Unit ⇒ 2 Managing storage devices :-

Semiconductor Memory :-

→ Semiconductors are those material which have conductivity between conductors (silver, copper, etc) and insulators (glass, diamond, etc).

→ Semiconductors can be pure elements, such as silicon or germanium or compounds such as gallium arsenide or cadmium selenide

Semiconductor Memory :-

→ A device which is used to stores digital information is known as Semiconductor memory.

→ It is also known as memory chip, semiconductor storage or transistor memory.

→ The semiconductor memory is directly accessible by the microprocessor.

→ It offers high operating speed and has the ability to consume low power.

→ Thus, semiconductor devices are preferred as primary memory.

→ The fabrication of semiconductor memories is done through CMOS technology.

There are two types of semiconductor memory :-

(i) Volatile
(ii) Non-volatile

Semiconductor memory

- Volatile
  - RAM
    - SRAM
    - DRAM
- Non Volatile
  - ROM
    - PROM
    - EPROM
    - EEPROM

Flash memory :-

→ Flash memory combines the advantages of ROM and RAM.

- It can be written or programmed in unit called "Sector" or a "Block".
- Flash memory is EEPROM means that it can retain it contents when the power supply removed.

- It is commonly found phones, USB Flash drives, tablet computers, and embedded controllers.

- Flash memory is often used to hold control code such as the BIOS in a personal computer.

- This memory is used in USB, SD Card, memory chip etc.

Ram Technology :-

→ RAM is a type of computer memory that is used to store data that is actively being used or processed by a computer.

→ It provides quick access to data for the CPU, allowing for faster data retrieval that than other types of storage like hard drives or SSDs.

SIMMs

→ SIMMs stands for Single In-Line memory module.

→ It is a type of memory module used in old computer system for RAM.

→ SIMMS have row of electrical contacts on side and typically used in pair.

→ They were commonly used in computers during 1980s and 1990s.

→ They typically had 32-bit data bus and were available types 30 and 72-pin.

→ However, they have largely been replaced by DIMMS in modern computer systems which provide flexibility and performances.

DIMMS

→ DIMMs stands for Dual In-line Memory Modules).

→ It is a type of memory module used in modern computer systems for RAM.

→ DIMMs have electrical contacts on both sides and offer greater flexibility capacity compared to older memory modules like SIMMs.

DDR (Double Data Rate)

→ They come in various capacities and speeds, supporting the latest DDR technologies.

→ DIMMs are widely used in desktops laptops and servers, providing a higher memory capacity and improved performance for a wide range of computing tasks.

Hard drives —

→ HDD stands for hard disk drive.

→ It is a non-volatile hardware component on a computer.

→ A hard drive acts as the storage for all digital content.

→ It holds program files, documents, picture, video, music and more.

→ It uses magnetic storage for storing and retrieving the digital data.

→ The HDD was introduced in the year 1956 by IBM.

Following are the advantages of Hard disk drive :-

⇒ One of the significant advantage of a Hard disk drive is that it's cost is low.

⇒ Another advantage of Hard disk drive is that readily available in the market.

⇒ The capacity for storing the data in HDD are large.

Disadvantage :-

⇒ The speed of reading and writing in HDD is slower than the RAM.

⇒ HDD are noisy.

⇒ Another disadvantage of HDD is energy inefficiency

⇒ HDD consume more power.

Hard disk drive Technology :—

(I) IDE
(II) EIDE
(III) SCSI
(IV) SATA

(I) IDE :—

→ IDE stand for Integrated Drive Electronics.

→ IDE is also known as ATA and PATA. (parallel ATA).

→ IDE is a standard interface for connecting storage devices like hard drive and CD-ROM drives to a computer's motherboard.

→ IDE has largely been replaced by SATA (Serial ATA) in modern systems.

→ It is a standard interface for IBM computers that was first developed by Western Digital and compaq in 1986 for hard drives and CD or DVD drives.

→ IDE and its updated success, EIDE are common drive interfaces found in IBM computers.

IBM → International Business Machine.

(II) EIDE :-

→ Enchanced integrated drive electoon

→ EIDE is the hard drive interface that succeeded IDE, also known as ATA-1

→ EIDE provides faster data transfer rates and support for large hard drives

→ EIDE supports data transfer rate up to 16.6 MB/s and can handle larger storage capacities compared to the older IDE standard.

→ It's worth noting that while EIDE was an improvement, it has largely been replaced by newer interfaces like SATA (Serial ATA) in modern computer.

• SATA offers even higher data transfer rates and improved features for connecting storage devices to computers.

(III) SCSI

→ SCSI stands for Serial Advanced Technology Attachment.

→ SCSI hard drives are upgrades over SATA and PATA drive drives for many reasons such as –

- > Round-the-clock operations,
- > Speed ,
- > Storage and,
- > Several others.

→ SCSI which stands for small Computer System Interface.

→ It is a set of standards for connecting and transferring data between computers and peripheral devices.

→ originally developed for connecting hard drives and storage devices, SCSI has evolved to support a variety of devices including scanners, printers, and CD/DVD drives.

→ It provides a versatile and robust interface, that allowing multiple devices to be connected to a single SCSI bus.

→ Connections through SCSI on personal computers have now been replaced by the USB.

→ This means that they transfer
· SCSI is no longer used as
com. consumer hardware.

(IV) SATA

→ SATA stands for serial advanced technology Attachment.

→ SATA is a widely used interface for connecting storage devices such as hard drives and solid-state drives (SSDs) to a computer motherboard.

→ It replaced the older parallel ATA (PATA) interface, providing several advantages.

→ Key feature of SATA include a serial data transfer mechanism,

- which allows for higher data transfer rate and thinner, more flexible cable

→ SATA is commonly used in both desktop and laptop compilers, as well as external storage devices.

Several generation of SATA —

i SATA I (1.5 Gbps)
SATA II (3 Gbps)
SATA III (6 Gbps)

→ SATA remains a standard interface for connecting internal storage ~~for~~ or devices in many computer.

Hard drive partitions —

→ Hard drive partiation is logically and physically seperate section of a computers hard disk or storage device.

→ A hard drive can have multiple primary partition but only one active one of a time.

Hard drive partition type —

(i) Primary partition :- This is main partition in the hardware and it typically used to install operating System.

(ii) Extand partition :- It do not store data directly but serve as container for logical drive.

(iii) Logical drive — Logical drive can't boot operating system. A hard drive have multiple logical drive.

Q It is possible to install OS in logical drive during hard drive partition.

Ans No, it is not possible to install OS in logical drive during hard drive partition because it occurs only in primary partition.

⟹ Benifit of hard drive partition :—

(i) Organizing data :—

partition helps in organize data by seperating into different area into hard drive making it easier to manage file.

(ii) Data isolation :—

If one partition become corrupted data an another partition may unaffected.

(III) Multiple Boot System :-
It help in partition which are used to install in multiple OS on a single harddrive enabling user to choose between them at a good time.

(IV) Backup and recovery :-
We can use one partition of operating system and another for the data storage. This can be simply backup and recovery process.

Caution :-

(I) Data loose risk :- when working with partition there is a risk of data loose critical to back up important data before making changing.

(II) Careful management :-
Incorrectly managing or resizing partition can result in data corruption

Steps for harddrive partition :-
Partning a hard drive involed driving it into seperate section or volumn.

This can be useful for various purpose such as organising data, installing multiple OS, improving data management.

Step 1 :-

- Open Disk management " press ~~cont~~ window + X and select disk management".

alternatively press "window + R" and type "disk management.msc' and press enter. diskmgmt.msc

Step 2 :-

- Identify the drive that you want to partition.

(III) Shrink the existing partition :-
If we want to create a new a partition from an existing one you want shrink it and select the " shrink volume".

Follow the on screen instruction to choose the size of new partation.

(IV) Create a new partition —
Right click on the unalocated space all the free space created in the privous space and select new simple volume.

→ For the new simple volume wizard to set the size drive letter file system and formate option.

(V) Formate the new partition —
after creating the partition you may need to formately.

→ This process the pears the partition for data store.

(VI) Assign and drive letter —
- choose an avalable drive letter accept the default letter.

(VII) Complete the process

(VIII) Verify and use the new partition.

Physical damage :-

Hard drive is dead and damage because of few reason —

(I) Physical damage
hard drive are made up of moving parts physical damage can easily render out hard drive unusable if one of the platter inside becomes scratched.

(II) Data corruption
corruption is in the form of physical damage.
→ corruption may occurs to individual file or the entire file system.

(III) Malware attack
Malware like virus can attack our file or damage entire drive.
Ex Annabella virus, Ransomware virus

→ Trouble-shooting of hard drive :-

→ Troubleshooting a harddrive involves identifying and resolving issues that may affect its performance or functionality.

→ Common steps include checking physical connections, running diagnostic tests, scanning for malware, updating drivers, and assessing disk health using tools like CHKDSK or Disk Utility.

• How to troubleshoot Hard Disk —

(I) open File Explorer and find the disk which has problems

(II) Right click on the hard disk with errors.

(III) choose Properties

(IV) Navigate to tools bar in the properties window

(V) Click on the check button

(VI) Select Scan and repair to start detecting & fixing disk errors.

Recover Data from a corrupted or Crashed Hard Drive.

(I) Type cmd into the search box on taskbar.

(II) Right click on command Prompt from the search result.

(III) Select Run as administor

(IV) Type CHKDSK *: /f and Press Enter.

(V) wait for the completion.

Recover Data from a corrupted or crashed Hard drive with Software:

→ Disk Drill is a data recovery tool that facilitates easy recovery of your essential documents, photos, video and other related data lost from a variety of storage devices.

→ It is an effective and economical solution with a straight forward interface for beginners.

Steps :-

(I) Download and Install Disk Drill for windows or Mac OS.

(II) Launch Disk Drill recovery software, select the crashed hard drive disk and click.

(III) Preview the files we find with Quick or Deep scan.

Disk Drill provides us with a complete disk scan report at the end of the recovery operation.

(IV) Click Recover to recover our lost data.

⇒ Optimizing Hard drive —

What does it mean to optimize a drive? Hao to optimize?

- optimizing the disk means that it compresses and organizes the files on our hard disk.

→ optimizing our drives can help our PC run smoother and boot up faster.

To optimize them:—

→ Select the search bar on the taskbar and enter defrag.

→ Select Defragment and optimize Drives.

→ Select the disk drive you coe want to optimize.

→ Select the optimize button.

Disk clean-up :—

→ It is a microsoft software utility program.

→ first introduced with windows 98 and included in all subsequent releases of windows.

→ It allows users to remove files that are no longer needed or that can be safely deleted.

→ Removing unnecessary files, including temporary files, helps speed up and improve the performance of the hard drive and computer.

→ Running Disk cleanup at least once a month is an excellent maintenance task and frequency.

How to open microsoft disk clean up —

→ window + R to open power user task menu.

→ In the menu top on the click on the run option

→ In the text mean to run text file "cleanmgr" and press enter.

For window 7 and earlier —

→ Open start menu.

→ click program ⇒ accessories ⇒ System tools

→ In the system tool click the disk cleanup utility.

OR

→ open start menu → Run → cleanmgr.

Disk fragmentation

→ Fragmentation of disk means allocating

→ Usually, data is stored in hard drive in sequencyal form.

→ Operating System spit entire data into small packets and store data in different locations of storage area.

→ It occurs when a file is broken into pieces to fit on the disk, because are constantly being written deleted resized.

Types of disk fragmentation

(I) Internal fragmentation

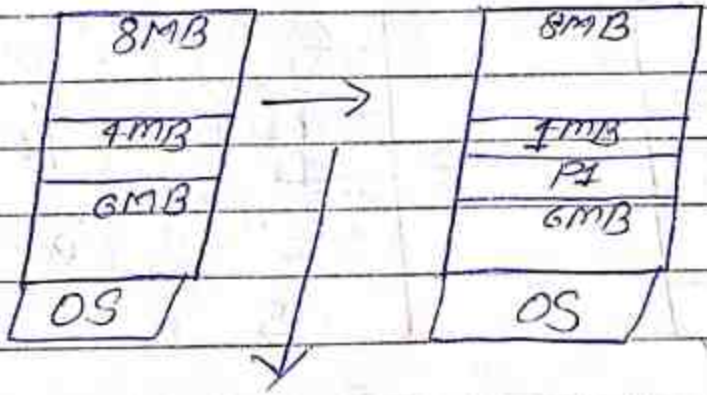
(II) External fragmentation.

Internal fragmentation :—

→ It happens when the memory is spilt into mounted sized blocks.

→ In this fragmentation, the process is allocated a memory block of size more than the size of that process.

• Due to this some part of the memory is left unused and this caused internal fragmentation.



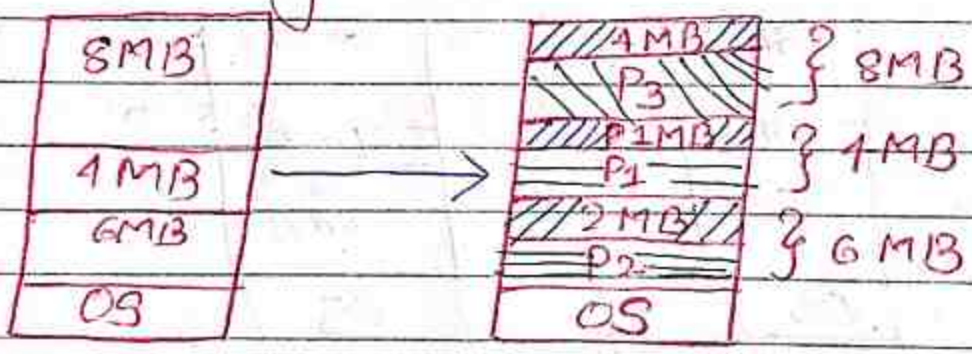
Allocating memory block (4MB) for process P1

External fragmentation :-

It happens when there is a sufficient quality of area within memory to satisfy the memory request of methods.

→ In this fragmentation, although we have total space available that is needed by a process still we are not able to put that process in the memory because that space is not contiguous. This is called external fragmentation.

External fragmentation



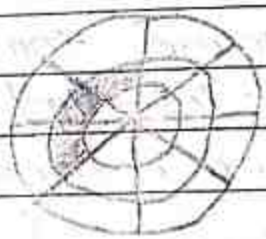
Now, suppose a new process of 4MB comes. Though we have total space of 1MB Still we can't allocate this memory to the Process. This is called external fragmentation.

Disk defragmentation :-

It is a process in which all scattered fragments / data are arranged in such a way that they come in sequence form.

→ The process of defragmentation moves the data blocks on the hard drive around to bring all the parts of a file together.

→ Defragmentation is the opposite of fragmentation, which is an inefficient use of computer storage.



Disk Backup :-

→ It is also known as disk cleaning.

→ It is a process where we make a copy of entire content of a hard drive or disk to another storage medium.

→ Hard disk Backup is a process to create a complete copy of everything in a hard drive to another HDD / SSD or an external hard drive

Basic steps to create a disk backup :-

(I) Select the backup tool
- choose a backup software or tool that we need.
example :- macrium reflection, Acroni's true image.

(II) Prepeare backup media :-
we need an external Hard drive, other internal hard drive, external hard drive, new storage drive, with enough to store.

(III) connect or install the backup drive -
ensure that the backup drive is connected or installed properly and recoorgonized by our computer.

(IV) Configure backup setting —
configure backup setting according to our ~~perf~~ preferences.

(V) verify backup —
Integrity of backup should be ensure.

(VI) Regularly update the backup —

To maintain an effective strategy update disk backup regularly especially when you make disk changes.