

LINUX DISK MANAGEMENT

What is file system?

File System is a method to store and organize files and directories on disk.

A file system can have different formats called file system types.

These formats determine how the information is stored as files and directories.

Hard disk & pendrive

Windows file system

FAT

FAT32

NTFS

Linux file system

ext1

ext2

ext3

ext4 - Default file system in RHEL/OEL- 6

XFS - Default filesystem in RHEL/OEL - 7/8/9

BTRFS

swap

CD/DVD

iso9660

Ext2

- 1.Ext2 stands for second extended file system.
- 2.Ext2 does not have journaling feature.
- 3.Maximum individual file size can be from 16 GB to 2 TB
- 4.Overall ext2 file system size can be from 2 TB to 32 TB

Ext3

- 1.Ext3 stands for third extended file system.
- 2.Starting from Linux Kernel 2.4.15 ext3 was available.
- 3.The main benefit of ext3 is that it allows journaling.
- 4.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.
- 5.Maximum individual file size can be from 16 GB to 2 TB
- 6.Overall ext3 file system size can be from 2 TB to 32 TB
- 7.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.

7.You can convert a ext2 file system to ext3 file system directly (without backup/restore).

Ext4

- 1.Ext4 stands for fourth extended file system.
- 2.It was introduced in 2008.
- 3.Starting from Linux Kernel 2.6.19 ext4 was available.
- 4.Supports huge individual file size and overall file system size.
- 5.Maximum individual file size can be from 16 GB to 16 TB
- 6.Overall maximum ext4 file system size is 1 EB (exabyte). 1 EB = 1024 PB (petabyte). 1 PB = 1024 TB (terabyte).
- 7.Directory can contain a maximum of 64,000 subdirectories (as opposed to 32,000 in ext3)

XFS File System

- 1.The XFS file system is an extension of the extent file system.
- 2.The XFS is a high-performance 64-bit journaling file system.
- 3.The support of the XFS was merged into Linux kernel in around 2002 and In 2009 Red Hat Enterprise Linux version 5.4 usage of the XFS file system.
- 4.XFS supports maximum file system size of 8 exbibytes for the 64-bit file system.
- 5.There is some comparison of XFS file system is XFS file system can't be shrunk and poor performance with deletions of the large numbers of files.
- 6.Now, the RHEL 7.0 uses XFS as the default filesystem.

Create an ext4 file system:

```
#mkfs.ext4 /dev/sdb1
#mkfs -t ext4 /dev/sdb1
#mke2fs -t ext4 /dev/sdb1
```

Create an xfs file system:

```
#mkfs.xfs /dev/sdb1
#mkfs -t xfs /dev/sdb1
```

Partition Table

Partition can be considered as a piece of disk space.A partition table is a partition of a disk that contains information about sizes and locations of partitions on hard disk and it is located at the first sector of the disk.

The two most popular partition tables are MBR and GPT.

- 1.Master Boot Record (MBR) partition

2. GUID Partition Table (GPT) partition

MBR (dos) partition

We can create max 4 partition

3 primary

1 Extended

GPT partition - GUID partition

we can create 128 partition

lsblk command

lsblk command is used to list information about all available block devices in Linux

```
#lsblk
```

```
#lsblk /dev/sdb
```

```
#lsblk -o name,size
```

IDE --> /dev/had (Integrated drive electronics)

SCSI and SATA --> /dev/sda (Small Computer System Interface, Serial Advanced Technology Attachment

AWS(xen) --> /dev/xvda

Nvme --> /dev/nvme0n1 (Non Volatile memory express)

commands to create partition

```
#fdisk
```

```
# fdisk -l
```

```
# fdisk /dev/sdb
```

```
#partprobe /dev/sdb
```

Commad to create file system

```
#mkfs.ext4 <device name>
```

```
#mkfs.xfs /dev/sdb
```

```
#mkfs.xfs /dev/sdb1
```

check the file system status

```
#file -s /dev/sdc3
```

mount the file system

```
#mkdir /oracle
```

```
mount /dev/sdb1 /oracle
```

```
#mount
```

#umount

Command to check the mounted filesystem

#df -h

#df -hT

#lsblk

command to check the blockid of devices

#blkid

scan\detect new LUN's & SCSI disks in Linux

#ls /sys/class/scsi_host/

echo '- - -' > /sys/class/scsi_host/host0/scan

Temporary Mount file

/etc/mtab

The */etc/mtab* file contains the currently mounted filesystems.

It's used by the *mount* and *umount* commands to mount, list, and unmount the volumes.

The */etc/mtab* file is a file that contains a list of currently mounted filesystems.

Any mounted filesystem will appear here. In case you have a disk or volume that is not mounted, it will not show up in this file.

Permanent mount file

/etc/fstab

fields in /etc/fstab

<Device name>	<Mount point>	<File system>	<Options>	<Backup operation>	<File system check order>
/dev/sdb1	/prod-data	xfs	defaults	0	0

Device – the first field specifies the mount device. These are usually device filenames. Most distributions now specify partitions by their labels or UUIDs.

Mount point – the second field specifies the mount point, the directory where the partition or disk will be mounted. This should usually be an empty directory in another file system.

File system type – the third field specifies the file system type.

Options – the fourth field specifies the mount options. Most file systems support several mount options, which modify how the kernel treats the file system. You may specify multiple mount options, separated by commas.

Backup operation – the fifth field contains a 1 if the dump utility should back up a partition or a 0 if it shouldn't. If you never use the dump backup program, you can ignore this option.

File system check order – the sixth field specifies the order in which fsck checks the device/partition for errors at boot time. A 0 means that fsck should not check a file system. Higher numbers represent the check order. The root partition should have a value of 1, and all others that need to be checked should have a value of 2.

commands to resizing the file system

After extending the device partition

ext4 file system

```
#resize2fs <mount point>
#resize2fs /prod_data
#resize2fs /dev/vg_data/lv_data
#df -h
```

xfs filesystem

```
#xfs_growfs <mount point>
#xfs_growfs /oracle_data
#df -h
```

scan disk - echo '- - -' > /sys/class/scsi_host/host0/scan

remove disk from vm level - echo 1 > /sys/class/block/sdc/device/delete

remove the fstab entry if any.

create filesystem using raw disk

select VM ---> setting ---> attach disk

scan disk (scan disk - echo '- - -' > /sys/class/scsi_host/host0/scan)

lsblk

sdb - raw disk

mkfs.xfs /dev/sdb

create mount point - /data1

mount /dev/sdb /data1

for permanent mount add fstab entry

create filesystem with partition

selete VM ---> setting ---> attach disk

scan disk

lsblk

sdc - create partition using fdisk /dev/sdc

sdc1

sdc2

partprobe /dev/sdc

mkfs.xfs /dev/sdc1

mkfs.xfs /dev/sdc2

create mount point - /data-1,/data-2

mount /dev/sdc1 /data-1

mount /dev/sdc2 /data-2

for permanent mount add fstab entry