

# What is Partitioning in Linux?

Partitioning is the process of dividing your **physical storage (hard disk or SSD)** into **multiple virtual sections (partitions)** to manage data efficiently.

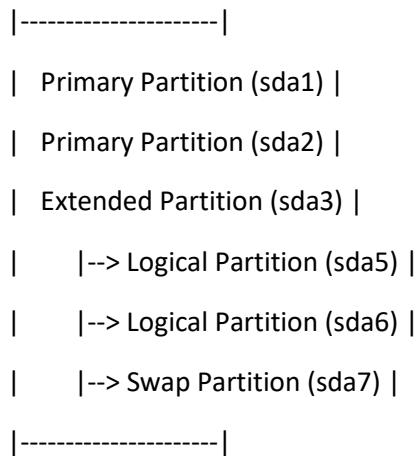
## Main Concepts in Partitioning:

Concept	Description
<b>Primary Partition</b>	Main partitions where operating systems or boot loaders are installed. (Max 4 allowed on MBR)
<b>Extended Partition</b>	A special partition that acts as a container to hold multiple <b>logical partitions</b> .
<b>Logical Partition</b>	Virtual partitions created inside an <b>Extended Partition</b> (unlimited in number).
<b>Swap Space</b>	Special partition used as <b>virtual memory</b> when RAM is full (helps in memory management).
<b>Mount Point</b>	A location (like <code>/mnt/</code> , <code>/home/</code> , <code>/var/</code> ) where partitions are attached to the Linux filesystem.

# Disk Partition Table Types:

Partition Table Type	Max Partitions	Supported OS
<b>MBR (Master Boot Record)</b>	4 Primary Partitions (or 3 Primary + 1 Extended)	Old Systems (like Windows 7, Legacy BIOS)
<b>GPT (GUID Partition Table)</b>	128 Primary Partitions	Modern Linux, Windows 10/11, UEFI-based systems

## Structure of a Hard Disk:



A Hard Disk is Like a Physical Book:

Hard Disk Structure	Book Analogy
Hard Disk (Physical Storage)	The Entire Book
Partition Table (MBR/GPT)	The Table of Contents
Partitions (Primary, Extended, Logical)	Chapters of the Book
File System (ext4, NTFS, FAT32)	The Language of the Book
Mount Points (/mnt/c, /mnt/d)	Page Numbers

## What is SWAP Space?

- Linux uses **swap space** as **virtual RAM** when physical memory (RAM) is full.
- It allows the system to run smoothly without crashing when RAM runs out

# Partition Types in Linux:

Partition Type	Purpose
/ (Root Partition)	Contains the core Linux system files.
/home	User data (like Documents, Downloads).
/boot	Contains the bootloader (like GRUB).
/swap	Virtual memory (acts as RAM).
/mnt	Temporary mount point for other partitions

# Basic Partitioning Commands in Linux (WSL Compatible):

Command	Purpose
sudo fdisk -l	List all disks and partitions.
sudo parted /dev/sda	Open the partition table editor.
lsblk	Show disk layout (including mount points).
df -h	Show disk usage.
mkfs.ext4 /dev/sda1	Format partition as ext4.
mount /dev/sda1 /mnt/	Mount a partition.
sudo swapoff -a	Turn off swap space.
sudo swapon /dev/sda5	Enable a swap partition.

## Create a New Partition (Step-by-Step):

### 1 View available disks:

```
lsblk
```

### 2 Open the disk editor:

```
sudo fdisk /dev/sda
```

### 3 Inside fdisk:

```
Command (m for help): n
```

### 4 Select partition type:

```
Primary (p) or Extended (e)
```

### 5 Choose partition size:

```
+10G (10 GB partition)
```

### 6 Write changes to disk:

```
W
```

## Format the Partition:

```
sudo mkfs.ext4 /dev/sda1
```

## Mount the Partition:

```
sudo mount /dev/sda1 /mnt/new_partition/
```

## Creating a SWAP Partition in Linux (For Ethical Hacking Setup):

```
sudo mkswap /dev/sda5
sudo swapon /dev/sda5
```

## Check if Swap is Active:

```
free -h
```

## Check Disk Layout After Partitioning:

`lsblk`

## Partitioning Tools in Linux:

Tool	Purpose
<code>fdisk</code>	For MBR partitions
<code>parted</code>	For GPT partitions
<code>gparted (GUI)</code>	Graphical tool for advanced partition management
<code>lsblk</code>	Show block devices

## Real Scenario of Ethical Hackers:

Partition	Purpose
/ (Root)	Main Linux filesystem
/boot	Bootloader (GRUB)
/home	Personal data
/swap	Virtual memory
/mnt/hacking	Mounting external hacking tools

## Pro Tip: Access All Partitions in WSL:

`sudo lsblk`

## **Concept to Master Level**

Partitioning (Primary, Extended, Logical)  Basic

Managing Swap Space  Intermediate

Mounting and Unmounting Disks  Intermediate

Creating Bootable Linux Partitions  Advanced