



# Linux System Administration

## UNIT 2



# Understanding Partitions and Logical Volumes

- **partitions** - static way to configure storage on a server
- **logical volumes** - dynamic way to configure storage
- all Red Hat servers have **at least one partition** that is used to boot the server, because the boot loader GRUB can't read data from logical volumes.
- only basic storage features, you'll use partitions on the storage devices. Otherwise it is better to use logical volumes.
- The Logical Volume Manager (LVM) offers many benefits.
  - LVM makes resizing of volumes possible.
  - In LVM, you can work with snapshots, which are useful in making a reliable backup.
  - In LVM, you can easily replace failing storage devices.



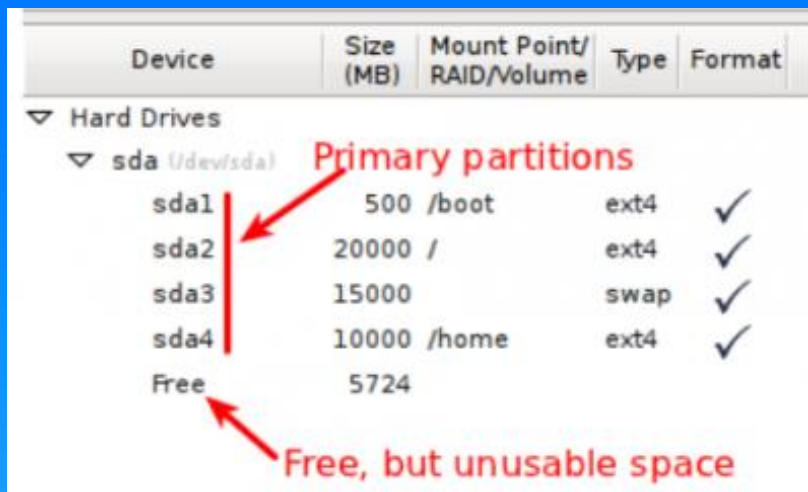
# Creating Partitions

- Two ways to create and manage partitions on a Red Hat server.
- You can use the **graphical Palimpsest tool**, which you can start by selecting **Applications > System Tools > Disk Utility**.
- This tool easier than working with **fdisk on the command line**, but it has the disadvantage that not all Red Hat servers offer access to the graphical tools.

## Three kinds of partitions

Device	Size (MB)	Mount Point/ RAID/Volume	Type	Format
▼ Hard Drives				
▼ sda (ldev/sda) <b>Primary partitions</b>				
sda1	500	/boot	ext4	✓
sda2	20000	/	ext4	✓
sda3	15000		swap	✓
sda4	10000	/home	ext4	✓
Free	5724			

Free, but unusable space



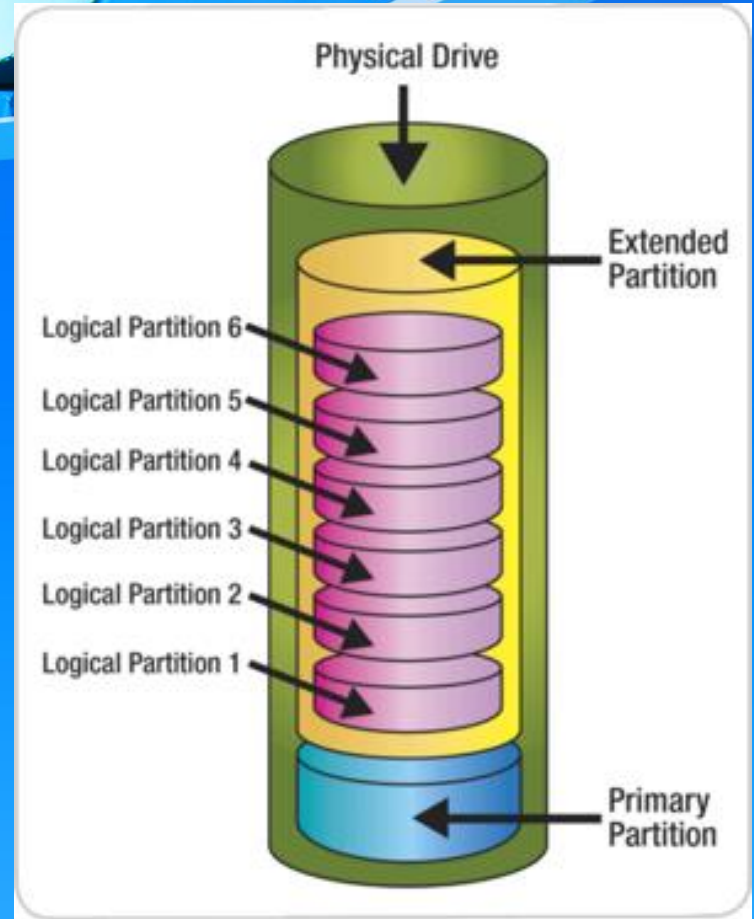
### Primary Partitions :

- These are written directly to the master boot record of your hard drive.
- After creating four primary partitions, you can't add any more partitions—even if there is still a lot of disk space available.

**There's space for just four partitions in the partition table and no more than four.**

**Extended Partition** : Every hard drive can have one extended partition. You cannot create a file system in an extended partition. The only thing you can do with it is to create logical partitions. You'll use an extended partition if you intend to use more than four partitions in total on a hard drive.

**Logical Partitions** : A logical partition (not to be confused with a logical volume) is created inside an extended partition. You can have a maximum of 11 logical partitions per disk, and you can create file systems on top of logical partitions.



# MBR

Boot Code

Partition Table

MSDOS

Win 98

Win XP

Extended

Extended Partition Table

D:

E:

Extended

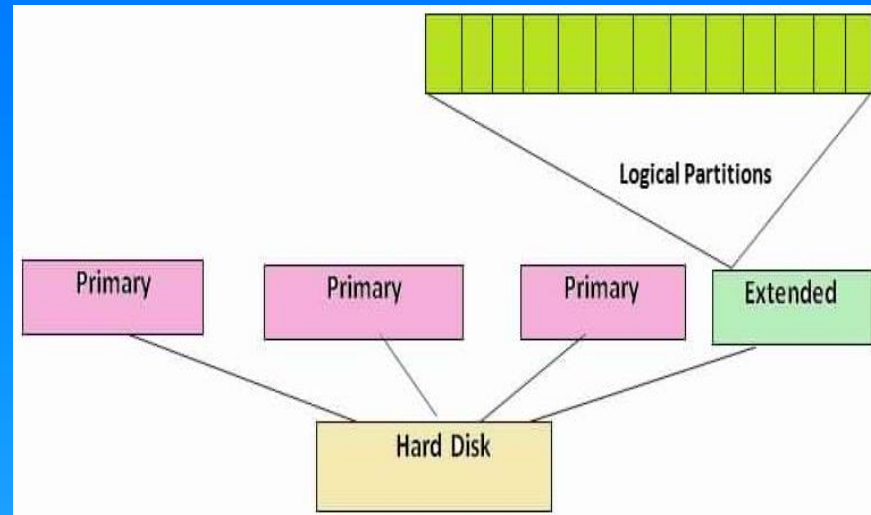
F:

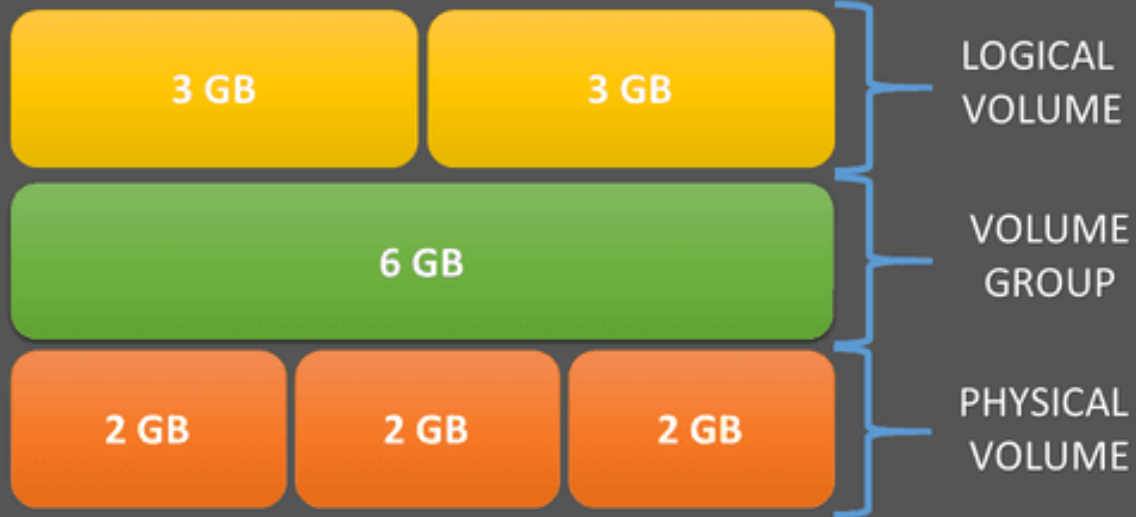
Extended Partition Table

Linux

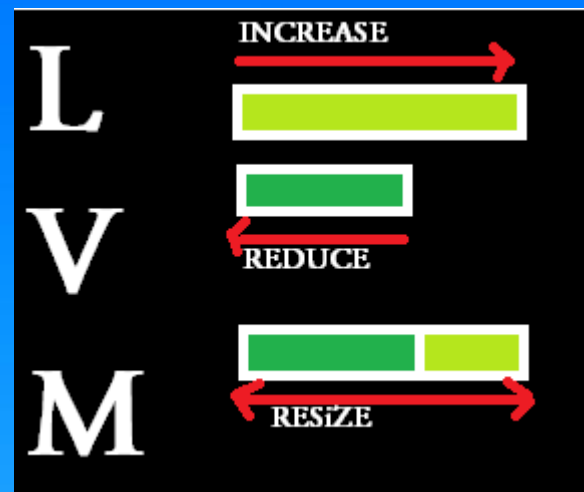
Linux swap

- Primary Partitions
- Extended Partitions
- Logical drives





## LOGICAL VOLUME MANAGER

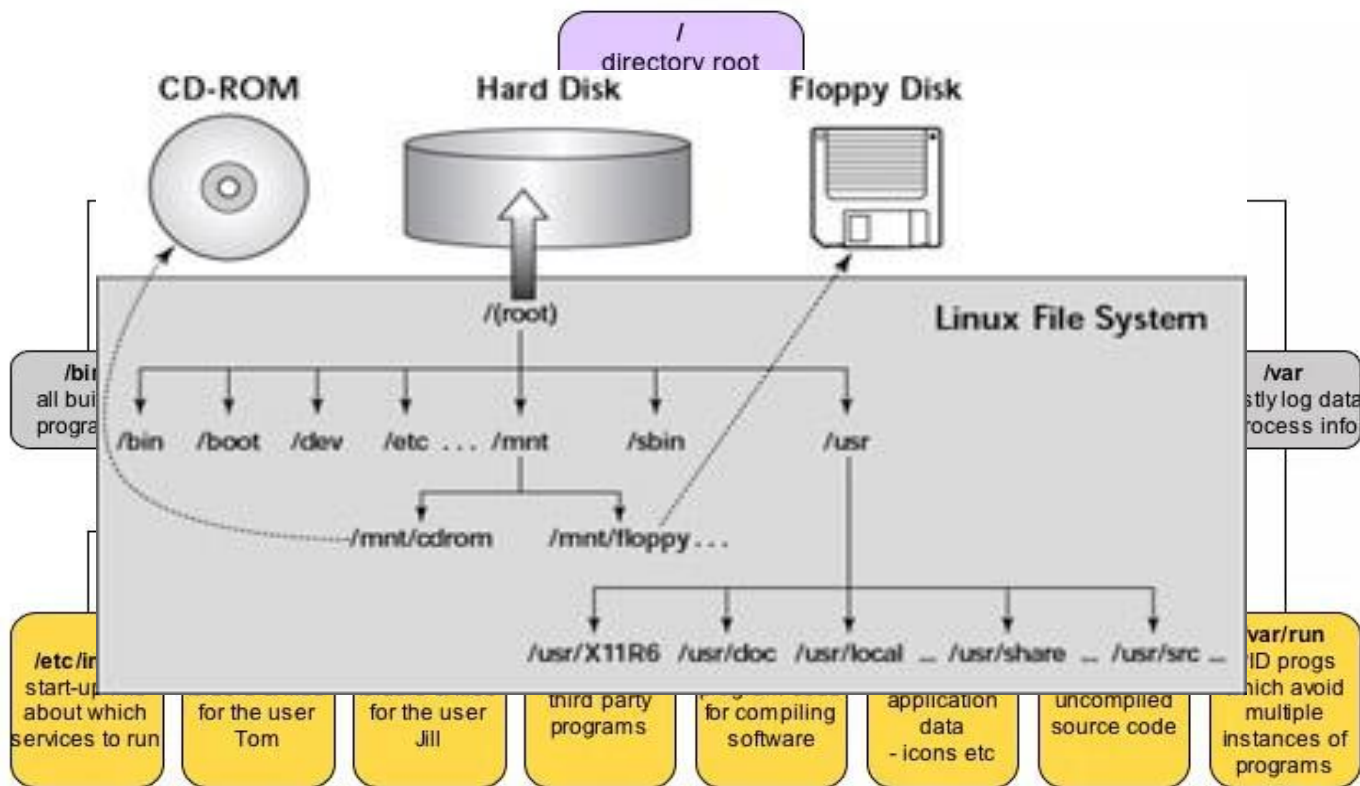




- Most of the computer users out there must have felt a need for increasing or decreasing (resizing) partition size after it is created.
- To make a large partition, by **combining small hard disks of various size**, so that, it appears as one large hard disk/partition to the operating system.



# A Typical Linux File System



# Creating File Systems

- Once you have created one or more partitions or logical volumes, most likely you'll put a file system on them next.
- Several file systems are available on Red Hat Enterprise Linux, but Ext4 is used as the default file system.

TABLE 5.1 File system overview

File system	Use
Ext4	The default file system on RHEL. Use it if you're not sure which file system to use, because it's an excellent general-purpose file system.
Ext2/3	The predecessors of the Ext4 file system. Since Ext4 is much better, there is really no good reason to use Ext2 or Ext3, with one exception: Ext2 doesn't use a file system journal, and therefore it is a good choice for very small partitions (less than 100MB).
XFS	XFS must be purchased separately. It offers good performance for very large file systems and very large files. Ext4 has improved a lot recently, however, and therefore you should conduct proper performance tests to see whether you really need XFS.
Btrfs	Btrfs is the next generation of Linux file systems. It is organized in a completely different manner. An important difference is that it is based on a B-tree database, which makes the file system faster. It also has cool features like Copy on Write, which makes it very easy to revert to a previous version of a file. Apart from that, there are many more features that make Btrfs a versatile file system that is easy to grow and shrink. In RHEL 6.2 and newer, Btrfs is available as a tech preview version only, which means that it is not supported and not yet ready for production.
VFAT and MS-DOS	Sometimes it's useful to put files on a USB drive to exchange them among Windows users. This is the purpose of the VFAT and MS-DOS file systems. There is no need whatsoever to format partitions on your server with one of these file systems.
GFS	GFS is Red Hat's Global File System. It is designed for use in high availability clusters where multiple nodes need to be able to write to the same file system simultaneously.



## File system journal

- Modern Linux file systems offer journaling as a standard feature.
- The journal *works as a transaction log* in which the file system keeps records of files that are open for modification at any given time.
- The benefit of using a file system journal is that, if the *server crashes*, it can check to see what files were open at the time of the crash and immediately indicate which files are potentially damaged.
- **Drawback** to using a journal : a file system journal takes up *disk space*—an average of **50MB** normally on Ext4.
- It's not a good idea to create a journal on very small file systems because it might *leave insufficient space to hold your files.*