

# Logical Volume Management (LVM)

Increase / Decrease file system sizes of partitions for:

- Existing virtual hard disks
- New virtual hard disks



# Logical Volume Management (LVM)

Increase / Decrease file system sizes of partitions for:

- Existing virtual hard disks
- New virtual hard disks



# What is Logical Volume Management?

An application called **LVM** is a very useful tool for Linux system administrators to easily manage file systems, in some cases, even when the computer system is running!

**LVM (Logical Volume Management)** is used to manage hard disk drives / partitions for Linux and Unix systems. LVM provides more flexibility than just partitioning hard disks. Volume Groups are areas used to define Physical Volumes (i.e. hard disks, disk partitions, or other forms of storage devices). Logical Volumes are then used to relate directories (mount points) to a specific physical volume or for a "range" or "span" of physical volumes.

# How Logical Volume Management Works

LVM allows more **flexibility and growth potential for Linux file-systems** (for example, having Logical volumes span multiple hard disks). CentOS uses LVM by default upon installation. Other Linux distributions may provide the capacity to install LVM.

**LVM** uses the terms **volume groups** (storage area), **physical volumes** (partitions), and **logical volumes** (mount-points relating to physical volumes).

Click or double-click on the Youtube video to see how these terms relate to LVM.

# Managing File System Size with an Existing Hard Drive

Some Linux distributions have **LVM graphical applications**, but many are deprecated (obsolete), and there is no "standard" graphical application for all Linux distributions.

Therefore, it is good to use command line. You need to use **CLI** for **centos2** and **centos3** anyways.

General Steps:

- Use **fdisk** to create a partition. Format with **mkfs** command.
- Use **pvcreate** to initialize physical volume (partition) to be used by LVM
- Use **vgextend** to add physical volume (partition) to volume group
- Use **lvcreate** to create a new mount point to be used when mounting.

Click or double-click on Youtube video to see the process

## Managing File System Size with an Existing Hard Drive

You can also use LVM to help extend (increase) a logical volume with an **un-used partition within an existing hard disk** to help increase the size of a file-system (mount-point). For example, in centos2, we did not use up all of the 20GB of hard drive space - only 8GB was used for / and 2GB used for home partitions respectively.

Steps:

- Use **fdisk** to create a partition. Format with **mkfs** command.
- Use **pvcreate** to initialize physical volume (partition) to be used by LVM
- Use **vgextend** to add physical volume (partition) to volume group
- Use **lvextend** to increase the size of a logical volume over a newly created partition.  
(NOTE: there is a big difference between adding size **-L +2GB** and setting size: **-L 2GB!**)

Click or double-click on Youtube video to see the process

## Managing File System Size with an Existing Hard Drive

Likewise, you can use LVM to **reduce** a logical volume with an un-used partition within an existing hard disk to help shrink the size of a file-system (mount-point). By the way, you CANNOT perform this operation for the **xf**s file-system. That is why we FORCED you to create partitions for the file-type: **ext4**!

Steps:

Use **lvreduce** to decrease the size of a logical volume over a newly created partition. (NOTE: there is a big difference between reducing size: **-L +2GB** and setting size: **-L 2GB**!)



## Managing File System Size with an Existing Hard Drive

The following LVM commands are useful to verify the changes to the volume group, physical volume and logical volume information (requires root login to work):

`vgs`

`pvs`

`lvs`

The `ssm list` command is useful to show all vgs, pvs, and lvs information simultaneously, but you will be required to install the system-storage-manager package.

Click or double-click on the image to view typical output from these commands



# Managing File System Size with adding a new virtual hard disk

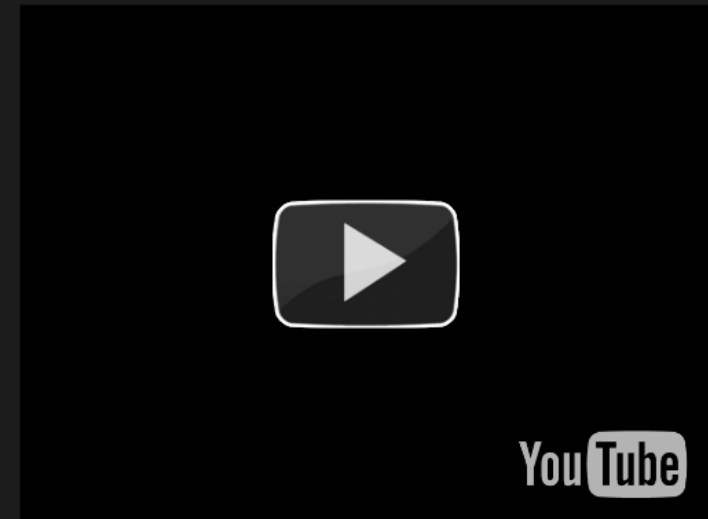
Since we are using virtual machines, we can simulate creating a new hard disk by creating a new virtual disk.

Steps:

In the running VM window, click **view, details** (instead of console). At the bottom left-hand corner, click **Add Hardware, select storage (default)**, and **select the size of the virtual disk**.

Then use those LVM command to increase the size of your desired file system.

Click or double-click on the YouTube Video to view procedure.



# Manually Mounting and Unmounting file systems

We take for granted that a file-system must be mounted (for example, the root partition) in order for a Linux system to be usable upon system start-up. We need to learn how to do this manually by editing or adding an entry in the file system table (`/etc/fstab`). This file contains entries to mount various file systems automatically upon start-up of the Linux system.

The Linux system administrator also has the ability to manually `mount` (connect) and `un-mount` (disconnect) partitions in order to perform maintenance on the file system (for example, unmounting the `/home` partition to install software and prevent users from logging in during that process). You will be learning to do this in lab5.

# Manually Mounting and Unmounting file systems

We take for granted that a file-system must be mounted (for example, the root partition) in order for a Linux system to be usable upon system start-up. We need to learn how to do this manually by editing or adding an entry in the file system table (`/etc/fstab`). This file contains entries to mount various file systems automatically upon start-up of the Linux system.

The Linux system administrator also has the ability to manually `mount` (connect) and `un-mount` (disconnect) partitions in order to perform maintenance on the file system (for example, unmounting the `/home` partition to install software and prevent users from logging in during that process). You will be learning to do this in lab5.

# Logical Volume Management (LVM)

Increase / Decrease file system sizes of partitions for:

- Existing virtual hard disks
- New virtual hard disks

