

# DISK MANAGEMENT



# TOPICS IN DISK MANAGEMENT

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- Types of disks
- Managing disk Partitions
- Creating File systems
- Types of File system
- Mounting & umounting file systems
- Maintaining file systems



# Types of disks

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- **IDE** : Integrated Drive Electronics. IDE drives are also known as PATA drives( Parallel advance technology attachment )
- **SATA** : Serial advance technology attachment
- **SCSI** : Small Computer System Interface. SCSI is pronounced as scuzzy.
- **SAS** : Serial Attached SCSI



## IDE / PATA (Integrated Drive Electronics Drive / Parallel Advance Technology Attachment Drive)

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- IDE/PATA Drives have usually 40 pins.
- IDE/PATA Drives offer 133 MB/sec transfer rate.
- It sends 8 bit data at a time.
- PATA Cables are used to connect PATA HDD. Two drives can be connected in a single pata cable. One as master and other as slave. The configuration of master and slave is done by different combination of jumpers in the hdd.

# IDE DISK



# SATA (Serial Advance Technology Attachment Drive)



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- SATA Drives have usually 7 pins, 4 pins in pair of two for sending and receiving data and rest 3 pins are grounded.
- SATA Drives offers generally 300MB/sec transfer rate.
- It sends data bit by bit.
- SATA Cables are used to connect SATA HDD. Only one drive can be connected in a single sata cable.



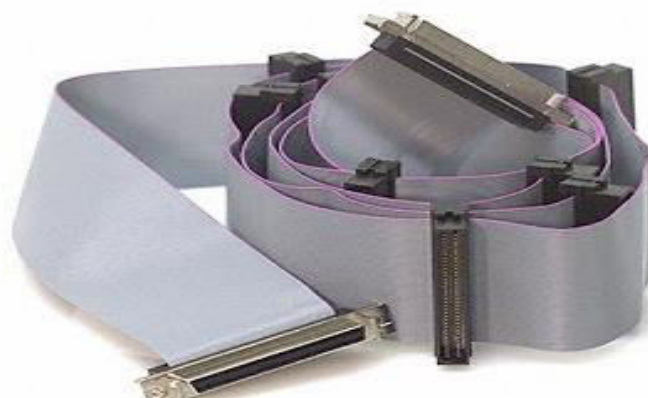
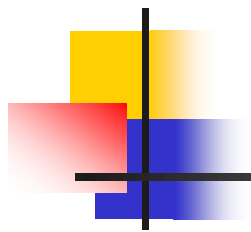


# SCSI (Small Computer System Interface Drive)

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- SCSI Drives have usually 50 to 68 pins.
- SCSI Drive offers generally 640MB/sec transfer rate.
- These drives are hot swappable.
- SCSI cables are used to connect SCSI HDD.  
Maximum of 16 drives can be connected in a single SCSI cable. Each HDD has an 8-byte hexadecimal code known as **WWN** (worldwide name) for its identification in the cable.



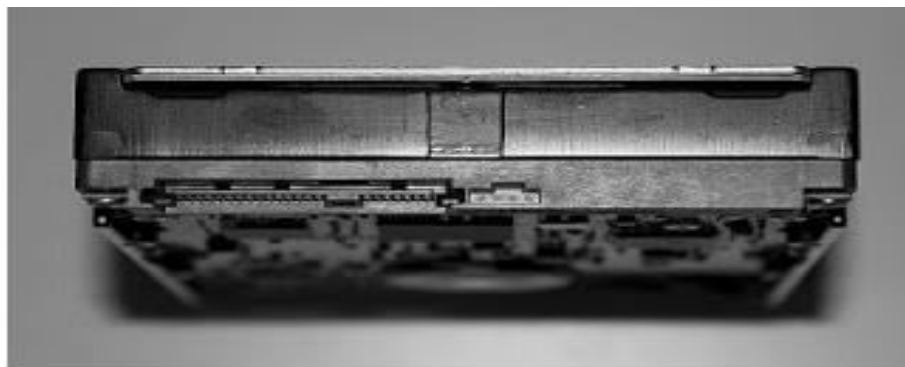




# SAS(Serial Attached SCSI Drive)

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- SAS Drives generally offers 805 MB/sec transfer rate.
- This drives are hot swappable.
- SAS Cables are used to connect SAS Drives. Maximum of 128 drives can be connected in a single sas cable.





# To find the disks information

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```
[root@linuxlab ~]# lsblk -io KNAME,TYPE,SIZE,MODEL
KNAME TYPE    SIZE MODEL
sda    disk     20G  VMware Virtual S
sda1   part     200M
sda2   part     7.8G
sda3   part     3.9G
sda4   part      1K
sda5   part     3.9G
sda6   part      2G
sda7   part      2G
sdb    disk      1G  VMware Virtual S
sdb1   part    784.4M
sdb2   part    235.3M
sr0    rom       2.9G  VMware SATA CD01
```

```
[root@linuxlab ~]# parted --list
```

```
Model: VMware, VMware Virtual S (scsi)
```

```
Disk /dev/sda: 21.5GB
```

```
Sector size (logical/physical): 512B/512B
```

```
Partition Table: msdos
```

Number	Start	End	Size	Type	File system	Flags
1	1049kB	211MB	210MB	primary	ext4	boot
2	211MB	8599MB	8389MB	primary	ext4	
3	8599MB	12.8GB	4194MB	primary	ext4	
4	12.8GB	21.5GB	8681MB	extended		
5	12.8GB	17.0GB	4194MB	logical	ext4	
6	17.0GB	19.1GB	2097MB	logical	linux-swap(v1)	
7	19.1GB	21.2GB	2097MB	logical	ext4	

```
Model: VMware, VMware Virtual S (scsi)
```

```
Disk /dev/sdb: 1074MB
```

```
Sector size (logical/physical): 512B/512B
```

```
Partition Table: msdos
```

Number	Start	End	Size	Type	File system	Flags
1	32.3kB	823MB	822MB	primary	ext2	
2	823MB	1069MB	247MB	primary	ext3	



```
[root@linuxlab ~]# smartctl -i /dev/sdb
```

```
smartctl 5.42 2011-10-20 r3458 [i686-linux-2.6.32-279.el6.i686] (local build)
```

```
Copyright (C) 2002-11 by Bruce Allen, http://smartmontools.sourceforge.net
```

```
Vendor:                VMware,
```

```
Product:               VMware Virtual S
```

```
Revision:              1.0
```

```
User Capacity:         1,073,741,824 bytes [1.07 GB]
```

```
Logical block size:    512 bytes
```

```
Device type:           disk
```

```
Local Time is:         Mon Nov 9 00:48:34 2015 IST
```

```
Device does not support SMART
```

```
[root@linuxlab ~]# █
```



# Types of File systems

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- EXT2
- EXT3
- EXT4



# EXT2 FILE SYSTEM

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- Ext2 stands for second extended file system.
- It was introduced in 1993. Developed by Rémy Card.
- This was developed to overcome the limitation of the original ext file system.
- Ext2 does not have journaling feature.
- Maximum individual file size can be from 16 GB to 2 TB
- Overall ext2 file system size can be from 2 TB to 32 TB





# EXT3 FILE SYSTEM

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- Ext3 stands for third extended file system.
- It was introduced in 2001. Developed by Stephen Tweedie.
- Starting from Linux Kernel 2.4.15 ext3 was available.
- The main benefit of ext3 is that it allows journaling.
- Journaling has a dedicated area in the file system, where all the changes are tracked. When the system crashes, the possibility of file system corruption is less because of journaling.
- Maximum individual file size can be from 16 GB to 2 TB
- Overall ext3 file system size can be from 2 TB to 32 TB
- There are three types of journaling available in ext3 file system.
  - Journal – Metadata and content are saved in the journal.
  - Ordered – Only metadata is saved in the journal. Metadata are journaled only after writing the content to disk. This is the default.
  - Writeback – Only metadata is saved in the journal. Metadata might be journaled either before or after the content is written to the disk.
- You can convert a ext2 file system to ext3 file system directly (without backup/restore).



# EXT4 FILE SYSTEM

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- Ext4 stands for fourth extended file system.
- It was introduced in 2008.
- Starting from Linux Kernel 2.6.19 ext4 was available.
- Supports huge individual file size and overall file system size.
- Maximum individual file size can be from 16 GB to 16 TB
- Overall maximum ext4 file system size is 1 EB (exabyte). 1 EB = 1024 PB (petabyte). 1 PB = 1024 TB (terabyte).
- Directory can contain a maximum of 64,000 subdirectories (as opposed to 32,000 in ext3)
- You can also mount an existing ext3 fs as ext4 fs (without having to upgrade it).
- Several other new features are introduced in ext4: multiblock allocation, delayed allocation, journal checksum, fast fsck, etc. All you need to know is that these new features have improved the performance and reliability of the filesystem when compared to ext3.
- In ext4, you also have the option of turning the journaling feature



# Difference b/w File systems

Features	Ext3	Ext4
Filesystem limit	16TB	1EB (1 EB = 1024 PB, 1 PB = 1024 TB)
File limit	2TB	16TB
Default inode size	128 bytes	256 bytes
Block Mapping	Indirect	Extent
<u>Time Stamp</u>	Second	Nanosecond
Sub Directory Limit	32,768	Unlimited
Preallocation	In-core reservation	For extent file
Defragmentation	No	Yes
Directory Indexing	Disabled	Enabled
Delayed Allocation	No	Yes
Multiple Block Allocation	Basic	Advanced



# Identify File system

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- Use the df -Th command .  
`#df -Th`
- Use the mount command  
`#mount | grep "^/dev")`
- use the file command  
`#file -sL /dev/sdb1)`
- View the /etc/fstab file  
`#cat /etc/fstab`
- Execute the fsck command  
`#Fsck -N /dev/sdb1`



## PROCEDURE FOR ADDING A DISK IN MACHINE

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- We don't need any downtime to perform this Activity
- Before adding a new disk we have to check the disks which are available in our machine.
- Take outputs by using commands
- `fdisk -l ----` it will give the total disk information in your system
- `df -h -----` it will show the disk free information in your system



# Steps :

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- Go to edit vmware machine settings
- Click on hard disk and then click on add
- Select hard disk and then next
- Choose create a new virtual disk and then next
- Choose virtual disk type scsi (becoz scsi hot swappable, redundant, faster capacity) then next
- Specify the size we want to give (max size is 10 gb) and then next
- And click on ok

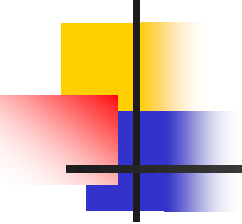


# How to scan a new disk

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Try this to rescan the SCSI hosts (each SATA port appears as a SCSI bus):

- `echo "0 0 0" >/sys/class/scsi_host/host<n>/scan`  
`echo " - - - " > /sys/class/scsi_host/host0/san`
- **To remove a drive:**
- `echo x > /sys/bus/scsi/devices/<n>:0:0:0/delete` Replace <n> with the right numbers for your system, respectively.  
`#echo " - - - " > /sys/class/scsi_host/host0/san`  
`#echo " - - - " > /sys/class/scsi_host/host1/san`  
`#echo " - - - " > /sys/class/scsi_host/host2/san`  
1<sup>st</sup> –Controller  
2<sup>nd</sup> –Channel  
3<sup>rd</sup> –LUN id

- 
- 
- The three values stand for channel, SCSI target ID, and LUN. The dashes act as wildcards meaning "rescan everything"
  - You can also use `rescan-scsi-bus.sh` script to detect new LUNS.
  - **`# yum install sg3_utils`**
  - **`# ./rescan-scsi-bus.sh`**





# Field Name

# Description

Field Name	Description
Device	Specifies the device to be mounted. You can specify the device file or Label in this field. If mounted, you can find the related information from /etc/mtab file.
Mount Point	The directory under the root filesystem, where this filesystem will be mounted.
Filesystem Format	Specifies the filesystem type (ext2, ext3, iso9660 etc).
Mount Options	Refer the next link to learn about different Linux mount options
Dump Value	Dump is a backup utility. The possible values can be either 0 or 1. Dump use this value to decide whether the filesystem should be backed up. If the value is "0", dump will ignore that filesystem.
Filesystem Check Order	"fsck" is a tool to check the file system consistency. This value determines the order that filesystems are checked by "fsck" program during the boot process. If the value is "0", fsck won't check the filesystem.





# How to partition disk

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- Use `fdisk /dev/sdb`
- We will get options like
- `m` for help
- `n` for create a new partition
- Note: we can create up to 3 primary partitions and one extended partition
- Specify the cylinder size and press `w`
- `Parted -l` will give partition information
- `partprobe /dev/sdb ---` will update the kernel without rebooting our server



## Create file system for your disk

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- `mkfs.ext3 /dev/sdb1`
- Or `mkfs -t ext3 /dev/sdb1`
- Make a directory `mkdir /ora`
- Mount the disk into that mount point  
`Mount /dev/sdb1 /ora`



# Mounting disks permanently

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- We have to mount the disk info in fstab to make it permanently.

- Vi /etc/fstab

- Mount disk in fstab

- |            |            |                 |               |         |         |
|------------|------------|-----------------|---------------|---------|---------|
| /dev/sdb1  | /ora       | ext3            | default       | 0       | 0       |
| devicename | mountpoint | filesystem type | mount options | dumping | chk seq |



# Unmounting Mountpoint

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- We can use umount command to unmount
- `umount /ora`
- `umount -f /ora`
- `umount -l /ora`

- 
- 
- To know the users who are working on that mount mount

`fuser -cu /ora`

- To know kill the session

`fuser -ck /ora`

The logo consists of three overlapping squares: a yellow one at the top left, a red one at the bottom left, and a blue one at the bottom right. A black crosshair is superimposed on the squares.

# HPACUCLI

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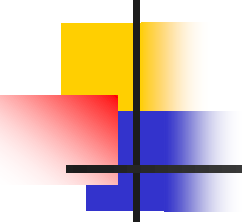
- HP Array configuration utility CLI
- How to find the hard disk status

`#hpacucli ctrl all show config`

- How to find the server serial no

`#dmidecode -s system-serial-number`





```
bash-3.2# hpacucli
HP Array Configuration Utility CLI 8.50-6.0
Detecting Controllers...Done.
Type "help" for a list of supported commands.
Type "exit" to close the console.

=> ctrl all show config

Smart Array P410i in Slot 0 (Embedded)      (sn: 5001438008F8F900)

    array A (SAS, Unused Space: 0 MB)

        logicaldrive 1 (136.7 GB, RAID 1, Interim Recovery Mode)

            physicaldrive 1I:1:1 (port 1I:box 1:bay 1, SAS, 146 GB, Failed)
            physicaldrive 1I:1:2 (port 1I:box 1:bay 2, SAS, 146 GB, OK)

SEP (Vendor ID PMCSIERA, Model SRC 8x6G) 250 (WWID: 5001438008F8F90F)

=> █
```

```
root@alpcispapp767 ~]# date
at Sep  5 01:38:28 EDT 2015
root@alpcispapp767 ~]# hpacucli ctrl all show config
```

```
Smart Array P410i in Slot 0 (Embedded)      (sn: 50014380236BB730)
```

```
array A (SAS, Unused Space: 0 MB)
```

```
logicaldrive 1 (136.7 GB, RAID 1, OK)
```

```
physicaldrive 1I:1:1 (port 1I:box 1:bay 1, SAS, 146 GB, OK)
```

```
physicaldrive 1I:1:2 (port 1I:box 1:bay 2, SAS, 146 GB, OK)
```

```
array B (SAS, Unused Space: 0 MB)
```

```
logicaldrive 2 (1.6 TB, RAID 5, OK)
```

```
physicaldrive 1I:1:3 (port 1I:box 1:bay 3, SAS, 900.1 GB, OK)
```

```
physicaldrive 1I:1:4 (port 1I:box 1:bay 4, SAS, 900.1 GB, Predictive Failure)
```

```
physicaldrive 2I:1:5 (port 2I:box 1:bay 5, SAS, 900.1 GB, OK)
```

```
array C (SAS, Unused Space: 0 MB)
```

```
logicaldrive 3 (1.6 TB, RAID 5, OK)
```

```
physicaldrive 2I:1:6 (port 2I:box 1:bay 6, SAS, 900.1 GB, OK)
```

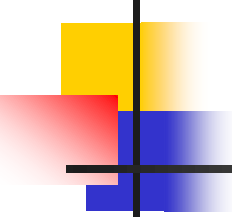
```
physicaldrive 2I:1:7 (port 2I:box 1:bay 7, SAS, 900.1 GB, OK)
```

```
physicaldrive 2I:1:8 (port 2I:box 1:bay 8, SAS, 900.1 GB, OK)
```

```
SEP (Vendor ID PMCSIERA, Model SRC 8x6G) 250 (WWID: 50014380236BB73F)
```

```
root@alpcispapp767 ~]# dmidecode -s system-serial-number
E244L652
```

```
root@alpcispapp767 ~]# █
```



```
root@gisalpsiem79:~
```

```
physicaldrive 2I:1:25 (port 2I:box 1:bay 25, 900.1 GB, spare): Predictive Failure
```

```
=> ctrl slot=0 pd 2I:1:25 show detail
```

```
Smart Array P420i in Slot 0 (Embedded)
```

```
physicaldrive 2I:1:25
```

```
Port: 2I
```

```
Box: 1
```

```
Bay: 25
```

```
Status: Predictive Failure
```

```
Drive Type: Spare Drive
```

```
Interface Type: SAS
```

```
Size: 900.1 GB
```

```
Rotational Speed: 10000
```

```
Firmware Revision: HPDC
```

```
Serial Number: KXGMTHYR
```

```
Model: HP EG0900FBVFQ
```

```
Current Temperature (C): 26
```

```
Maximum Temperature (C): 40
```

```
PHY Count: 2
```

```
PHY Transfer Rate: 6.0Gbps, Unknown
```

```
Drive Authentication Status: OK
```

```
Carrier Application Version: 11
```

```
Carrier Bootloader Version: 6
```