Task No: 01

Spinning Disk (HDD):

It uses magnetic platters to store data, with a moving read-write head. It performance is low due to mechanical parts. It cost per GB is less than SSD and provide more storage facility with minimum price. It produces heat and noise due to moving of mechanical parts inside it.

Solid State Disk (SSD):

IT stores data on flash memory chips, with no moving parts that's why it is working faster than HDD because of having no mechanical parts. It is costly per GB than HDD but is more durable and uses less power and operates silently.

Logical Block Addressing (LBA):

LBA is a way in which computers organize and access data on a hard disk. Instead of using the physical layout of the disk like cylinders, heads, and sectors.LBA gives each data block a unique number which makes it easier to manage data without worrying about the hardware structure.

24 bit LBA -----> 2^24 blocks and maximum size is (2^24 * 512 bytes) about 8.4 GB

28 bit LBA -----> 2^28 blocks and maximum size is (2^28 * 512 bytes) about 137 GB

Hard Disk Interface:

It is the connection between a hard disk drive and a computer motherboard. It acts as a communication bridge that transferring the data back and forth between the storage device and the system.

Important Features of HDD interfaces:

1 : ATA/IDE/PATA (Parallel ATA) :

Speed: Up to 133 MB/s.

Size: Bulky ribbon cables (40 cm)

Pins : 40 on connector

Connections: Supports up to 2 devices per cable.

Hot-Pluggable: No.

2: SATA (Serial ATA):

Speed: Up to 6 Gbps

Size: Slim cables for better airflow (1-m)

Pins: 7 pins for data and 15 pins for power

Connections: One device per port

Hot-Pluggable: Yes

3: SCSI (Small Computer System Interface):

Speed: Up to 640 MB/s

Size: Moderately large cables.(6-m)

Pins: 50, 68, or 80 pins

Connections: up to 1

Hot-Pluggable: Yes

CHS stands for Cylinders, Heads, and Sectors, which are used to organize and locate data on older hard disks

Reading:

The computer sends a request with the cylinder, head, and sector where the data is stored.

The disk arm moves to the correct cylinder or track.

The head reads data from the correct sector as the disk rotates.

Writing:

The arm moves to the correct cylinder.

The head writes data to the specified sector.

Seek Time :

The time takes by the disk arm to move to the correct cylinder.

Rotational Delay:

The time it takes for the disk to spin and align the correct sector under the read/write head.

How CHS Mapping to LBA Reduces Seek Time?

In CHS the system finds data by moving the disk arm to the right cylinder and waiting for the sector to spin under the head, which takes time. LBA simplifies this by assigning each block a unique

number, so the system doesn't need to calculate specific cylinder, head, or sector positions. This makes data access faster by reducing both seek time and rotational delay.

Task No: 02

Five Advantages of Partitioning the Hard Disk:

1. Better Organization

2. Improved Performance

3. Data Safety

4. Multiple Operating Systems

5. Easier Backup

Primary Partition:

A primary partition is one of the main divisions on a hard disk. You can have up to four primary partitions on a disk. It is bootable, meaning the computer can start from it.

Logical Partition:

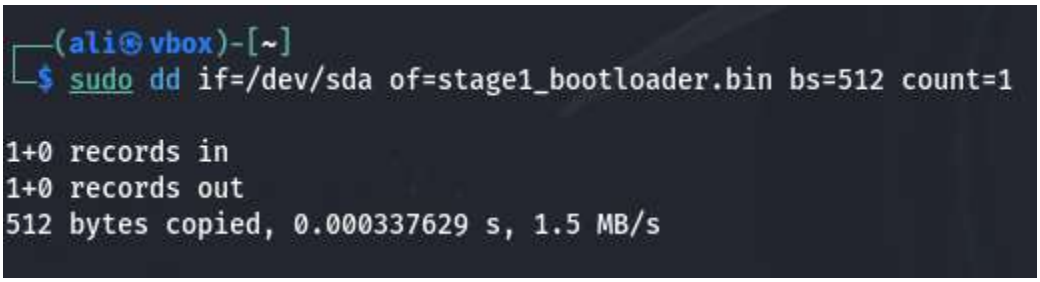
A logical partition is created within an extended partition. You can have many logical partitions, and they are often used when you need more than four partitions on a disk. Logical partitions cannot be booted directly.

Partition Table

A partition table is a data structure on a hard disk that contains information about the partitions on the disk. It tells the operating system where each partition begins and ends, along with other information such as the partition type and boot information.

Shell command that displays boot signature of your hard disk

Shell command that displays the stage 1 boot loader program on your hard disk



Shell command that displays the partition type of the first partition of your hard disk

Five different partition types along with their numbers that your system supports.

1.Linux

Partition Type Number: 83

Used for standard Linux file systems (e.g., ext4, ext3).

2.Windows NTFS

Partition Type Number: 07

Used for Windows operating systems, especially for NTFS file systems.

3.Linux Swap

Partition Type Number: 82

Used for swap partitions in Linux systems, which act as virtual memory.

4.FAT32

Partition Type Number: 0B

Used for partitions formatted with the FAT32 file system, commonly used in removable media and older Windows systems.

5.EFI System Partition (ESP)

Partition Type Number: EF

Used in UEFI-based systems to store boot-related files.

Task no : 03

File System :

A file system is a method for storing, organizing, and managing files on a storage device, allowing users and programs to retrieve, update, or delete data.

Journaling File System:

A journaling file system logs changes to files and directories before they are made, ensuring quick recovery and consistency after crashes or power failures.

Functionalities of a Good File System:

1.Data Storage and Retrieval

2.File Management

3.Security and Access Control

4.Reliability

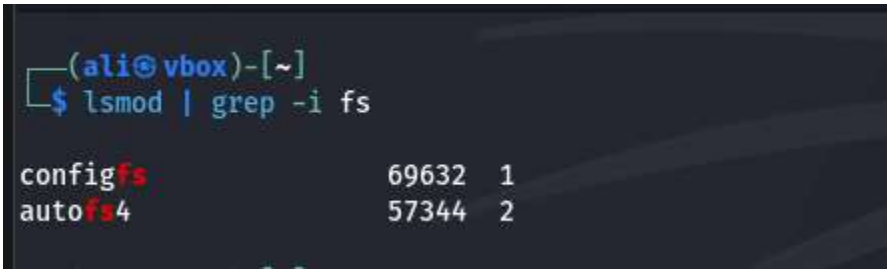
5.Efficiency

6.Consistency

7.Support for Large Files and Volumes

8.Scalability

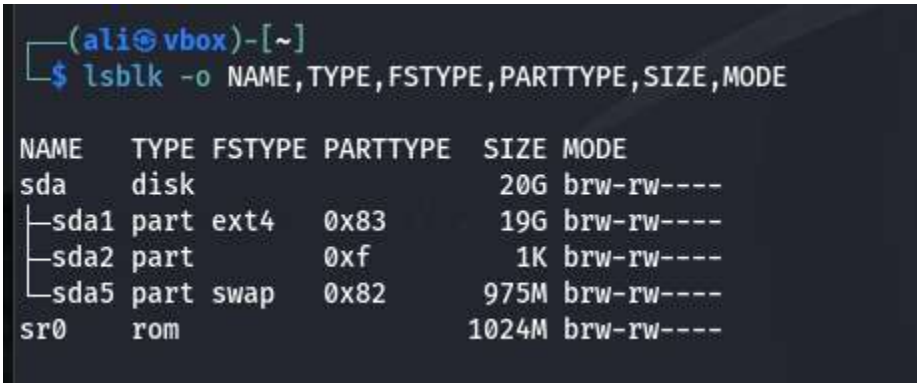
Command that displays the list of currently loaded file system drivers



Maximum file size and maximum partition size for the specified file systems:

File System	Maximum File Size	Maximum Partition Size
ext3	2 TiB	16 TiB
ext4	16 TiB	1 EiB
VFAT	4 GiB - 1 Byte	32 GiB (FAT32)
NTFS	16 TiB	256 TiB
ZFS	16 EiB	256 ZiB

Shell command to display the name, type, fstype, parttype, size, and mode of the hard disk



Command to assign a label “pucit9” to the first logical partition of your only attached scsi hard disk, and later give a command to undo it