**The Central Processing Unit (CPU)**

CPU is also called the Processor or microprocessor is a tiny chip etched into a silicon chip. The CPU is the most important component of the computer. This is because it is the portion of the computer responsible for executing (processing) instructions stored in memory. Also all control operations are coordinated

here.

The CPU performs the following functions:

- Processing data

- System control

- Provide temporary storage (RAM)and permanent storage (ROM)

- Runs the Operating System software installed on the computer, peripheral devices such as printers, scanners etc.In microcomputers, the CPU is housed inside the system unit where its mounted on a circuit board called the motherboard or the system board.

**Functional units of the CPU**

Regardless of size, a processor consists of three

functional elements namely;

- Arithmetic and Logic Unit (ALU)

- Control Unit (CU)

- The Main Memory (primary memory)

** Control unit**

CU controls / coordinates all processing activities in the CPU using a system clock, which sends electrical signals. The CU interprets instruction fetched from the Main Memory and sends control signals to the ALU instructing it on how to execute instructions,

issue control instructions to the operating system,

determines the operation to be performed by the

instruction, where the results are to be stored, and

where the next instruction is located. The CU fetches

data from the main memory and puts it in the proper

order for the processor. It also sends the processed

results back to the main memory. The CU also locates

any data needed by the instruction and sees that the

instruction is followed.

** Arithmetic and Logic Unit (ALU)**

ALU performs arithmetic and logical operations (the

basic data transformation in a microprocessor).

Arithmetic operations include addition, multiplication

and division. Logical operations includes comparing

two quantities or more numbers to determine which is

greater or equal to or less than the other. It also

involves testing for existence of a condition

encountered during the processing of an application.

The ALU carries out all the logical and arithmetic

processing on data as directed by Control Unit. It

decodes the instructions and then processes the data.

Data to be executed by ALU is temporarily held

registers inside the processor.

** Main memory**

It is also called primary memory storage. It provides

storage location for data and instructions accessed by

the control unit.

Its two main functions are:

i). Holding data just before and after processing

ii). Holding instructions just before and execution

Classification of Computer Memory

The different types of memories are

 Primary storage

 Secondary storage

The primary memory is used for temporarily holding

data and instructions required immediately by the

CPU and contents are lost once the power is switched

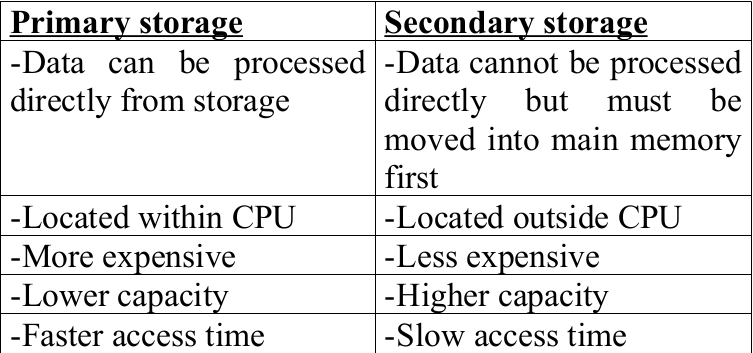
off. Secondary storage is used for permanently storing

information by the CPU and is not lost when power is

switched off.

A comparison between primary and secondary

memory:

**Primary memory**

Is of two types Read Only Memory (ROM) and

Random Access Memory (RAM).

A).Read Only Memory (ROM) – Used to store firmware from hardware manufacturers and/or programmed instructions and data permanently

or semi-permanently. Its contents can be read but

cannot be written back or you cannot store anything in

ROM during normal computer operations. ROMs are

used in computers for permanent storage of

instructions such as

- Power On Self Test (POST)

- The Basic Input Output System (BIOS)

- The bootstrap loader (the automatic program that

finds and loads the operating system program

from disk) so that the computer has something to

do when power is first applied.

NB: Ordinary users can’t change ROM.

Types of ROM

i). Mask Read Only memory (ROM) Contents are written once by the manufacturer and

cannot be changed afterwards.

ii). Programmable Read Only Memory(PROM)

Can be programmed directly by the user using a

special PROM programmer. PROMs come as blanks

having nothing programmed or recorded on them.

Once programmed it cannot be changed therefore it

allows user to program (write) it only once. After

programming it assumes the characteristics of Mask

ROM..

iii). Erasable programmable read only memory

(EPROM)

Is a special type of ROM that can be erased and

reprogrammed again by exposing it to ultra-violet

light for 5 to 10 minutes, thus reducing the contents of

all the memory cells to zero by discharging them.

Advantage: contents can be erased and

reprogrammed for another use.

iv). Electrically Erasable Programmable ROM

(EEPROM)

EEPROM can be erased and reprogrammed using

electricity under software control and can support

selective modification of its contents. A BIOS chip

found on a microcomputer’s motherboard is an

example of EEPROM..

v). Electrically alterable ROM

Can be read from and written to. However, since the

processes are significantly different, the EAROM can

be called a “read-mostly” memory. in order to write

into EAROM you require a millisecond, while the

read operation can be performed in microseconds. The

application of EAROM is limited to critical industrial

and military applications.

Advantage:

It is non-volatile and does not require an auxiliary

power source such as battery.

Disadvantage:

- Cannot be used as a general purpose read/write

memory because it takes much time to write to than

read from.

- EAPROM has limited application only to critical

industrial and military applications

Characteristics of ROM

- Can only be read and cannot be written to unless it’s

a special ROM e.g EAROM

- Its non-volatile

- High bit density

- Stores permanent or semi permanent instructions

from manufacture although some can be

programmed according to users specification.

Disadvantages of ROM

- Are not cost effective because of large production

volumes

- A ROM cannot be changed, once manufactured.

- Delay in production of the ROM.

B). Random Access Memory (RAM)

RAM is mostly referred to as working storage. RAM

holds the programs being run and the data being used

by the CPU at the current time. Its contents can be

read directly regardless of the sequence in which it

was stored. RAM can be written to and retrieved

from. RAM is the memory used in large quantities in

Main Memory and every computer must specify its

size. Ram holds the programs being run and the data

being used by the CPU at the current time.

Characteristics of RAM

- Data can be read and written in it.

- It’s temporary (volatile) storage , its contents are

lost/ disappears when the computer is switched

off.

- It’s contents is user defined.

Types of RAM

There are two types of RAM namely Static RAM

(SRAM) and Dynamic RAM (DRAM)

i). Static RAM (SRAM)

SRAM is a fast type of memory found inside a

microprocessor.

Characteristics

- Stores a bit of information within a flip-flop

- It’s a very fast memory and holds its contents as

long as there is power.

- Its content does not require refreshment

- Its expensive

- Its very fast compared to DRAM

- Its mostly used to make special types of memories

known as Cache memory

- Used for smaller memories

- Has low packing density

ii). Dynamic RAM (DRAM)

The term dynamic refers to the tendency for stored

charge to leak away, even with constant power

supply. Due to this DRAM requires periodic

recharging referred to as refreshing to maintain its

data storage.

- Stores a bit of information in a charge and (a

disadvantage) additional logic is needed for

refreshing the memory.

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- It holds its contents for a short while even when

the power is on. To maintain its content it must be

refreshed severally per second.

- Packing density is much higher than SRAM

- Is less expensive than SRAM

Disadvantages of RAM

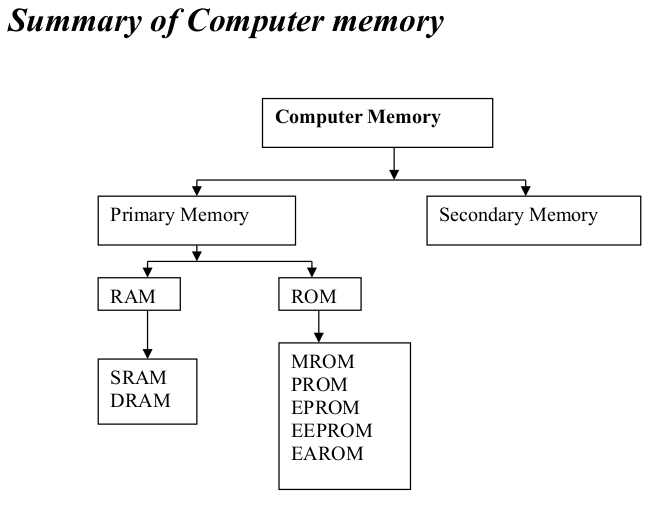
- It is expensive

- It loses its content when you turn the power off

- It is very difficult to archive information or pass it

along to someone else, if everything is kept in

RAM.



**Special purpose memories**

Are memories embedded in a microprocessor in order

to enhance its processing speed and are found inside

the CPU or in the input and output devices. These

memories increase the overall performance of data

and instructions moving in and out of the CPU. They

increase the hit ratio (the availability of data and

information when required) and reducing the wait

time when the CPU searches for data and instructions

from memory. Slower memories like DRAM make

the CPU to wait longer when it needs data stored in

them.

These memories include: Buffers, Registers and cache

memory.

i) Buffers

Is a temporary holding place that may be part of the

CPU or built in an I/O device.. Acts as interface

between very fast processor and slow input/output

devices. Since the CPU is very fast compared to the

I/O devices, buffers provide temporary storage so that

the CPU is set free to carry other activities instead of

waiting for all data entered or information to be

output. Input data is held in the input buffer while

processed data is held processed data is held in output

buffer. Examples: computer printers have buffers

where they can store massive documents sent by the

CPU for printing hence freeing the CPU to perform

other urgent tasks as the printer continues to print in

the background.

NB: Buffers can hold more than one piece of data at a

time.

ii) Registers

Are high speed temporary memory locations within

the CPU that holds data and instructions just before

and after processing in the ALU. They hold one piece

of data a time and are located inside the CPU.

Types of registers

 Program counter (PC)

Holds the memory address of the instruction to be

fetched next.

 Instruction register (IR)

Temporarily holds an instruction just before it is

interpreted into a form that CPU can understand it.

 An accumulator (AC)

Temporarily holds the results of the last processing

step of the ALU e.g 3 + 4 = 7 is held in the

accumulator.

 An address register (AR)

Temporarily holds the address of the next piece of

data to be fetched for processing.

 Storage register (SR)

Temporarily holds a piece of data that is on its way to

and from the CPU and

main memory.

iii) Cache memory

Cache memory (pronounced as cash) is a very high

speed type of SRAM whose purpose is to allow the

processor to access data and instructions faster i.e.

speeds up processing (fetch cycle).

There are three types of cache memory namely:

- Level 1 (primary cache) located inside the

microprocessor.

- Level 2 (external cache) may be inside the

microprocessor or mounted on the motherboard.

- Level 3 is the latest type of cache that works with

Level 2 cache to optimize system performance.

Virtual memory

If you have limited memory or you have many

programs open, your computer may need to use part

of the hard drive to simulate more memory. This

simulated more memory is called virtual memory and

allows the computer to continue operating but at much

slower speed. Therefore a virtual memory is simulated

memory from hard drive which makes the computer

operate at a much slower speed.

Memory capacities

Memory and storage capacity is measured in special

units called bytes. A byte is equivalent to a single

character, which can be numbers 0 – 9, letters A – Z

or a special symbol e.g. a number 2341 has 4 bytes,

while words ‘My school’ has 9 bytes.

Memory quantities can be expressed in:

1. Kilobytes (KB) – Approximately one thousand

bytes (10 3 )

2. Megabytes (MB) – Approximately one million

bytes (10 6 )

3. Gigabytes (GB) – Approximately one billion bytes

(10 12 )

4. Terabytes (TB) – Approximately one trillion bytes

(10 24 )

Overall organization of the CPU

The ALU, CU and Main Memory use electrical

pathways or links called buses. A bus is an electrical

path for signal to flow from one point to another in a

circuit. There are three types of computer buses

namely:

a). Control bus

This is a pathway for all timings and controlling

functions sent by the control unit to other parts of the

system.

b). Address bus

This is used to locate the storage position in memory

of the data to be executed or an instruction to be

decoded.

c). Data bus

This is the pathway where the actual data transfer

takes place.

Summary of the overall organization of the CPU

The central processing unit exchanges data with the

main memory and input/output devices. The control

unit fetches data and instructions from the main

memory then sends to ALU for execution in a process

called fetch execute cycle. The program counter (PC)

holds the address of the instruction to be fetched next.

The fetched instruction is loaded into instruction

register (IR). The control unit interprets the

instruction and directs the ALU to perform the

necessary execution.

Processors

A processor consists of an inbuilt set of instructions

called instruction set.

Types of processors

A microprocessor is a complete CPU where ALU and

Control unit has been combined into tiny single

processor. The microprocessor chips use many

different internal designs, and the chips vary in

appearance and capability.

Three basic characteristics that differentiate

microprocessors are:

 Bandwidth: Which is the number of bits that can

be processed by one instruction

 Clock speed or Clock Rate: Which is the speed

of the internal timer that determines how many

instructions per second the processor can execute. The

internal clock regulates the rate at which instructions

are executed and synchronizes all the various

computer components. The faster the clock, the more

instructions the CPU can execute.

 Instruction set: is an inbuilt set of instructions

that the microprocessor can execute.

There are two types/ classes of Microprocessors

namely:

 Reduced Instruction Set Computer (RISC)

 Complex Instruction Set Computer (CISC)

- Complex Instruction Set Computer (CISC) is the

name given to types of processors that use a large

number of complicated instructions microcoded into

the processor, to try to do more work.

- Reduced Instruction Set Computer (RISC) is the

name given to processors that use a small number of

simple instructions meant to do less work with each

instruction but execute them faster.

Processor Clock speed

Clock speed is measured in units called Hertz (Hz),

where 1 Hz equals 1 cycle (tick) per second. A Hertz

is a unit of frequency which measures the number of

cycles in a signal.

The clock/clock rate – refers to how many

instructions per second the processor can execute.

Quantities of clock speed can be expressed in :

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i) Kilohertz (kHz) : approximately one thousand

hertzs.

ii) Megahertz (MHz): approximately one million

hertzs

iii) Gigahertz (GHz) : Approximately one billion

hertzs.

- Modern CPUs reach over 3 GHz.

**Output Devices**

An output device is a peripheral device that a

computer uses to give out information produced after

processing. The most common types of output data

include text, pictures, sound and video.

Types of output devices

Are classified as either softcopy or hardcopy.

Softcopy

Refers to intangible output displayed on the screen or

listened to through devices like speakers. Softcopy

output devices include monitors, speakers, LCD

Projectors and light emitting diodes.

Example of softcopy output devices:

A). Monitors (VDU)

Also known as Visual Display Unit or Screen. It

displays information in form of text, pictures and

video on the screen thus helping the user to monitor

operations carried out by the computer.

Types of monitors

There are two commonly used technologies used in

monitors: Cathode Ray Tube (CRT) and Liquid

Crystal Display (LCD). Monitors that display sharp

clear images are said to have high resolution.

Terms associated with computer display include:

Pixel: Picture elements are tiny dots which are used to

form the images displayed on the screen. In colour

monitor, a pixel has three primary colours namely red,

green and blue.

Colour depth: refers to number of colours which can

be displayed by a pixel. It is measured in bits.

Resolution: is the number of pixels per inch on the

screen usually given in dots per inch (dpi) or bits. The

higher the resolution, the more the number of pixels

per inch, hence the clearer the images.

Refresh rate

Since the CRTs cannot hold an image for a long time,

image in the video RAM is used to refresh the one on

the screen as long as necessary. If a screen has a low

fresh rate, images tend to flicker hence causing

eyestrain.

Display size: is measured in inches as the diagonal

length of the screen measured from top to bottom left.

CTR monitor

The screen is curved slightly outward forming a

convex shape. A CRT monitor consists of a long glass

tube with an electron gun on one end and a screen on

the other end. The screen is coated with tiny

phosphorus dots that illuminate red, green and blue to

make a pixel. The CRTs are too bulky to carry

around, consume a lot of power and are cheap to buy.

Flat Panel Display (LCD monitors)

The screen is flat, they are portable, consume less

power, comfortable to use, occupy less space, are

expensive and provides high quality output.

Examples of flat panel displays

(i). Liquid crystal display (LCD)

Are made from a tiny special liquid crystals that

reflect light falling on them from the environment.

Are less bulky, consume less power and have very

little effect on eyes.

(ii). Thin Film Transistor (TFT)

It provides high quality output (text and graphics)

(iii). Electro Luminescent (EL)

They glow when exposed to an electric current, giving

rise to an electroluminescent display. Images are

clearer than LCD.

(iv). Gas Plasma

They use gas that emits light when electric current is

passed through them. They contain millions of pixels

that are illuminated by charged neon gas. Gas Plasma

panels do not suffer from angle distortion and the

technology is popularly used in producing high

definition Tvs (HDTV) with large screens used in

homes and entertainment places.

Video adapter

Also referred to as graphic adapter or video card. The

monitor is connected to the system unit through the

video port to a video adapter. The video adapter

determines the resolution and clarity of the monitor.

Graphic Adapter / Video card is a piece of circuit

board plugged to the motherboard that connects a

monitor to a computer and allows the computer to

show images and text on its screen.

Examples of Graphic Adapters

- Monochrome Displays Adapter (MDA) which

displays text only in one colour.

- Hercules Graphic Card (HGC) – displays both

text and images in one colour.

- Colour Graphic Adapter (CGA) – displays text

and images using up to 16 colours.

- Enhanced Graphics Adapter (EGA) – displays

text, graphics and video using 16 colours.

- Video Graphic Adapter (VGA) – offers at most

256 colours.

- Super Video Graphic Array (SVGA) – Offers over

256 colours with a minimum resolution of 800 x

600 pixels.

- Super Extended Graphics Array (SXGA) has a

resolution of 1280 x 1024 pixels and is popular

with 19 and 21 inch monitors.

- Ultra Extended Graphics Array (UXGA) is the

latest and has the highest standard.

B). Sound output devices

These devices produce sounds such as beeps, audio or

digital. Speaker is an example of sound output device.

This output is in form of spoken words. Speakers are

used to output sound from a computer. Sound may be

output inform of music, warning, video, interactive

communication with the computer or to give

messages in emergency situations. Speakers can be

external or internal. Some computers have internal

speakers like Compaq. An external speaker should be

connected to a sound card through the jacks on the

system unit or on a multimedia monitor.

Sound output has the following advantages:

- No reading is needed

- Useful in situation where you can’t look at the

screen or where you are too busy

Disadvantage

Not suitable for noisy situations

Inappropriate for lengthy or permanent information.

Applications of sound output

- Learning Aids e.g. Computer Aided Learning

- Lift where messages are used to greet visitors and

tell them the floor they are in.

- Emergency massages i.e. Public address systems,

in cars when running out of petrol.

- Text speech translation for blind people.

C). LCD Projectors (Data Projectors)

Are used to display output from a computer on plain

white paper screen like a wall or whiteboard. It’s

actually a creative and interesting technology way of

presenting computer output to an audience unlike

traditional overhead projectors.

D). Light Emitting Diodes (LED)

They are components (indicators) that display light

when electric current is passed through them. It is

used mainly for warnings. Example: a red or green

light displayed by the system unit to help user know is

ON or OFF, warnings given by motorists to indicate

when overtaking or taking a turn.

Hardcopy Output Devices

Hardcopy refers to tangible output that can be seen

and touched and recorded on a physical media.

Hardcopy output devices are printers, plotters and

facsimile (fax).

1. Printers

Produce a hard copy of information on papers. The

printing mechanism determines the quality of

hardcopy. They are two types of printers namely

impact and non-impact.

Impact printers

Impact printers print using striking mechanism, they

strike the paper in order to form an imprint on it.

Impact printers are cheap to run, slow, use inked

ribbons, produces multiple copies, uses cheap

technology, are noisy because of impact, produce low

quality printout and print for long periods without

breaking down. They produce characters by using

special light hammers with characters or pins held on

the printing head. When the hammer strikes on the

head, character mark is stamped. In impact printing,

the printing head comes into physical contact with the

stationery. An inked ribbon placed between the

stationery and the printing head element creates the

imprints when the printing head strikes.

Types of impact printers

i) Dot Matrix Printer

Has a set of pins which strikes on an ink ribbon

placed over the paper and provide character prints in

terms of dots.

ii) Daisy Wheel Printer

Works like a typewriter, and has a removable flower-

like wheel consisting of spokes with embossed

characters. When printing, the wheel is rotated to

align the required character and then hit with a

hammer on an inked ribbon against a sheet of paper,

leaving an image of the letter.

iii) Golf Ball Printer

The character images are incorporated on the surface

of a gold ball like Print head, which is either rotating

or pivoted.

iv) Drum printer

It provides one whole line print at a time. The

characters are incorporated on circular bands that

move round the surface of the drum.

v) Chain printer

It’s an impact line printer that incorporates engraved

characters printing slugs on a moving chain or belt.

The chain moves the character printing slugs at high

constant speed past printing positions.

Non-impact printers

Are fast, use thermal and electrostatic principles,

produces single copies, are costly due to technology

involved and quiet because of non-impact. They print

using ink, toner catridge , thermal or laser

mechanisms. In non-impact the printing head does not

come into physical contact with the stationery but by

other means like thermal or electrostatic.

Types of non-impact printers

i). Thermal printer

Use heat principle to transfer characters onto a piece

of paper. Work by heating solid ink which is normally

in wax or resin form to melting point then transferring

it onto the paper to form characters. Thermal printers

are mostly used on point of sale terminals to print

receipts and bar codes. Thermal printers produce high

quality printouts. They are inexpensive alternative to

inkjets.

ii).

Inkjet printer

Use the concept of spraying ink onto the paper, from

tiny holes on the ink

cartridge onto the paper. A

colour inkjet printer may

have two cartridges, one for

black and a tricolour that

contains cyan, magenta and

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yellow (CMY) compartments. The cartridge has

nozzles that do the actual spraying of ink on the paper

Advantages

- Are cheaper and produce better quality printouts

- Inkjets printers use smaller mechanical parts than

laser printers

- Provide inexpensive way to print full-colour

document.

Weaknesses

- Are slow

- Expensive to run because they require special type

of ink

- An inkjet printout is easily gets smudged when

water drops on it.

iii). Electrostatic printer

Uses electrostatic charges to form characters in a line

on a special paper

iv). Photo printers are special purpose printers designed

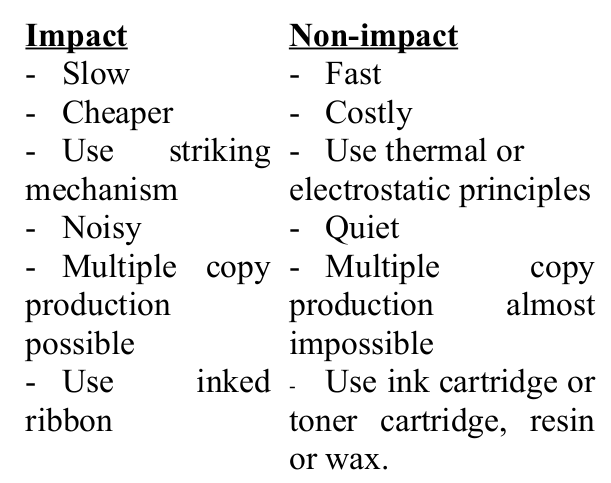
to print photographs.

v). Laser printer

Prints by passing laser beam back and forth over a

rotating drum, just the same technology as photocopy machine. As the beam hits the drum, it ionizes some regions which attract ink toner particles. They are cheaper to run,faster, produce high quality printouts but are expensive to buy than inkjets.

Diference between impact and non-impact printers



**Factors to consider when selecting a printer**

- Initial cost and subsequent costs of maintenance

- Volume of printing expected

- Colour printing coloured laser printers are very

expensive, so depending with the volume of print one

can decide to buy Laser or Inkjet.

- Nature of reports to be generated

- Range of capability for selected printers e.g.

multiple copier, print styles etc.

- Interface with the computer system

- Speed: the speed of a printer is measured in Pages

per minute

- Quality of prints (print quality).

2. Plotters

These are output devices that are mostly used in

engineering and architecture field for production of

graphical outputs e.g. diagrams, photographs, maps,

architectural designs and such outputs. The most

common commercially available graph plotters are the

Flatbed Plotter and Drum Plotter.

2.5 Secondary (Auxiliary) Storage and Media

Are alternative long-term storage devices that are not

part of the Main memory. These devices are not

directly accessed by the CPU and are not housed

inside the system unit. Can be carried around to be

used with another computer hence the name

removable storage devices and media. A drive is

needed in order to read and write data into the storage

media. The data and instruction held in these devices

must first be moved into RAM before processing.

They are used to store information for longer period,

data stored in them is permanent unless erased by

user. Stores large volume of data. Stored data can be

erased and the media reused to store fresh data and

programs.

**What is a drive ?**

A computer device for reading data from or writing

data into a storage media e.g. a tape, or disk.

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Types / examples of computer drives

- Hard disk drive (HDD)

- CD-ROM drive

- USB Port

- USB Port

- Floppy disk drive (FDD)

- DVD – ROM drive

- Zip drive

Examples of computer auxiliary storage devices

Magnetic tapes, floppy disks, cassette tapes, Hard

disks, zip disks, jaz , Flash disks, video compact disks

(VCD), digital video disks (DVD’s), Punched cards,

optical disks e.g CDs, LS-120 Super Disks, optical

card, optical tape.

Classification of Secondary Storage Devices

Can be classified in two ways by:

1. Portability as removable and fixed.

2. Technology used to store and retrieve data

(magnetic, optical, magneto-optical and solid

state).

It is important to have a backing storage for long –

term storage of data and programs and also when

there is limited storage capacity in the main memory.

Backing store is a non-volatile (permanent) memory

outside the CPU such as floppy disks, CDs and USB

flash Disks.

Characteristics of a Backing store

- Data is usually accessed using read/write heads.

- Access to backing storage is slower than main

storage

- Are non-volatile i.e. the data is stored on the

medium until it is deleted.

REMOVABLE STORAGE

Magnetic Disks

Magnetic storage media use magnetic technology to

store data.

i). Magnetic tapes

A magnetic tape is made using a thin ribbon of mylar

(plastic) coated with a thin layer of magnetic material

composed of iron oxide on which data can be stored

using magnetic process. The tape may be housed

inside a plastic as a cassette or coiled around an open

wheel. It uses serial access where all proceeding data

is read before the required data can be accessed.

Advantages

- Store large amount of data

- Light and easy to carry

- Effective when to store sequential files for batch

applications

- High capacity and backup storage at relatively low

cost

Disadvantages

- Slow due to sequential reading of data

- Wastage of recording surface because of Inter-

block gaps left for stopping purposes.

- Easily distorted by environmental factors such as

dust, moisture, humidity etc.

ii). Floppy disks

Are made of a thin plastic disc with a magnetisable

iron oxide coating and enclosed in a plastic case.

Inscription of data is done on the magnetic coating

around the plastic. The floppy disk is inserted inside a

floppy drive which has a read /write that runs over the

magnetized spots. There are two types of disks:

 3 1⁄2 which has storage capacity of 1.44MB and

 5 1⁄4 inch which has a storage capacity of 1.2MB.

3 1⁄2 inch floppy store more data and are better

protected as opposed to 5 1⁄4 inch floppy.

Parts of a floppy disk

Recording window - used to read and write data to the

diskette

Hub – used for rotating the diskette

Index (spindle) hole – assists in rotating the diskette

Plastic case – protects the mylar coated with iron

oxide that stores data.

Sectors – concentric circles where data is written.

The structure of a disk platter

A block

Tracks

The surface is divided into tiny invisible concentric

circles called tracks that store data. The tracks are

further divided into units called sectors. The area

within the same track bound by the two edges of a

sector forms a block which forms the unit for the

read/write operations. Data can be written to and read

from the disk.

Note:

To write data means to move it or copy it from the

main memory to backing storage.

To read data means to move it or copy it from the

backing store to the main memory.

Disks are direct access storage media.

Disadvantages of floppy disks

- Storage area is limited to 1.44MB

- Easily damaged

- Are short-lived

- Slow access time. Access time is the time taken to

read the data from disk to the Main storage.

Removable Magneto-Optical Storage

Magneto – optical media stores data both

magnetically and optically. i.e write using magnetic

and read using optical beam. Some examples are: Zip,

Jaz, HiFD and LS-120 Super disk.

i). Jaz Disk

Is a high storage floppy disk with a storage capacity

of up to 2GB. They are read using an internal or

external jaz drive.

ii). Zip disks

Resemble floppy disk but are slightly larger and

thicker in size. Have a storage capacity which can

hold up to 250MB. It is stable, inexpensive and easy

to work Have either internal or externally portable Zip

drive. Are mainly used for backing up and archiving

personal computer files.

iii). High capacity floppy disk: simply known as HiFD

disk stores upto 200MB of data. HiFD drive can also

read the 1.44MB floppy disk.

iv). Laser Servo 120 SuperDisks

Laser Servo 120 SuperDisks simply known as LS-120

Super disk. It resembles 3 1⁄2 floppy disk but uses

optical technology instead magnetic technology to

read data. It has a greater storage capacity of 120MB

and greater speed of data retrieval.

Fixed storage

Refers to storage devices that are housed inside the

system unit. E.g. Hard disk.

NB: Some hard disks especially those in small

computers such as laptops are removable.

v). Hard disk (Winchester)or hard drive

Is a sealed unit in which are shiny rigid magnetic

disks or platters that are arranged vertically one after

the other on a common axis. The read and write

operations are carried out by the R/W heads, in the

disk drive, under the influence of the computers

command signals. They can hold thousand of

programs and files.

Care of hard disk

- Keep it away from smoke and dust

- Switch off the computer using the correct

procedure to avoid crashing on rotating disks.

Advantages of hard disk

- It’s cheap

- Store very large volume of data

- Very reliable than floppy

- Does not deteriorate as floppy disks

- Has faster access time

Disadvantages

- Are usually fixed and cannot be removed without

opening the system unit.

- They can suffer a head crash resulting to loss of

data

- Are sensitive to dust, humidity, magnetism which

can corrupt the data stored

- They are inflexible i.e cannot be changed.

Care for magnetic and magneto-optical media

- Do not expose them to strong magnetic fields

because the magnetically recorded data on disk

will be erased

- Keep them away from excessive heat because heat

energy weakness magnetic media’s ability to store

data

- Do not drop magnetic media on the ground.

- Do not bend or fold magnetic media or put heavy

weights on the to avoid breaking or damaging

them

- Do not touch the magnetic surfaces

- Do not remove media from drive when it sis still

being accessible by the computer because this may

result in data loss.

Removable Optical storage

Data is written and read from using a laser beam.

Laser disks

Data is recorded using a very concentrated light (laser

beam). They store very large volumes of data. Data

stored in them is more stable and permanent than the

magnetic media. Examples are: Compact disks (CD),

Digital Versatile Disk (DVD), Optical Card and

Optical tape.

i.

Compact disk (CD)

CD is made of a small plastic disk with a reflective

aluminium coating on one side. They hold large

quantities of data and information, as much as

700MB.

Forms of CDs:

a). Compact Disk – Read Only Memory (CD-

ROM)

When data is recorded on them one cannot change or

add anything on them. Mostly used to store music

recordings.

b).

Compact Disk – Recordable (CD-R)

They are initially blank but with a CD- Writer

(Drive), the user can record data, programs or

information on it. Once data has been written on it,

one can only read but not change it i.e. it becomes

read only.. Are coated with special dye which

changes colour to represent data when burned using a

laser beam.

Both CD-ROMs and CD-Rs are referred to as WORM

(Write Once Read Many) because they allow the use

to write (record) data on them once but read them

many times.

c). Compact Disk – Rewriteable (CD-RW)

Data written to the can be erased (overwritten) and

rewrite new information.

d). Digital Versatile Disk / Digital Video Disk (DVD)

Resemble CDs but have higher storage capacity of

upto 17GB, approximately 26 CDs of capacity

640MB! Are suitable for recoding motion pictures

like videos because of they offer better sound and

quality pictures. There are three common types of

DVDs namely read only, recordable and rewriteable

DVDs.

ii. Optical card

Resemble MICR, but it has optically recordable stripe

that store information. Mostly used in Banking to

store customer details.

iii. Optical tape

Similar to magnetic tape, but data is stored on it using

optical technology.

Advantages of optical storage

- Have massive capacity

- Stores data permanently

- Accessing of data is fast

- Secured i.e. it’s hard to copy

- High quality pictures and sound

- Portable

Disadvantage

- Expensive

- Costly hardware and software for reading

- It can break easily

- Very sensitive to things like dust, water, heat,

scratches which easily damage them.

Solid state storage devices

Is a kind of non-volatile storage media that employs

integrated circuits rather than mechanical, magnetic or

optical technology. They are regarded as solid state

because they do not have moving parts but everything

is electronic as the case of RAM or EEPROM.

Examples include flash disks, Flash pen drives and

memory cards.

Flash disk

It is small in size but with massive storage capacity of

as much as 32GB. Its more portable and convenient to

carry around than other secondary storage medias.

Advantages of solid state storage over other

removable

- Are noiseless since they have no mechanical parts

- Offer faster access to stored data

- Are very small hence more portable