning scheme, the partition type, or the device driver, whichever is the most restrictive.

- ♦ **Partitioning scheme:** The MS-DOS format allows up to 4 primary partitions, where 1 can be an extended partition with logical partitions. The GPT format allows up to 128 partitions.
- ♦ **Partition type:** If a device contains only NetWare type partitions, the number of partitions is limited only by the space on the disk. If there are any non-NetWare partitions on the device, each partition created, including Netware type partitions, will be a physical partition and limited by Linux to 255 partitions.
- ♦ **Device driver:** Check your device vendor's documentation to determine driver restrictions. For example, the Hewlett-Packard CCISS device driver supports up to 15 partitions per device, regardless of the partition type.

Best Practices for Creating Partitions

- ♦ Disks using NetWare partitions should have only NetWare partitions on the device.
- ♦ Do not create more than 15 partitions on a device.

Command Options

type=partition_type

Mandatory. You must specify the partition type in hexadecimal, without the leading 0x.

Before you create a Novell Cluster Services SBD (split brain detector) partition with type=1ad, you must take the cluster down, and stop Novell Cluster Services from running on all nodes.

Example

```
type=83 (partition type for Linux)
type=8e (partition type for Linux LVM)
type=169 (partition type for NSS)
type=1ad (partition type for Novell Cluster Services SBD partition)
```

device=<devicename|anydisk|anyshared>

Mandatory. Specify the device to use for the partition, or specify the keyword anydisk or anyshared.

If you use NLVM to create an SBD, the nlvm create partition command can accept an initialized or uninitialized device when you use the type=1ad option. NLVM checks the specified device to see if it is initialized, and takes the following actions:

- ♦ **Uninitialized device:** NLVM initializes the device, marks it as Shareable for Clustering, and creates the requested SBD partition.
- ♦ **Initialized and shared device:** NLVM creates the requested SBD partition.
- ♦ **Initialized and unshared device:** NLVM creates the requested SBD partition, but does not alter the shared state. It returns an error warning that the SBD partition is not shared.

You must manually mark the device as Shareable for Clustering after the partition is created. You can use the nlvm share command to share the device.

Examples

```
device=sdb
device=/dev/sdb
device=anydisk
device=anyshared
```

size=<value[K|M|G|T]|max>

Mandatory. Specify the size of the partition to create, or specify `max` to use all free unpartitioned space. The minimum allowed size is 1 MB.

Because a physical partition must end on a cylinder boundary, its size might be slightly different than the size you specify. If the size does not fall naturally on a cylinder boundary, the partition size is rounded up or down, depending on the partition type, the size specified, and the amount of free space. For a NetWare type partition (NSS or SBD), the size is rounded down. For a Linux type partition, the size is rounded up if enough free space is available; otherwise, the size is rounded down.

Example

```
size=20G
size=100.45M
size=max
```

label="Label for the partition"

Specify the label to be added to a Novell partition type. This option is ignored for other partition types. If the label contains spaces, you must put quotation marks around it. If the label contains a special character, you must escape the character by adding a backslash character (\) in front of it.

If you create a Novell Cluster Services SBD partition, the label should be the cluster name. For example, if the cluster name is `cluster1`, NLVM creates a partition named `cluster1.sbd`. If an SBD partition already exists for the cluster, the new partition is named `cluster1.sbd1`, and the cluster does not recognize it. To use the new partition for the cluster, you must delete the old partition. Then the new partition is automatically renamed as `cluster1.sbd`, and is used by the cluster.

Example

```
label="This label has spaces"
label=engineering
label=special\character
label=cluster1
```

dm

Create a device mapper object for this partition in the `/dev/nss` directory. This is useful when creating Novell partition types that need to be accessed directly.

Example

```
dm
```

Command Examples

```
nlvm create partition type=169 device=sdb size=20G dm
```

Create an NSS partition on the `/dev/sdb` device of size 20 GB. Also create a device mapper object for the partition, `/dev/nss/sdb1.1`.

```
nlvm create partition type=83 device=sdc size=200G
```

Create a Linux partition on the `/dev/sdc` device of size 200 GB.

```
nlvm create partition type=8e device=sdf size=200G
```

Create a Linux LVM partition on the `/dev/sdf` device of size 200 GB.


```
nlvm -s create partition type=lad device=sdg size=max label=cluster1
```

Take the cluster down and stop Novell Cluster Services. Create a Novell Cluster Services SBD partition on the /dev/sdg device, and use all available free space on the device. Use the -s NLVM option to override the shared locking requirement and force the command to execute.

6.6 Create Pool

```
create pool <name> <size [device]|part> [ip] [vsu] [csn] [cifs] [afp]
```

Create an NSS pool.

```
nlvm [nlvm_options] create pool <name> <size [device]|part> [ip] [vsu] [csn] [cifs] [afp]
```

For a cluster-enabled pool, issue the command from the master node in the cluster.

Command Options

name=pool_name

Mandatory. Specify the name of the pool to create. This name must be unique from other pools. The pool name is automatically converted to uppercase.

Pool names are 2 to 15 characters. Uppercase letters A to Z, number characters 0 to 9, and underscore (_) are valid characters for all pools. Names cannot start or end in underscore, and cannot contain double underscores.

If the pool is not shared, the pool can also contain special characters:

```
!@#$%&()
```

Names that contain special characters must be enclosed in quotation marks in all commands and scripts.

The names cannot be reserved names such as con, com, lpt, pipe, all, and so on.

Example

```
name=MYPOOL1
```

size=<value[K|M|G|T]|max>

Mandatory. Specify the amount of space to be used on the associated device. The size is mandatory unless you specify the `part=partition_name` option. The total pool size must be greater than 10 megabytes.

If multiple devices are specified, each `device` option instance must have a matching `size` option instance. The first `size` instance is matched to the first `device` instance, and so on.

Example

```
size=200G
size=3.98T
```

device=<devicename|anydisk|anyshared>

Specify the device to use for the pool, or specify the keyword `anydisk` or `anyshared`.

Do not specify the `device` option in combination with the `part` option.

You can specify multiple device instances to create a pool comprised of multiple segments. Each `device` option instance must have a matching `size` option instance. The first `device` instance is matched to the first `size` instance, and so on. When specifying multiple devices, device names must be provided for each instance.

Examples

```
device=sdb
device=sde device=sdf device=sdg    (Specify a size for each instance.)
device=anydisk
device=anyshared
```

part=partition_name

Specify the node name (such as `sdcl.1`) for the partition where you want to create the pool. The partition must exist; it is not created with this command. The entire partition is used for the pool.

Do not specify the `part` option in combination with the `device` option.

Example

```
part=sdcl.1
```

ip=ip_address

Specify this option to create a cluster enabled pool. If using this option, the device or partition must be shared. This option is mandatory if you are creating a cluster enabled pool.

Example

```
ip=10.10.10.41
```

vsn=virtual_server_name

Specify the virtual server name for a cluster enabled pool. It is optional and used only for cluster enabled pools. If a name is not supplied, the default name will be used in the format of `<clusterName>-<poolName>-SERVER`. Underscores in the cluster name or pool name are changed to hyphens. If you customize the virtual server name, you can use letters, numbers, hyphens, and underscores.

Example

```
vsn=CLUSTER2-POOL-2-SERVER
vsn=C1-P1-SERVER
vsn=MY-CUSTOM-NAME
```

csn=cifs_virtual_server_name

Specify the CIFS virtual server name for a cluster enabled pool. It is optional and used for cluster enabled pools where CIFS is enabled as an advertising protocol. The name can be up to 15 characters, which is a restriction of the CIFS protocol.

For users to collaborate effectively, all paths for user access should be identical, independent of the access protocol used. This is possible only if the same name is used for the NCP virtual server name and the CIFS virtual server name, and the name can be only up to 15 characters.

If the `cifs` option is used without the `csn` option, the NCP virtual server name is used as the CIFS virtual server name. In this case, if the name is more than 15 characters, the CIFS virtual server name uses the rightmost 13 characters and adds `-w`. For example, an NCP virtual server name of `CLUSTER1-P_USERS` is modified to `STER1-P_USERS-w` for the CIFS virtual server name. If a default NCP virtual server name was used in the form of `<clusterName>-<poolName>-SERVER` and the name exceeds 15 characters, the CIFS virtual server name uses the rightmost 13 characters of the `<clusterName>-<poolName>` part of the name and adds `-w`. For example, an NCP virtual server name of `CLUS1-P123-SERVER` is modified to `CLUS1-P123-w` for the CIFS virtual server name.

To use the NCP virtual server name for the CIFS server name, use the `nlvm` command as follows without the `csn` option:

```
nlvm create pool name=a4 size=15M device=sdb ip=10.10.10.39 vsn=pqr cifs
```

In this example, pqr is used as the NCP virtual server name and CIFS virtual server name.

If an administrator user later changes the NCP virtual server name in NSSMU or iManager, NSSMU automatically applies the name change to the CIFS virtual server name, so that the administrator does not need to make the change twice. To use a different server name for the CIFS virtual server name, you can change the CIFS virtual server name by using the CIFS management tools. This change will not affect the NCP virtual server name.

Examples

```
csn=CLUS1-P1  
csn=c1-p123
```

cifs

Specify this option to enable CIFS as an advertising protocol when you create a cluster enabled pool. By default, CIFS is disabled as an advertising protocol. Novell CIFS must be installed on the machine in order for this option to work.

You can use the `csn` option to specify a CIFS virtual server name. Without the `csn` option, the NCP virtual server name is used as the CIFS virtual server name. See the `csn` option for details.

Example

```
cifs
```

afp

Specify this option to enable AFP as an advertising protocol when you create a cluster enabled pool. By default, AFP is disabled as an advertising protocol. Novell AFP must be installed on the machine in order for this option to work.

Example

```
afp
```

Command Examples

```
nlvm create pool name=MYPOOL1 size=20G device=sdb
```

Create a pool named MYPOOL1 on device `/dev/sdb` that is 20 GB in size.

```
nlvm create pool name=MYPOOL2 size=20G device=sdb size=100G device=sdg
```

Create a pool named MYPOOL2 that is a total of 120 GB in size. Use 20 GB of free space from device `/dev/sdb`. Use 100 GB of free space from device `/dev/sdg`.

```
nlvm create pool name=MYPOOL2 size=200G device=anydisk
```

Create a pool named MYPOOL2 on any device that has 200 GB of free unpartitioned space available.

```
nlvm create pool name=MYPOOL3 size=100G device=anyshared
```

Create a pool named MYPOOL3 on any shared device that has 100 GB of free unpartitioned space available.

```
nlvm create pool name=MYPOOL4 part=sdcl.1
```

Create a pool named MYPOOL4 on partition `/dev/sdc1.1` and use all of the partition.

6.7 Create RAID

```
create raid <name> <raid> [type] <size> <device> [stripe] [part]
```

Create an NSS software RAID device or an SBD software RAID device.

```
nlvm [nlvm_options] create raid <name> <raid> [type] <size> <device> [stripe]
[part]
```

Command Options

name=raid_name

Mandatory except when you mirror an existing SBD partition. This name must be unique from other RAID devices. The RAID name is case sensitive.

When you create an NSS software RAID device, you must specify the name of the device to create.

When you create a new Novell Cluster Services SBD RAID 1 device, you must specify the name of the device to create. The name must match the name of an existing cluster (such as `cluster1`) that has a Cluster object in Novell eDirectory. This allows the SBD to be used by the cluster. The name is case sensitive.

When you mirror an existing Novell Cluster Services SBD partition, the name is optional. If you specify a name (which should be the cluster name), the RAID 1 is given that name. If the name is not specified, the RAID 1 name defaults to the SBD partition's name.

RAID names are 2 to 58 characters. Names are preferred to use characters A to Z, a to z, 0 to 9, and underscore (_). Names cannot start or end in underscore, and cannot contain double underscores. Printable ASCII characters (see decimal codes 33 to 122 in a code chart) are valid.

RAID names can contain special characters such as:

```
!@#$%&()
```

Names that contain special characters must be enclosed in quotation marks in all commands and scripts. On the BASH command line, each special character must be escaped by preceding it with a backslash character (\).

The names cannot be reserved names such as `con`, `com`, `lpt`, `pipe`, `all`, and so on.

Example

```
name=MYRAID1
```

raid=<0|1|5>

Mandatory. Specify the RAID type. Valid options are 0 for striping, 1 for mirrored, or 5 for striping with parity.

Example

```
raid=1
```

type=<nss|sbd>

Mandatory except when you mirror an existing partition. Specify the type of partition to mirror. This option is used only for RAID 1. Valid options are `nss` and `sbd` (Novell Cluster Services split-brain detector). The default mirror type is `nss`.

Before you create a new SBD RAID 1, you must take the cluster down, and stop Novell Cluster Services from running on all nodes. This is not necessary when you mirror an existing SBD partition.

Example

```
type=nss
type=sbd
```

size=<value[K|M|G|T]|max>

Mandatory except when you mirror an existing partition. Specify the size of each segment of the RAID. The minimum size is 12 megabytes.

Because a physical partition must end on a cylinder boundary, its size might be slightly smaller than the size you specify. If the size does not fall naturally on a cylinder boundary, the partition size is rounded down for NetWare type partitions.

Example

```
size=20G
size=1.45T
```

device=devicename

Mandatory. Specify the device to create a RAID segment on. This option is used multiple times, once for each segment to create. RAID 0 or RAID 1 requires a minimum of two devices. RAID 5 requires a minimum of three devices. Devices must be unique for each instance.

Example

```
device=sdb device=sd c device=sdd
```

stripe=stripe_size

Specify the RAID strip size in bytes. This option is applicable only for RAID 0 and RAID 5. The stripe size must be a power of 2, with a minimum size of 4 KB and a maximum size of 256 KB. The default stripe size is 64 KB.

Example

```
stripe=64K
```

part=partition_name

Specify the node name for the partition to be mirrored. Use this option to mirror an existing NSS partition (such as `sdc1.1`) or Novell Cluster Services SBD partition (such as `cluster1.sbd`). The existing partition is the first segment of a RAID 1 mirror.

If the `part` option is used, the RAID size option is ignored. Each segment's size is the size of the existing partition. The data on the original partition is mirrored on up to three specified devices.

After you mirror the partition, you manage the RAID 1 device by using the normal NSS software RAID management tools and commands.

Example

```
part=sdc1.1
part=cluster1.sbd
```

Command Examples

```
nlvm create raid name=MYRAID5 size=20G raid=5 device=sdb device=sd c device=sdd
```

Create a RAID 5 (striping with parity) device that has segments of 20 GB each on devices `/dev/sdb`, `/dev/sdc`, and `/dev/sdd`. The default stripe size of 64 KB is automatically applied. The default partition type is `nss`.

```
nlvm create raid name=MYRAID1 raid=1 device=sdf part=sdc1.1
```

Create a RAID 1 (mirror) for the existing NSS pool partition `/dev/sdc1.1` on the `/dev/sdf` device. The partition type is the same as the existing partition's type. The pool's existing partition becomes the first segment of the RAID, and its existing data is mirrored to device `/dev/sdf`.

```
nlvm -s create raid name=cluster1 raid=1 type=sbd device=sd c size=max device=sde
```

Before you issue the command, take the cluster down, and then stop Novell Cluster Services on all nodes. Create a new Novell Cluster Services SBD RAID 1 device for a cluster named `cluster1`. Use devices `sdc` and `sde`. Use the maximum space available as the

partition size, based on the smaller of the two devices. Specify the size only once. Use the `-s` NLVM option to override the shared locking requirement and force the command to execute. Afterwards, join the nodes to the cluster.

nlvm create raid name=cluster2 raid=1 part=cluster2.sbd device=sdf

Mirror an existing Novell Cluster Services SBD partition named `cluster2.sbd`. The RAID type is RAID 1. The name `cluster2` is the same name as the cluster that uses the SBD partition. This name is also the same as the label on the existing SBD partition. The partition is mirrored on the previously initialized and shared device `/dev/sdf`. Device `sdf` is at least the size of the existing partition, and can be formatted as MSDOS or GPT. The new SBD RAID 1 device is named `cluster2.sbd`. The mirrored SBD partitions are named `cluster2.msbd0` and `cluster2.msbd1`.

6.8 Create Snap

create snap <name> <pool> <device> <size> [chunk]

Create a snapshot of an NSS pool.

```
nlvm [nlvm_options] create snap <name> <pool> <device> <size> [chunk]
```

Command Options

name=snapshot_name

Mandatory. Specify the name of the NSS snapshot. This name must be a unique snap name on the server. The snap name is automatically converted to uppercase.

Pool snapshot names are 2 to 15 characters. The naming conventions are the same as for pools.

Example

```
name=POOL1SNAP
```

pool=pool_name

Mandatory. Specify the name of an existing pool that you want to snap.

Example

```
pool=MYPOOL1
```

device=devicename

Specify the device where you want to create a partition to be used to store copy-on-write data.

Example

```
device=sdb
```

size=<value[K|M|G|T]|max>

Specify the size of the partition used to store copy-on-write data. The minimum size is 1 MB; there is no maximum.

NSSMU restricts the size of Snapshots, with a minimum size of 50 MB, and a maximum size of 8 TB.

Example

```
size=20G
size=100.50M
```

chunk=*chunk_size*

Specify the chunk size of the snapshot in bytes. The default size is 64 KB. The chunk size must be a power of 2, with the minimum size of 512 bytes, and a maximum size of 256 KB.

Example

```
chunk=128K
```

Command Example

```
nlvm create snap name=POOL1SNAP pool=MYPPOOL1 device=sdb size=20G chunk=128K
```

Create a snapshot named POOL1SNAP of pool MYPPOOL1. The copy-on-write partition is on device /dev/sdb and of size 20 GB, and the snapshot chunk size is 128 KB.

6.9 Create Volume

create volume <name> <pool> [passw] [quota]

Create an NSS volume on an existing pool. NSS volumes are always mounted at /media/nss/<VolumeName> unless otherwise specified.

```
nlvm [nlvm_options] create volume <name> <pool> [passw] [quota]
```

Command Options

name=*volume_name*

Mandatory. Specify the name of the NSS volume to create. This name must be unique from other volumes. The volume name is automatically converted to uppercase.

Volume names are 2 to 15 characters. The naming conventions are the same as for pools.

Example

```
name=MYVOL1
```

pool=*pool_name*

Mandatory. Specify the name of an existing NSS pool where you want to create the volume.

Examples

```
pool=MYPPOOL1
```

passw=*password*

Specify a password if the volume is an encrypted volume.

Example

```
passw=novell
```

quota=*size*

Optional. Specify a quota for the volume. A quota is the maximum amount of space in the pool that can be used by the volume. If no quota is specified, the volume can grow to the size of the pool.

If the maximum pool size is smaller than the specified volume quota, the volume can grow only to the size of the pool. If you later expand the size of the pool, then the volume quota is again the limiting factor.

Example

```
quota=500G
```

Command Examples

```
nlvm create volume name=MYVOL1 pool=MYPPOOL1
```

Create a non-encrypted NSS volume on an existing pool named MYPPOOL1.

```
nlvm create volume name=MYVOL1 pool=MYPPOOL1 passw=novell
```

Create an NSS volume on an existing pool named MYPPOOL1, and encrypt the volume using the password of novell.

```
nlvm create volume name=MYVOL1 pool=MYPPOOL1 quota=500G
```

Create a non-encrypted NSS volume on an existing pool named MYPPOOL1. The volume has a quota of 500 GB.

6.10 Delete Linux Volume

delete linux volume <volume_name>

Delete an existing Linux POSIX volume. You cannot delete the root (/) volume. You must unmount the volume before you can delete it.

If the volume is a clustered LVM volume group and logical volume, you must take the cluster resource offline, then delete the resource before you can delete the volume.

```
nlvm [nlvm_options] delete linux volume <volume_name>
```

You are automatically prompted to confirm the delete action. Respond by typing *yes* or *no*, then pressing Enter. Use the `--no-prompt` NLVM option to suppress the confirmation prompt.

You can use the `nlvm list linux volumes` command to find the *volume_name*. A Linux POSIX volume is preceded by a forward slash, such as `/vol1`. This is the last directory of the mount point path that you provided when you created the Linux POSIX volume with NLVM or NSSMU. An LVM volume name is the volume name you used when you created the volume, such as `lvvol1`.

Command Options

volume_name

Mandatory. Specify the name of the volume to delete.

Examples

For a Linux POSIX volume mounted at `/home/bob`, the volume name is `/bob`.

For an LVM logical volume that you named `lvvol1` that is mounted at `/mnt/lvvol1`, the volume name is `lvvol1` (with no forward slash).

For an LVM logical volume that you named `lvvol2` that is mounted at `/home/users`, the volume name is `lvvol2` (not `/users`).

--no-prompt

Optional. Specify this NLVM option to prevent a confirmation message from being displayed.

Example

```
--no-prompt
```

Command Examples

```
nlvm delete linux volume /bob
```

Delete the Linux POSIX volume that is mounted at `/home/bob`.


```
nlvm delete linux volume lvvol1
```

Delete the Linux LVM logical volume `lvvol1` that is mounted at `/mnt/lvvol1`.

```
nlvm --no-prompt delete linux volume lvvol2
```

Delete the Linux LVM logical volume `lvvol2` that is mounted at `/home/users`. The confirmation message is not displayed.

6.11 Delete Move

delete move <<move_name>|<pool_name>>

Delete an NSS pool move. This command deletes the move request, returns the pool back to its original location, and removes the new location. You can delete the move at any time while the move is in progress, even if it is pending only the `complete move` command to be finalized.

Use the `complete move` command if you want to keep the new location and remove the original location.

If a pool is cluster-enabled, issue the command on the node where its pool cluster resource is currently online.

```
nlvm [nlvm_options] delete move <<move_name>|<pool_name>>
```

You are automatically prompted to confirm the delete action. Respond by typing `yes` or `no`, then pressing Enter. Use the `--no-prompt` NLVM option to suppress the confirmation prompt.

Command Options

move_name or pool_name

Mandatory. Specify the name of the NSS pool move to delete, such as `POOLNAME_move`. You can alternatively specify the pool name.

--no-prompt

Optional. Specify this NLVM option to prevent a confirmation message from being displayed.

Example

```
--no-prompt
```

Command Examples

```
nlvm delete move MYPPOOL_move
```

Delete the pool move named `MYPPOOL_move`. This removes the new location, and sets the pool to the original location.

6.12 Delete Partition

delete partition <partition_name>

Delete an existing partition by name.

```
nlvm [nlvm_options] delete partition <partition_name>
```

You are automatically prompted to confirm the delete action. Respond by typing `yes` or `no`, then pressing Enter. Use the `--no-prompt` NLVM option to suppress the confirmation prompt.

Before you create a Novell Cluster Services SBD partition, you must take the cluster down, and stop Novell Cluster Services from running on all nodes.

Command Options

partition_name

Mandatory. Specify the node name (such as `sdc1.1`) of the partition to be deleted.

Example

```
sdc1.1
```

-f, --force

Optional. The `force` NLVM option can be used with the `delete partition` command if the partition is part of a pool or move. If the partition is part of a pool, deleting the partition automatically deletes the pool. If the partition is part of a move destination, deleting the partition automatically deletes the pool move.

Examples

```
-f  
--force
```

--no-prompt

Optional. Specify this NLVM option to prevent a confirmation message from being displayed.

Example

```
--no-prompt
```

Command Examples

```
nlvm delete partition sdc1.1
```

Delete the partition `/dev/sdc1.1`.

```
nlvm --force delete partition sdd1.2
```

Delete the partition `/dev/sdd1.2` that is part of an NSS pool move destination. The pool move is deleted as well.

6.13 Delete Pool

delete pool *<pool_name>*

Delete an existing NSS pool by name.

```
nlvm [nlvm_options] delete pool <pool_name>
```

You are automatically prompted to confirm the delete action. Respond by typing `yes` or `no`, then pressing Enter. Use the `--no-prompt` NLVM option to suppress the confirmation prompt.

Command Options

pool_name

Mandatory. Specify the name of the NSS pool to be deleted.

Example

```
MYPOOL1
```

--no-prompt

Optional. Specify this NLVM option to prevent a confirmation message from being displayed.

Example

`--no-prompt`

Command Example

```
nlvm delete pool MYPOOL1
```

Delete the NSS pool named MYPOOL1.

6.14 Delete RAID

`delete raid <raid_name>`

Delete an existing NSS software RAID device by name. If the RAID device is a single element RAID 1, this command removes the RAID 1 from the pool and leaves the pool on the corresponding partition. Otherwise, it deletes the RAID device and the pool (or pools) on the device.

```
nlvm [nlvm_options] delete raid <raid_name>
```

You are automatically prompted to confirm the delete action. Respond by typing *yes* or *no*, then pressing Enter. Use the `--no-prompt` NLVM option to suppress the confirmation prompt.

For single element RAID 1 devices, this command duplicates the `nlvm raid delete` command, which deletes a single element mirror from a pool, leaving the pool on the corresponding partition.

Before you delete a Novell Cluster Services SBD RAID 1, you must take the cluster down, and stop Novell Cluster Services from running on all nodes.

Command Options

raid_name

Mandatory. Specify the name of the NSS software RAID device to be deleted.

Example

```
MYRAID1
```

`--no-prompt`

Optional. Specify this NLVM option to prevent a confirmation message from being displayed.

Example

```
--no-prompt
```

Command Example

```
nlvm delete raid MYRAID1
```

Delete the NSS software RAID device named MYRAID1.

6.15 Delete RAID Segment

`delete raid <raid_name> segment <number>`

Delete a specified segment of an existing NSS software RAID device. This is valid only for RAID 1 and RAID 5 devices. RAID 5 can remove only 1 segment, but it must be replaced by another segment to have redundancy.

```
nlvm [nlvm_options] delete raid <raid_name> segment <number>
```

You are automatically prompted to confirm the delete action. Respond by typing *yes* or *no*, then pressing Enter. Use the `--no-prompt` NLVM option to suppress the confirmation prompt.

Use the `--force` NLVM option to remove out-of-sync segments.

Command Options

raid_name

Mandatory. Specify the name of the NSS software RAID device that contains the segment to be deleted.

Example

```
MYRAID1
```

number

Mandatory. Specify the segment index (zero relative) to be removed. For RAID 1, the value must be 0 to 3. For RAID 5, the value must be 0 to 13.

Example

```
0
```

`--no-prompt`

Optional. Specify this NLVM option to prevent a confirmation message from being displayed.

Example

```
--no-prompt
```

`-f, --force`

Optional. Specify this NLVM option to force the command to delete out-of-sync segments.

Command Example

```
nlvm delete raid MYPPOOL1 segment 0
```

Delete the first segment of the NSS software RAID device named MYRAID1.

```
nlvm --force delete raid MYPPOOL1 segment 1
```

Delete the second segment of the NSS software RAID device named MYRAID1. Use the `--force` option to force the deletion of an out-of-sync segment.

6.16 Delete Snap

`delete snap <snap_name>`

Delete an existing NSS pool snapshot by name.

```
nlvm [nlvm_options] delete snap <snap_name>
```

You are automatically prompted to confirm the delete action. Respond by typing *yes* or *no*, then pressing Enter. Use the `--no-prompt` NLVM option to suppress the confirmation prompt.

Command Options

snap_name

Mandatory. Specify the name of the NSS pool snapshot to be deleted.

Example

```
POOL1SNAP
```

--no-prompt

Optional. Specify this NLVM option to prevent a confirmation message from being displayed.

Example

--no-prompt

Command Example

```
nlvm delete snap POOL1SNAP
```

Delete the NSS pool snapshot named POOL1SNAP.

6.17 Delete Volume

delete volume *<volume_name>*

Delete an existing NSS volume by name.

```
nlvm [nlvm_options] delete volume <volume_name>
```

You are automatically prompted to confirm the delete action. Respond by typing *yes* or *no*, then pressing Enter. Use the **--no-prompt** NLVM option to suppress the confirmation prompt.

Command Options

volume_name

Mandatory. Specify the name of the NSS volume to be deleted.

Example

MYVOL1

--no-prompt

Optional. Specify this NLVM option to prevent a confirmation message from being displayed.

Example

--no-prompt

Command Example

```
nlvm delete volume MYVOL1
```

Delete the NSS volume named MYVOL1.

6.18 Expand Partition

expand partition *<partition_name>* *<size>*

Expand an existing partition.

This command does not add a partition, but expands the existing partition. There must be free space contiguously following this partition in order to expand it.

```
nlvm [nlvm_options] expand partition <partition_name> <size>
```

Command Options

partition_name

Mandatory. Specify the node name (such as `sdc1.1`) of the partition to be expanded. This must be the first command option.

Example

```
sdc1.1
```

size=<value[K|M|G|T]|max>

Mandatory. Specify the amount of space to add to the existing partition.

Example

```
size=20G  
size=200.45G
```

Command Example

```
nlvm expand partition sdc1.1 size=20G
```

Expand the `/dev/sdc1.1` partition by adding the next 20 GB of contiguous free unpartitioned space. For example, if the original partition is 20 GB, the expanded size is 40 GB.

6.19 Expand Pool

expand pool <pool_name> <size device | part >

Expand an existing NSS pool by adding a new partition. Either a partition must be specified, or the device and size must be specified.

If the specified device is the same device as the last segment of the existing pool, and free space exists following the last segment, the utility tries to expand the partition first before trying to add a new partition.

```
nlvm [nlvm_options] expand pool <pool_name> <size device | part >
```

Command Options

pool_name

Mandatory. Specify the name of the NSS pool to be expanded. This must be the first command option.

Example

```
MYPOOL1
```

device=device_name

Specify the device to use for the expanded space.

You can specify multiple device option instances to create a pool comprised of multiple segments. Each device option instance must have a matching size option instance. The first device instance is matched to the first size instance, and so on.

Example

```
device=sdb
```

size=<value[K|M|G|T]|max>

Specify the amount of space to add to the existing pool.

If multiple devices are specified, each device option instance must have a matching size option instance. The first size instance is matched to the first device instance, and so on.

Example

```
size=20G
size=100.50M
```

part=partition_name

Specify the name of a partition to add to the pool. The entire partition size is added to the pool's capacity. The partition must be of type 0X169 (nss).

Example

```
part=sdc1.1
```

Command Examples

```
nlvm expand pool MYPOOL1 device=sdf size=20G
```

Expand the NSS pool named MYPOOL1 by adding the 20 GB of free space from device /dev/sdf.

```
nlvm expand pool MYPOOL2 device=sdf size=20G device=sdg size=100G
```

Expand the NSS pool named MYPOOL1 by adding the 20 GB of free space from device /dev/sdf and 100 GB of free space from device /dev/sdg.

```
nlvm expand pool MYPOOL1 part=sdc1.1
```

Expand the NSS pool named MYPOOL1 by adding the /dev/sdc1.1 partition to it. The partition is type 0X169. The entire partition size is added to the pool's capacity.

6.20 Expand RAID

expand raid <raid_name> <device>

Expand an existing NSS software RAID device by adding a new segment. Specify the RAID name and the device to use. The device option can be specified multiple times to specify additional segments. Each device must have a free space area at least as big as the segment size of the RAID.

```
nlvm [nlvm_options] expand raid <raid_name> <device>
```

Command Options

raid_name

Mandatory. Specify the name of the NSS software RAID device to be expanded. This must be the first command option.

Example

```
MYRAID1
```

device=device_name

Specify the device to use for the expanded space.

Example

```
device=sdb
```

Command Examples

```
nlvm expand raid MYRAID1 device=sdf
```

Expand the NSS software RAID device named MYRAID1 by adding the device /dev/sdf.

```
nlvm expand raid MYRAID5 device=sdg device=sdh
```

Expand the NSS software RAID device named MYRAID5 by adding the /dev/sdg and /dev/sdh devices as two new segments.

6.21 Init Device

init <device_name> [format] [shared|unshared]

Initialize a device by deleting all partitions on the device and setting the partitioning scheme.

```
nlvm [nlvm_options] init <device_name> [format] [shared|unshared]
```

You are automatically prompted to confirm the initialize action. Respond by typing yes or no, then pressing Enter. Use the --no-prompt NLVM option to suppress the confirmation prompt.

You can optionally specify whether to set the device as shared or unshared. If neither the shared nor unshared option is added, the device is initialized, the partitioning scheme is set, and the shared state remains what it was before the initialize command.

Command Options

device_name

Mandatory. Specify the name of the device to be initialized. This must be the first command option.

You can enter multiple devices by separating the device names with a comma and no spaces.

Example

```
sdb  
sde,sdf,sdg
```

format=<gpt|msdos>

Specify the partitioning scheme as gpt or msdos. The default is msdos. The MSDOS partitioning scheme supports device sizes that are less than or equal to 2 TB. If the device size is greater than 2 TB and the partitioning scheme is not specified, the default partitioning scheme of MSDOS applies, and the device size is truncated to 2 TB with the remainder as unusable space. Devices of any size can be set to use the GPT partitioning scheme.

Example

```
format=msdos
```

shared

After initializing the device, the device is set as shared. A small partition is created on the device to store the shared setting. The remainder of the device is free space.

For example, use this option to mark a device as Shareable for Clustering if you plan to use it for a shared NSS pool. NSS looks for this setting to cluster enable the pool.

unshared

After initializing the device, the device is not marked as shared. The device is unpartitioned free space.

Use this option to remove all partitions from a device. For example, LVM requires that a device contains no partitions before it creates a volume group on it.

-f, --force

Optional. Specify this NLVM option to force the initialization. This option is required if the device contains a root (/), swap, or boot partition, or if the `init` command cannot delete any pools on the disk.

Example

```
-f
--force
```

--no-prompt

Optional. Specify this NLVM option to prevent a confirmation message from being displayed.

Example

```
--no-prompt
```

Command Examples

nlvm --force init sdb

Force the initialization of a previously formatted device `/dev/sdb`, and set its partitioning scheme to use the default setting of `msdos`. If the device size is greater than 2TB, the device has only 2 TB of usable space. If the device was previously set as shared, the shared setting remains after the initialization. Otherwise, the device is unshared.

nlvm init sdd format=gpt unshared

Initialize the device `/dev/sdd`, and set its partitioning scheme to GPT. If the device was previously set as shared, this removes the shared setting from the device. The device is unpartitioned free space.

nlvm init sde format=gpt shared

Initialize the device `/dev/sde`, set its partitioning scheme to GPT, and mark the device as shared. The device contains a small partition to hold the shared setting, and the rest is free space.

nlvm --no-prompt init sde,sdf,sdg format=gpt unshared

Initialize multiple devices at a time. Set each device's partitioning scheme to GPT. If a device was previously set as shared, the unshared option removes its shared setting. The devices are each unpartitioned free space. The confirmation message is not displayed.

6.22 Label

label *<partition_name>* *<"label text">*

Modify or add a label to a Novell type partition (NSS, SBD, or RAID).

```
nlvm [nlvm_options] label <partition_name> <"label text">
```

Command Options

partition_name

Mandatory. Specify the node name (such as `sdc1.1`) of the partition. This must be the first command option.

Example

```
sdc1.1
```

"label text"

Mandatory. Specify the text word or phrase to use for the label. If the text has spaces, use quotation marks.

Example

```
"This is the label"  
engineering
```

Command Example

```
nlvm label sdc1.1 "This is the label"
```

Add the label "This is the label" to the /dev/sdc1.1 partition.

6.23 List Device

list device <device_name>

Print the details of a specified device.

```
nlvm [nlvm_options] list device <device_name>
```

Command Option

device_name

Mandatory. Specify the desired device.

Example

```
sdb
```

Command Example

```
nlvm list device sdb
```

Print the details for the /dev/sdb device.

Response Parameters

The command returns the following information about the specified device:

Device name

Device major:minor numbers

Size of device in MB, GB, or TB

Free space remaining on the device in KB, MB, GB, or TB

Partitioning format MSDOS, GPT, CSM, LVM (meaning Clustered Linux LVM volume),
None

Geometry heads:sectors per track

Shared – (Yes or No) Whether this device is marked as shared

RAID – (Yes or No) Whether this is an NSS software RAID device

For RAID devices, it provides the following information:

Type – 0 or 5 Software RAID type

Segs – Number of segments that this RAID should have

Missing – Segment number (if any) that is missing in the RAID

Stripe – RAID stripe size in bytes (typically kilobytes)

Enbl – (Yes or No) Whether the RAID is enabled on this node

Sync – (1 or 0) Whether the RAID is in sync

% – Percent complete of remirror or restripe

For RAID segments, it provides the following information:

- Segment index
- Segment (partition) name
- Device name of the segment
- Segment size in MB, GB, or TB
- Sync – (1 or 0) If this mirror segment is in sync
- % – Percent this mirror segment is remirrored

For a device's partitions, it provides the following information:

- Partition name
- Partition size
- Partition type
- Pool name if the partition is the NSS type and it contains a pool

Sample Command Responses

Sample 1: Standard Device

```
nlvm list device D1_LH-DFS01-1
D1_LH-DFS01-1 (253:6) size=25.00GB(52428800) free=0KB(0) format=MSDOS
h:s=255:63 shared=Yes RAID=No

Partition D1_LH-DFS01-1_part1.1 size=24.99GB(52427968) type=NSS
pool=DFS01_TEST
```

Sample 2: Mirror Device

```
nlvm list device myraid
myraid (253:1) size=199.99GB(419430368) free=179.99GB(377487328)
format=MSDOS h:s=255:32 shared=No RAID=Yes

Mirror segs=2 enbl=Yes sync=1 100%
  Segment 0: sdc1.1 device=sdcc size=200.00GB(419430400) sync=Yes 100%
  Segment 1: sdd1.1 device=sddd size=200.00GB(419430400) sync=Yes 100%

Partition myraid1.1 size=20.00GB(41943040) type=NSS pool=MYPOOL
```

Sample 3: RAID 0 Device

```
nlvm list device myraid
myraid (253:1) size=199.99GB(419430368) free=179.99GB(377487328)
format=MSDOS h:s=255:32 shared=No RAID=Yes

Raid type 0 segs=3 missing=None stripe=64k enbl=Yes sync=1 100%
  Segment 0: sdc1.1 device=sdcc size=66.69GB(139878400)
  Segment 1: sdd1.1 device=sddd size=66.69GB(139878400)
  Segment 2: sde1.1 device=sdee size=66.69GB(139878400)

Partition myraid1.1 size=20.00GB(41943040) type=NSS pool=MYPOOL
```

6.24 List Devices

list devices [more] [exclude]

Print a list of the devices. For each device, display the device name, size, free available space, partitioning type, if it is marked as Shareable for Clustering, and if it is an NSS software RAID device. If no other options are specified, this prints a list of all devices and software RAID devices.

```
nlvm [nlvm_options] list devices [more] [exclude]
```

Command Options

more

Specifies to print detailed information about each of the devices. This is the same information that is printed for the `list device` command.

Example

```
more
```

exclude=<raid|nonraid|shared|nonshared|lvm|nonlvm>

Exclude the specified type of devices. This option can be used multiple times to add exclusions for different types. Valid device types are `raid`, `nonraid`, `shared`, `nonshared`, `lvm`, or `nonlvm`.

Example

```
exclude=raid exclude=nonshared
```

Command Example

```
nlvm list devices more exclude=raid exclude=nonshared exclude=lvm
```

Print the details for all non-LVM shared devices that are not software RAID devices.

Response Parameters

The command returns the following information about the devices on the server:

Device name

Size of device in MB, GB, or TB

Free space available on the device in KB, MB, GB, or TB

Partitioning format MSDOS, GPT, CSM, LVM (meaning Clustered Linux LVM volume),
None

Shared – (Yes or No) Whether this device is marked as Shareable for Clustering

RAID – (Yes or No) Whether this is an NSS software device

If the `more` option is specified, the information returned for each device is the same as for the `list device` command.

Sample Command Responses

```
nlvm list devices | egrep "LH-DFS01-|LH-DFS01 |LH_DFS01"
```

```
D1_LH-DFS01 size=100.00GB free=99.99GB format=GPT shared=Yes RAID=No
D1_LH-DFS01-1 size=25.00GB free=0KB format=MSDOS shared=Yes RAID=No
D1_LH-DFS01-2 size=25.00GB free=24.99GB format=GPT shared=Yes RAID=No
D1_LH-DFS01-3 size=50.00GB free=49.99GB format=MSDOS shared=Yes RAID=No
D2_LH-DFS01 size=100.00GB free=99.99GB format=MSDOS shared=Yes RAID=No
D2_LH-DFS01-1 size=25.00GB free=24.99GB format=MSDOS shared=Yes RAID=No
D2_LH-DFS01-2 size=25.00GB free=24.99GB format=GPT shared=Yes RAID=No
D2_LH-DFS01-3 size=50.00GB free=49.99GB format=GPT shared=Yes RAID=No
D3_LH-DFS01 size=100.00GB free=0KB format=None shared=No RAID=No
cluster2.sbd size=99.57MB free=0KB format=None shared=Yes RAID=Yes
```

```
nlvm list devices
```

```
mpatha size=232.88GB free=232.88GB format=MSDOS shared=No RAID=No
mpathc size=2.44TB free=1.50TB format=GPT shared=Yes RAID=No
```

6.25 List Linux Volumes

list linux volumes

Print a list of Linux POSIX volumes and for each, display its path, mount point, file system type, NCP enabled status, and mount status. There are no command options available.

```
nlvm [nlvm_options] list linux volumes
```

Command Example

```
nlvm list linux volumes
```

Print a list of Linux POSIX volumes and the paths where they are mounted.

Response Parameters

The command returns the following information about the Linux volumes on the server:

Volume name. If it is LVM, this is the name you assigned to the logical volume. If it is not LVM, this is the name of the last directory of the mount point.

Device path. For LVM, this is typically `/dev/<volume_group_name>/<logical_volume_name>`. If it is not LVM, this is the partition path.

Mount point where the volume is mounted.

File system type (such as `btrfs` (in OES 11 SP1 or later), `ext2`, `ext3`, `reiserfs`, or `xfs`).

If NCP is enabled, it displays NCP.

If it is mounted, it displays Mounted.

Sample Command Response

```
nlvm list linux volumes
```

```
Linux Volumes:
Name=/ Path=/dev/sda3 mountpoint=/ type=ext3 Mounted
Name=/boot Path=/dev/sda1 mountpoint=/boot type=ext2 Mounted
Name=/lxvd Path=/dev/sdd1 mountpoint=/usr/novell/lx/lxvd type=xfs NCP
Mounted
Name=lvmlve Path=/dev/lvmvge/lvmlve mountpoint=/usr/novell/lvm/lvmlve
type=xfs NCP Mounted
```

6.26 List Move

list move <<move_name>|<pool_name>>

Print detailed information about a specified NSS pool move. It lists the devices you are moving from and the devices you are moving to, such as

```
from=sdc,sdd,sde to=sdg
```

If a pool is cluster-enabled, the pool move is enabled and active only on the node where the pool cluster resource is currently online. On other nodes in the cluster, the pool move is not enabled.

```
nlvm [nlvm_options] list move <<move_name>|<pool_name>>
```

The move occurs as a low-level block mirror between the original location and the new location. The entire pool area is mirrored. The response reports the number of mirror regions to be moved for the pool relative to the maximum original pool size, which is unrelated to the NSS blocks in use. The region count for the old pool location does not change during the move. The complete parameter indicates the number of regions that have been moved so far and the percentage that it represents of the total number of regions to be moved.

The size of a mirror region is determined internally based on the total size of the mirror. One sector is used to track the number of mirror regions that are currently synchronized. A bit represents a mirror region, and there are 4096 bits total (512 * 8) to track. A shift technique is used so that the mirror region size is always a power of 2 (128, 256, 512, and so on) and the total number of regions to move is less than or equal to 4096. Except for very small mirrors, the number of mirror regions is usually between 2048 and 4096. The minimum mirror region size used is 64 sectors (32 KB). There is no maximum. For an 8 TB pool the mirror region size is 2 GB. When a complete region is mirrored, the bit is set. If a region is partially mirrored during a system failure or cluster resource migration, the entire region is remirrored when mirroring resumes.

The response lists the set of devices that are being used for the original location (from) and the new location (to).

Command Option

move_name or *pool_name*

Mandatory. Specify the name of the move, such as POOLNAME_move. You can alternatively specify the pool name.

Example

MYPOOL_move

Command Example

```
nlvm list move MYPOOL_move
```

Print detailed information about the MYPOOL_move move.

Response Parameters

The command returns the following information about the specified pool move:

- Name of the move. Typically, <pool_name>_move.
- Major:minor of the move object
- Name of the pool being moved
- From set of devices for the pool being moved
- To set of devices for the pool in its new location
- Size of the pool being moved
- Total number of mirror regions to be moved
- Number of mirror regions that are complete along with associated percent complete
- Status of the "from" group (Active, ReadError, WriteError, Missing, NotEnabled)
- Status of the "to" group (Active, ReadError, WriteError, Missing, NotEnabled)

Sample Command Responses

Sample 1: Cluster Node where the Pool Cluster Resource Is Active

```
nlvm list move DFS01_TEST

Move=DFS01_TEST_move (253:200) pool=DFS01_TEST
from=raid5_1,sde,sdd,sdg to=sdg,sdd
oldsize=7.19GB(15087616) regions=3684 complete=1245(33%)
fromstat=Active tostat=Active
```

Sample 2: Any Cluster Node where the Pool Cluster Resource Is Not Active

```
nlvm list move DFS01_TEST

Move=DFS01_TEST_move (253:200) pool=DFS01_TEST
from=raid5_1,sde,sdd,sdg to=sdg,sdd
Move is not enabled on this node.
```

6.27 List Moves

list moves

Print a list of current NSS pool moves. There are no command options available.

If a pool is cluster-enabled, the pool move is enabled and active only on the node where the pool cluster resource is currently online. On other nodes in the cluster, the pool move is not enabled.

```
nlvm [nlvm_options] list moves
```

Command Example

```
nlvm list moves
```

Print a list of NSS pool moves that are in progress now.

Response Parameters

The command returns the following information about the pool moves on the server:

Name of the move. Typically, *<pool_name>_move*.

Name of the pool being moved

Percent complete

Status of the “from” group (*Active, ReadError, WriteError, Missing, NotEnabled*)

Status of the “to” group (*Active, ReadError, WriteError, Missing, NotEnabled*)

Sample Command Responses

Sample 1: Server with No Active Moves

```
nlvm list moves
No moves
```

Sample 2: Cluster Node where the Pool Cluster Resource Is Active

```
nlvm list moves

Moves:
Name=DFS01_TEST_move Pool=DFS01_TEST complete=71% fromstat=Active
tostat=Active
```

Sample 3: Any Cluster Node where the Pool Cluster Resource Is Not Active

```
nlvm list moves

Moves:
Name=DFS01_TEST_move Pool=DFS01_TEST complete=0% fromstat=NotEnabled
tostat=NotEnabled
```

6.28 List Partition

list partition <partition_name>

Print detailed information about a specified partition.

```
nlvm [nlvm_options] list partition <partition_name>
```

Command Option

partition_name

Mandatory. Specify the node name (such as *sdc1.1*) for the partition.

Example

```
sdc1.1
```

Command Example

```
nlvm list partition sdc1.1
```

Print detailed information about the `/dev/sdc1.1` partition.

Response Parameters

The command returns the following information about the specified partition:

- Name of the partition
- Major:minor of the partition (if applicable)
- Device the partition is on
- Name of the pool using this partition (if applicable)
- Partition type in both hex and type name if known
- Starting sector of the partition
- Size of the partition in both byte format and sector count
- Whether the partition is shared for clustering or not (1, 0)

Sample Command Response

```
nlvm list partition clus1.msbd0
```

```
clus1.msbd0 (0:0) on sdb pool= type=1AD(Cluster) start=32
size=99.59MB(203968) shared=1
Label: clus1
```

6.29 List Partitions

list partitions [device] [mask]

Print a list of partitions based on the options. If no command options are specified, all data partitions are listed.

```
nlvm [nlvm_options] list partitions [device] [mask]
```

Command Options

device=*device_name*

Print a list of the partitions on the specified device.

Example

```
device=sdb
```

mask=<free|all|nss|nssfree>

Print a list of the partitions that meet the specified mask option.

Mask Options

free

Print a list of only the free space partitions.

all

Print a list of both data and free space partitions.

nss

Print a list of only NSS type partitions.

nssfree

Print a list of free space that can be used to create NSS partitions. This option combines contiguous free space together to give a true view of available space.

Example

```
mask=nss
```

Command Example

```
nlvm list partitions device=sdb mask=nss
```

Print a list of partitions of type nss on the /dev/sdb device.

Response Parameters

The command returns the following information about the specified partition:

- Name of the partition
- Device the partition is on
- Partition type in both hex and type name if known
- Starting sector of the partition
- Size of the partition in both byte format and sector count

Sample Command Responses

Sample 1: All Partitions

```
nlvm list partitions

sda1 device=sda type=83(Linux) start=63 size=196.07MB(401562)
sda2 device=sda type=82(Linux Swap) start=401625 size=1019.75MB(2088450)
sda3 device=sda type=83(Linux) start=2490075 size=8.49GB(17816085)
sda5.1 device=sda type=169(NSS) start=20306223 size=400.00MB(819200)
sda6.1 device=sda type=169(NSS) start=21125538 size=200.00MB(409600)
sda7.1 device=sda type=169(NSS) start=21543228 size=200.00MB(409600)
clus1.msbd0 device=sdb type=1AD(Cluster) start=32 size=99.59MB(203968)
clus1.msbd1 device=sd c type=1AD(Cluster) start=32 size=99.59MB(203968)
sde1.1 device=sde type=169(NSS) start=32 size=200.00MB(409600)
```

Sample 2: Partitions that Contain a Specified String in the Name

```
nlvm list partitions | grep LH-DFS01-

D1_LH-DFS01-1_part1.1 device=D1_LH-DFS01-1 type=169(NSS) start=32
size=24.99GB(52427968)
```

6.30 List Pool

list pool <pool_name>

Print detailed information about a specified NSS pool.

```
nlvm [nlvm_options] list pool <pool_name>
```

Command Option

pool_name

Mandatory. Specify the name of the NSS pool.

Example

```
MYPOOL1
```

Command Example

```
nlvm list pool MYPOOL1
```

Print detailed information about the pool MYPOOL1.

Response Parameters

The command returns the following information about the specified pool:

- Pool name
- Major:minor of the pool object
- State of the pool (active, deactive, maintenance, unknown)
- Size of the pool in byte format
- Used space in byte format
- Number of segments in the pool
- Number of volumes in the pool
- Whether the pool is shared for clustering or not (Yes, No)
- If it is a snapshot pool, it displays “snapshot”
- Name of the pool move (if applicable)
- Percent complete of the pool move (if applicable)
- Date and time the pool was created

The command returns the following information about the pool’s segments:

- Starting offset in the pool
- Next offset in the pool
- Partition name for this segment

Sample Command Responses

Sample 1: Pool with No Volumes

```
nlvm list pool DFS01 TEST
DFS01_TEST (253:162) state=active size=24.99GB used=78.56MB segments=1
volumes=0 shared=Yes
Created Wed Sep 28 11:00:06 2011
1: Start 0 Next 52427936 on D1_LH-DFS01-1_part1.1
```

Sample 2: Pool with a Volume

```
nlvm list pool DFS01 TEST
DFS01_TEST (253:162) state=active size=24.99GB used=78.62MB segments=1
volumes=1 shared=Yes
Created Wed Sep 28 11:00:06 2011
1: Start 0 Next 52427936 on D1_LH-DFS01-1_part1.1
```

Sample 3: Pool with a Pool Move at 100% but before Complete Move

```
nlvm list pool DFS01 TEST
DFS01_TEST (253:162) state=active size=99.99GB used=2.51GB segments=3
volumes=1 shared=Yes
Move object DFS01_TEST move at 100% complete
Created Wed Sep 28 13:50:44 2011
1: Start 0 Next 52427936 on LH_DFS01_01_R1
2: Start 52427936 Next 104856607 on LH_DFS01_02_R1
3: Start 104856607 Next 209712543 on LH_DFS01_03_R1
```

Sample 4: Pool Is Deactive

```
nlvm list pool DFS01 TEST
DFS01_TEST (253:162) state=deactive segments=3 shared=No
```

6.31 List Pools

list pools [more] [exclude]

Print a list of all NSS pools.

```
nlvm [nlvm_options] list pools [more] [exclude]
```

Command Options

more

Print detailed information about each pool. This option provides the same information as the `list pool` command.

Example

```
more
```

exclude=<nss|shared|nonshared|snap|snapnomount>

Specify types of pools to exclude from the list. The `exclude` option can be used multiple times to add exclusions.

Exclude Options

nss

NSS pools

shared

Shared pools

nonshared

Pools that are not shared

snap

Snapshot pools that are mounted

snapnomount

Snapshot pools that are not mounted

Example

```
exclude=snap exclude=snapnomount
```

Command Example

```
nlvm list pools more exclude=shared
```

Print detailed information about the each of the pools, but exclude shared pools.

Response Parameters

The command returns the following information about the pools on the server:

Pool name

Size of the pool in byte format (KB, MB, GB, or TB)

If mounted, it displays “mounted”

If it is a snapshot pool, it displays “snapshot”

Whether the pool is shared for clustering or not (Yes, No)

If the `more` option is specified, the information returned for each pool is the same as for the `list pool` command.

Sample Command Response

```
nlvm list pools
```

```
POOLA size=199.98MB mounted shared=No
POOLB size=199.98MB mounted shared=No
POOLD size=399.98MB mounted shared=No
POOLE size=199.98MB mounted shared=No
```

6.32 List Snap

list snap <snap_name>

Print detailed information about a specified snapshot. There are no command options available.

```
nlvm [nlvm_options] list snap <snap_name>
```

Command Example

```
nlvm list SNAP1
```

Print a detailed information about SNAP1.

Response Parameters

The command returns the following information about the specified pool snapshot:

Name of the snapshot

Major:minor of the snapshot object

Pool that is being snapped

Partition used to store copy-on-write data

Mounted state of the snapshot (mounted, not_mounted)

Size of the snapshot (same size as the pool)

Size of the partition storing the copy-on-write data

Chunk size

Percent of space on the partition that is used for copy-on-write-data

Snap flags in hex (2=shared, 4=mounted, 8=snapshot, 16=valid DM object, 32=writeable, 64=invalid, this snapshot has a duplicate partition)

Sample Command Responses

Sample 1: Snap Is Not Mounted

```
nlvm list snap DFS01_TEST_S1
```

```
Snap=DFS01_TEST_S1 (253:145) pool=DFS01_TEST partition=D2_LH-DFS01-1_part1.1 state=not_mounted
size=209652188 part_size=10485760 chunk=128 %=0 flags=30
```

Sample 2: Snap Is Mounted

```
nlvm list snap DFS01_TEST_S2
```

```
Snap=DFS01_TEST_S2 (253:192) pool=DFS01_TEST partition=D2_LH-DFS01-1_part1.2 state=mounted
size=209652188 part_size=10485760 chunk=128 %=0 flags=34
```

6.33 List Snaps

list snaps [more]

Print a list of all snapshots.

```
nlvm [nlvm_options] list snaps [more]
```

Command Option

more

Displays details about each of the snapshots. This is the same information as in the `list snap` command.

Example

more

Command Example

```
nlvm list snaps more
```

Print a list of all snapshots and detailed information about each one.

Response Parameters

The command returns the following information about the pool snapshots on the server:

Name of the snapshot

Pool that is being snapped

Mounted state of the snapshot (mounted, not_mounted)

If the `more` option is specified, the information returned for each pool snapshot is the same as for the `list snap` command.

Sample Command Response

```
nlvm list snaps
```

```
DFS01_TEST_S3 pool=DFS01_TEST state=not_mounted
DFS01_TEST_S2 pool=DFS01_TEST state=mounted
DFS01_TEST_S1 pool=DFS01_TEST state=not_mounted
```

6.34 List Volume

list volume <volume_name>

Print detailed information about a specified NSS volume.

```
nlvm [nlvm_options] list volume <volume_name>
```

Command Option

volume_name

Mandatory. Specify the name of the NSS volume.

Example

MYVOL1

Command Example

```
nlvm list volume MYVOL1
```

Print detailed information about the volume MYVOL1.

Response Parameters

The command returns the following information about the specified NSS volume:

Volume name

Pool name

Volume state (active, deactive)

Mount point

Amount of space used

Amount of free space

Amount of purgeable space

Volume quota (value, none)

Number of objects

Number of files
Authentication model ID (1, 0)
Block size
Shred count
Read Ahead Blocks setting
Primary name space
Name spaces supported (for NSS volumes: DOS, MAC, UNIX, LONG)
Date created
Date last modified
Date last modified
Date last archived

Sample Command Response

```
nlvm list volume DFS01_TEST
```

```
Volume DFS01_TEST on pool DFS01_TEST State=active
Mountpoint: /media/nss/DFS01_TEST
Used=556KB Free=24.92GB Purgeable=12KB
Quota=none
Objects=13 Files=13 authModelID=1
Blocksize=4096 ShredCount=1 ReadAheadblocks=16
Primary name space: LONG Namespaces Supported: DOS MAC UNIX LONG
Create time: Wed Sep 28 11:11:34 2011
Mod time: Wed Sep 28 11:11:55 2011
Archive time: never
```

6.35 List Volumes

list volumes

Print a list of NSS volumes on the system. There are no command options available.

```
nlvm [nlvm_options] list volumes
```

Command Example

```
nlvm list volumes
```

Print a list of NSS volumes.

Response Parameters

The command returns the following information about the NSS volumes on the server:

Volume name
Pool name
Volume state (active, deactive)

Sample Command Response

```
nlvm list volumes
```

```
Volumes:
DFS02_TEST on pool DFS02_TEST state=active
LH_DRSTORE01 on pool LH_DRSTORE01 state=active
LH_USER01 on pool LH_USER01 state=active
LH_USER04 on pool LH_USER04 state=active
DFS01_TEST on pool DFS01_TEST state=active
```

6.36 Mount

mount *<pool_name>*

Mount a specified NSS pool.

```
nlvm [nlvm_options] mount <pool_name>
```

Command Option

pool_name

Mandatory. Specify the name of the NSS pool to mount.

The `nlvm mount` command internally sets the `-m` flag, so only the specified pool is mounted.

Example

```
MYPOOL1
```

Command Example

```
nlvm mount MYPOOL1
```

Mount the pool MYPOOL1.

6.37 Move

move *<pool_name>* *<device>* *<size>* [*<device>* *<size>*...]

Move an NSS pool from one location to another on the same system. If the new location is larger than the original location, the pool is automatically expanded after the move is complete.

```
nlvm [nlvm_options] move <pool_name> <device> <size> [<device> <size>...]
```

You can use the `device` and `size` combination multiple times to create a move target comprised of multiple segments. You must specify a size for each device. The device and size options can be used in any order. The first device instance is matched to the first size instance, and so on. The move target's size is the sum of the space contributed from the specified segments.

The total size of the target must be at least as big as the pool. You cannot shrink a pool by using the move command. If the size is larger, the pool size is expanded when the move is complete.

If a pool is cluster-enabled, issue the command on the node where the pool cluster resource is currently online. The move advances only when the resource is online. If the pool cluster resource is cluster migrated to another node, the move is enabled and active on the new node when the resource is brought online, and then the pool move continues. The status of the pool move can be reported only on the node where the resource is online.

You can check the status of a pool move by using the `nlvm list move` command.

When the move status is 100% complete, it is not yet final. You can issue the `nlvm complete move <move_name>` command to finalize the move. This sets the pool to the new location and removes the original location. Other NSS utilities might also complete the move. For information, see “Moving a Pool” in the *OES 11 SP1: NSS File System Administration Guide for Linux*.

You can delete a pool move by using the `nlvm delete move` command with the `abort` option. This sets the pool back to the original location and removes the new location.

In a cluster, issue the commands to complete, delete, or list the pool move from the node where the pool cluster resource is currently online.

Command Options

pool_name

Mandatory. Specify the name of the NSS pool to be moved. This must be the first command option.

Example

```
MYPOOL1
```

device=*device_name*

Mandatory. Specify the target device where the pool will be relocated.

You can specify multiple device instances to create a move target comprised of multiple segments. Each device instance must have a matching *size* instance. The first device instance is matched to the first size instance, and so on.

Example

```
device=sdg
```

size=*<value[K|M|G|T]|max>*

Mandatory. Specify the size of the target partition. The size must be the same size or larger than the original pool.

If multiple devices are specified, each device instance must have a matching *size* instance. The first size instance is matched to the first device instance, and so on.

Example

```
size=200G  
size=3.98T
```

Command Examples

```
nlvm move MYPOOL1 device=sdg size=200G
```

Move the NSS pool named MYPOOL1 to the /dev/sdg device and allocate 200 GB to the partition.

```
nlvm move MYPOOL1 device=sdg size=200G device=sdh size=500G
```

Move the NSS pool named MYPOOL1 to a 700 GB space comprised of 200 GB of free space from device sdg and 500 GB of free space from device sdh.

6.38 Pool Activate

pool activate *<pool_name>*

Activate a specified NSS pool.

```
nlvm [nlvm_options] pool activate <pool_name>
```

Command Option

pool_name

Mandatory. Specify the name of the NSS pool to activate.

Example

```
MYPOOL1
```


Command Example

```
nlvm pool activate MYPOOL1
```

Activate the pool MYPOOL1.

6.39 Pool Deactivate

pool deactivate <pool_name>

Deactivate a specified NSS pool.

```
nlvm [nlvm_options] pool deactivate <pool_name>
```

Command Option

pool_name

Mandatory. Specify the name of the NSS pool to deactivate.

Example

```
MYPOOL1
```

Command Example

```
nlvm pool deactivate MYPOOL1
```

Deactivate the pool MYPOOL1.

6.40 RAID

raid <raid_action> <raid_name>

Perform actions on an NSS software RAID device.

```
nlvm [nlvm_options] raid <raid_action> <raid_name>
```

RAID Actions

abort <raid_name>

Abort the restripe or remirror currently in progress on the specified NSS software RAID. If the restripe/remirror is complete, the command has no effect.

Example

```
nlvm raid abort MYRAID1
```

delete <raid_name>

Delete a single element mirror from a pool, and leave the pool on the corresponding partition. This applies for RAID 1 (mirror) objects only.

This is a duplicate of the `nlvm delete raid` command, but it is added here for support reasons. This command removes only a single element mirror object.

Example

```
nlvm raid delete MYRAID1
```

disable <raid_name>

Disable an NSS software RAID device from remIRRORing or restriping on this server, and do not allow stamp updates to occur.

This command is used in Novell Cluster Services clusters to disable an NSS software RAID device that is active on another node.

Example

```
nlvm raid disable MYRAID1
```

enable <raid_name>

Enable a RAID device to remirror or restripe on this server. This enables an NSS software RAID device that was disabled by using the `nlvm raid disable` command.

This command is used in Novell Cluster Services clusters to enable an NSS software RAID device for this node. It is important that the RAID device be enabled on only one node at a time.

WARNING: Use caution when in a cluster configuration to avoid possible corruption that can occur if the RAID is enabled on multiple nodes at the same time.

Example

```
nlvm raid enable MYRAID1
```

force <raid_name>

Force a single element mirror to be in sync. This condition can occur if a mirror element was removed, and the last element shows that it is not in sync due to a crash after a successful remirror. This command is only valid on NSS software RAID 1 (mirror) devices.

If you have a single element RAID 1 where the element shows out of sync, you can alternatively put it into sync (if you feel that it has all of the data) by selecting the Restripe (F6) function on the Software RAID page in NSSMU.

WARNING: If a remirror has not completed successfully on this element, using the `nlvm raid force` command causes the element to look in sync, but the data is not there, and is corrupt. Use this command only if you know that a remirror was completed successfully on this element.

Example

```
nlvm raid force MYRAID1
```

pause <raid_name>

Pause a remirror process to allow other I/O to happen during a heavy I/O process. This command is valid only on NSS software RAID 1 (mirror) devices. Because remIRRORING can cause many I/Os to the devices, a pause allows other I/Os to happen more quickly.

The device must be resumed again by using the `nlvm raid resume` command. The pause is intended to be used only for a short time.

Example

```
nlvm raid pause MYRAID1
```

remirror <raid_name>

Restart a remirror or restripe process on the specified NSS software RAID device that has either been aborted, or has failed.

Example

```
nlvm raid remirror MYRAID1  
nlvm raid remirror MYRAID5
```

resume <raid_name>

Resume a remirror process that was paused by using the `nlvm raid pause` command. This command is valid only on NSS software RAID 1 (mirror) devices.

Example

```
nlvm raid resume MYRAID1
```

status [*raid_name*]

Check the status on one or all NSS software RAID devices. The name is optional. If a name is specified, it returns detailed status for the given RAID device. If the name is omitted, it returns the status for all the NSS software RAID devices on the server.

Example

```
nlvm raid status MYRAID1
nlvm raid status
```

Command Option

raid_name

Mandatory when specified. Specify the name of the NSS software RAID device to be acted upon.

Example

```
MYRAID1
```

Sample Command Responses

Sample 1: RAID Status During a Remirror

```
nlvm raid status LH_DFS01_01_R1

LH_DFS01_01_R1 is remirroring at 9%
--> D1_LH-DFS01-1_part1.1 (100%) In Sync
--> D2_LH-DFS01-1_part1.1 (9%) Out of Sync
```

Sample 2: RAID Status During a Remirror on a Cluster Node where the RAID Is Not Active

```
nlvm raid status

LH_DFS01_01_R1 is remirroring at 5%
LH_DFS02_R1 is Synchronized
tst-nda04150cl.sbd is not active on this node
```

6.41 Rename Pool

rename pool <*pool_name*> <*new_pool_name*>

Rename a specified NSS pool.

```
nlvm [nlvm_options] rename pool <pool_name> <new_pool_name>
```

Command Option

pool_name

Mandatory. Specify the name of the NSS pool to rename.

Example

```
MYPOOL1
```

new_pool_name

Mandatory. Specify the new name of the NSS pool.

For pool naming conventions, see the [create pool](#) command.

Example

P_SALES

Command Example

```
nlvm rename pool MYPOOL1 P_SALES
```

Rename the pool MYPOOL1 as P_SALES.

6.42 Rename RAID

rename raid <raid_name> <new_raid_name>

Rename a specified NSS software RAID device.

If the RAID device is shared, issue the command on the node where the device is currently online.

```
nlvm [nlvm_options] rename raid <raid_name> <new_raid_name>
```

Command Option

raid_name

Mandatory. Specify the name of the NSS software RAID device to rename.

Example

MYRAID1

new_raid_name

Mandatory. Specify the new name of the NSS software RAID device. See the `create raid` command for RAID naming conventions.

Example

R1_SALES

Command Example

```
nlvm rename raid MYRAID1 R1_SALES
```

Rename the NSS software RAID device MYRAID1 as R1_SALES.

6.43 Rename Volume

rename volume <volume_name> <new_volume_name> [encryption_password]

Rename a specified NSS volume. If the volume is encrypted, you might also need to provide its encryption password.

If a volume's pool is cluster-enabled, issue the command on the node where the pool cluster resource is currently online.

```
nlvm [nlvm_options] rename volume <volume_name> <new_volume_name>  
[encryption_password]
```

Command Option

volume_name

Mandatory. Specify the name of the NSS volume to rename.

Example

MYVOL1

new_volume_name

Mandatory. Specify the new name of the NSS volume.

Volume names are 2 to 15 characters. The naming conventions are the same as for pools. See the `create pool` command for naming conventions.

Example

V_SALES

encryption_password

Optional. If the volume is encrypted, the volume's encryption password might be needed. You can try the command without the password. If the password is needed, you are prompted to enter it.

Example

novell

Command Example

```
nlvm rename volume MYVOL1 V_SALES
```

Rename the NSS volume MYVOL1 as V_SALES.

```
nlvm rename volume MYVOL2 V_FINANCE novell
```

Rename the encrypted NSS volume MYVOL2 as V_FINANCE. In this example, the encryption password is novell.

6.44 Rescan

rescan

Performs a rescan of the storage objects (such as partitions, NSS pools, and NSS software RAIDs) on known devices, and creates any Device Mapper device or partition objects, or updates them as needed. It also mounts all pools that are not mounted unless you use the `-m` option. There are no command options.

```
nlvm [nlvm_options] rescan
```

Command Example

```
nlvm rescan
```

Scans for storage objects, creates and updates Device Mapper objects, and mounts pools as needed.

6.45 Share

share <device_name>

Set the specified device as shared.

```
nlvm [nlvm_options] share <device_name>
```

Command Option

device_name

Mandatory. Specify the device to be shared.

You can enter multiple devices by separating the device names with a comma and no spaces.

Example

```
sdb  
sde,sdf,sdg
```

Command Example

```
nlvm share sdb
```

Sets the /dev/sdb device as shared.

```
nlvm share sde,sdf,sdg
```

Sets the /dev/sde, /dev/sdf, and /dev/sdg devices as shared.

6.46 Unmount

unmount <pool_name>

Unmount a specified NSS pool. This removes the pool from NSS and causes any open files to be closed and any volumes to be deactivated. It also removes the Device Mapper object for the pool, the link to the Device Mapper object, and the mount point for the pool. This allows you to gracefully log out the server from an iSCSI device that contains a pool. Use this command with caution.

```
nlvm [nlvm_options] unmount <pool_name>
```

Command Option

pool_name

Mandatory. Specify the name of the NSS pool to unmount.

Use the unmount command to temporarily unload a pool in order to manage underlying devices. Pools are by design auto mounted. Therefore, running the nssmu utility, or running most nlvm commands without the -m option can cause an unmounted pool to be remounted if underlying devices and partitions still exist. To execute an nlvm command without mounting the unmounted pools, you must include the -m option. The nlvm mount command internally sets the -m flag, so only the specified pool is mounted.

Example

```
MYPOOL1
```

Command Example

```
nlvm unmount MYPOOL1
```

Unmount the pool MYPOOL1.

6.47 Unshare

unshare <device_name>

Set the specified device as not shared.

```
nlvm [nlvm_options] unshare <device_name>
```

Command Option

device_name

Mandatory. Specify the device to be unshared.

You can enter multiple devices by separating the device names with a comma and no spaces.

Example

```
sdb  
sde,sdf,sdg
```

Command Example

```
nlvm unshare sdb
```

Sets the /dev/sdb device as not shared.

```
nlvm unshare sde,sdf,sdg
```

Sets the /dev/sde, /dev/sdf, and /dev/sdg devices as not shared.

6.48 Volume Mount

volume mount <volume_name> [encryption_password]

Mount a specified NSS volume. This also activates the volume before mounting it.

```
nlvm [nlvm_options] volume mount <volume_name> [encryption_password]
```

Command Options

volume_name

Mandatory. Specify the name of the NSS volume to mount.

Example

```
MYVOL
```

encryption_password

Optional. The password is required to mount an encrypted NSS volume on the first mount after a reboot. Thereafter, the password is stored encrypted in system memory until the next server reboot.

Example

```
novell
```

Command Examples

```
nlvm volume mount MYVOL
```

Mount the volume MYVOL.

```
nlvm volume mount MYVOL2 novell
```

Mount the encrypted volume MYVOL2 on the first mount after a reboot. Thereafter until the next reboot, the password is not used to mount the volume. For example:

```
nlvm volume mount MYVOL2
```

6.49 Volume Unmount

volume unmount *<volume_name>*

Dismount a specified NSS volume. This also deactivates the volume before dismounting it.

```
nlvm [nlvm_options] volume unmount <volume_name>
```

Command Option

volume_name

Mandatory. Specify the name of the NSS volume to dismount.

Example

MYVOL

Command Example

```
nlvm volume unmount MYVOL
```

Dismount the volume MYVOL.

7 NLVM Examples for the NSS File System

This section provides examples for using the Novell Linux Volume Manager to manage the Novell Storage Services (NSS) file system on your Novell Open Enterprise Server (OES) 11 Support Pack 1 (SP1) servers.

For information about using NLVM commands to create and manage Linux POSIX volumes on your OES 11 SP1 servers, see “[Managing Linux Volumes with NLVM Commands](#)” in the *OES 11 SP1: Linux POSIX Volume Administration Guide*.

- ♦ [Section 7.1, “Creating an NSS Pool and Volume,” on page 81](#)
- ♦ [Section 7.2, “Mirroring a Pool Partition,” on page 81](#)
- ♦ [Section 7.3, “Recovering a Mirror where All Elements Report ‘Not in Sync’,” on page 82](#)
- ♦ [Section 7.4, “Logging Out of an iSCSI Device that Contains an NSS Pool,” on page 82](#)

7.1 Creating an NSS Pool and Volume

Enter commands at a terminal command prompt as the root user.

Create an NSS pool named `MYPOOL1` with a size of 100 GB on device `/dev/sdb`. Create a volume on the new pool named `MYVOL`.

```
nlvm create pool device=sdb size=100G name=MYPOOL1
```

```
nlvm create volume name=MYVOL pool=MYPOOL1
```

The command to create an NSS pool creates the partition, pool, Device mapper object, (such as `/dev/nss/sdb1.1`), and activates the pool.

The command to create the volume creates the volume and automatically mounts it if the pool is not shared. If the pool is shared and cluster enabled, you must configure the pool cluster resource and use the Novell Cluster Services commands to bring the resource and its volume online.

7.2 Mirroring a Pool Partition

You can mirror an existing NSS pool partition by using the `Create RAID` command with the `part=<existing_partition_name>` option as follows:

```
nlvm [nlvm_options] create raid
    name=<raid_name>
    raid=1
    [type=nss|sbd]
    part=<pool_partition_name>
    device=<device_name>
```

This command specifies the existing pool partition as the first segment of a RAID1 mirror. You must specify the `device` option one time with the device to use as its mirror. You do not specify a size in the command. The size of the existing partition determines the amount of space that is used for the

mirrored segment. The partition type created for the mirror is the same type as the original partition. After you mirror the partition, you manage the RAID1 device by using the normal NSS software RAID management tools and commands.

For example, if `POOL1` uses partition `sdc1.1`, the following command creates an NSS software RAID 1 mirrored device named `POOL1RAID1`. The pool's existing partition becomes the first segment of the RAID, and its existing data is mirrored to device `sdf`.

```
nlvm create raid name=POOL1RAID1 raid=1 part=sdc1.1 device=sdf
```

7.3 Recovering a Mirror where All Elements Report 'Not in Sync'

If all elements of a mirrored RAID report a status of "not in sync", use the following procedure to recover the mirror.

- 1 Determine which element you believe to be the in-sync element.
- 2 Log in to the server as the `root` user, and open a terminal console.
- 3 Using the `nlvm delete raid segment` command, remove all of the elements from the mirror except the element you want to keep.

For each element that you want to remove, enter the following command. When you are prompted to confirm, type `yes`, then press Enter. Wait for the segment to be removed before you remove the next segment.

```
nlvm --force delete raid <raid_name> segment <segment_number>
```

Use the `--force` NLVM option to force the deletion of an out-of-sync segment. When you are done, you have a RAID1 device that consists of the single element that you believed to be the in-sync element.

For example, enter

```
nlvm -f delete raid MYRAID1 segment 0
```

When prompted to confirm the deletion, type `yes`, then press Enter.

- 4 Force the single RAID element to be in sync. At the command prompt, enter

```
nlvm raid force <raid_name>
```

- 5 Add elements back into the mirror as desired by using the `nlvm raid expand` command. At the command prompt, enter

```
nlvm expand raid <raid_name> device=<device_name>
```

The `device` option can be specified multiple times to specify additional segments.

7.4 Logging Out of an iSCSI Device that Contains an NSS Pool

Before you log out of an iSCSI device that is used for an NSS pool, you must first unmount the volumes, deactivate the pool, and unmount the pool. Log out of iSCSI immediately after you unmount the pool.

IMPORTANT: The `nlvm unmount <poolname>` command removes the pool's Device Mapper object and allows the device to be disconnected gracefully. Otherwise, a server hang can occur.

- 1 Log in to the server as the `root` user, then launch a terminal console.
- 2 Launch NSSMU.

```
nssmu
```

- 3 Dismount the volumes on the pool.
 - 3a In the NSSMU main menu, select *Volumes*, then press Enter.
 - 3b Select the volume, then press F7 to dismount it.
 - 3c If the pool contains multiple volumes, repeat [Step 3b](#) for each volume.
 - 3d Press Esc to exit the Volumes page.
- 4 Deactivate the pool.
 - 4a In the NSSMU main menu, select *Pools*, then press Enter.
 - 4b Select the pool, then press F7 to deactivate it.
 - 4c Press Esc to exit the Pools page.
- 5 Press Esc to exit NSSMU.

Ensure that you have exited NSSMU before you continue. It is essential that there be no cached states for device, partition, and pool objects within NSSMU.

- 6 Use NLVM to unmount the pool.

```
nlvm unmount <poolname>
```

An unmounted pool is a temporary state. You must log out of the iSCSI connection immediately after executing the `nlvm unmount <poolname>` command before any NLVM or NSSMU command is executed. As soon as NSSMU is run, NSSMU remounts the pool in order to manage it. In addition, almost any NLVM command that is run after the unmount also causes the pool to be remounted unless you use the `-m` option.

- 7 Log out of the iSCSI connection.
 - 7a Launch YaST to manage the iSCSI client.

```
yast2 iscsi-client
```

- 7b Select the *Connected Targets* tab, then select the iSCSI device and click *Logout*.

8 NLVM Examples for Clustering with Novell Cluster Services

This section provides examples for using the Novell Linux Volume Manager with Novell Cluster Services on your Novell Open Enterprise Server (OES) 11 Support Pack 1 (SP1) servers.

- ♦ [Section 8.1, “Creating or Mirroring an SBD Partition,” on page 85](#)
- ♦ [Section 8.2, “Unmirroring a Mirrored SBD Partition with NLVM,” on page 97](#)
- ♦ [Section 8.3, “Deleting an SBD Partition with NLVM,” on page 98](#)

8.1 Creating or Mirroring an SBD Partition

If a single node (or group of nodes) somehow becomes isolated from other nodes, a condition called *split brain* results. Each side believes the other has failed, and forms its own cluster view that excludes the nodes it cannot see. Neither side is aware of the existence of the other. If the split brain is allowed to persist, each cluster will fail over the resources of the other. Since both clusters retain access to shared disks, corruption will occur when both clusters mount the same volumes.

Novell Cluster Services provides a split-brain detector (SBD) function to detect a split-brain condition and resolve it, thus preventing resources from being loaded concurrently on multiple nodes. The SBD partition contains information about the cluster, nodes, and resources that helps to resolve the split brain condition.

Novell Cluster Services requires an SBD partition for a cluster if its nodes use physically shared storage. Typically, you create the SBD when you configure the cluster on the first node. You can alternatively configure an SBD for the cluster after you configure the first node, but before you configure Novell Cluster Services on the second node of the cluster. You might also need to delete and re-create an SBD partition if the SBD becomes corrupted or its device fails.

An SBD must exist and the cluster must be enabled for shared disk access before you attempt to create shared storage objects such as pools and volumes in a cluster. NLVM and other NSS management tools need the SBD to detect if a node is a member of the cluster and to get exclusive locks on physically shared storage.

Typically, you use the Novell Cluster Services SBD Utility (`sbdutil`) to create or delete an SBD partition for a cluster, as described in [“Creating or Deleting Cluster SBD Partitions”](#) in the *OES 11 SP1: Novell Cluster Services 2.1 for Linux Administration Guide*. However, you can also use NLVM commands in OES 11 SP1 and later to create or delete SBD partitions.

Use the procedures in this section to create a non-mirrored or mirrored SBD partition:

- ♦ [Section 8.1.1, “Requirements and Guidelines for Creating an SBD Partition,” on page 86](#)
- ♦ [Section 8.1.2, “Creating a Non-Mirrored SBD Partition with NLVM,” on page 88](#)
- ♦ [Section 8.1.3, “Mirroring an Existing SBD Partition with NLVM,” on page 91](#)
- ♦ [Section 8.1.4, “Creating a Mirrored SBD Partition with NLVM,” on page 93](#)

8.1.1 Requirements and Guidelines for Creating an SBD Partition

Consider the requirements and guidelines in this section when you create a Novell Cluster Services SBD (split-brain detector) partition.

- ♦ [“Preparing Novell Cluster Services” on page 86](#)
- ♦ [“Using a Shared Disk System” on page 86](#)
- ♦ [“Preparing a SAN Device” on page 86](#)
- ♦ [“Working with NLVM Commands in a Cluster” on page 87](#)
- ♦ [“Initializing and Sharing a Device for the SBD” on page 87](#)
- ♦ [“Determining the SBD Partition Size” on page 87](#)
- ♦ [“Replacing an Existing SBD Partition” on page 87](#)

Preparing Novell Cluster Services

Before you create an SBD partition for an existing cluster, you must take the cluster down and stop Novell Cluster Services software on all nodes. Do not restart Novell Cluster Services and rejoin nodes to the cluster until after you create the new SBD and configure the Shared Disks flag attribute for the Cluster object.

You can mirror an existing SBD while the cluster is up and running.

Using a Shared Disk System

You must have a shared disk system (such as a Fibre Channel SAN or an iSCSI SAN) connected to your cluster nodes before you create a split-brain-detector (SBD) partition. For information, see [“Shared Disk Configuration Requirements”](#) in the *OES 11 SP1: Novell Cluster Services 2.1 for Linux Administration Guide*.

Preparing a SAN Device

Use the SAN storage array software to carve a LUN to use exclusively for the SBD partition. The device should have at least 20 MB of free available space. Connect the LUN device to all nodes in the cluster.

For device fault tolerance, you can use the `nlvm create raid` command to mirror the SBD partition on another SAN device. Before you mirror the device, you must carve a second LUN of the same size, and connect the LUN device to all nodes in the cluster.

The device you use to create the SBD must not be a software RAID device. A hardware RAID configured in a SAN array is seen as a regular device by the server.

If you attach new devices to the server while it is running, you should scan for new devices on each cluster node to ensure that the devices are recognized by all nodes. Log in as the root user, launch a terminal console, then enter

```
nlvm -s rescan
```

Working with NLVM Commands in a Cluster

If an SBD does not exist in the cluster, NLVM cannot detect if a node is a member of the cluster and cannot get exclusive locks to the physically shared storage. In this state, you must use the `-s` NLVM option to override the shared locking requirement and force NLVM to execute the commands you use to create the SBD partition. To minimize the risk of possible corruption, you are responsible for ensuring that you have exclusive access to the shared storage at this time.

Initializing and Sharing a Device for the SBD

When you use `sbdutil` to create an SBD, you must initialize the SAN device that you created for the SBD, and mark it as Shareable for Clustering before you create the SBD partition. When you mark the device as Shareable for Clustering, share information is added to the disk in a free-space partition that is about 4 MB in size. This space becomes part of the SBD partition.

When you use NLVM to create an SBD, the `nlvm create partition` command can accept an initialized or uninitialized device when you use the `type=1ad` option. NLVM checks the specified device to see if it is initialized, and takes the following actions:

- **Uninitialized device:** NLVM initializes the device, marks it as Shareable for Clustering, and creates the requested SBD partition.
- **Initialized and shared device:** NLVM creates the requested SBD partition.
- **Initialized and unshared device:** NLVM creates the requested SBD partition, but does not alter the shared state. It returns an error warning that the SBD partition is not shared.

You must manually mark the device as Shareable for Clustering after the partition is created. You can use the `nlvm share` command to share the device.

Determining the SBD Partition Size

When you create the SBD partition by using the `nlvm create partition` command, you can specify how much free space to use for the SBD, or you can specify the `max` option to use the entire device. If you specify a device to use as a mirror, the same amount of space is used. If you specify to use the maximum size and the mirror device is bigger than the SBD device, you will not be able to use the excess free space on the mirror for other purposes.

Because an SBD partition must end on a cylinder boundary, the partition size might be slightly smaller than the size you specify. When you use an entire device for the SBD partition, you can use the `max` option as the size, and let the software determine the size of the partition.

Replacing an Existing SBD Partition

To replace an existing SBD partition, you must first delete the old SBD partition, and then create the new one. To reuse the SBD partition's device, you must remove the SBD partition, then re-initialize and share the device.

You must take the cluster down and stop Novell Cluster Services on all nodes before you delete the existing SBD partition. Do not restart Novell Cluster Services and rejoin nodes to the cluster until after you create the new SBD.

8.1.2 Creating a Non-Mirrored SBD Partition with NLVM

Use the procedure in this section to create a new SBD partition. If an SBD partition already exists, you must first delete the SBD as described in [Section 8.3, “Deleting an SBD Partition with NLVM,” on page 98](#).

- 1 Ensure that nobody else is changing any storage on any nodes at this time.
Until the SBD exists and the cluster is set up for shared disk access, you are responsible for ensuring that you have exclusive access to the shared storage.
- 2 Take the cluster down:
 - 2a Log in to any node in the cluster as the `root` user, then open a terminal console.
 - 2b At the command prompt, enter
- 3 On each cluster node, stop Novell Cluster Services:
 - 3a Log in to the cluster node as the `root` user, then open a terminal console.
 - 3b At the command prompt, enter
 - 3c After you have stopped Novell Cluster Services on all nodes, continue with the next step.
- 4 Prepare a SAN device to use for the SBD partition:
 - 4a Use the SAN storage array software to carve a device to use exclusively for the SBD partition.
 - 4b Attach the device to all nodes in the cluster.
 - 4c On each node, log in as the `root` user and rescan for devices:

```
nlvm -s rescan
```

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

- 5 Log in to any node in the cluster as the `root` user, then open a terminal console.

- 6 View a list of the devices and identify the leaf node name (such as `sdc`) of the SAN device that you want to use for the SBD partition. At the command prompt, enter

```
nlvm -s list devices
```

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

The device information shows the leaf node name, the size, the amount of free available space, the partitioning format (such as MSDOS or GPT), the shared state (whether it is marked as Shareable for Clustering), and the RAID state (whether the device is an NSS software RAID device). Do not use an NSS software RAID for the device.

For example, an uninitialized device reports a format of `None` and a shared state of `No`:

```
sdc size=102.00MB free=0KB format=None shared=No RAID=No
```

- 7 Initialize and share the device. At the command prompt, enter

```
nlvm -s init <device_name> format=msdos shared
```

WARNING: Initializing a device destroys all data on the device.

Replace *device_name* with the leaf node name (such as *sdc*) of the SAN device you want to use as the SBD partition.

Specify a partitioning format of *msdos*.

Specify the *shared* option to mark the device as Shareable for Clustering.

Use the *-s* NLVM option to override the shared locking requirement and force the command to execute.

You can list the devices to visually verify that the device is formatted and shared:

```
nlvm -s list devices
```

For example, the formatted device *sdc* reports a format of *MSDOS* and a shared state of *Yes*:

```
sdc size=102.00MB free=101.98MB format=MSDOS shared=Yes RAID=No
```

- 8 Create the SBD partition. At the command prompt, enter (all on the same line):

```
nlvm -s create partition
      type=1ad
      device=<device_name>
      size=<value[K|M|G|T] |max>
      label="<cluster_name>"
```

Specify a type of *1ad* to create the SBD partition type.

Replace *device_name* with the leaf node name (such as *sdc*) of the SAN device you want to use as the SBD partition.

Replace *value* with the amount of space to use for the SBD partition and select a unit of measure as its multiplier, or specify *max* to use the entire device. If you specify a value without a multiplier, gigabytes (G) is assumed.

Replace *cluster_name* with the name of the cluster, such as *cluster1*. This name must match the name of an existing cluster that has a Cluster object in Novell eDirectory. The name is case sensitive.

Use the *-s* NLVM option to override the shared locking requirement and force the command to execute.

For example, to create an SBD partition for a cluster named *cluster1* on device *sdc* that has already been initialized and shared, enter

```
nlvm -s create partition type=1ad device=sdc size=max label="cluster1"
```

A partition is created named *cluster1.sbd* that uses all available free space on the specified device.

- 9 View a list of partitions and verify that the new partition appears in the list. At the command prompt, enter

```
nlvm -s list partitions
```

Use the *-s* NLVM option to override the shared locking requirement and force the command to execute.

The partition information shows the partition name, the leaf node name of the device, the partition type (1AD), the starting location, and the partition size. Because an SBD partition must end at a cylinder boundary, the partition size might be slightly smaller than the device size, or the size you specified for the partition.

For example, for device *sdc* that is 102 MB in size, the partition created is 99.59 MB in size:

```
cluster1.sbd device=sdc type=1AD(Cluster) start=32 size=99.59MB(203968)
```

You can list devices again to see the amount of space that is unused beyond the cylinder boundary. Our example device shows 2.39 MB of free space after the partition is created:

```
sdc size=102.00MB free=2.39MB format=MSDOS shared=Yes RAID=No
```

- 10 Modify the Cluster object in eDirectory to enable its NCS: Shared Disk Flag attribute.

This step is required only if the cluster has never had an SBD partition. However, it does no harm to verify that the *NCS: Shared Disk Flag* attribute is enabled.

- 10a In a Web browser, open iManager, then log in to the Novell eDirectory tree that contains the cluster you want to manage.

IMPORTANT: Log in as an administrator user who has sufficient rights in eDirectory to delete and modify eDirectory objects.

- 10b Select *Directory Administration*, then select *Modify Object*.

- 10c Browse to locate and select the Cluster object of the cluster you want to manage, then click OK.

- 10d Under *Valued Attributes*, select the NCS: Shared Disk Flag, then click *Edit*.

Modify Object: cluster.novell

General **Other**

Valued Attributes

- GUID
- modifiersName
- NCS:CRM Quorum
- NCS:CRM Quorum Timeout
- NCS:CRM Resource Priority
- NCS:Email Addresses
- NCS:Email Filter
- NCS:GPC Heartbeat
- NCS:GPC Master Watchdog
- NCS:GPC Max Retransmits
- NCS:GPC Slave Watchdog
- NCS:GPC Tolerance
- NCS:Network Address
- NCS:Port Number
- NCS:Revision
- NCS: Shared Disk Flag**
- Network Address
- Object Class
- Revision
- Used By

Unvalued Attributes

- ACL
- Audit:File Link
- Certificate Validity Interval
- Cross Certificate Pair
- DirXML-Associations
- Equivalent To Me
- Last Referenced Time
- masvAuthorizedRange
- masvDefaultRange
- masvProposedLabel
- NCS:CRM HMO Setting
- NCS:CRM Load Script
- NCS:CRM Load Timeout
- NCS:CRM Unload Script
- NCS:CRM Unload Timeout
- NCS:GPC Config
- NCS:Node Isolation Script
- Other GUID
- rbsAssignedRoles
- rbsAssignedRoles2

Edit... **Delete**

OK **Cancel** **Apply** **Refresh**

- 10e Select (enable) the *NCS: Shared Disk Flag* check box, then click OK.

Edit Attribute

NCS: Shared Disk Flag

☒

OK **Cancel**

- 10f Click *Apply* to save changes.

- 11 On each cluster node, start Novell Cluster Services:
 - 11a Log in to the cluster node as the `root` user, then open a terminal console.
 - 11b At the command prompt, enter


```
rcnovell-ncs start
```
 - 11c After you have restarted Novell Cluster Services on all nodes, continue with the next step.
- 12 On each cluster node, join the cluster. At the command prompt, enter


```
cluster join
```
- 13 (Optional) Continue with [Section 8.1.3, “Mirroring an Existing SBD Partition with NLVM,”](#) on [page 91](#).

8.1.3 Mirroring an Existing SBD Partition with NLVM

You can mirror an existing Novell Cluster Services SBD partition to provide device fault tolerance. It is not necessary to take the cluster down or stop the cluster software.

- 1 Prepare a SAN device to use as the mirror segment for the SBD partition:
 - 1a Use the SAN storage array software to carve a device that is at least the size of the existing SBD partition’s device.
 - 1b Attach the device to all nodes in the cluster.
 - 1c On each node, log in as the `root` user and rescan for devices:

```
nlvm rescan
```

- 2 Log in to any member node of the cluster as the `root` user, then open a terminal console.
- 3 View a list of the devices and identify the leaf node name (such as `sde`) of the SAN device that you want to use as the mirror for the existing SBD partition. At the command prompt, enter

```
nlvm list devices
```

For example, an uninitialized device reports a format of `None` and a shared state of `No`:

```
sde size=102.00MB free=0KB format=None shared=No RAID=No
```

- 4 Initialize and share the device. At the command prompt, enter

```
nlvm init <device_name> format=msdos shared
```

WARNING: Initializing a device destroys all data on the device.

Replace *device_name* with the leaf node name (such as `sde`) of the SAN device you want to use as the mirror for the existing SBD partition.

Specify a partitioning format of `msdos`.

Specify the `shared` option to mark the device as Shareable for Clustering.

You can list the devices to visually verify that the device is formatted and shared:

```
nlvm list devices
```

For example, the formatted device `sde` reports a format of `MSDOS` and a shared state of `Yes`:

```
sde size=102.00MB free=101.98MB format=MSDOS shared=Yes RAID=No
```

- 5 Mirror the SBD partition. At the command prompt, enter (all on the same line):

```
nlvm create raid
raid=1
name=<cluster_name>
type=sbd
part=<partition_name>
device=<device_name>
```

Specify a RAID type of 1 for mirroring.

Replace *cluster_name* with the name of the SBD's cluster, such as `cluster1`. This name must match the name of an existing cluster that has a Cluster object in Novell eDirectory. The name is case sensitive.

Specify a type of `sbd` to create SBD partitions on the RAID1 device. The `type` option must precede the `part` option in the command.

Replace *partition_name* with the partition name of the existing SBD partition.

Replace *device_name* with the leaf node name (such as `sde`) of the SAN device you want to use as the mirror for the existing SBD partition. The device must be at least the same size as the partition you want to mirror.

You do not specify a size in the command. The size of the existing partition determines the amount of space that is used for the mirrored segment.

For example, to mirror the SBD partition `cluster1.sbd` with device `sde` for a cluster named `cluster1`, enter

```
nlvm create raid raid=1 type=sbd name=cluster1 part=cluster1.sbd device=sde
```

For our example, a RAID1 (mirror) device is created named `cluster1.sbd` that is made up of device `sdc` and device `sde`. The existing SBD partition is renamed from `cluster1.sbd` to `cluster1.msbd0`. A new partition named `cluster1.msbd1` is created on device `sde`.

- 6 View a list of devices to verify the current state of both devices and to verify that a RAID1 device named `cluster1.sbd` was created. At the command prompt, enter

```
nlvm list devices
```

The entries of interest in the devices list are the devices that you use for the SBD partition (such as `sdc` and `sde`) and the newly created RAID1 device:

```
sdc size=102.00MB free=2.39MB format=MSDOS shared=Yes RAID=No
sde size=102.00MB free=2.39MB format=MSDOS shared=Yes RAID=No
cluster1.sbd size=99.57MB free=0KB format=None shared=Yes RAID=Yes
```

- 7 View a list of partitions to verify the status of mirrored SBD partitions `cluster1.msbd0` and `cluster1.msbd1`. At the command prompt, enter

```
nlvm list partitions
```

The entries of interest in the list are:

```
cluster1.msbd0 device=sdc type=1AD(Cluster) start=32 size=99.59MB(203968)
cluster1.msbd1 device=sde type=1AD(Cluster) start=32 size=99.59MB(203968)
```

8.1.4 Creating a Mirrored SBD Partition with NLVM

You can create a mirrored Novell Cluster Services SBD partition to provide device fault tolerance for the SBD. You must take the cluster down and stop the cluster software. If an SBD partition already exists, you must first delete the SBD as described in [Section 8.3, “Deleting an SBD Partition with NLVM,” on page 98](#).

Use the procedure in this section to create a new mirrored SBD partition by using NLVM commands.

- 1 Ensure that nobody else is changing any storage on any nodes at this time.

Until the SBD exists and the cluster is set up for shared disk access, you are responsible for ensuring that you have exclusive access to the shared storage.

- 2 Take the cluster down:

2a Log in to any node in the cluster as the `root` user, then open a terminal console.

2b At the command prompt, enter

```
cluster down
```

- 3 On each cluster node, stop Novell Cluster Services:

3a Log in to the cluster node as the `root` user, then open a terminal console.

3b At the command prompt, enter

```
rcnovell-ncs stop
```

3c After you have stopped Novell Cluster Services on all nodes, continue with the next step.

- 4 Prepare two SAN devices to use for the mirrored SBD partition:

4a Use the SAN storage array software to carve two devices of equal size to use exclusively for the mirrored SBD partition.

4b Attach the devices to all nodes in the cluster.

4c On each node, log in as the `root` user and rescan for devices:

```
nlvm -s rescan
```

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

- 5 Log in to any node in the cluster as the `root` user, then open a terminal console.

- 6 View a list of the devices and identify the leaf node name (such as `sdc`) of the two SAN devices that you want to use for the mirrored SBD partition. At the command prompt, enter

```
nlvm -s list devices
```

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

The device information shows the leaf node name, the size, the amount of free available space, the partitioning format (such as MSDOS or GPT), the shared state (whether it is marked as Shareable for Clustering), and the RAID state (whether the device is an NSS software RAID device). Do not use an NSS software RAID for the device.

For example, uninitialized devices report a format of `None` and a shared state of `No`:

```
sdc size=102.00MB free=0KB format=None shared=No RAID=No
sdd size=102.00MB free=0KB format=None shared=No RAID=No
```

- 7 Initialize and share the two devices. At the command prompt, enter

```
nlvm -s init <device_name1>,<device_name2> format=msdos shared
```

WARNING: Initializing a device destroys all data on the device.

Replace *device_name1* and *device_name2* with the leaf node names (such as *sdc* and *sdd*) of the two SAN devices you want to use for the mirrored SBD partition.

Specify a partitioning format of *msdos*.

Specify the *shared* option to mark the devices as Shareable for Clustering.

Use the *-s* NLVM option to override the shared locking requirement and force the command to execute.

For example, to initialize devices *sdc* and *sdd*, enter

```
nlvm -s init sdc,sdd format=msdos shared
```

You can list the devices to visually verify that the device is formatted and shared:

```
nlvm -s list devices
```

For example, the formatted devices *sdc* and *sdd* report a format of MSDOS and a shared state of Yes:

```
sdc size=102.00MB free=101.98MB format=MSDOS shared=Yes RAID=No
sdd size=102.00MB free=101.98MB format=MSDOS shared=Yes RAID=No
```

8 Create the mirrored SBD partition. At the command prompt, enter (all on the same line):

```
nlvm -s create raid
      raid=1
      type=sbd
      name=<cluster_name>
      device=<device_name1> size=max
      device=<device_name2>
```

Specify a RAID type of 1 for mirroring.

Specify a type of *sbd* to create SBD partitions on the RAID1 device.

Replace *cluster_name* with the name of the cluster, such as *cluster1*. This name must match the name of an existing cluster that has a Cluster object in Novell eDirectory. The name is case sensitive.

Replace *device_name1* and *device_name2* with the leaf node names (such as *sdc* and *sdd*) of the two SAN devices you want to use for the mirrored SBD partition. The *cluster1.msbd0* mirrored SBD partition is created on the first device option instance in the command. The *cluster1.msbd1* mirrored SBD partition is created on the second device option instance in the command.

Specify a size of *max* to use all of the available space. Specify the size only once. Both devices should be the same size, but if they are not, the size of the RAID segments is determined by the size of the smaller device.

Use the *-s* NLVM option to override the shared locking requirement and force the command to execute.

For example, to create a mirrored SBD for a cluster named *cluster1* with devices *sdc* and *sdd* that have already been initialized and shared, enter

```
nlvm -s create raid raid=1 type=sbd name="cluster1" device=sdc size=max device=sdd
```

A RAID1 device is created named *cluster1.sbd*. The *cluster1.msbd0* partition is created on device *sdc*. The *cluster1.msbd1* partition is created on device *sdd*.

9 View a list of devices to verify the current state of both devices and to verify that a RAID1 device named *cluster1.sbd* was created. At the command prompt, enter

```
nlvm -s list devices
```

The entries of interest in the devices list are the devices that you used for the SBD RAID1 device (such as `sdc` and `sdd`) and the newly created RAID1 device:

```
sdc size=102.00MB free=2.39MB format=MSDOS shared=Yes RAID=No
sdd size=102.00MB free=2.39MB format=MSDOS shared=Yes RAID=No
cluster1.sbd size=99.57MB free=0KB format=None shared=Yes RAID=Yes
```

- 10** View a list of partitions and verify that the new partitions appear in the list. At the command prompt, enter

```
nlvm -s list partitions
```

The partition information shows the partition name, the leaf node name of the device, the partition type (1AD), the starting location, and the partition size. Because an SBD partition must end at a cylinder boundary, the partition size might be slightly smaller than the device size, or the size you specified for the partition.

For example, for devices `sdc` and `sdd` that are 102 MB in size, the partitions created are 99.59 MB in size:

```
cluster1.msbd0 device=sdc type=1AD(Cluster) start=32 size=99.59MB(203968)
cluster1.msbd1 device=sdd type=1AD(Cluster) start=32 size=99.59MB(203968)
```

You can list devices again to see the amount of space that is unused beyond the cylinder boundary. Our example devices show 2.39 MB of free space after the partition is created, as shown in [Step 9](#).

- 11** Modify the Cluster object in eDirectory to enable its NCS: Shared Disk Flag attribute.

This step is required only if the cluster has never had an SBD partition. However, it does no harm to verify that the NCS: Shared Disk Flag attribute is enabled.

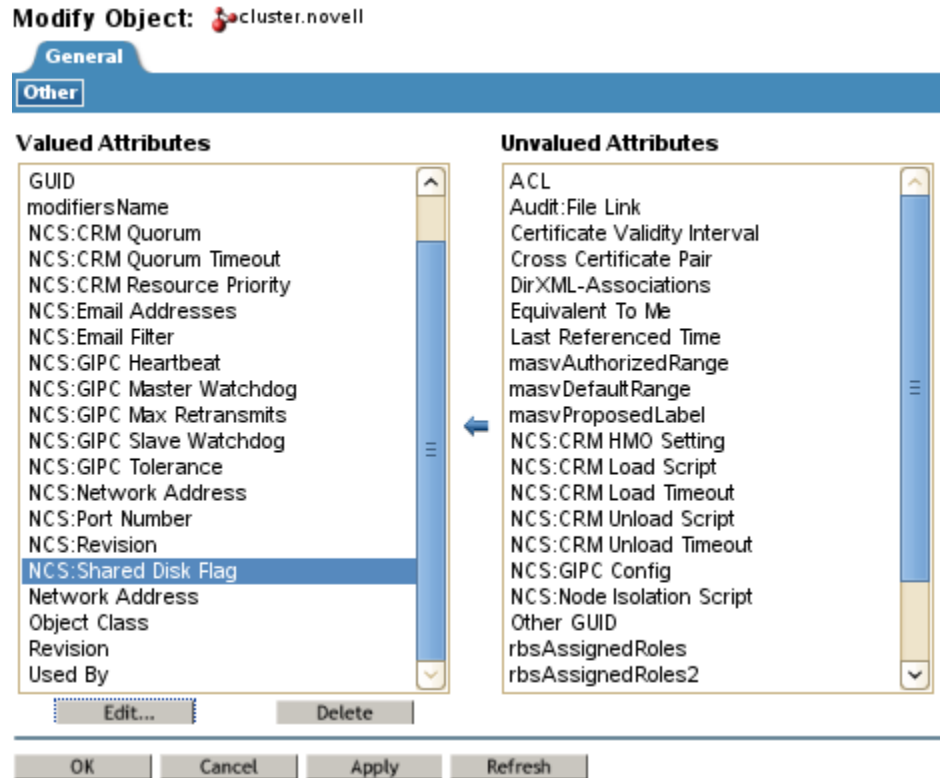
- 11a** In a Web browser, open iManager, then log in to the Novell eDirectory tree that contains the cluster you want to manage.

IMPORTANT: Log in as an administrator user who has sufficient rights in eDirectory to delete and modify eDirectory objects.

- 11b** Select *Directory Administration*, then select *Modify Object*.

- 11c** Browse to locate and select the Cluster object of the cluster you want to manage, then click *OK*.

- 11d** Under *Valued Attributes*, select the *NCS: Shared Disk Flag*, then click *Edit*.



- 11e** Select (enable) the *NCS: Shared Disk Flag* check box, then click *OK*.



- 11f** Click *Apply* to save changes.
- 12** On each cluster node, start Novell Cluster Services:
- 12a** Log in to the cluster node as the *root* user, then open a terminal console.
- 12b** At the command prompt, enter
- ```
rcnovell-ncs start
```
- 12c** After you have restarted Novell Cluster Services on all nodes, continue with the next step.
- 13** On each cluster node, join the cluster. At the command prompt, enter
- ```
cluster join
```


8.2 Unmirroring a Mirrored SBD Partition with NLVM

Use the procedure in this section to remove the mirrored segment from a mirrored SBD partition, and then remove the single element mirror from the SBD. This leaves a single device that contains an SBD partition.

- 1 Log in to any node as the root user, then launch a terminal console.

- 2 Delete the mirrored segment from the mirrored SBD partition. At the command prompt, enter

```
nlvm [--force] [--no-prompt] delete raid <raid_name> segment <segment_number>
```

You are automatically prompted to confirm the delete action. Respond by typing *yes* or *no*, then pressing Enter. You can use the `--no-prompt` NLVM option to suppress the confirmation prompt.

Replace *raid_name* with the name of the mirrored SBD RAID device that contains the segment to be deleted, such as `cluster1.sbd`. The RAID name is case sensitive.

Replace *segment_number* with the segment index (zero relative) to be removed. For a mirrored SBD RAID the possible values are 0 and 1.

Use the `--force` NLVM option to remove out-of-sync segments.

For example, to delete segment 1 of the `cluster1.sbd` RAID1 device, enter

```
nlvm delete raid cluster1.sbd segment 1
```

- 3 View a list of partitions and verify that the SBD partition named `<cluster_name>.msbd1` has been deleted. At the command prompt, enter

```
nlvm list partitions
```

- 4 View a list of RAID1s and verify that the SBD RAID1 device `<cluster_name>.sbd` still exists. At the command prompt, enter

```
nlvm list raids
```

- 5 Delete the single element mirror from the SBD. At the command prompt, enter

```
nlvm [--no-prompt] delete raid <raid_name>
```

You are automatically prompted to confirm the delete action. Respond by typing *yes* or *no*, then pressing Enter. You can use the `--no-prompt` NLVM option to suppress the confirmation prompt.

Replace *raid_name* with the name of the mirrored SBD RAID device that contains the segment to be deleted, such as `cluster1.sbd`. The RAID name is case sensitive.

Because the RAID device is now a single element RAID1, this command removes the single element mirror from the SBD, and leaves the SBD partition on the device. The SBD partition is renamed from `<cluster_name>.msbd0` to `<cluster_name>.sbd`, and the RAID1 device `<cluster_name>.sbd` is deleted.

- 6 View a list of RAID1s and verify that the SBD RAID1 device `<cluster_name>.sbd` has been removed. At the command prompt, enter

```
nlvm list raids
```

- 7 View a list of partitions and verify that the SBD partition name has been changed from `<cluster_name>.msbd0` to `<cluster_name>.sbd`. At the command prompt, enter

```
nlvm list partitions
```

For example, the SBD partition entry is now:

```
cluster1.sbd device=sdC type=1AD(Cluster) start=32 size=99.59MB(203968)
```

8.3 Deleting an SBD Partition with NLVM

You might need to delete and re-create a Novell Cluster Services SBD partition if the SBD becomes corrupted or its device fails. Use the procedure in this section to delete the SBD partition, then create a new SBD partition by using one of the methods in [Section 8.1, “Creating or Mirroring an SBD Partition,”](#) on page 85.

IMPORTANT: You must take the cluster down and stop Novell Cluster Services on all nodes before you delete the existing SBD partition. Do not restart Novell Cluster Services and rejoin nodes to the cluster until after you create a new SBD.

- 1 Ensure that nobody else is changing any storage on any nodes at this time.

Until the SBD exists and the cluster is set up for shared disk access, you are responsible for ensuring that you have exclusive access to the shared storage.

- 2 Take the cluster down:

2a Log in to any node in the cluster as the `root` user, then open a terminal console.

2b At the command prompt, enter

```
cluster down
```

- 3 On each cluster node, stop Novell Cluster Services:

3a Log in to the cluster node as the `root` user, then open a terminal console.

3b At the command prompt, enter

```
rcnovell-ncs stop
```

3c After you have stopped Novell Cluster Services on all nodes, continue with the next step.

- 4 Log in to any node in the cluster as the `root` user, then launch a terminal console.

- 5 If the SBD partition is mirrored, unmirror the SBD partition:

5a Delete the mirrored segment from the mirrored SBD partition. At the command prompt, enter

```
nlvm -s [--force] [--no-prompt] delete raid <raid_name> segment <segment_number>
```

You are automatically prompted to confirm the delete action. Respond by typing `yes` or `no`, then pressing Enter. You can use the `--no-prompt` NLVM option to suppress the confirmation prompt.

Replace *raid_name* with the name of the mirrored SBD RAID device that contains the segment to be deleted, such as `cluster1.sbd`. The RAID name is case sensitive.

Replace *segment_number* with the segment index (zero relative) to be removed. For a mirrored SBD RAID the possible values are 0 and 1.

Use the `--force` NLVM option to remove out-of-sync segments.

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

For example, to delete segment 1 of the `cluster1.sbd` RAID1 device, enter

```
nlvm -s --force delete raid cluster1.sbd segment 1
```

5b Delete the single element mirror from the SBD. At the command prompt, enter

```
nlvm -s [--no-prompt] delete raid <raid_name>
```

Because the RAID device is now a single element RAID1, this command removes the single element mirror from the SBD, and leaves the SBD partition on the device.

You are automatically prompted to confirm the delete action. Respond by typing *yes* or *no*, then pressing Enter. You can use the `--no-prompt` NLVM option to suppress the confirmation prompt.

Replace *raid_name* with the name of the mirrored SBD RAID device that contains the segment to be deleted, such as `cluster1.sbd`. The RAID name is case sensitive.

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

For example, to delete the single element mirror from the `cluster1.sbd` device, enter

```
nlvm -s delete raid cluster1.sbd
```

5c View a list of RAID1s and verify that the SBD RAID1 device `<cluster_name>.sbd` has been removed. At the command prompt, enter

```
nlvm -s list raids
```

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

5d View a list of partitions and verify that the SBD partition name has been changed from `<cluster_name>.msbd0` to `<cluster_name>.sbd`. At the command prompt, enter

```
nlvm -s list partitions
```

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

For example, the SBD partition entry is now:

```
cluster1.sbd device=sdC type=1AD(Cluster) start=32 size=99.59MB(203968)
```

6 Delete the SBD partition. At the command prompt, enter

```
nlvm -s delete partition <partition_name>
```

Replace *partition_name* with the name of the SBD partition, such as `cluster1.sbd`. The partition name is case sensitive.

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

For example, to delete the single element mirror from the `cluster1.sbd` device, enter

```
nlvm -s delete partition cluster1.sbd
```

7 If you plan to reuse the device for the SBD, initialize and share the device. At the command prompt, enter

```
nlvm -s init <device_name> format=msdos shared
```

WARNING: Initializing a device destroys all data on the device.

Replace *device_name* with the leaf node name (such as `sde`) of the SAN device.

Specify a partitioning format of `msdos`.

Specify the `shared` option to mark the device as Shareable for Clustering.

Use the `-s` NLVM option to override the shared locking requirement and force the command to execute.

You can list the devices to visually verify that the device is formatted and shared:

```
nlvm -s list devices
```

For example, the formatted device `sdc` reports a format of MSDOS and a shared state of Yes:

```
sdc size=102.00MB free=101.98MB format=MSDOS shared=Yes RAID=No
```

- 8** To re-create the SBD partition, continue with [Section 8.1, “Creating or Mirroring an SBD Partition,” on page 85](#).

Do not restart Novell Cluster services and rejoin nodes to the cluster until after you create the new SBD.

9 Troubleshooting NLVM

This section identifies common problems and troubleshooting tips for Novell Linux Volume Manager (NLVM) on your Novell Open Enterprise Server (OES) 11 Support Pack 1 (SP1) server.

- ♦ [Section 9.1, “Viewing Error Code Messages,” on page 101](#)
- ♦ [Section 9.2, “Failure to Create an LVM Volume Group,” on page 101](#)
- ♦ [Section 9.3, “Failure to Create a Clustered LVM Volume Group,” on page 102](#)
- ♦ [Section 9.4, “Device Is Not Available for Use in an LVM Volume Group,” on page 102](#)
- ♦ [Section 9.5, “NLVM Pool Move Fails and Deactivates the Pool,” on page 102](#)
- ♦ [Section 9.6, “NLVM Fails to Mirror from a DOS Partitioned Device to a GPT Partitioned Device of the Same Size,” on page 102](#)
- ♦ [Section 9.7, “Error 20897 - This node is not a cluster member,” on page 103](#)
- ♦ [Section 9.8, “NLVM Error Codes,” on page 103](#)
- ♦ [Section 9.9, “NSS Error Codes,” on page 111](#)

For additional troubleshooting information, see the [Novell Technical Support Web site \(http://www.novell.com/support\)](http://www.novell.com/support).

9.1 Viewing Error Code Messages

If an error message for a failed NLVM command line operation provides an error code without a corresponding message, you can use the `nss /err` command to view the message. At a command prompt, enter

```
nss /err=<error_code_number>
```

You can also use the following command to view the error code message in the NSS Console (`nsscon`):

```
nsscon /ErrorCode=<error_code_number>
```

Type `exit` and press Enter to close the NSS console and return to the command prompt.

9.2 Failure to Create an LVM Volume Group

When you create an LVM volume group or clustered LVM volume group, the command fails with the following error:

```
Error 23384: Not enough free space to handle requested size
```

This error occurs if any one of the devices you used for the volume group is not initialized. Uninitialized devices report that there is no available free space on the device. Initialize the device and try again.

9.3 Failure to Create a Clustered LVM Volume Group

When you create a clustered Linux Volume Manager (LVM) volume group, the command fails with the following error:

```
Error 23384: Device /dev/sde is not shared by clvmd
```

This error can occur if the installed Linux kernel does not contain the latest Clustered LVM software. Clustered LVM requires the Linux kernel 2.6.32.45-0.3 or later. You can get the latest kernel version by using the SUSE Linux Enterprise Server (SLES) 11 SP2 update channel. For information about applying patches for your OES 11 SP1 server, see [“Updating \(Patching\) an OES 11 SP1 Server”](#) in the *OES 11 SP1: Installation Guide*.

9.4 Device Is Not Available for Use in an LVM Volume Group

A device cannot be used to create an LVM volume group if any of the following conditions exist:

- ♦ The device is not initialized.
- ♦ The device contains partitions.
- ♦ The device is marked as Shareable for Clustering, which adds a 4 KB partition on the device to store the shared state.

9.5 NLVM Pool Move Fails and Deactivates the Pool

If a hardware error is encountered during an `nlvm move`, the pool move fails, and the pool is automatically deactivated. Currently, no error is returned, but the pool will not activate.

The pool move cannot continue because of the hardware error. You must delete the move to clear the move:

```
nlvm delete move [<poolname>|<movename>]
```

After the move is deleted, you can activate the pool.

Because of the hardware error, you cannot use the `nlvm move` command to move the pool. You can move the pool's data to another SAN device by restoring files from backup media, or by copying the files from the old pool to a new pool.

9.6 NLVM Fails to Mirror from a DOS Partitioned Device to a GPT Partitioned Device of the Same Size

Because MSDOS partitions can start on sector 32 and GPT partitions start at sector 64, there is a condition where a pool that uses the entire MSDOS device cannot be mirrored to a GPT device of the same size. This problem occurs because the free space on the GPT is 32 sectors smaller. The NLVM command reports an error, and fails to mirror from a DOS partitioned device to a GPT partitioned device of the same size. In NSSMU, the GPT partitioned device is not presented as an option.

If the device has other partitions on it, the problem should not occur because the first partition is already adjusted for the 32 sector difference. It should also work if the GPT device is larger than the DOS device.

To avoid this problem, when mirroring a pool that consumes an entire MSDOS partitioned disk, the device used to mirror it must also be MSDOS if it is the same size. If the device is at least 4 MB larger, it can be either MSDOS or GPT.

9.7 Error 20897 - This node is not a cluster member

If Novell Cluster Services is installed on a node, but an SBD does not exist, NLVM commands return the following error:

```
Error 20897 - This node is not a cluster member.
```

In a Novell Cluster Services cluster, NLVM uses the cluster's SBD to detect if a node is a cluster member and to lock against concurrent changes to physically shared storage. Without an SBD, NLVM cannot detect whether a node is a member of the cluster and cannot acquire the locks it needs to execute tasks. In this state, you can use the -s option with NLVM commands to prepare a device and create an SBD partition. To minimize the risk of corruption, you must ensure that nobody else is changing any storage on any nodes at the same time.

For information about creating an SBD partition by using NLVM commands, see [Section 8.1, "Creating or Mirroring an SBD Partition,"](#) on page 85.

9.8 NLVM Error Codes

Use the information in this section to manage your storage when Novell Linux Volume Manager (NLVM) error conditions exist. NLVM error codes are usually displayed in positive decimal numbers with a message and a status= prefix. For example:

```
Pool is not active: status=23357
```

- ♦ [Section 9.8.1, "NLVM Error List,"](#) on page 103
- ♦ [Section 9.8.2, "NLVM Error Descriptions,"](#) on page 106

9.8.1 NLVM Error List

NLVM error code numbers can be categorized as follows:

- ♦ NLVM General Errors (23300 to 23309)
 - ♦ [23300 zERR NLVM LOCKED](#)
 - ♦ [23301 zERR NLVM BOOT DEVICE](#)
 - ♦ [23302 zERR NLVM DEVICE HAS RAID](#)
 - ♦ [23303 zERR NLVM NO LOCK](#)
 - ♦ [23304 zERR NLVM VLDB SYMBOL ERROR](#)
 - ♦ [23305 zERR NLVM NOT PERMITTED](#)
 - ♦ [23306 zERR NLVM PARSE ERROR](#)
 - ♦ [23307 zERR NLVM INVALID PARAMETER](#)
- ♦ NLVM Device Errors (23310 to 23319)
 - ♦ [23310 zERR NLVM CSM DEVICE](#)
 - ♦ [23311 zERR NLVM DEVICE NOT FOUND](#)
 - ♦ [23312 zERR NLVM PART NOT FOUND](#)

- ♦ 23313 zERR NLVM READ FAILURE
- ♦ 23314 zERR NLVM WRITE FAILURE
- ♦ 23315 zERR NLVM PART EXPAND FAILURE
- ♦ 23316 zERR NLVM SIZE TOO SMALL
- ♦ 23317 zERR NLVM SIZE TOO BIG
- ♦ 23318 zERR NLVM INVALID PART TYPE
- ♦ 23319 zERR NLVM DEVICE NOT INIT
- ♦ NLVM General File System Errors (23320 to 23329)
 - ♦ 23320 zERR NLVM ERROR OPENING DB
 - ♦ 23321 zERR NLVM DB MATCH ERROR
 - ♦ 23322 zERR NLVM INVALID MODE
 - ♦ 23323 zERR NLVM ERROR OPENING CONFIG
 - ♦ 23324 zERR NLVM ERROR OPENING DEBUG
 - ♦ 23325 zERR NLVM ERROR OPENING DEV
 - ♦ 23326 zERR NLVM ERROR READING DEV
 - ♦ 23327 zERR NLVM INVALID VERSION
 - ♦ 23328 (reserved)
 - ♦ 23329 (reserved)
- ♦ NLVM Device Mapper Errors (23330 to 23340)
 - ♦ 23330 zERR NLVM ERROR OPENING DM
 - ♦ 23331 zERR NLVM DM IOCTL ERROR
 - ♦ 23332 zERR NLVM BAD SEGMENT COUNT
 - ♦ 23333 (reserved)
 - ♦ 23334 zERR NLVM BAD IDENTIFIER
 - ♦ 23335 zERR NLVM DM OBJECT NOT FOUND
 - ♦ 23336 zERR NLVM INVALID OBJECT
 - ♦ 23337 zERR NLVM OBJECT EXISTS
 - ♦ 23338 zERR NLVM OBJECT BUSY
 - ♦ 23339 zERR NLVM INVALID TYPE
 - ♦ 23340 zERR NLVM LOAD ERROR
- ♦ NLVM Create Snapshot Error (23341)
 - ♦ 23341 zERR NLVM SNAP NOT FOUND
- ♦ NLVM Create Partition Errors (23342 to 23345)
 - ♦ 23342 zERR NLVM LIMIT ERROR
 - ♦ 23343 zERR NLVM PART CREATE
 - ♦ 23344 zERR NLVM PART DELETE
 - ♦ 23345 zERR NLVM PART WRITE
- ♦ NLVM NSS Pool and Volume Errors (23341 to 23359)
 - ♦ 23346 zERR NLVM UNABLE TO EXPAND POOL
 - ♦ 23347 zERR NLVM UNABLE TO CREATE POOL

- ♦ 23348 zERR NLVM SHARED MISMATCH
- ♦ 23349 zERR NLVM TYPE MISMATCH
- ♦ 23350 zERR NLVM HAS POOL
- ♦ 23351 zERR NLVM DIRECTORY TOO LONG
- ♦ 23352 zERR NLVM UNABLE TO CREATE DIR
- ♦ 23353 zERR NLVM UNABLE TO CREATE NODE
- ♦ 23354 zERR NLVM POOL UPDATE
- ♦ 23355 zERR NLVM POOL MOUNT ERROR
- ♦ 23356 zERR NLVM POOL MAX SIZE
- ♦ 23358 zERR NLVM GROUP NOT FOUND
- ♦ 23359 (reserved)
- ♦ NLVM NSS Pool Snapshot Errors (23360 to 23369)
 - ♦ 23360 zERR NLVM SNAPSHOT ERROR
 - ♦ 23361 to 23369 (reserved)
- ♦ NLVM NSS Software RAID Errors (23370 to 23379)
 - ♦ 23370 zERR NLVM DUPLICATE DEVICE
 - ♦ 23371 zERR NLVM MAX ELEMENTS
 - ♦ 23372 zERR NLVM TOO FEW ELEMENTS
 - ♦ 23373 zERR NLVM SIZE MISMATCH
 - ♦ 23374 zERR NLVM NOT A RAID
 - ♦ 23375 zERR NLVM NOT A MIRROR
 - ♦ 23376 zERR NLVM TOO MANY PARTITIONS
 - ♦ 23377 zERR NLVM RAID NOT IN SYNC
 - ♦ 23378 zERR NLVM RAID NOT ENABLED
 - ♦ 23379 zERR NLVM RAID NONE IN SYNC
- ♦ NLVM Linux POSIX Volume Errors (23380 to 23390)
 - ♦ 23380 zERR NLVM FSTAB UPDATE
 - ♦ 23381 zERR NLVM OPEN ERROR
 - ♦ 23382 zERR NLVM NO VOLUME NAME
 - ♦ 23383 zERR NLVM NO IP ADDRESS
 - ♦ 23384 zERR NLVM ERROR CREATING LVM VOL
 - ♦ 23385 zERR NLVM ERROR MAKING FS
 - ♦ 23386 zERR NLVM ERROR DELETING RES
 - ♦ 23387 zERR NLVM ERROR DELETING LVM VOL
 - ♦ 23388 zERR NLVM ERROR SENDING CMD
 - ♦ 23389 zERR NLVM NCP ERROR
 - ♦ 23390 zERR NLVM DUPLICATE MP
- ♦ NLVM Novell eDirectory Errors (23391 to 233 92)
 - ♦ 23391 zERR NLVM EDIR OBJECT NOT FOUND

- ♦ [23392 zERR NLVM Invalid CRC](#)
- ♦ [23393 to 23399 \(reserved\)](#)

9.8.2 NLVM Error Descriptions

- ♦ [“NLVM General Errors \(23300 to 23309\)” on page 106](#)
- ♦ [“NLVM Device Errors \(23310 to 23319\)” on page 106](#)
- ♦ [“NLVM General File System Errors \(23320 to 23329\)” on page 107](#)
- ♦ [“NLVM Device Mapper Errors \(23330 to 23340\)” on page 108](#)
- ♦ [“NLVM Create Snapshot Error \(23341\)” on page 108](#)
- ♦ [“NLVM Create Partition Errors \(23342 to 23345\)” on page 108](#)
- ♦ [“NLVM NSS Pool and Volume Errors \(23346 to 23369\)” on page 109](#)
- ♦ [“NLVM NSS Pool Snapshot Errors \(23360 to 23369\)” on page 110](#)
- ♦ [“NLVM NSS Software RAID Errors \(23370 to 23379\)” on page 110](#)
- ♦ [“NLVM Linux POSIX Volume Errors \(23380 to 23390\)” on page 110](#)
- ♦ [“NLVM Novell eDirectory Errors \(23391 to 233 99\)” on page 111](#)

NLVM General Errors (23300 to 23309)

23300 zERR NLVM LOCKED

The NLVM lock is already locked.

23301 zERR NLVM BOOT DEVICE

This device contains /boot, root (/), or swap partitions.

23302 zERR NLVM DEVICE HAS RAID

This device contains RAID partitions.

23303 zERR NLVM NO LOCK

A function was called without the NLVM lock.

23304 zERR NLVM VLDB SYMBOL ERROR

An error occurred when importing the Novell Distributed File Services (DFS) VLDB (volume location database) library or functions.

23305 zERR NLVM NOT PERMITTED

This request is not permitted.

23306 zERR NLVM PARSE ERROR

An error occurred when parsing the data.

23307 zERR NLVM INVALID PARAMETER

An invalid parameter was passed in.

NLVM Device Errors (23310 to 23319)

23310 zERR NLVM CSM DEVICE

This device contains a Cluster Segment Manager (CSM) container.

23311 zERR NLVM DEVICE NOT FOUND

The device was not found in NLVM.

23312 zERR NLVM PART NOT FOUND

The partition was not found in NLVM.

23313 zERR NLVM READ FAILURE

An error occurred while reading a stamp from the disk.

23314 zERR NLVM WRITE FAILURE

An error occurred while writing a stamp to the disk.

23315 zERR NLVM PART EXPAND FAILURE

An error occurred while expanding the partition.

23316 zERR NLVM SIZE TOO SMALL

The specified size is too small.

23317 zERR NLVM SIZE TOO BIG

Unable to find a space big enough for the request.

23318 zERR NLVM INVALID PART TYPE

The specified partition type is invalid.

23319 zERR NLVM DEVICE NOT INIT

The device is not initialized.

NLVM General File System Errors (23320 to 23329)**23320 zERR NLVM ERROR OPENING DB**

An error occurred while opening the data base file.

23321 zERR NLVM DB MATCH ERROR

The current object does not match the data base object.

23322 zERR NLVM INVALID MODE

Invalid mode opening the data base file.

23323 zERR NLVM ERROR OPENING CONFIG

An error occurred while opening the NLVM configuration file.

23324 zERR NLVM ERROR OPENING DEBUG

An error occurred while opening the NLVM debug file.

23325 zERR NLVM ERROR OPENING DEV

An error occurred while opening the device for I/O.

23326 zERR NLVM ERROR READING DEV

An error occurred while reading from the device.

23327 zERR NLVM INVALID VERSION

The stamps have an unsupported version.

22328 (reserved)

Not used.

22329 (reserved)

Not used.

NLVM Device Mapper Errors (23330 to 23340)

23330 zERR NLVM ERROR OPENING DM

An error occurred while opening the Device Mapper.

23331 zERR NLVM DM IOCTL ERROR

An error occurred while sending Device Mapper I/O Control (ioctl).

23332 zERR NLVM BAD SEGMENT COUNT

A segment count mismatch occurred.

22333 (reserved)

Not used.

23334 zERR NLVM BAD IDENTIFIER

The object identifier does not match a Device Mapper object ID.

23335 zERR NLVM DM OBJECT NOT FOUND

The Device Mapper object was not found.

23336 zERR NLVM INVALID OBJECT

The object is invalid.

23337 zERR NLVM OBJECT EXISTS

The object already exists in Device Mapper.

23338 zERR NLVM OBJECT BUSY

The object is busy.

23339 zERR NLVM INVALID TYPE

Invalid type parameter.

23340 zERR NLVM LOAD ERROR

An error occurred while loading a module.

NLVM Create Snapshot Error (23341)

23341 zERR NLVM SNAP NOT FOUND

The NSS pool snapshot was not found.

NLVM Create Partition Errors (23342 to 23345)

23342 zERR NLVM LIMIT ERROR

An error occurred while getting the device limits.

23343 zERR NLVM PART CREATE

An error occurred while creating a partition object.

23344 zERR NLVM PART DELETE

An error occurred while deleting a partition object.

23345 zERR NLVM PART WRITE

An error occurred while writing to a partition object.

NLVM NSS Pool and Volume Errors (23346 to 23369)**23346 zERR NLVM UNABLE TO EXPAND POOL**

Unable to expand the NSS pool.

23347 zERR NLVM UNABLE TO CREATE POOL

Unable to create the NSS pool.

23348 zERR NLVM SHARED MISMATCH

The shared states do not match.

23349 zERR NLVM TYPE MISMATCH

The partition types do not match.

23350 zERR NLVM HAS POOL

The partition already has an NSS pool.

23351 zERR NLVM DIRECTORY TOO LONG

The specified directory is too long.

23352 zERR NLVM UNABLE TO CREATE DIR

Unable to create the directory.

23353 zERR NLVM UNABLE TO CREATE NODE

Unable to create the device node.

23354 zERR NLVM POOL UPDATE

An error occurred while updating the NSS pool.

23355 zERR NLVM POOL MOUNT ERROR

An error occurred while updating the NSS pool.

23356 zERR NLVM POOL MAX SIZE

The NSS pool is already at the maximum size.

23357 zERR NLVM POOL NOT ACTIVE

The NSS pool is not active.

23358 zERR NLVM GROUP NOT FOUND

The group was not found in NLVM.

23359 (reserved)

Not used.

NLVM NSS Pool Snapshot Errors (23360 to 23369)

23360 zERR NLVM SNAPSHOT ERROR

A pool snapshot error occurred.

23361 to 23369 (reserved)

Not used.

NLVM NSS Software RAID Errors (23370 to 23379)

23370 zERR NLVM DUPLICATE DEVICE

The device is already used in this RAID.

23371 zERR NLVM MAX ELEMENTS

The RAID already has the maximum number of elements.

23372 zERR NLVM TOO FEW ELEMENTS

There are too few elements to create the RAID.

23373 zERR NLVM SIZE MISMATCH

The element sizes do not match.

23374 zERR NLVM NOT A RAID

The device is not a RAID device.

23375 zERR NLVM NOT A MIRROR

The device is not a RAID1 device.

23376 zERR NLVM TOO MANY PARTITIONS

You are trying to add too many partitions to a RAID.

23377 zERR NLVM RAID NOT IN SYNC

The RAID is not in sync.

23378 zERR NLVM RAID NOT ENABLED

The RAID is not enabled.

23379 zERR NLVM RAID NONE IN SYNC

No partition of the RAID device is in sync.

NLVM Linux POSIX Volume Errors (23380 to 23390)

23380 zERR NLVM FSTAB UPDATE

An error occurred while updating the `/etc/fstab` file.

23381 zERR NLVM OPEN ERROR

An error occurred while opening the file.

23382 zERR NLVM NO VOLUME NAME

No volume name was specified.

23383 zERR NLVM NO IP ADDRESS

No IP address was specified.

23384 zERR NLVM ERROR CREATING LVM VOL

An error occurred while creating the LVM2 volume.

23385 zERR NLVM ERROR MAKING FS

An error occurred while making the file system on a volume.

23386 zERR NLVM ERROR DELETING RES

An error occurred while deleting a cluster resource for a volume.

23387 zERR NLVM ERROR DELETING LVM VOL

An error occurred while deleting the LVM2 volume.

23388 zERR NLVM ERROR SENDING CMD

An error occurred while sending the XML command.

23389 zERR NLVM NCP ERROR

An error occurred while adding a volume to NCP (NetWare Core Protocol).

23390 zERR NLVM DUPLICATE MP

A duplicate mount point was specified.

NLVM Novell eDirectory Errors (23391 to 233 99)**23391 zERR NLVM EDIR OBJECT NOT FOUND**

The Novell eDirectory object was not found.

23392 zERR NLVM Invalid CRC

Invalid CRC (cyclic redundancy check) in GPT(GUID partition table) partitions.

23393 to 23399 (reserved)

Not used.

9.9 NSS Error Codes

For information about Novell Storage Services error codes, see the [Novell Storage Services Error Codes](http://www.novell.com/documentation/nwec/nwec/data/al3s3ui.html) (<http://www.novell.com/documentation/nwec/nwec/data/al3s3ui.html>).

10 Security Considerations

This section describes the security considerations for the Novell Linux Volume Manager (NLVM) on a Novell Open Enterprise Server (OES) 11 Support Pack 1 (SP1) server.

- ♦ [Section 10.1, “Root User Privileges,” on page 113](#)
- ♦ [Section 10.2, “Files,” on page 113](#)

10.1 Root User Privileges

The Linux system root user privileges are required to use NLVM commands.

10.2 Files

/dev/nss/

Location where NSS software RAID and SBD partition device mapper objects are created.

/dev/pool/

Location where NSS pool device mapper objects are created.

/etc/opt/novell/nss/nlvm.conf

Location of the NLVM configuration file.

/opt/novell/nss/mnt/.pools/

Location where NSS pool objects are mounted.

/opt/novell/nss/nlvm/

Location of the NLVM storage configuration database files. The database files are named `nlvm.<number.>db`, such as `nlvm.db`, `nlvm.1.db`, and so on. The default is to keep the 10 most recent files. The number of NLVM database files to keep is set in the `/etc/opt/novell/nss/nlvm.conf` file.

/opt/novell/nss/sbin/nlvm

Location of the NLVM utility. It also has a link in the `sbin` directory so that it is in the search path.

/var/opt/novell/log/nss/debug/

Location of the debug log files when debug is enabled. The debug files are named `nlvm_debug.<number.>log`, such as `nlvm_debug.log`, `nlvm_debug.1.log`, and so on. The default is to keep the 10 most recent files. The number of debug log files to keep is set in the `/etc/opt/novell/nss/nlvm.conf` file.

/var/run/novell-nss/nlvm.lock

Local lock file for NLVM.

A Configuring Settings for the NLVM Library

The Novell Linux Volume Manager (NLVM) library software has some configurable settings that are exposed in the `/etc/opt/novell/nss/nlvm.conf` file. The default settings are automatically configured. To modify the default behavior, use the options described in [Table A-1](#).

Table A-1 *Default Settings for the NLVM Library*

Parameter	Description
<code>Debug on</code>	<p>If this line is enabled, the command allows the debug feature of the NLVM utility to run every time without needing to use the <code>-d</code> option.</p> <p>The default is off (commented out). You can enable debug as needed by using the <code>-d</code> option when you start the utility.</p> <p>To enable debug to run every time, you can uncomment the <code>Debug on</code> command in the <code>nlvm.conf</code> file.</p> <p>To return to the default debug behavior with the <code>-d</code> option, you can comment out the <code>Debug on</code> command again.</p>
<code>Debug files 10</code>	<p>If this line is enabled, the command specifies the number of NLVM debug log files to keep before deleting the oldest file. A log file shows actions that were performed by the NLVM library.</p> <p>The default is to keep the 10 most recent files. The minimum value is 1. The default setting applies when the command is commented out.</p> <p>To modify the number of files kept, uncomment the line and specify a new value.</p> <p>To use the default setting, comment out the command again.</p> <p>When debug runs, a debug log file is opened in the <code>/var/opt/novell/log/nss/debug</code> directory. The debug files are named <code>nlvm_debug.<number.>log</code>, such as <code>nlvm_debug.log</code>, <code>nlvm_debug.1.log</code>, and so on.</p>

Parameter	Description
Data base files 10	<p>If this line is enabled, the command specifies the number of NLVM data base files to keep before deleting the oldest file. Data base files are stored every time a change is made to the system with the NLVM library.</p> <p>The default is to keep the 10 most recent files. The minimum value is 1. The default setting applies when the command is commented out.</p> <p>To modify the number of files kept, uncomment the line and specify a new value.</p> <p>To use the default setting, comment out the command.</p> <p>When a change is made to the system, a data base file is opened in the <code>/opt/novell/nss/nlvm/</code> directory. The database files are named <code>nlvm.<number.>db</code>, such as <code>nlvm.db</code>, <code>nlvm.1.db</code>, and so on.</p>
Auto refresh off	<p>If this line is enabled, the command turns off the autorefresh. The system gets its information from the data base files. This results in much faster load times for utilities, but might require a refresh within the utility. If the autorefresh is off, a refresh can be triggered by using the <code>-r</code> option when you start the NLVM utility.</p> <p>IMPORTANT: If Novell Cluster Services is on, the autorefresh is always on.</p> <p>The default is that autorefresh is enabled (the line is commented out). This allows the NLVM library to refresh the system each time it is used. The autorefresh picks up any changes to the system that happened outside the library.</p>

B Documentation Updates

This section contains information about documentation content changes made to the *Novell Linux Volume Manager Reference* since the initial release of Novell Open Enterprise Server (OES) 11.

This document was updated on the following dates:

- ♦ [Section B.1, "December 3, 2013," on page 117](#)
- ♦ [Section B.2, "September 19, 2013," on page 117](#)
- ♦ [Section B.3, "August 2, 2013," on page 117](#)
- ♦ [Section B.4, "June 12, 2013," on page 118](#)
- ♦ [Section B.5, "April 2013 Scheduled Maintenance," on page 118](#)
- ♦ [Section B.6, "January 2013 Scheduled Maintenance," on page 119](#)
- ♦ [Section B.7, "December 7, 2012," on page 121](#)
- ♦ [Section B.8, "November 2012 Scheduled Maintenance," on page 121](#)
- ♦ [Section B.9, "September 2012 Scheduled Maintenance," on page 123](#)
- ♦ [Section B.10, "August 28, 2012 \(OES 11 SP1\)," on page 124](#)
- ♦ [Section B.11, "January 18, 2012," on page 127](#)

B.1 December 3, 2013

The new site for iManager 2.7.6 and earlier is at <https://www.netiq.com/documentation/imanager27>.

B.2 September 19, 2013

Modified Novell eDirectory 8.8 SP7 links to point to the [NetIQ eDirectory 8.8 SP7 Web site \(http://www.netiq.com/documentation/edir887\)](http://www.netiq.com/documentation/edir887).

B.3 August 2, 2013

Updates were made to the following section. The changes are explained below.

B.3.1 NLVM Commands

Location	Change
Section 6.1.2, "Syntax Conventions," on page 32	Device names support node names (<code>sdc</code> and <code>mpatha</code>), full Linux path names (<code>/dev/sdc</code> and <code>/dev/mapper/mpatha</code>), and keywords <code>anydisk</code> or <code>anyshared</code> (for commands that support keyword use).
Section 6.4, "Create Linux Volume," on page 35	For a cluster-enabled LVM volume, issue the command from the master node in the cluster.
Section 6.5, "Create Partition," on page 39	<code>type=8e</code> (partition type for Linux LVM)
Section 6.6, "Create Pool," on page 41	For a cluster-enabled pool, issue the command from the master node in the cluster.

B.3.2 Planning for NLVM

Location	Change
Section 5.10, "Using iSCSI Devices with NSS Software RAID5," on page 28	This section is new.

B.4 June 12, 2013

Updates were made to the following section. The changes are explained below.

B.4.1 NLVM Commands

Location	Change
Section 6.37, "Move," on page 71	<p>You can check the status of a pool move by using the <code>nlvm list move <move_name></code> command.</p> <p>You can issue the <code>nlvm complete move <move_name></code> command to finalize the move. Other NSS utilities might also complete the move. For information, see "Moving a Pool" in the <i>OES 11 SP1: NSS File System Administration Guide for Linux</i>.</p>

B.5 April 2013 Scheduled Maintenance

Updates were made to the following section. The changes are explained below.

B.5.1 What's New or Changed in Novell Linux Volume Manager

Location	Change
Section 2.1, "What's New (OES 11 April 2013 Patches)," on page 11	This section is new.

B.6 January 2013 Scheduled Maintenance

Updates were made to the following sections. The changes are explained below.

- ♦ [Section B.6.1, "NLVM Commands," on page 119](#)
- ♦ [Section B.6.2, "NLVM Examples for the NSS File System," on page 119](#)
- ♦ [Section B.6.3, "Planning for NLVM," on page 120](#)
- ♦ [Section B.6.4, "What's New or Changed in Novell Linux Volume Manager," on page 120](#)

B.6.1 NLVM Commands

Location	Change
Section 6.46, "Unmount," on page 78	The <code>nlvm unmount <poolname></code> command also removes the Device Mapper object for the pool, the link to the Device Mapper object, and the mount point for the pool. This allows you to gracefully log out the server from an iSCSI device that contains a pool.

B.6.2 NLVM Examples for the NSS File System

Location	Change
Section 7.4, "Logging Out of an iSCSI Device that Contains an NSS Pool," on page 82	This section is new.

B.6.3 Planning for NLVM

Location	Change
Section 5.9, "Using NLVM with Linux Software RAIDs," on page 27	<p>We recommend that you do not use Linux software RAIDs (such as MD RAIDs and Device Mapper RAIDs) for devices that you plan to use for storage objects that are managed by NSS management tools. The Novell Linux Volume Manager (NLVM) utility and the NSS Management Utility (NSSMU) list the Linux software RAID devices that you have created by using Linux tools. Beginning with Linux Kernel 3.0 in OES 11 SP1, NLVM and NSSMU can see these devices, initialize them, and allow you to create storage objects on them. However, this capability has not yet been fully tested.</p> <p>IMPORTANT: In OES 11, a server hang or crash can occur if you attempt to use a Linux software RAID when you create storage objects that are managed by NSS management tools.</p>

B.6.4 What's New or Changed in Novell Linux Volume Manager

Location	Change
Section 2.2, "What's New (OES 11 SP1 Jan 2013 Patches)," on page 11	This section is new.
Section 2.3, "What's New (OES 11 Jan 2013 Patches)," on page 12	This section is new.

B.7 December 7, 2012

Updates were made to the following section. The changes are explained below.

- ♦ [Section B.7.1, “NLVM Commands,” on page 121](#)

B.7.1 NLVM Commands

Location	Change
-m option in Section 6.2, “NLVM Options,” on page 34	<p>This option prevents pools that have been unmounted from being mounted.</p> <p>Pools are by design auto mounted. Therefore, running the <code>nssmu</code> utility, or running most <code>nlvm</code> commands without the <code>-m</code> option can cause an unmounted pool to be remounted if underlying devices and partitions still exist. To execute an <code>nlvm</code> command without mounting the unmounted pools, you must include the <code>-m</code> option. The <code>nlvm mount</code> command internally sets the <code>-m</code> flag, so only the specified pool is mounted.</p>
Section 6.36, “Mount,” on page 71	<p>The <code>nlvm mount</code> command internally sets the <code>-m</code> flag, so only the specified pool is mounted.</p>
Section 6.46, “Unmount,” on page 78	<p>Use the <code>unmount</code> command to temporarily unload a pool in order to manage underlying devices. Pools are by design auto mounted. Therefore, running the <code>nssmu</code> utility, or running most <code>nlvm</code> commands without the <code>-m</code> option can cause an unmounted pool to be remounted if underlying devices and partitions still exist. To execute an <code>nlvm</code> command without mounting the unmounted pools, you must include the <code>-m</code> option. The <code>nlvm mount</code> command internally sets the <code>-m</code> flag, so only the specified pool is mounted.</p>

B.8 November 2012 Scheduled Maintenance

Updates were made to the following sections. The changes are explained below.

- ♦ [Section B.8.1, “NLVM Commands,” on page 122](#)
- ♦ [Section B.8.2, “Troubleshooting NLVM,” on page 122](#)
- ♦ [Section B.8.3, “What’s New or Changed in Novell Linux Volume Manager,” on page 122](#)

B.8.1 NLVM Commands

Location	Change
Section 6.4, "Create Linux Volume," on page 35	If you use the <code>ncp</code> option, the volume name used for the <code>name</code> option must comply with the name limitations described in Section 5.2.4, "NCP Volume Names," on page 24 .
Section 6.5, "Create Partition," on page 39	Because a physical partition must end on a cylinder boundary, its size might be slightly different than the size you specify.
Section 6.7, "Create RAID," on page 43	<p>When mirroring a pool that consumes an entire MSDOS partitioned disk, you can use an MSDOS or GPT partitioned device of the same size.</p> <p>The <code>type</code> option is optional for mirroring existing partitions.</p> <p>The <code>name</code> option is optional for mirroring existing an SBD partition.</p> <p>Because a physical partition must end on a cylinder boundary, its size might be slightly different than the size you specify.</p>

B.8.2 Troubleshooting NLVM

Location	Change
Section 9.1, "Viewing Error Code Messages," on page 101	<p>With the latest OES 11 SP1 patches, the NSS utility provides an <code>/err</code> switch that can be used from the command prompt to view error messages for NLVM commands error codes:</p> <pre>nss /err=<error_code_number></pre>

B.8.3 What's New or Changed in Novell Linux Volume Manager

Location	Change
Section 2.4, "What's New (OES 11 SP1 Nov 2012 Patches)," on page 14	This section is new.
Section 2.5, "What's New (OES 11 Nov 2012 Patches)," on page 14	This section is new.

B.9 September 2012 Scheduled Maintenance

Updates were made to the following sections. The changes are explained below.

- ♦ [Section B.9.1, “NLVM Commands,” on page 123](#)
- ♦ [Section B.9.2, “NLVM Examples for Clustering with Novell Cluster Services,” on page 124](#)
- ♦ [Section B.9.3, “Troubleshooting NLVM,” on page 124](#)
- ♦ [Section B.9.4, “What’s New or Changed in Novell Linux Volume Manager,” on page 124](#)

B.9.1 NLVM Commands

Location	Change
-s, --share in Section 6.2, “NLVM Options,” on page 34	In a cluster, if the SBD does not exist or fails, you can use the <code>-s</code> option with NLVM commands to prepare a device and create an SBD partition. To minimize the risk of corruption, you must ensure that nobody else is changing any storage on any nodes at the same time.
Section 6.5, “Create Partition,” on page 39	<p>A physical partition size might be rounded up or down to the next nearest cylinder boundary depending on the partition type, the specified size, and the amount of free space.</p> <p>Before you create a Novell Cluster Services SBD partition, you must take the cluster down, and stop Novell Cluster Services from running on all nodes.</p>
Section 6.7, “Create RAID,” on page 43	<p>For NetWare type partitions, the physical partition size might be rounded down to the next nearest cylinder boundary.</p> <p>When you mirror an existing partition, the <code>type</code> option must precede the <code>part</code> option in the command.</p> <p>When you mirror an existing partition, the <code>type</code> option must precede the <code>part</code> option in the command.</p> <p>Before you create a Novell Cluster Services SBD RAID 1, you must take the cluster down, and stop Novell Cluster Services from running on all nodes.</p> <p>Added examples for creating a mirrored SBD RAID 1 device and for mirroring an existing SBD partition.</p>
Section 6.12, “Delete Partition,” on page 49	Before you delete a Novell Cluster Services SBD partition, you must take the cluster down, and stop Novell Cluster Services from running on all nodes.
Section 6.14, “Delete RAID,” on page 51	Before you delete a Novell Cluster Services SBD RAID 1, you must take the cluster down, and stop Novell Cluster Services from running on all nodes.
Section 6.42, “Rename RAID,” on page 76	This section is new.

B.9.2 NLVM Examples for Clustering with Novell Cluster Services

This section is new.

B.9.3 Troubleshooting NLVM

Location	Change
Section 9.7, "Error 20897 - This node is not a cluster member," on page 103	This section is new.

B.9.4 What's New or Changed in Novell Linux Volume Manager

Location	Change
Section 2.6, "What's New (OES 11 SP1 September 2012 Patches)," on page 15	This section is new.

B.10 August 28, 2012 (OES 11 SP1)

Updates were made to the following sections. The changes are explained below.

- ♦ [Section B.10.1, "Installing and Upgrading NLVM," on page 124](#)
- ♦ [Section B.10.2, "NLVM Commands," on page 124](#)
- ♦ [Section B.10.3, "NLVM Examples for the NSS File System," on page 126](#)
- ♦ [Section B.10.4, "Planning for NLVM," on page 126](#)
- ♦ [Section B.10.5, "Troubleshooting NLVM," on page 127](#)
- ♦ [Section B.10.6, "Using NLVM in a Virtualized Environment," on page 127](#)
- ♦ [Section B.10.7, "What's New or Changed in Novell Linux Volume Manager," on page 127](#)

B.10.1 Installing and Upgrading NLVM

This section is new.

B.10.2 NLVM Commands

Location	Change
"Create Linux Volume" on page 35	The ncp option is new. NLVM does not support using Linux software RAID devices and NSS software RAID devices with Linux POSIX file systems.

Location	Change
"Create Linux Volume" on page 35	<p>Corrected a typo for the <code>mntopt</code> option.</p> <p>If no mount point path is specified for an LVM volume, the default mount point path is <code>/usr/novell/<volume_name></code>, where the volume name is the name you specified with the <code>name</code> option.</p> <p>If no mount point path is specified for a Linux POSIX volume, the default mount point path is <code>/usr/novell/<fs_type>_<number></code>.</p>
"Create Partition" on page 39	When you create an SBD partition, if you specify a device that is uninitialized, NLVM initializes the device and marks it Shareable for Clustering.
"csn=cifs_virtual_server_name" on page 42 "cifs" on page 43	If the <code>csn</code> option is not specified in combination with the <code>cifs</code> option, the NCP virtual server name is used as the CIFS virtual server name. In this case, if the name is more than 15 characters, the CIFS virtual server name is truncated from the left to 13 characters and <code>-W</code> is added at the end.
"NLVM Options" on page 34 "Delete Linux Volume" on page 48 "Delete Move" on page 49 "Delete Partition" on page 49 "Delete Pool" on page 50 "Delete RAID" on page 51 "Delete RAID Segment" on page 51 "Delete Snap" on page 52 "Delete Volume" on page 53 "Init Device" on page 56	The <code>--no-prompt</code> NLVM option can be used with certain commands to prevent a confirmation message from being displayed.
"Create Partition" on page 39	Added information about the maximum number of device partitions.
"Create Pool" on page 41 "Expand Pool" on page 54	You can specify multiple device and size instances for certain commands.
"Create RAID" on page 43	When mirroring a pool that consumes an entire MSDOS partitioned disk, the device used to mirror it must also be MSDOS if it is the same size. If the device is at least 4 MB larger, it can be either MSDOS or GPT.
"Init Device" on page 56 "Share" on page 77 "Unshare" on page 78	You can specify multiple devices for certain commands.

Location	Change
“Sizes” on page 33 “Create Linux Volume” on page 35 “Create Partition” on page 39 “Create Pool” on page 41 “Create RAID” on page 43 “Create Snap” on page 46 “Expand Partition” on page 53 “Expand Pool” on page 54 “Move” on page 71	A terabyte (TB) multiplier of T is supported for OES 11 with the latest patches applied. If no multiplier is specified, the default multiplier of gigabytes is assumed.
“Sizes” on page 33	All sizes can be entered as whole numbers or with fractional parts such as 200.45G and 3.98T.
“Delete Move” on page 49	The abort option has been deprecated.
“List Linux Volumes” on page 61	Print a list of Linux POSIX volumes and for each, display its path, mount point, file system type, NCP enabled status, and mount status.
“List Move” on page 61	You can alternatively specify the pool name instead of the pool move name.
“Move” on page 71	The <code>nlvm delete move</code> command sets the pool back to the original location and removes the new location. You can delete the move at any time while the move is in progress, even if it is pending only the <code>complete move</code> command to be finalized.

B.10.3 NLVM Examples for the NSS File System

Location	Change
Section 7.3, “Recovering a Mirror where All Elements Report ‘Not in Sync’,” on page 82	This section is new.

B.10.4 Planning for NLVM

Location	Change
Section 5.2.4, “NCP Volume Names,” on page 24	This section is new.
Section 5.8, “Using NLVM with NSS Software RAID,” on page 26	This section is new.

B.10.5 Troubleshooting NLVM

Location	Change
Section 9.5, "NLVM Pool Move Fails and Deactivates the Pool," on page 102	This section is new.
Section 9.6, "NLVM Fails to Mirror from a DOS Partitioned Device to a GPT Partitioned Device of the Same Size," on page 102	This section is new.
Section 9.8, "NLVM Error Codes," on page 103	This section is new.
Section 9.9, "NSS Error Codes," on page 111	This section is new.

B.10.6 Using NLVM in a Virtualized Environment

This section is new.

B.10.7 What's New or Changed in Novell Linux Volume Manager

Location	Change
Section 2.8, "What's New (OES 11 SP1)," on page 15	This section is new.

B.11 January 18, 2012

The document format was updated to reflect newly revised corporate standards.

