

**📂 File System & Storage in Linux**

Linux file system and storage management are **core responsibilities of a Linux Administrator**. Knowing how to create, manage, expand, and troubleshoot file systems is a must.

**1️⃣ What is a File System?**

A **file system** organizes data on storage devices (HDD, SSD, SAN, NAS) into files and directories.

* **Types of File Systems in Linux**:
  + **ext2/ext3/ext4** → Default Linux file systems (ext4 is widely used).
  + **XFS** → High-performance file system (better for large files).
  + **Btrfs** → Advanced FS with snapshots and volume management.
  + **vFAT/NTFS** → Windows-compatible FS.

**2️⃣ Checking File Systems & Disks**

👉 Commands to check storage:

# Check mounted file systems

df -h

# Check disk partitions

lsblk

# Detailed disk usage

fdisk -l

# Check file system type

df -Th

# Show inodes

df -i

# Mount table info

cat /etc/fstab

**3️⃣ How to Create & Configure File System**

**Step 1: Add New Disk**

(If it’s a VM, attach from VM settings; if physical, plug in HDD).

fdisk -l # Verify new disk

**Step 2: Partition Disk**

fdisk /dev/sdb

# Inside fdisk

n # new partition

p # primary

1 # partition number

<enter> # default first sector

<enter> # default last sector

w # write changes

**Step 3: Create File System**

mkfs.ext4 /dev/sdb1 # Create ext4 FS

mkfs.xfs /dev/sdb1 # Create xfs FS

**Step 4: Mount File System**

mkdir /data

mount /dev/sdb1 /data

df -hT | grep data

**Step 5: Permanent Mount**

Edit /etc/fstab:

/dev/sdb1 /data ext4 defaults 0 0

Run:

mount -a # Reload mounts

**4️⃣ Increase Storage (Extend File System)**

**Case 1: Extend LVM Partition**

lvextend -L +5G /dev/vg01/lv\_data # Increase by 5GB

resize2fs /dev/vg01/lv\_data # For ext4

xfs\_growfs /data # For xfs

**Case 2: Extend Non-LVM Partition**

* Add new partition, then use parted or gparted.
* Or migrate to LVM.

**5️⃣ Reduce File System (Shrink)**

⚠️ **Only possible on ext4 (not XFS).**

umount /data

e2fsck -f /dev/vg01/lv\_data

resize2fs /dev/vg01/lv\_data 10G # Shrink FS to 10G

lvreduce -L 10G /dev/vg01/lv\_data

mount /data

**6️⃣ Monitoring File System**

df -h # Disk usage

du -sh \* # Directory size

iostat -xz 1 # Disk performance

**7️⃣ Interview Questions & Answers**

**Q1: How do you check disk usage in Linux?**  
👉 Using df -h, du -sh, lsblk.

**Q2: What’s the difference between ext4 and XFS?**  
👉 ext4 supports shrinking and is widely used, XFS supports large files and higher performance but cannot be shrunk.

**Q3: How do you extend an XFS filesystem?**  
👉 xfs\_growfs /mountpoint after lvextend.

**Q4: How to make a file system permanent?**  
👉 Add entry in /etc/fstab.

**Q5: If mount -a fails after editing /etc/fstab, what to do?**  
👉 Boot in rescue mode, fix syntax in /etc/fstab, then remount.

**Q6: Can we shrink an XFS file system?**  
👉 No, XFS doesn’t support shrinking.

**Q7: How to monitor inode usage?**  
👉 df -i.