**PARTITIONS & FILESYSTEMS**

**Partition:**

Partition is dividing One HDD in to multiple logical drives. The purpose we are going for partitioning is for easier management of data and to utilise the disk space more effectively

**Physical Drives Representation in Linux :**

SATA / SCSI    (/dev/sdX)
IDE  (/dev/hdX)
Virtual HDD (/dev/vdX)

**/dev/sda ( SCSI | SATA )**
**/dev/hda ( IDE )**
**/dev/vda ( Virtual )**

**Logical drives representation in LINUX :**

**/dev/sda**
/dev/sda1
/dev/sda2
/dev/sda3
/dev/sda4

**/dev/sdb**
/dev/sdb1
/dev/sdb2
/dev/sdb3
/dev/sdb4

**Virtual HDD**
/dev/vda
/dev/vdb
/dev/vdc

## Types of partitions:
1)Primary Partition
2)Extended partition

## Primary Partition :
These are the partitions where bios can recognise. These are the partitions we can use it for installing OS

## Extended  Partition:
These are the partitions where bios can't recognise. These are the partitions we can't use it for installing OS

## Logical partitions:
These are the partitions we creating inside of Extended partitions.

## We can create partitions using :
1)Fdisk
2)Parted
3)gdisk

## Creating Partitions using FDISK:

#fdisk   -l          **(Lists all the available HDD's along with its Partitions)**

#fdisk   -l          /dev/sda  **(Lists information about /dev/sda & its partitions)**

#fdisk          /dev/sdb
                 :m(for Help)
                 :p(prints the Partition table)
                 :n(for creating New Partition)
                 :Primary / Extended (Select Primary)
                 :[1 – 4] Partition Number
                 :Enter First Sector [Take default]
                 :Enter last Sector[enter  +2G]
                 :p
                 :w     [Writes the changes to Partition Table]
#partprobe          /dev/sdb  **(Inform the changes happed on /dev/sdb to Kernel)**

#fdisk   -l          /dev/sdb

**Deleting Partition using FDISK:**

```
#fdisk          /dev/sdb
                :p
                :d  (To Delete the partition)
                :Enter the Partition ID to delete
                :p
                :w
#partprobe              /dev/sdb
#fdisk          -l      /dev/sdb
```

**File System :**

It is the logical layer created on Partition. The purpose of creating FS on a partition is to make OS to perform Read & Write Operations.
➔ The Partition which is not formatted with FS called as RAW Device.
➔ The Partition which is formatted with FS called as block device.

**MKFS :**

It is the command used to create FS on partition. We can define the FS type as per our requirement. If we apply this command on any partition the complete data will be lost along with that it creates a new directory called lost + found.

   Unfortunately if FS metadata is corrupted we cannot access the data from FS.

```
#mkfs.ext4      /dev/sdb1
```

```
#dumpe2fs       -h      /dev/sdb1
```   **(Displays the complete information of specific FS)**

**Mounting :**

   **It is the process of attaching a FS to any one of the directory called as mounting. The purpose of mounting is to make FS accessible to users for performing read & write operations.**

```
#mkdir          /sun
```

```
#mount          /dev/sdb1       /sun
```

```
#df      -h
```

**NOTE :**

This mounting is temporary for the session, to make it permanent we have to update the FS information to /etc/fstab file

#vi /etc/fstab

| Device to Mount | Mount Point | FS Type | Mount Point | FS Dump | FSCK |
|---|---|---|---|---|---|
| /dev/sdb1 | /sun | ext4 | /sun | 0 | 2 |

:wq!

**FS Dump :**
0 : Disabled
1 : Enabled

**FSCK :**
0 : Disabled
1 : Enabled for Root FS
2 : Enabled for Non root FS

**Unmounting :**

It is the process of detaching the Filesystem from the root directory. The most common reasons we unmount a filsystem is to delete a partition or for troubleshooting a filsystem.
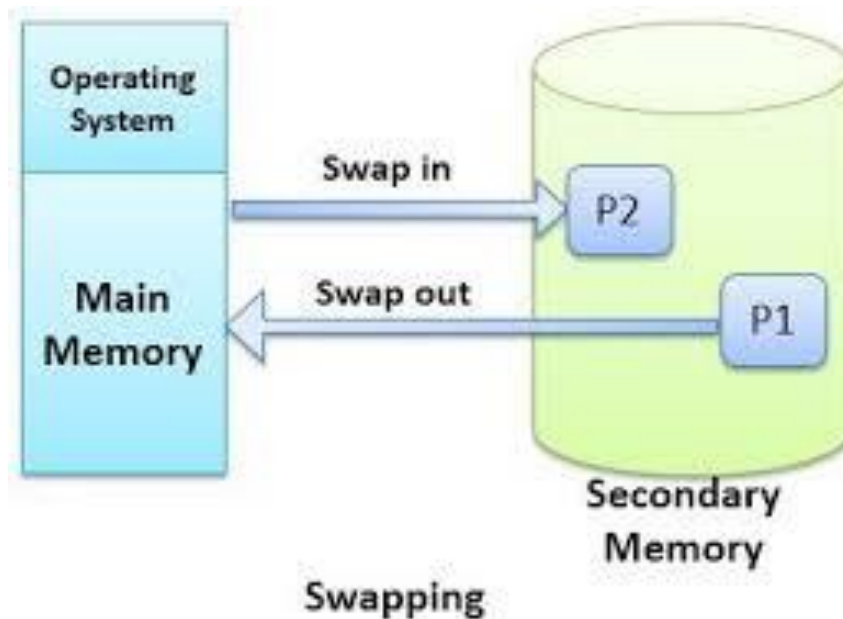
#umount  /sun
**NOTE :**

 To make the filesystem unmounting permanent we need to remove the entries of this filesystem in /etc/fstab file.

## Swap Management

## What is SWAP :

  Swap is Virtual memory & which is a part of Hard disk. *Swap space* in Linux is used when the amount of physical memory (RAM) is full. If the system needs more memory resources and the RAM is full, inactive pages in memory are moved to the swap space. While swap space can help machines with a small amount of RAM, it should not be considered a replacement for more RAM

Swapping

## Understanding :

When we run any Application, It uses the free space in the RAM to store its temporary files. If the RAM does not have sufficient free space then the remaining data copies to Swap. Once the data is freed in main memory again data from SWAP will copied from SWAP to RAM.

The data copying from RAM to SWAP called as SWAPIN or Page Out. The data copying from SWAP to RAM called as Swap Out or Pagein. The total interchanging of data from ram to swap & Swap to ram called as swapping.

**NOTE** : **Recommended to have Double to the ram of Swap space.**
**NOTE:**

It is very imp to have sufficient swap space available on OS. If unfortunately if any of the server is running out of swap it might crash or its performance might be impacted. If this is the case make sure to kill all the unwanted process consuming more Swap, Take the approval from the respected owners and kill them. Even after doing this house keeping work if still swap utilisation is beyond the threshold then the final solution is to increase the swap space.

#free    -m    **(Displays' Ram & Swap space information )**

#swap    -s  **(Displays' Swap space information )**

**Increasing swap space by creating SWAP Partition**

**NOTE :** Decide how much size you wanted to increase the swap accordingly create the partition of the eqal size. Make sure to change the Partition ID to 82 before creating as swap partition.

#mkswap    /dev/sdb1  **(To format the partition with SWAP filesystem)**

#swapon    /dev/sdb1 **(To activate the swap space to main swap)**

#swapon    -s

**To make it Permanent**
#vi    /etc/fstab
/dev/sdb1        /swap        swap    defaults    0    0
:wq
**To deactivate the swapspace from main swap**
#swapoff    /dev/sdb1
#swapon    -s
NOTE : **Remove it from /etc/fstab  to make it permanent**