UNIT-I

Information Technology: -

We use the term information technology or IT to refer to an entire industry. In actuality, information technology is the use of computers and software to manage information. In some companies, this is referred to as Management Information Services (or MIS) or simply as Information Services (or IS). The information technology department of a large company would be responsible for storing information, protecting information, processing the information, transmitting the information as necessary, and later retrieving information as necessary.

Hence Information technology is gathering or manufacturing of data, processing data, storing data, delivering data or distribution of data or sharing of data.

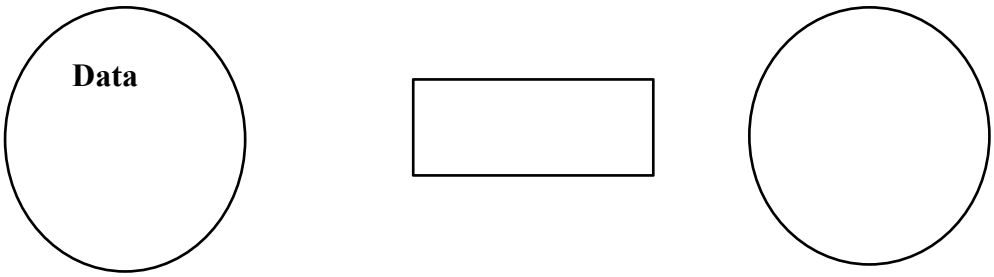


Fig: Information Technology

Information Processing Cycle:

Processing Information is only one step in a larger process called the Information Processing cycle. This cycle has five steps:

1. Input: During the input stage you enter Information into the computer. The most common input devices are keyboard, mouse, scanner, camera, and microphone. The data you enter can be text, number, images or sounds.

2. Processing: Once information is in the computer. It can be processed. Computer can compare, sort or sum numbers format text, or let you edit images & sounds.

3. Output: To see what the computer has processed it has to be output to a screen, printer or speakers. It might also be transferred to another device that processed the data further.

4. Storage: Programs and data that are not currently being used are normally stored so they can be loaded back into the computer at any time. Typically these are stored on disks or tapes of some kind.

5. Distribution: Data can be printed, distributed or directly distributed from one computer to other computer.

Categories of Machines:- **Computers** are defined as machine basically computers are categorized into five sizes: Tiny, small, medium, large and super large.

1. Micro controllers
2. Micro computers
3. Mini Computers
4. Mainframe Computers
5. Super Computers

MICRO CONTROLLERS:- These are also called as embedded computers are tiny specialized micro processors installed in " Smart" appliances and automobiles.

Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, and toys.

MICRO COMPUTERS:- Micro computers are small computers that can fit on or beside a desk or portable. Micro computers are considered to be of 2 types: Personal computers & workstations. Pc's are desktop, tower or portable computers that can run easy to use programs such as word processing or spread sheets.

Personal computers:

- Desktop & Tower units: Desktop pcs those in which the system cabinets sits on a desk, with keyboard in front & monitor often on top. Tower pc's are those in which the system cabinet sits as a tower on the desk or on the floor next to the desk. Giving us more usable desk space.

- Laptop: A laptop computer is a portable computer equipped with a flat display screen & weighing about 2-11 pounds. The top of the computer opens like a clam shell to reveal the screen: The 2 principal types of laptop computers are notebooks, sub note books.

Workstations:

- Workstations look like desktop pc's but are for more powerful. Workstations are sophisticated machines that fit on a desk, cost many thousands of dollars and are used by engineers & scientists for technical purposes. Workstations are used for computer aided design and manufacturing. Software development & scientific modeling.

MINI COMPUTERS:-

Its cost and capability is in between microcomputers and mainframes. They can be used as single user workstations. When used in a system tied by network to several hundred terminals for many users they are known as midrange computers.

A minicomputer is a class of multi-user computers that lies in the middle range of the computing spectrum, in between the largest multi-user systems (mainframe computers) and the smallest single-user systems (microcomputers or personal computers).

MAINFRAME COMPUTERS:-

The large computers called mainframes are the oldest category of computer system. Occupying specially wired, air- conditioned rooms and capable of great processing speed and data storage.

Such machines are typically operated by professional programmers and technicians in a centrally managed department within a large company. Such companies are banks, Insurance Companies & Airlines.

Modern mainframe computers have abilities not so much defined by their single task computational speed (usually defined as MIPS — Millions of Instructions Per Second) as by their redundant internal engineering and resulting high reliability and security, extensive input-output facilities, strict backward compatibility with older software, and high utilization rates to support massive throughput. These machines often run for years without interruption, with repairs and hardware upgrades taking place during normal operation.

SUPER COMPUTERS:-

Super Computers are high capability machines that require special air-conditioned rooms & are the fastest calculating devices ever invented. Super Computers users are those who need to model complex phenomena. Examples are automotive engineers & airplane designers who simulate air flowing over an airplane wing. They are also used for oil exploration & weather forecasting.

SERVERS:- A server is a software program, or the computer on which that program runs, that provides a specific kind of service to client software running on the same computer or other computers on a network.

The client-server model is an architecture (i.e., a system design) that divides processing between clients and servers that can run on the same machine or on different machines on the same network. It is a major element of modern operating system and network design.

The client provides the user interface, such as a GUI (graphical user interface), and performs some or all of the processing on requests it makes from the server, which maintains the data and processes the requests.

An example is a web server, which stores files related to web sites and serves (i.e., sends) them across the Internet to clients (i.e., web browsers) when requested by a user.

A file server is software, or hardware plus software, that is dedicated to storing files and making them accessible for reading and writing to clients (i.e., users) across a network.

A print server is software or hardware that manages one or more printers. A network server manages network traffic. A name server maps user and computer names to machine addresses. A database server allows clients to interact with a database. An application server runs applications for clients.

Three Types of Servers are:

1. File Server
2. Database Server
3. Network Server

FILE SERVER:- In computing, a file server is a computer attached to a network that has the primary purpose of providing a location for shared disk access, i.e. shared storage of computer files (such as documents, sound files, photographs, movies, images, databases, etc.) that can be accessed by the workstations that are attached to the computer network. The term server highlights the role of the machine in the client–server scheme, where the clients are the workstations using the storage.

File servers are commonly found in schools and offices and rarely seen in local internet service providers using LAN to connect their client computers.

DATABASE SERVER: - A database server is a computer program that provides database services to other computer programs or computers, as defined by the client–server model. Database management systems frequently provide database server functionality, Such a server is accessed either through a "front end" running on the user's computer which displays requested data or the back end which runs on the server and handles tasks such as data analysis and storage.

NETWORK SERVER: - A network server is a computer designed to process requests and deliver data to other (client) computers over a local network or the Internet. Examples include Web servers, proxy servers, and FTP servers.

HARDWARE DEVICES:-

1. Input Hardware
2. Output Hardware

INPUT DEVICES:- An input device is any device that provides input to a computer. There are dozens of possible input devices, but the two most common ones are a keyboard and mouse. Every key you press on the keyboard and every movement or click you make

with the mouse sends a specific input signal to the computer. These commands allow you to open programs, type messages, drag objects, and perform many other functions on your computer. While most computers come with a keyboard and mouse, other input devices may also be used to send information to the computer. Some examples include joysticks, MIDI keyboards, microphones, scanners, digital cameras, web cams, card readers, UPC scanners, and scientific measuring equipment. All these devices send information to the computer and therefore are categorized as input devices. Peripherals that output data from the computer are called output devices.

Keyboard: In computing, a **keyboard** is typewriter keyboard, which uses an arrangement of buttons or keys, to act as mechanical levers or electronic switches. After punch cards and paper tape, interaction via teletype-style keyboards became the main input device for computers.

Different Types of Keys: - Alphabetic, alpha numeric, special characters, Functional Keys(F1 to F12) Arrow keys etc..

Mouse: A **mouse** is a pointing device that functions by detecting two-dimensional motion relative to its supporting surface. Physically, a mouse consists of an object held under one of the user's hands, with one or more buttons. (Although traditionally a button is typically round or square, modern mice have spring-loaded regions of their top surface that operate switches when pressed down lightly.) It sometimes features other elements, such as "wheels", which allow the user to perform various system-dependent operations, or extra buttons or features that can add more control or dimensional input. The mouse's motion typically translates into the motion of a cursor on a display, which allows for fine control of a graphical user interface.

OUTPUT DEVICES:- An **output device** is any piece of computer hardware equipment used to communicate the results of data processing carried out by an information (such as a computer) to the outside world.

In computing, input/output, or I/O, refers to the communication between an information processing system (such as a computer), and the outside world. Inputs are the signals or data sent to the system, and outputs are the signals or data sent by the system to the outside.

Examples of output devices:

- Speaker
- Headphones

- Screen (Monitor)
- Printer

MONITORS:- A **monitor** or **display** (sometimes called a **visual display unit**) is an electronic visual display for computers. The monitor comprises the display device, circuitry, and an enclosure. The display device in modern monitors is typically a thin film transistor liquid crystal display (TFT-LCD) thin panel, while older monitors use a cathode ray tube about as deep as the screen size.

Originally computer monitors were used for data processing and television receivers for entertainment; increasingly computers are being used both for data processing and entertainment. Displays exclusively for data use tend to have an aspect ratio of 4:3; those used also (or solely) for entertainment are usually 16:9 widescreen, Sometimes a compromise is used.

There are basically three types of monitors:

1. Black and white monitor
2. Gray scale monitor
3. Color monitor: Two types of Color Monitor are
    1. CRT monitors
    2. LCD monitors.

CRT MONITORS:- The **Cathode Ray Tube** (**CRT**) is a vacuum tube containing an electron gun (a source of electrons) and a fluorescent screen, with internal or external means to accelerate and deflect the electron beam, used to create images in the form of light emitted from the fluorescent screen.

LCD MONITORS:- A **liquid crystal display** (**LCD**) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly. LCDs have displaced cathode ray tube(CRT) displays in most applications. They are usually more compact, lightweight, portable, less expensive, more reliable, and easier on the eyes.

PRINTERS:- In computing, a **printer** is a peripheral which produces a text and/or graphics of documents stored in electronic form, usually on physical print media such as paper or transparencies. Many printers are primarily used as local peripherals, and are attached by a printer cable or, in most newer printers, a USB cable to a computer which serves as a document source. Some printers, commonly known as **network printers**, have built-in network interfaces, typically wireless and/or Ethernet based, and can serve as a hard copy device for any user on the network. Individual printers are often designed to support both

local and network connected users at the same time. In addition, a few modern printers can directly interface to electronic media such as memory cards, or to image capture devices such as digital cameras, scanners; some printers are combined with a scanners and/or fax machines in a single unit, and can function as photocopiers.

IMPACT PRINTER: Impact Printers use a print head containing a number of metal pins which strike an inked ribbon placed between the print head and the paper. Some print heads have only 9 pins to make the dots to build up a character; some have 24 pins which produce a better resolution.

Eg: Dot Matrix Printer

NON IMPACT PRINTER: Non-impact printers are much quieter than impact printers as their printing heads do not strike the paper.

Most non-impact printers produce dot-matrix patterns.

1. Laser Printer
2. Ink Jet Printer

DOT MATRIX PRINTER: - A **dot matrix printer** or **impact matrix printer** is a type of computer printer with a print head that runs back and forth, or in an up and down motion, on the page and prints by impact, striking an ink-soaked cloth ribbon against the paper, much like the print mechanism on a typewriter. However, unlike a typewriter or daisy, letters are drawn out of a dot matrix, and thus, varied fonts and arbitrary graphics can be produced. Because the printing involves mechanical pressure, these printers can create carbon copies and carbonless. Each dot is produced by a tiny metal rod, also called a "wire" or "pin", which is driven forward by the power of a tiny electromagnet or solenoid, either directly or through small levers (pawls). Facing the ribbon and the paper is a small guide plate (often made of an artificial jewel such as sapphire or ruby pierced with holes to serve as guides for the pins. The moving portion of the printer is called the print head, and when running the printer as a generic text device generally prints one line of text at a time. Most dot matrix printers have a single vertical line of dot-making equipment on their print heads; others have a few interleaved rows in order to improve dot density.

LASER PRINTER: - A **laser printer** is a common type of computer printer that rapidly produces high quality text and graphics on plain paper. As with digital photocopiers and multifunction printers (MFPs), laser printers employ a xerographic printing process but differ from analog photocopiers in that the image is produced by the direct scanning of a laser beam across the printer's photoreceptor. A laser beam projects an image

of the page to be printed onto an electrically charged rotating drum coated with selenium or, more common in modern printers, organic photoconductors. Photoconductivity removes charge from the areas exposed to light. Dry ink (toner) particles are then electro statically picked up by the drum's charged areas. The drum then prints the image onto paper by direct contact and heat, which fuses the ink to the paper.

Unlike impact printers, laser printer speed can vary widely, and depends on many factors, including the graphic intensity of the job being processed. The fastest models can print over 200 monochrome pages per minute (12,000 pages per hour). The fastest color laser printers can print over 100 pages per minute (6000 pages per hour). Very high-speed laser printers are used for mass mailings of personalized documents, such as credit card or utility bills, and are competing with lithography in some commercial applications. The cost of this technology depends on a combination of factors, including the cost of paper, toner, and infrequent drum replacement, as well as the replacement of other consumables such as the fuser assembly and transfer assembly. Often printers with soft plastic drums can have a very high cost of ownership that does not become apparent until the drum requires replacement.

INKJET PRINTER:- An **inkjet printer** is a type of computer printer that creates a digital image by propelling variable-sized droplets of ink onto paper. Inkjet printers are the most commonly used type of printer and range from small inexpensive consumer models to very large and expensive professional machines.

The concept of inkjet printing dates back to the 19th century and the technology was first developed in the early 1950s. Starting in the late 1970s inkjet printers that could reproduce digital images generated by computers were developed, mainly by Epson, Hewlett-Packard and Canon. In the worldwide consumer market, four manufacturers account for the majority of inkjet printer sales: Canon, Hewlett-Packard, and Epson.

The emerging ink jet material deposition market also uses ink jet technologies, typically piezoelectric crystals, to deposit materials directly on substrates.

Software: - Software is a collection of programs. Software are of two types :

1. System Software
2. Application Software

System software is computer software designed to operate the computer hardware and to provide and maintain a platform for running application software.

Application software, also known as an **application**, or an **app**, is computer software designed to help the user to perform singular or multiple related specific tasks. Examples include enterprise software, accounting software, office suites, graphics software, and media players.

How the processor or CPU works:-

Control Unit: - A **control unit** in general is a central (or sometimes distributed but clearly distinguishable) part of whatsoever machinery that controls its operation, provided that a piece of machinery is complex and organized enough to contain any such unit.

ALU: (**A**rithmetic **L**ogic **U**nit) the high-speed CPU circuit that does calculating and comparing. Numbers are transferred from memory into the ALU for calculation, and the results are sent back into memory. Alphanumeric data are sent from memory into the ALU for comparing.

Registers:

Registers are used to quickly accept, store, and transfer data and instructions that are being used immediately by the CPU, there are various types of those are used for various purpose. Among of the some Mostly used Registers named as AC or **Accumulator**, Data Register or DR, the AR or **Address Register**, **program counter**(PC), **Memory Data Register** (MDR) ,**Index Register**, *Memory Buffer Register*.

1) **Fetch**: The Fetch Operation is used for taking the instructions those are given by the user and the Instructions those are stored into the Main Memory will be fetch by using Registers.

2) **Decode**: The Decode Operation is used for interpreting the Instructions means the Instructions are decoded means the CPU will find out which Operation is to be performed on the Instructions.

3) **Execute**: The Execute Operation is performed by the CPU. And Results those are produced by the CPU are then Stored into the Memory and after that they are displayed on the user Screen.

Types of Registers

1. MAR stand for Memory Address Register

This register holds the memory addresses of data and instructions. This register is used to access data and instructions from memory during the execution phase of an instruction.

2. Accumulator Register

This Register is used for storing the Results those are produced by the System. When the CPU will generate Some Results after the Processing then all the Results will be Stored into the **AC Register**.

3. Memory Data Register (MDR)

MDR is the register of a computer's control unit that contains the **data to be stored in the computer storage** (e.g. RAM), or the **data after a fetch from the computer storage**. It acts **like a buffer** and holds anything that is copied from the memory ready for the processor to use it. **MDR hold the information before it goes to the decoder.**

4. Data Register

A register used in microcomputers to temporarily store data being transmitted to or from a peripheral device.

5. Program Counter

The **program counter (PC)**, commonly called the **instruction pointer** (IP) in Intel x86 microprocessors, and sometimes called the **instruction address register**, or just part of the instruction sequencer in some computers, is a processor register

It keeps track of the next memory address of the instruction that is to be executed once the execution of the current instruction is completed. In other words, it holds the address of the **memory location of the next instruction when the current instruction is executed by the microprocessor.**

Types of Memories:-

1. RAM
2. ROM

RAM(Random Access Memory):- Random-access memory (**RAM**) is a form of computer data storage. Today, it takes the form of integrated circuits that allow stored data to be accessed in any order (i.e., at random). "Random" refers to the idea that any piece of data can be returned in a constant time, regardless of its physical location and whether or not it is related to the previous piece of data.

The word RAM is often associated with volatile types of memory (such as DRAM memory modules), where the information is lost after the power is switched off. Many other types of memory are RAM, too, including most types of ROM and a type of flash memory called *NOR-Flash* types of *writable* RAM generally store a bit of data in either the state of a flip-flop, as in SRAM (static RAM), or as a charge in a capacitor (or transistor gate), as in DRAM (dynamic RAM), EPROM, EEPROM and Flash. Some types have circuitry to detect and/or correct random faults called *memory errors* in the stored data, using parity bits or error correction codes. RAM of the *read-only* type, ROM, instead uses a metal mask to permanently enable/disable selected transistors, instead of storing a charge in them. Of special consideration is SIMM and DIMM memory modules.

SRAM and DRAM are *volatile*, other forms of computer storage, such as disks and magnetic tapes, have been used as persistent storage in traditional computers. Many newer products instead rely on flash memory to maintain data when not in use, such as PDAs or small music players. Certain personal computers, such as many rugged computers and net books, have also replaced magnetic disks with flash drives. With flash memory, only the NOR type is capable of true random access, allowing direct code execution, and is therefore often used instead of ROM; the lower cost NAND type is commonly used for bulk storage in memory cards and solid-state drives.

Fig: RAM

Read-only memory (ROM) :- is a class of storage media used in computers and other electronic devices. Data stored in ROM cannot be modified, or can be modified only slowly or with difficulty, so it is mainly used to distribute firmware (software that is very closely tied to specific hardware, and unlikely to need frequent updates).

In its strictest sense, ROM refers only to mask ROM (the oldest type of solid state ROM), which is fabricated with the desired data permanently stored in it, and thus can never be modified. However, more modern types such as EPROM and flash EEPROM can be erased and re-programmed multiple times; they are still described as "read-only memory"(ROM) because the reprogramming process is generally infrequent, comparatively slow, and often does not permit random access writes to individual memory locations.

Complementary metal-oxide-semiconductor (CMOS) is a technology for constructing integrated circuits. CMOS technology is used in microprocessors, microcontrollers, static RAM, and other digital logic circuits. CMOS technology is also used for several analog circuits such as image sensors, data converters, and highly integrated transceivers for many types of communication. The phrase "metal-oxide-semiconductor" is a reference to the physical structure of certain field-effect transistors, having a metal gate electrode placed on top of an oxide insulator, which in turn is on top of a semiconductor material. Aluminum was once used but now the material is poly silicon

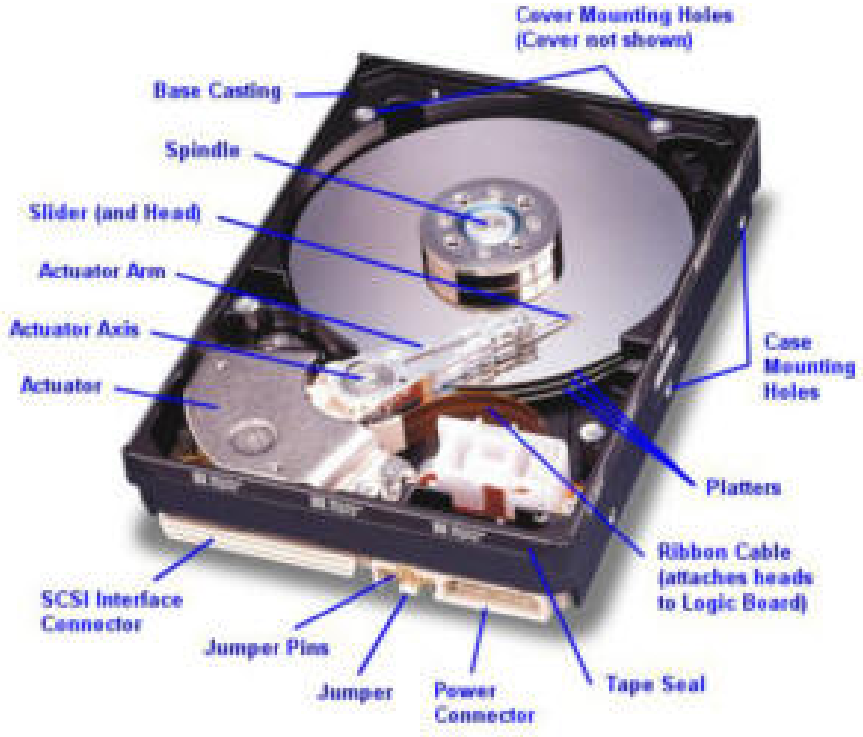
Flash memory is a non-volatile computer storage chip that can be electrically erased and reprogrammed. Flash drives and pen drives are USB storage devices based on flash memory. It is primarily used in memory cards, USB flash drives, MP3 players and solid-state drives for general storage and transfer of data between computers and other digital products. It is a specific type of EEPROM (electrically erasable programmable read-only memory) that is erased and programmed in large blocks; in early flash the entire chip had to be erased at once. Flash memory costs far less than byte-programmable EEPROM and therefore has become the dominant technology wherever a significant amount of non-volatile, solid state storage is needed. Example applications include PDAs (personal digital assistants), laptop computers, digital audio players, digital cameras and mobile phones. It has also gained popularity in console video game hardware, where it is often used instead of EEPROMs or battery-powered static RAM (SRAM) for game saves data.

floppy disk is a data storage medium that is composed of a disk of thin, flexible ("floppy") magnetic storage medium encased in a square or rectangular plastic shell.

Floppy disks are read and written by a **floppy disk drive** or **FDD**, Invented by the American information technology company IBM, floppy disks in 8 inch, 5¼ inch and 3½ inch forms enjoyed nearly three decades as a popular and ubiquitous form of data storage and exchange, from the mid-1970s to the late 1990s. While floppy disk drives still have some limited uses, especially with legacy industrial computer equipment, they have now been superseded by USB flash drives, external hard disk drives, optical discs, memory cards and computer networks

Hard disk drive (*hard disk*, *hard drive*, HDD) is a non-volatile storage device for digital data. It features one or more rotating rigid platters on a motor-driven spindle within a metal case. Data is encoded magnetically by read/write heads that float on a cushion of air above the platters.

HDDs record data by magnetizing ferromagnetic material directionally, to represent either a 0 or a 1 binary digit. They read the data back by detecting the magnetization of the material. A typical HDD design consists of a spindle that holds one or more flat circular disks called platters, onto which the data is recorded. The platters are made from a non-magnetic material, usually aluminum alloy or glass, and are coated with a thin layer of magnetic material, typically 10–20 nm in thickness — for reference, standard copy paper is 0.07–0.18 millimeter (70,000–180,000 nm) thick — with an outer layer of carbon for protection. Older disks used iron(III) oxide as the magnetic material, but current disks use a cobalt-based alloy.



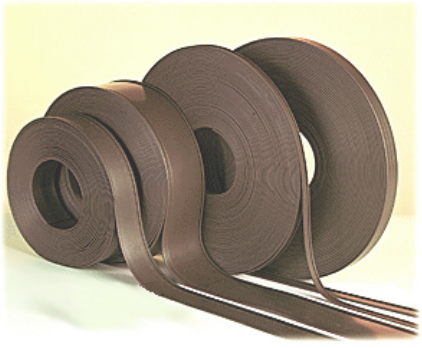
Optical disc is a flat, usually circular disc which encode binary data in the form of pits (binary value of 0 or off, due to lack of reflection when read) and lands (binary value of 1 or on, due to a reflection when read) on a special material often aluminium on one of its flat surfaces. The encoding material sits atop a thicker substrate (usually polycarbonate) which makes up the bulk of the disc and forms a dust defocusing layer. The encoding pattern follows a continuous, spiral path covering the entire disc surface and extending from the innermost track to the outermost track. The data is stored on the disc with a laser or stamping machine, and can be accessed when the data path is illuminated with a laser diode in an optical disc drive which spins the disc at speeds of about 200RPM up to 4000 rpm or more depending on the drive type, disc format, and the distance of the read head from the center of the disc (inner tracks are read at a faster disc speed). The pits or bumps distort the reflected laser light, hence most optical discs (except the black discs of the original PlayStation video game console) characteristically have an iridescent appearance created by the grooves of the

reflective layer. The reverse side of an optical disc usually has a printed label, generally made of paper but sometimes printed or stamped onto the disc itself. An optical disk is impressed with a series of spiral pits in a flat surface. **A master disk** is burnt by high-intensity laser beams in bit-patterns from which subsequent copies are formed which can be read optically by laser. The optical disk is a random access storage medium; information can be easily read from any point on the disk. A standard CD-ROM can store up to 650Mb of data, with 14,500 tracks per inch (tpi).

CD-ROM stands for Compact Disk - Read Only Memory. It is now possible to have CD-ROMs where extra tracks of information can be written onto them by the user. These are called read/writable CD-ROMs and these are becoming a popular and cheap method for storage.

Magnetic tape is a medium for magnetic recording, made of a thin magnetically coating on a long, narrow strip of plastic. It was developed in Germany, based on magnetic wire recording. Devices that record and play back audio and video using magnetic tape are tape recorders and video. A device that stores computer data on magnetic tape is a tape drive (tape unit, streamer).

Magnetic tape revolutionized broadcast and recording. When all radio was live, it allowed programming to be prerecorded. At a time when gramophones were recorded in one take, it allowed recordings in multiple parts, which mixed and edited with tolerable loss in quality. It is a key technology in early computer development, allowing unparalleled amounts of data to be mechanically created, stored for long periods, and to be rapidly accessed.



(Magnetic tapes)

Smart card, **chip card**, or **integrated circuit card** (**ICC**), is any pocket-sized card with embedded integrated circuits. There are two broad categories of ICCs. Memory cards contain only non-volatile memory storage components, and perhaps dedicated security logic. Microprocessor cards contain volatile memory and microprocessor components. The card is made of plastic, generally polyvinyl chloride, but sometimes acrylonitrile butadiene styrene or polycarbonate . Smart cards may also provide strong security authentication for single sign-on within large organizations.

(Smart Cards)

Memory card or **flash card** is an electronic flash memory data storage device used for storing digital information. They are commonly used in many electronic devices, including digital cameras, mobile phones, laptop computers, MP3 players, and video game consoles. They are small, re-recordable, and they can retain data without power.

The most common type of memory card in use today is the SD card which comes in capacities of up to 64 Gigabytes. In addition to these and other types of memory cards, there are also non-solid-state memory cards that do not use flash memory, and there are different types of flash memory. Many cards incorporate wear leveling algorithms in their design.


Kingston
TECHNOLOGY
Lock
micro SD
ADAPTER
Kingston
2GB
micro SD