COMPUTER & OFFICE APPLICATIONS

ICT/COMP.STUDIES
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Introduction

- What is a computer?
  - It is an electronic programmable machine that accepts data as input process it and give output in form of information.
- It is machine, electronic in nature, which accepts structured input, processes it according to prescribed rules (Computer program) and produces the results as an output.
- Alternatively, computer is a device that works under the control of stored programs, automatically accepting, storing, and processing data to produce information as a result.
  - **It is composed of two major components:**
    - Hardware and
    - software.

Computer Classifications

- Computers are classified according to a number of ways these include
  - Mode of operation
  - Purpose
  - class (size)
    - The size of a computer often determines its function and processing capacity.
    - The size of computers varies widely from tiny to huge and is usually dictated by computing requirements.
  - Generation
  - design (architecture)

Mode of operation

Computer systems may be classified according to the data they are designed to process or mode of operation and these are:

Analog Computers:

- The analog computers do not directly interact with numbers, but rather deal with variables measured along a continuous scale, like the temperature of a room.
- It uses continuous variables for mathematical operations and utilizes mechanical or electrical energy.
- Analog computers may be accurate to within 0.1% of the correct value.
- Analog computer can perform several mathematical operations simultaneously.

Digital Computers

- A digital computer operates on discrete data.
- It works basically by directly counting numbers that represent numerals, letters or other functional symbols.

Hybrid Computers

- A hybrid computing system is one in which desirable characteristics of both the analog and digital computers are integrated.
- In an intensive care unit, analog computers may measure the patient's heart rate, temperature, etc.
- The measurements may then be converted into numbers and supplied to the digital part of the system which will thereafter regulate the flow of certain medications.

Purpose

In reference to purpose, can be classified in to two classes.

Firstly, special purpose computers in which the instructions are stored in firm ware or wired in to or permanently stored in the machine. The processors installed in automobile in the fuel, ignition, braking system, to mention but a few are examples of such computer. What this type of computer lacks in variety, it makes up in speed and efficiency

Secondly general purpose digital computer by using different stored programs, can, thus, be used in countless applications. The versatility of the these systems is limited only by human imaginations.

SIZE/CLASS

In accordance with class (size) computers can be classified as

- ***supercomputers*** are the largest computers .
- They are the most powerful, the most expensive, and the fastest, capable of processing trillions of instructions per second.
- Users of these computers are governmental agencies, such as the, National Weather Service, and the National Defense Agency.
- Also, they are used in the making of movies, space exploration, and the design of many other machines.

Mainframe Computers.

- The second largest computers are called ***mainframes***.
- Mainframe computers process data at very high rates of speed, measured in the millions of instructions per second.
- They are very expensive, costing millions of dollars in some cases.
- Mainframes are designed for multiple users and process vast amounts of data quickly.
- Banks, insurance companies, manufacturers, mail-order companies, and airlines are typical users.
- Mainframes are often 'servers'-- computers that control the networks of computers.

Minicomputers

- A minicomputer system is a small general purpose computer varying in size from a desktop model to a unit the size of a four drawer filing cabinet".
- It is quite obvious that there is tremendous amount of similarity between the more powerful micros and the lower end minis.
- The same situation exists on the other end where the lower priced mainframes are almost similar to the higher priced minis.

Microcomputers

- ***Microcomputers A*** computer with a microprocessor and its central processing unit is known as a microcomputer.
- They do not occupy space as much as mainframes.
- When supplemented with a keyboard and a mouse, microcomputers are known as personal computers.
- A monitor, a keyboard and other similar input output devices, computer memory in the form of RAM and a power supply unit come packaged in a microcomputer.
- These computers can fit on desks or tables and serve as the best choices for single-user tasks.

Notebook Computers

- Another classification of computer is the ***notebook*** computer.
- It can fit into a briefcase and weigh fewer than two pounds, yet it can compete with the microcomputer.
- A larger, heavier version is called a ***laptop*** computer.
- Notebooks generally cost more than microcomputers but can run most of the microcomputer software and are more versatile.
- Like other computers, notebook computers are getting faster, lighter, and more functional.

PDAs

- The smallest computer is the handheld computer called a ***personal digital assistant*** or a ***PDA***.
- PDAs are used to track appointments and shipments as well as names and addresses.
- They are called pen-based computers because they utilize a pen-like stylus that accepts hand-written input directly on a touch-sensitive screen.
- You have probably noticed delivery employees using these.

First Generations 1951- 1958

- Used Vacuum Tubes for circuitry
- Magnetic Drum were used for memory
- Hard Wire Programs in computers
- Input was in form of punch cards and output was printouts. Examples include
- IBM 650, Univac I, ENIAC
- They generated a lot of heat and consumed a lot of electricity.

Second Generation 1959-1964

- They used Transistors instead of vacuum tubes
- This invention of the transistor which was faster, and smaller required considerably less power to operate, they generated a great deal of electricity.
- Magnetic Cores were used for memory
- They still used Punch Cards as input and printout as output, examples include
- CDC, GE, IBM

Third Generation 1965-1974

- By the late 1960's devices which included more than one circuit on a single silicon chip became available
- Silicon Chips (Integrated circuits)= IC
- Cores, IC's
- 128,000 bits
- Keyboards were introduced for input
- IBM, NCR, Honeywell

Fourth Generation 1975-1989

- computers, appearing in the mid 1970, are those (such as micro computers) in which large scale integration (LSI) enabled thousands of circuit to be incorporated on one chip. 100 million bits
- Read programs off disks
- Examples include Apple, Xerox, Texas Instrument, Hewlett-Packard

Fifth Generation 1990-present

- Silicon Chips (Very Large Integrated Circuits) computers, for example Pentium, combined VLSI with sophisticated approaches to computing including artificial intelligence and true distributed processing.
- Computers that are able to think and act like human beings.

DESIGN

- In accordance with design, there are two types of computers.
- Von Neumann architecture computer, developed in the mid 1940 by Von Neumann and other computer pioneers, is made up of a single control unit, arithmetic –logic unit, and primary storage section.
- Multi processor architecture computers are equipped with hundreds or thousands (even millions) of processor units in parallel assembles so as to achieve a high performance. This architecture enables several instructions to be processed simultaneously.

ADVANTAGES OF COMPUTERS

- It helps you automate various tasks that you can not do manually.
- It helps you organize your data and information in a better way.
- It has much more computing and calculating power then an ordinary human.
- It may help your work to be a lot easier.
- It may be the storage of your important data and files.
- It may be your handy book.
- It may help you solve problems faster than an ordinary human being can do.
- It has speed, storage, reliability, consistency and communications.
- It helps you to find useful information using the Internet.
- It helps in businesses, factories, offices, schools and homes.

DISADVANTAGES

- It can potentially destroy your social life and interactions with humans if you do not maintain the balance.
- It may effect to the destruction of your eye sight due to radiation.
- It may cause pimples and wrinkles.
- It may damage your studies and life.
- Too much time in front of monitor may adverse effect your eye sight and can also make you fat.
- The way it distracts and can deviate our thoughts and activities towards unproductive activities.
- It could cause violation of privacy, impact on labor force, health risks, impact on environment, distraction from work, and possible antisocial influences.
- getting away from their real life and getting into bad lines

Characteristics of computers

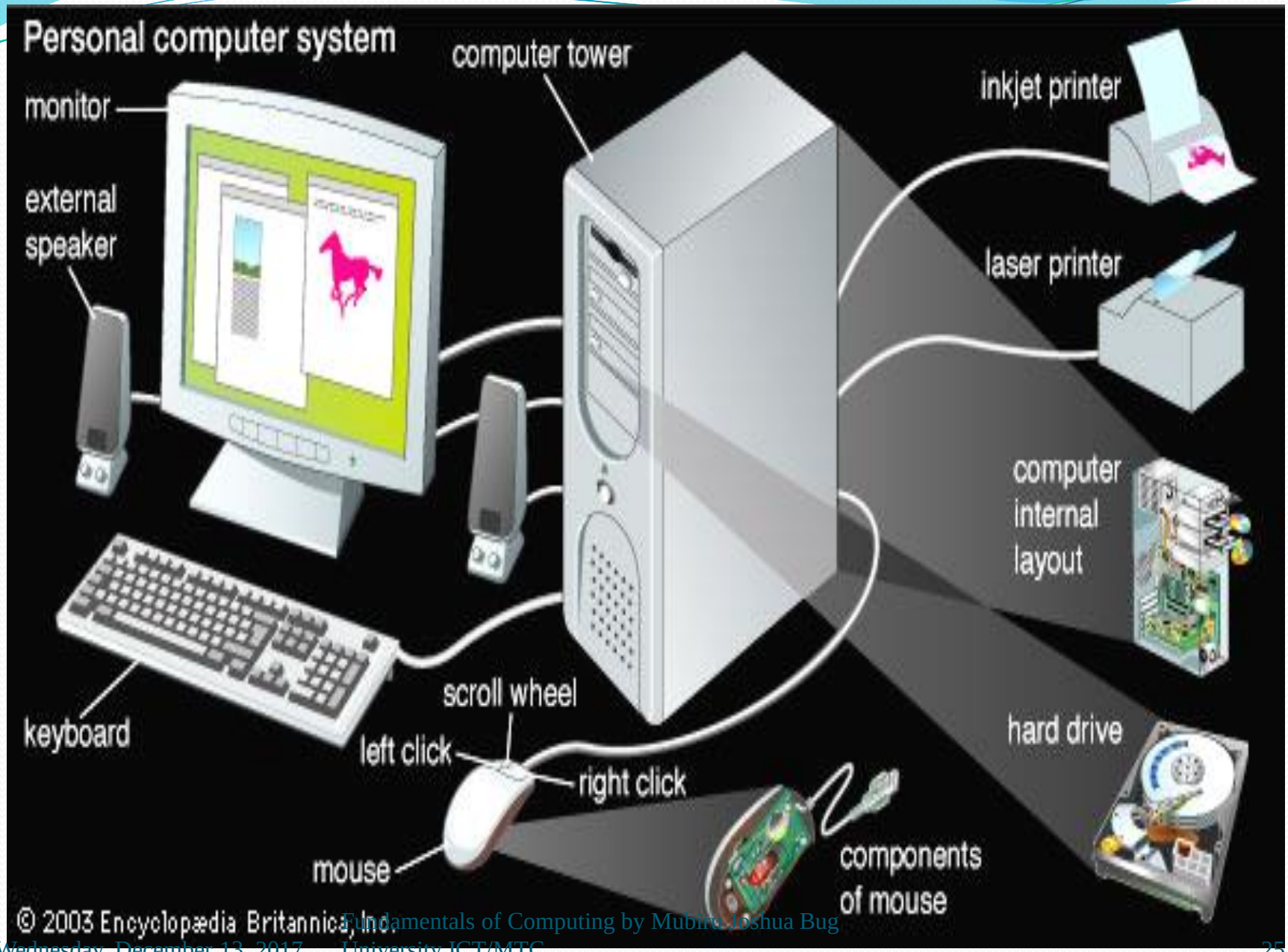
- ***Speed, Reliability, Storage Capacity, Productivity, Automation, and Diligence***
- Computers of all sizes have common characteristics -- speed, reliability, storage capacity, and productivity. Computers are the foundation of business, travel, and leisure life today. Computers provide the processing speed required by all facets of society. The quick service we expect at the bank, at the grocery store, on the stock exchange, and on the Internet are dependent on the speed of computers. **Automation** is the ability of a computer to work without human supervision. **Diligence** is the ability of a computer to work without getting tired.

General computer concepts

- What is the meaning of the terms hardware, software, Information Technology (IT)?
- **Hardware** • The term hardware refers to the physical components of a computer such as the system unit, mouse, keyboard, monitor etc.

Software

- **Software** • The software is the collection of instructions which makes the computer work.
- For instance, when you type in words via the keyboard, the software is responsible for displaying the correct letters, in the correct place on the screen.
- Software is held either on your computer's hard disk, CD-ROM, DVD or on a diskette (floppy disk) and is loaded (i.e. copied) from the disk into the computers RAM (Random Access Memory), as and when required.


Personal computer system
monitor
computer tower
inkjet printer
external speaker
laser printer
computer internal layout
keyboard
scroll wheel
left click
right click
hard drive
mouse
components of mouse
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Information Technology (IT)

• This is a general term which relates to the use of computers as an aid to creating and maintaining data, i.e. information.

- IT is related to all aspects of managing and processing information, especially within a large organization.
- Computers are critical to managing information, and computer departments within large organizations are often called IT departments. or IS departments (Information Services) or MIS departments (Management Information Services).

Main parts of a computer

Hardware - **Central Processing Unit (CPU)**

- In terms of computing power, the CPU is the most important element of a computer system.
- *"It is the brain of the computer."*
- **CPU** or **processor** or **Microprocessor** is an electronic circuit that can execute a ***sequence of stored instructions*** called programs.
- CPU controls all internal and external devices, performs arithmetic and logic operations.

CPU

- The program is represented by a series of numbers that are kept in some kind of computer memory.
- The CPU processes which is obtained, via the system bus, from the main memory.
- Results from the CPU are then sent back to main memory via the system bus.
- In addition to computation the CPU controls and co-ordinates the operation of the other major components.
- The CPU has two main components, namely:

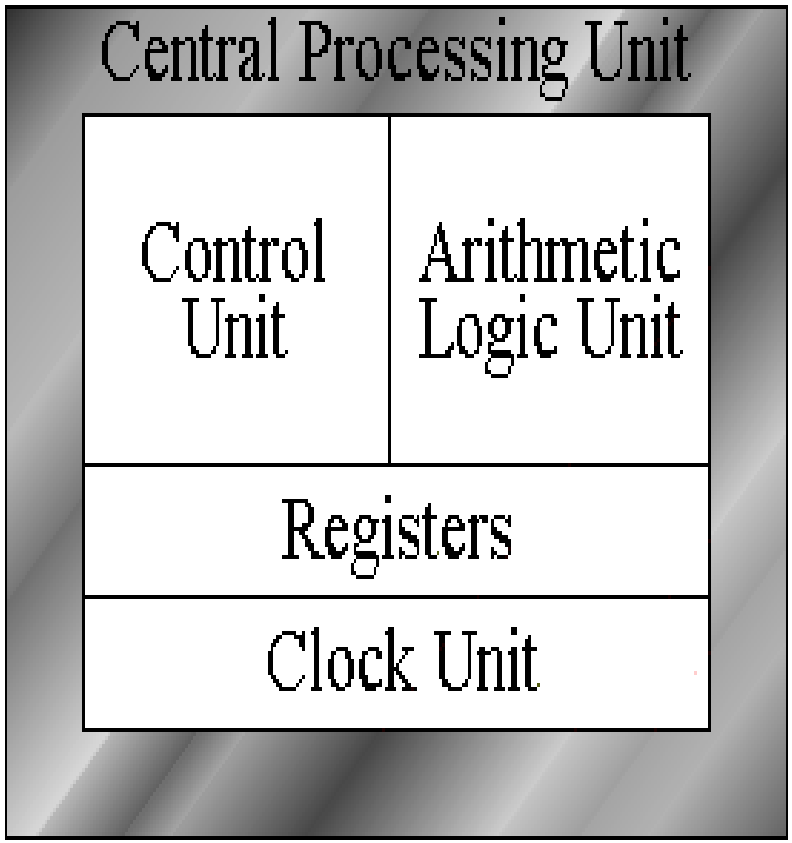
CPU Components

- **The Control Unit** -- controls the fetching of instructions from the main memory and the subsequent execution of these instructions.
- Among other tasks carried out are the control of input and output devices and the passing of data to the Arithmetic/Logical Unit for computation.

CPU Components

- **The Arithmetic/Logical Unit (ALU)** -- carries out arithmetic operations on integer (whole number) and real (with a decimal point) operands.
- It can also perform simple logical tests for equality and greater than and less than between operands.
  - It is worth noting here that the only operations that the CPU can carry out are simple arithmetic operations, comparisons between the result of a calculation and other values, and the selection of the next instruction for processing

CPU Components



- Registers are temporary storage area inside a CPU
  - It is a high-speed memory which holds only data for immediate processing and results of this processing

CPU manufacturers

- There are basically two best known makers of CPUs for consumer computers that is AMD and Intel.
- AMD's current line of processors includes Athlon, Phenom, Sempron and Turion processors
- Intel's current line of processors includes: the Celeron, Pentium, Core 2, Centrino and Centrino 2 processors.

CPU manufacturers

- Today, Intel is the best-known manufacturer of computer CPUs.
- Most CPUs conform to the von Neumann architecture, which says that the CPU must fetch, decode, execute, and write back the data in a fairly rapid succession.

Memory

- **Memory:** Circuitry that allows information to be stored and retrieved. In common usage it refers to RAM.
- **RAM:** Acronym for Random Access Memory. RAM is a semi-conductor- based memory that can be read and written by the microprocessor or other hardware devices.
- **ROM:** An acronym for Read Only Memory and refers to a semi-conductor- based memory that contains instructions or data that can be read but not modified.
- **CMOS** Complementary Metal Oxide Semiconductor

Storage measurement

- The unit for measuring the capacity of a storage media include: Binary digit (Bit), Byte, Kilobyte, Megabyte, Gigabyte, Terabyte, Petabyte, and Exabyte.

- **Binary digit:** This refers to binary alphabet which consists of two elements, namely 0 and 1.
- **Bit** is a short form for binary digit, however, in processing and storage, it is the smallest unit a computer can handle and is represented physically by elements such as a single pulse sent in a circuit, a spot on a magnetic or optical media capable of storing a one or zero. Singly as it is, a bit conveys little meaningful information to the human being.
- **Byte (B):** This is a string of eight bits used to represent characters such as letters, numbers, punctuation marks, mathematical symbols, among others.
- **Kilobyte (KB):** This refers to 2^{10} = 1024 bytes. The prefix kilo has a different meaning in the decimal numbering system in which it represents a thousand (1000). To differentiate between the two, a lower case "k" is used for the decimal system meaning and an upper case "K" for the computer meaning.

- **Megabyte (MB):** This refers to 2^{20} = 1,045,576 bytes which is close to one million (the analogue in the common numbering system, the decimal system)
- **Gigabyte (GB):** This refers to 2^{30} = 1,073, 741,824 bytes which is close to one billion.
- **Terabyte (TB):** This refers to 2^{40} = 1,099,511,627,776 bytes which is close to one trillion.
- **Petabyte (PB):** This refers to 2^{50} = 1,125, 899,906,842,624 bytes which is close to one quadrillion.
- **Exabyte (EB):** This refers to 2^{60} = 1,152, 921,504,606,846,976 bytes which is close to one quintillion.

Peripherals

- The term peripherals refers to all hardware devices that are attached to your computer and are controlled by your computer system, they help improve the functionality of the computer.
- Peripherals can be classified into input devices and output devices.
- Some can be both input devices and output devices e.g. a modem

Input Devices

- An input device is a piece of equipment that enables data to be entered into a computer for example:

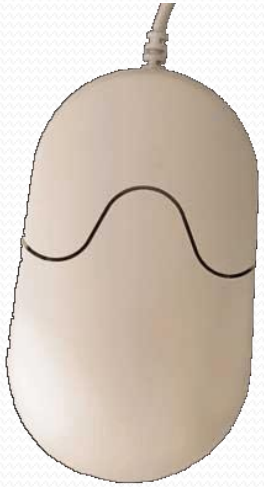
- Keyboard
- Mouse
- Joystick
- Graphics Tablet
- Digital Camera
- Scanner

Input

- **Input** is any data or instructions entered into the computer's memory

Input Devices: Giving Commands

Mouse

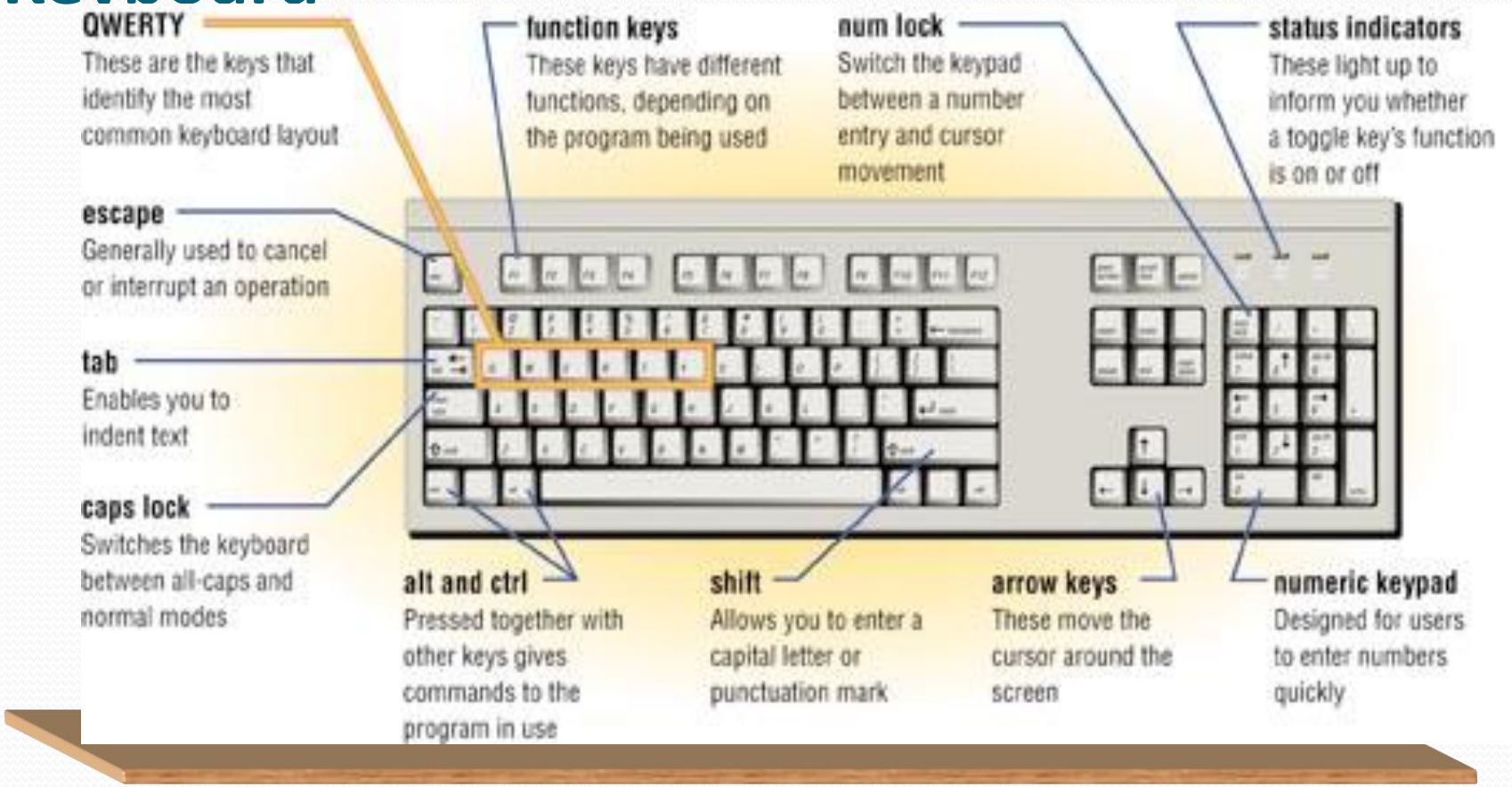


Keyboard

Stylus

- **Input devices** are types of hardware that enable you to get programs, data, commands, and responses into the computer's memory

Keyboard



- The **keyboard** allows the computer user to enter words, numbers, punctuation, symbols, and special function commands into the computer's memory

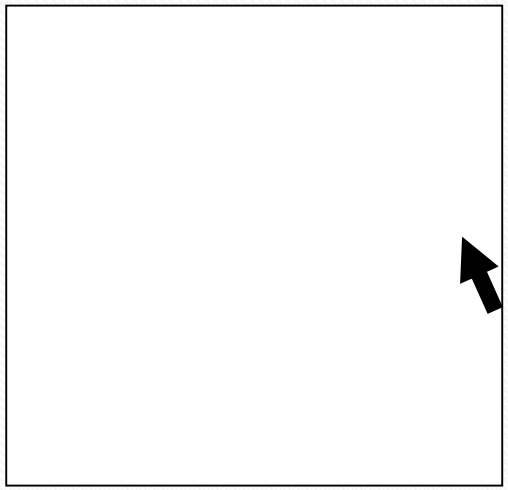
Types of Keyboard

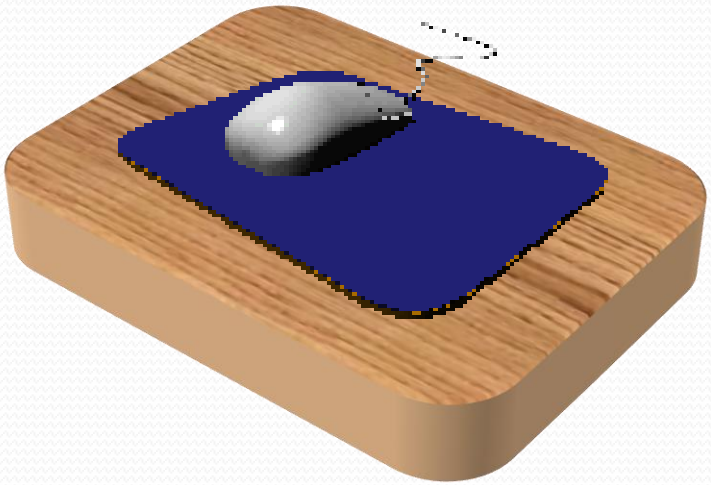
Enhanced / Extended Keyboard

Ergonomic Keyboard

- **Enhanced or Extended keyboard** – Typically 101 keys laid out in the QWERTY fashion; connected to the computer by a serial cable
- **Cordless keyboard** – Uses infrared or radio wave signals
- **Ergonomic keyboard** – Designed to help prevent Cumulative Trauma Disorder (CTD) or damage to nerve tissues in the wrist and hand due to repeated motion

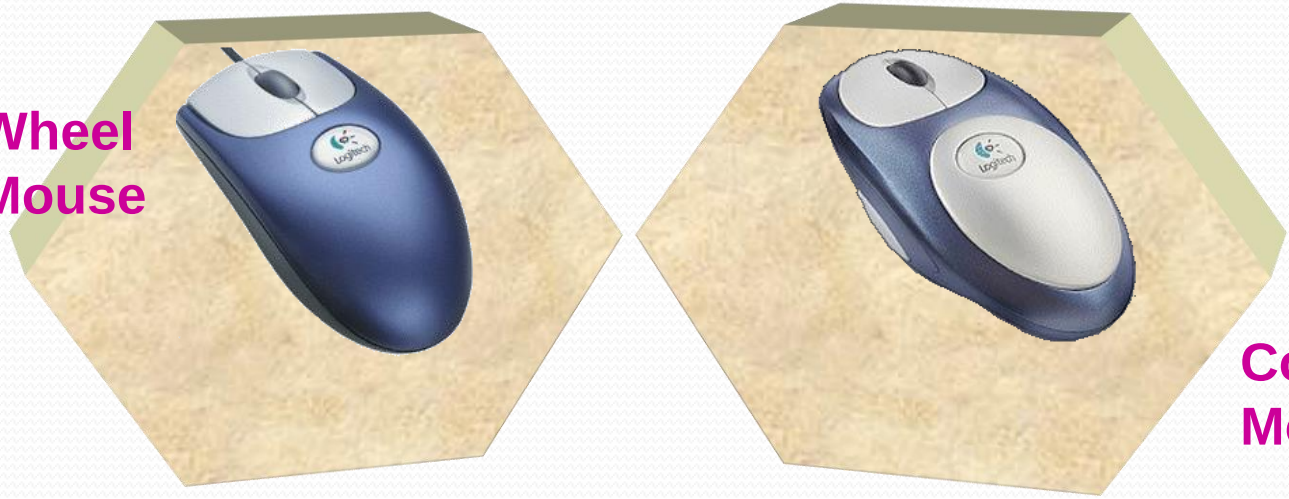
Mouse





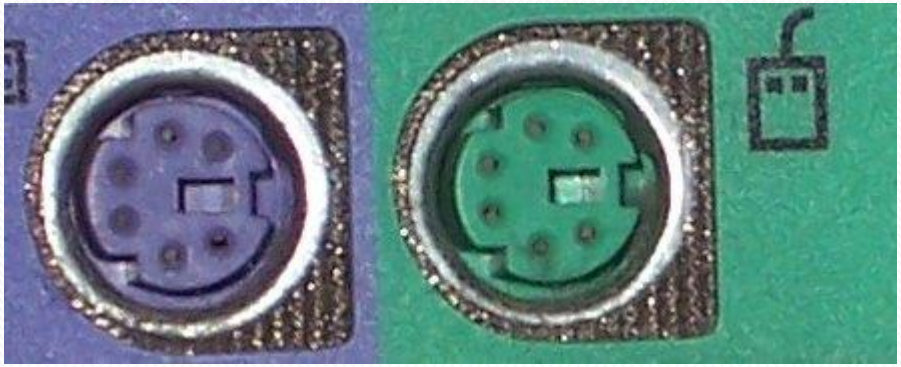
- The mouse is the most widely used pointing device
- A mouse is palm sized
- As the mouse is moved, its movements are mirrored by the on-screen pointer
- **Mouse pad** – clean, flat surface for mouse movement

Types of Mouse



- **Wheel mouse** – Contains a rotating wheel used to scroll vertically within a text document; connects to PS/2 port or USB port
- **Cordless mouse** – Uses infrared signals to connect to the computer's IrDA port; it must be within sight of the receiving port

PS/2 Port



- The color-coded PS/2 connection ports:
  - Purple for keyboard
  - Green for mouse

How a Mouse Works

- Mouse buttons enable the user to initiate actions
  - **Clicking (left-, right-, or double-clicking)** allows the user to select an item on the screen or open a program or dialog box
  - **Click and drag** – Holding down the left mouse button and moving the mouse enables the user to move objects on the screen

Other Types of Pointing Devices

Trackball

Touch Screen

Pointing Stick

Joystick

Touch Pad

Pen

Image Processing Systems: Scanners

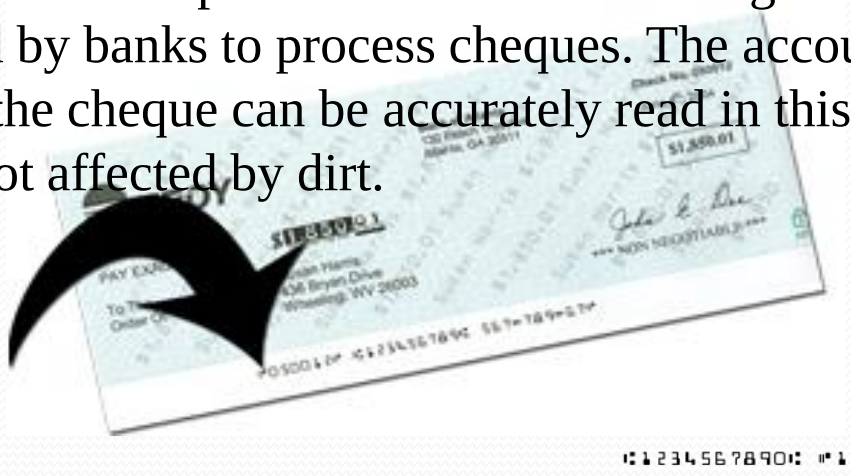
- Image processing systems are used in business, industry, and science to input data without manually keying it in

Scanners

Image Processing Systems: Scanners

Magnetic-ink character recognition (MICR) A computer can read numbers and letters printed with ink containing magnetic material.

MICR is used by banks to process cheques. The account details at the bottom of the cheque can be accurately read in this manner since MICR is not affected by dirt.



MICR

- **Optical Mark Reader (OMR) – A scanning device that senses the magnetized marks from #2 pencils.**

Alternative Input Devices

Barcode reader

Microphone – Speech recognition

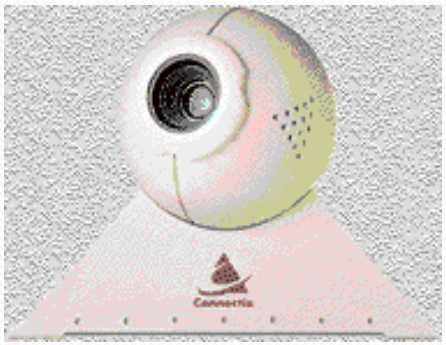
Alternative Input Devices

Digital Camera

Digital Video

Video-conferencing

Web Cam

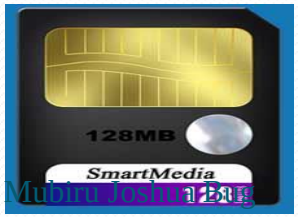


Speech Recognition - Microphone

- **Speech recognition** is a type of input in which the computer recognizes words spoken into a microphone
- Special software and a microphone are required
- A **microphone** – an input device that converts sound input into electrical signals
- Latest technology uses continuous speech recognition where the user does not have to pause between words

Digital Cameras

- The image's light falls on a charge-coupled device (CCD) which transforms the light's patterns into pixels
- Images are stored in the camera using flash memory. The most popular types are CompactFlash and SmartMedia.
- Photo-editing programs enable the user to edit the images
- Good pictures can be taken using point-and-shoot cameras
- Single-lens reflex (SLR) digital cameras are expensive and used by professional photographers



Digital Video

- A **video** capture board transforms analog video into digital video
- **Codecs** or compression/decompression standards are used to compress digital video files
- A **frame rate** of 24 frames per second (fps) is needed to produce a continuous smooth action

Video-conferencing

- **Videoconferencing** uses digital video technology to simulate face-to-face meetings
- **Whiteboards**, which are a part of the screen, can be used to write or draw

Web Cam

- A **Web cam** provides low-resolution video-conferencing for Internet users
- The images are small and jerky

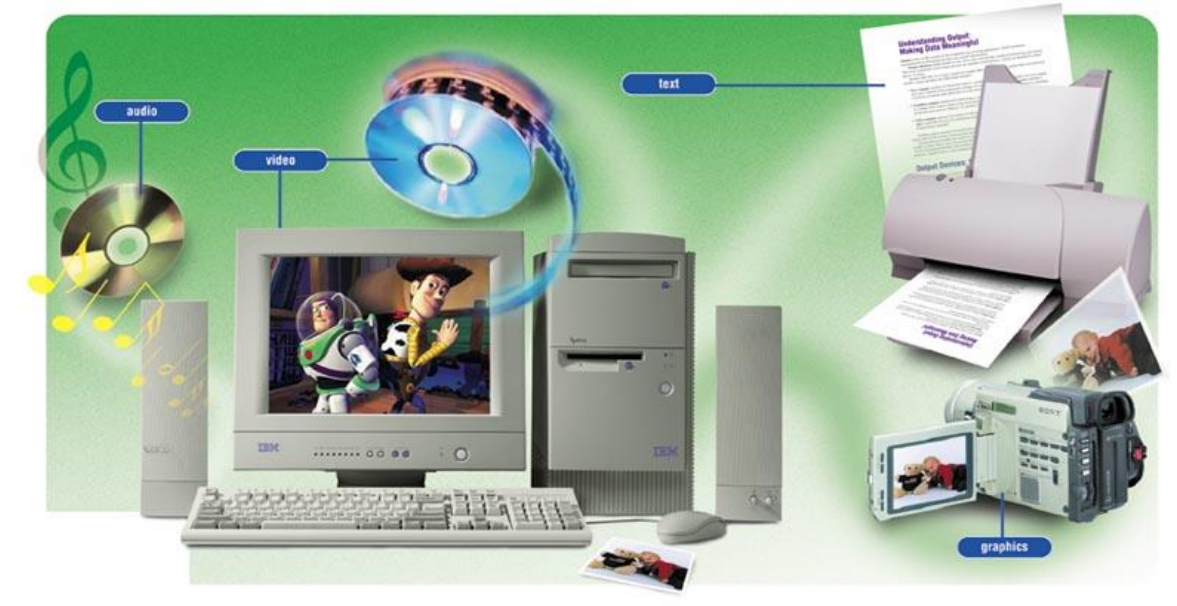
Output Devices

- Output devices allow information to be output from a computer.

- Examples of output devices are:

  - Monitors
  - Printers
  - Projectors
  - Plotters

Output Devices



- **Output devices** are peripheral devices that enable users to view or hear the computer's processed data
- **Visual output** – Text, graphics, and video
- **Audio output** – Sounds, music, and synthesized speech

Visual Display System

- A **visual display system** is composed of two parts:
  - **Video adapter** – Responsible for video quality
  - **Monitor** – Displays the video adapter's output

Video Adapter

- A **video adapter** is also called **display adapter**, **video card**, or **graphics card**
  - It plugs into an expansion slot on the motherboard
  - It contains memory called video RAM (VRAM)
  - It is designed to work with digital or analog monitors
  - It converts digital signals to analog
  - It determines a monitor's maximum resolution (VGA/Super VGA)
  - It determines a monitor's refresh rate
- **3D graphics adapter** – Enables 3-dimensional images
- Multi-display video adapter – Permits a connection of two monitors at a time

Monitors

CRT

LCD

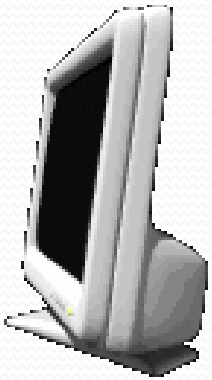
- A **monitor** is a peripheral device which displays computer output on a screen.
- **Screen output** is referred to as soft copy.
- Types of monitors:
  - **Cathode-ray tube (CRT)**
  - **Liquid Crystal Display (LCD or flat-panel)**

Cathode-ray tube (CRT)

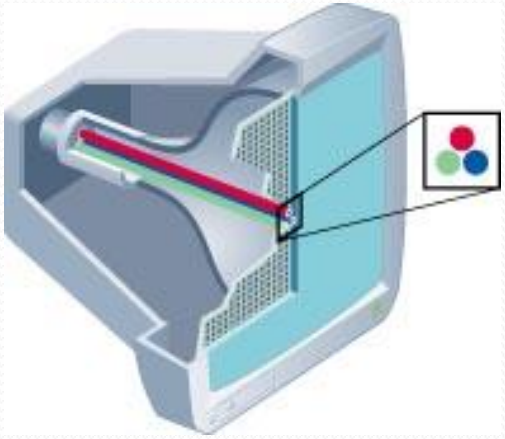
- Resembles televisions
- Uses picture tube technology
- Less expensive than a LCD monitor
- Takes up more desk space and uses more energy than LCD monitors

Liquid Crystal Display (LCD)

- Cells sandwiched between two transparent layers form images
- Used for notebook computers, PDAs, cellular phones, and personal computers
- More expensive than a CRT monitor
- Takes up less desk space and uses less energy than CRT monitors
- Types of LCD monitors:
  - **Passive-matrix LCD**
  - **Active-matrix LCD**
  - **Gas plasma display**
  - **Field emission display**

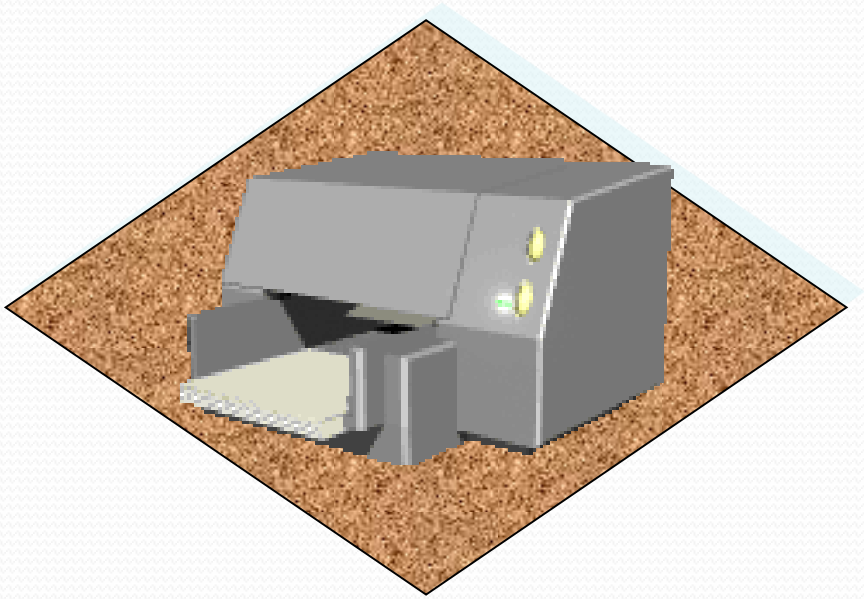


Monitor Specifications



- **Screen size** – The diagonal measurement of the screen surface in inches (15, 17, 19, 21)
- **Resolution** – The sharpness of the image determined by the number of horizontal and vertical dots (pixels) that the screen can display (800 x 600, 1024 x 768, 1600 x 1200)
- **Refresh rate** – The speed at which the screen is redrawn (refreshed) and measured in Hertz (Hz) (60Hz, 75Hz). The frequency at which a monitor can draw data from an external source in one second.

Printers

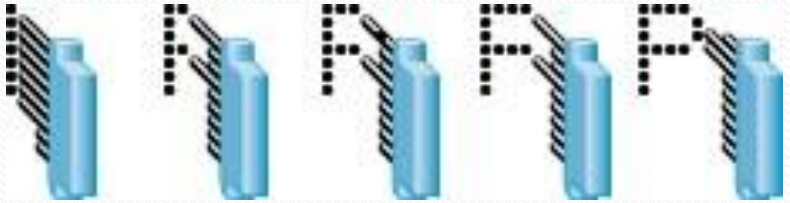


- A **printer** is a peripheral device that produces a physical copy or hard copy of the computer's output
- Two basic types:
  - **Impact printer**
  - **Non-impact printer**

Impact Printer

Impact printer

Dot-matrix



- An **impact printer** is a printer that has a print head that contacts the paper to produce a character
- It uses ink ribbon
- It is noisy, produces Near-letter quality printouts, and is not commonly used today
- **Dot-matrix** – Pins are used to make characters

Dot-matrix

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.

Advantages

Dot matrix printers can print on multi-part stationery or make carbon-copies. Impact printers have one of the lowest printing costs per page.

They are good, reliable workhorses ideal for use in situations where printed content is more important than quality. They can operate in harsh conditions.

Disadvantages

Impact printers create noise when the pins or typeface strike the ribbon to the paper.

They can only print lower-resolution graphics, with limited color performance, limited quality, and lower speeds compared to non-impact printers.

Uses

Dot matrix impact technology remains in use in devices such as cash registers, ATM, Fire alarm systems, and many other point-of-sales terminals.

Non-impact Printer

Inkjet

Laser

- The **non-impact printer** is the most commonly used printer today
- It works quietly compared to an impact printer

- **Inkjet printer**, also called a **bubble-jet**, makes characters by inserting dots of ink onto paper
- Letter-quality printouts
- Cost of printer is inexpensive but ink is costly

- **Laser printer** works like a copier
- Quality determined by dots per inch (dpi) produced
- Color printers available
- High initial costs but cheaper to operate per page

Inkjet printer

Inkjet printers create text and images on the surface of the paper by spraying small droplets of ink on them. All the droplets are very small in size and are also positioned very precisely. Inkjet printers are also very popular since they have now become inexpensive, and also easy to use, plus they can produce high quality text and graphics. The speed of these printers are expressed as pages per minute (ppm) and also the resolution is expressed as dots per inch (dpi).

Multifunction Printer

- A **multifunction printer** combines the functions of a non-impact printer, scanner, fax machine, and copier in one unit

Plotter

- A **plotter** is a printer that uses a pen that moves over a large revolving sheet of paper
- It produces high-quality images
- It is used in engineering, drafting, and map making.

Audio Output

- **Audio output** is the ability of the computer to output sound
- Two components are needed:
  - **Sound card** – Plays contents of digit recordings
  - **Speakers** – Attached to sound card
- Digital formats include WAV, MPEG, MP3, and MIDI

MEMORY STORAGE

What is Storage Devise?

- A **storage device** is a hardware device designed to store information.
- There are two types of storage devices used in computers; a '**primary storage**' device and a '**secondary storage**' device.
- **Primary Storage is Main Memory**
- This keeps track of what is currently being processed. It's **volatile memory i.e.** power off erases all data.
- For Main Memory, computers use **Random Access Memory (RAM)**. This uses memory chips and is the fastest but most expensive type of storage.

MEMORY STORAGE

- Secondary Storage is called Auxiliary Storage
- This is what is not currently being processed. This is the stuff "filed away", but ready to be pulled out when needed.
  It is **nonvolatile**. (power off does not erase)
  Auxiliary Storage is used for:
  - Input- data & programs.
  - Output- saving results of processing

MEMORY STORAGE

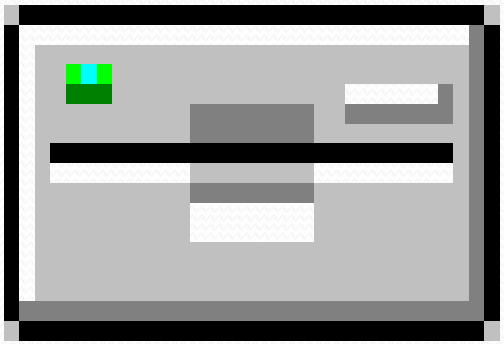
MAGNETIC DISKS

- Of the various types of Auxiliary Storage, the types used most often involve some type of **magnetic disk**.
- These come in various sizes and materials.
- This method uses magnetism to store the data on a magnetic surface.
- **Advantages:-** high storage capacity
  -reliable
  -gives direct access to data

TYPES OF MAGNETIC DISKS

- **Diskette / Floppy Disk**
- Sizes: Two types 5¼", and 3½"
  Several other kinds of removable magnetic media are in use, such as the popular Zip disk.
- All of these have a much higher capacity than floppy disks.
- Some kinds of new computers come without a floppy disk drive at all.

- Each type of media requires its own drive. The drives and disks are much more expensive than floppy drives and disks, but then, you are getting much larger capacities.



TYPES OF MAGNETIC DISKS

Hard Disks

- These consist of 1 or more metal platters which are sealed inside a case.
- The metal is one which is magnetic.
- It is usually installed inside the computer's case, though there are removable and cartridge types, also.
- Technically the **hard drive** is what controls the motion of the hard disks which contain the data.
- But most people use "hard disk" and "hard drive" interchangeably.

OPTICAL DISKS

- An entirely different method of recording data is used for **optical disks** it uses light.
- To make an optical disk, tiny lasers create peaks and valleys in a plastic layer on a circular disk.
- In the device that reads the optical disk these peaks and valleys are read as 1's and 0's by shining another laser on the disk.

CD ROM

- The most common size of optical disk, which stands for **Compact Disk - Read Only Memory**.
- It looks just like an audio CD. Almost all software is being distributed on CDs now. The price of the drives that read the disks (but can't write one) has dropped low enough that a new system will come with a CD drive. Such drives will also play your audio CDs, if you have a sound card and speakers.
- The CDs that contain commercial software are of the **Write Once Read Many** (**WORM**) variety.
- For changing data we need **rewritable** disks labeled as CD/RW

OPTICAL DISKS

Advantages of Optical Disc

1. The optical disk is much **sturdier** than the other media discussed so far. It is physically harder to break or melt or warp.
2. It is **not sensitive** to being touched, though it can g et too dirty or scratched to be read.
3. It is entirely **unaffected by magnetic fields**.
4. Plus you can imprint a pretty label right on the disk!
   So for software providers, the optical disk is a great way to store the software and data that they want to distribute or sell.

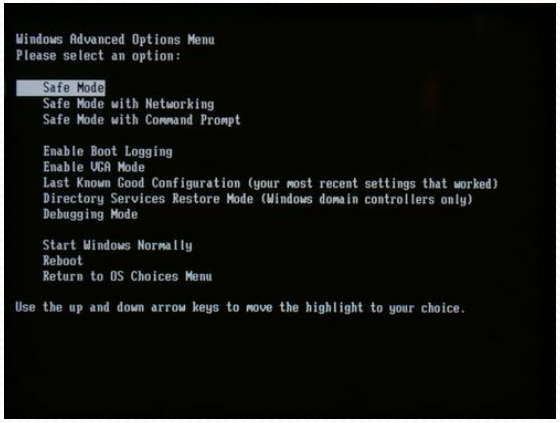
Disadvantages

1. The main disadvantage has been **cost**.
   But the cost of a CD-RW drive has dropped drastically and quickly.
   So for commercial use, the read/write drives are quite cost effective.
2. It is **not easy to copy** an optical disk. (This is an advantage as far as commercial software providers are concerned!).

Booting

Definition: the process of powering a computer on and starting the operating system

A cold boot is when you turn the computer on from an off position. A warm boot is when you reset a computer that is already on.



The few minutes that it takes for the computer to boot up are called the "black hole" of the digital age. During that time, there is nothing to do but wait and wait before one can log on.

Tasks performed at boot up

- Run diagnostics to determine the state of machine. If diagnostics pass, booting continues.
- Runs a Power-On Self Test (*POST*) to check the devices that the computer will rely on, are functioning.
- BIOS goes through a preconfigured list of devices until it finds one that is bootable. If it finds no such device, an error is given and the boot process stops.
- Initializes CPU registers, device controllers and contents of the main memory. After this, it loads the OS.

Booting and ROM

- System such as cellular phones, PDAs and game consoles stores entire OS on ROM. Done only for small OS, simple supporting hardware, and rugged operation.
- Changing bootstrap code would require changing ROM chips.

SOFTWARE COMPONENTS

- A Computer System is made up of *Hardware*, *Operating System* (OS) and *user interface*.
- Computer Software can be divided into:
  - **System programs** which manage the operation of the computer itself
  - **Application programs**, which solve problems for the users.
- The Operating System controls the entire Computers' resources and provides the base upon which the application programs can be written

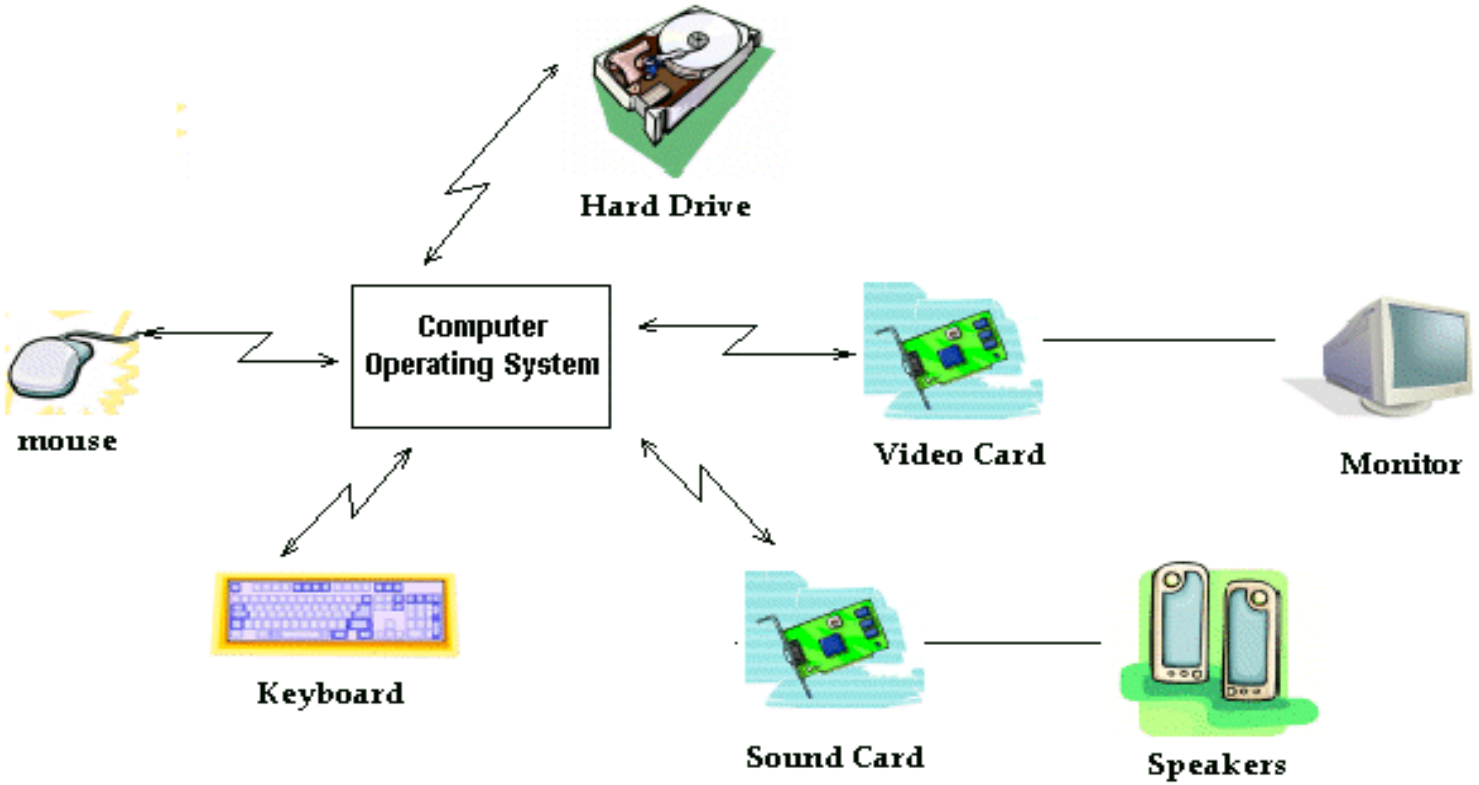
Definition of Operating System

- An OS is the core software component of a computer program that makes the computing power available to users by controlling the hardware using “Drivers”.
- OR- OS is a **program** that controls the execution of application programs. It masks/covers the details of the hardware to application programs.
- ***Assignment: What Are The Functions Of Operating System?***

What does a driver do?

- A **driver** is a specially written program which understands the operation of the device it interfaces to, such as a printer, video card, sound card or CD ROM drive.
  - A driver is a program designed to comprehend the functions of a particular device installed on the system.
- It translates commands from the operating system or user into commands understood by the component computer part it interfaces with.
- It also translates responses from the component computer part back to responses that can be understood by the operating system, application program, or user.

Operating System Interfaces



Basic Functions of OS

- Operating systems perform basic tasks, such as:
  - Recognizing **input** from the **keyboard**,
  - Sending **output** to the **display screen**
  - Keeping track of files and ***directories*** *on the* ***disk***
  - And controlling **peripheral devices** such as **disk drives** and printers.
- For large systems, the OS has even greater responsibilities and powers.
  - It makes sure that different program and **users** running at the same time do not interfere with each other.
  - It is also responsible for **security**, ensuring that unauthorized users do not **access** the system.
- The set of software products that jointly controls the system resource using these resources on a computer system is known as operating system.

Common Operating Systems

- Originally the operating system was created by each company that manufactured a processor and motherboard.
- Operating system was unique to each manufacturer.
- Problem: changing to a new computer meant your software had to be replaced!
- There was pressure early on to standardize things so that software could be transferred to the new *(and of course better!)* computer. This required more standardization in operating systems.
- The winner in the PC market was **MS-DOS**, Microsoft's **Disk Operating System**, and its twin at IBM, PC-DOS, also written by Microsoft

Types of Operating Systems

- There are several types of operating systems.
- Here is an overview on each system:
  - **Windows:** Windows is the popular Microsoft brand preferred by most personal users. This system has come a long way from version 1.0 all the way up to the new windows 7 and soon to be released Windows 8.
- Although Windows has made strides in regard to security, it has a reputation for being one of the most vulnerable systems.

Microsoft suite of operating systems

- They include from most recent to the oldest:
- Windows XP Professional Edition - A version used by many businesses on workstations. It has the ability to become a member of a corporate domain.
- Windows XP Home Edition - A lower cost version of Windows XP which is for home use only and should not be used at a business.
- Windows 2000 - A better version of the Windows NT operating system which works well both at home and as a workstation at a business. It includes technologies which allow hardware to be automatically detected and other enhancements over Windows NT.

Microsoft suite of operating systems

- Windows ME - A upgraded version from windows 98 but it has been historically plagued with programming errors which may be frustrating for home users.
- Windows 98 - This was produced in two main versions. The first Windows 98 version was plagued with programming errors but the Windows 98 Second Edition which came out later was much better with many errors resolved.
- Windows NT - A version of Windows made specifically for businesses offering better control over workstation capabilities to help network administrators.
- Windows 95 - The first version of Windows after the older Windows 3.x versions offering a better interface and better library functions for programs.

Types of Operating Systems

- **Unix:** is an operating system developed by Bell Labs to handle complex scientific applications.
- University networks are likely to use UNIX, as are Internet Service Providers.
  - It is often used more as a server than a workstation
- Unix OS is well known for its stability.
- Unix is text based, but X-Windows is a UNIX work based graphical interface for UNIX that some think is even easier to work with than Windows 98.
- UNIX is a machine-independent operating system, which means it is not specific to just one type of computer hardware.

Types of Operating Systems

- **Linux** is an operating system similar to UNIX that is becoming more and more popular.
- It is an open-source program created by Linus Torvalds at the University of Finland, starting in 1991.
- Open source means that the underlying computer code is freely available to everyone.

- Programmers can work directly with the code and add features.
- They can sell their customized version of Linux, as long as the source code is still open to others.

Types of Operating Systems

- **Apple Macintosh:** is a multitasking operating system that was the first graphical interface to achieve commercial success.
- Recent versions of the Macintosh operating system, including the Mac OS X, follow the secure architecture of Unix.
- Apple made a major marketing error when they decided to keep their hardware and software under tight control rather than licensing others to produce compatible devices and programs.
- Systems developed by Apple are efficient and easy to use, but can only function on Apple branded hardware.

Operating system updates

- Operating systems are updated frequently.
- For example, if users find a bug or security hole in an operating system, the company that makes the operating system normally releases an update called a patch or service pack.
- This allows you to update your operating system without installing from scratch.
- Check the Web site of the company that writes your operating system for the latest information about latest software patches .

Operating system categories

- **GUI** - Short for Graphical User Interface, a GUI Operating System contains graphics and icons and is commonly navigated by using a computer mouse.
- **Multi-user** - A multi-user Operating System allows for multiple users to use the same computer at the same time and/or different times. Below are some examples of multi-user Operating Systems. Linux, Unix, Windows 2000
- **Multiprocessing** - An Operating System capable of supporting and utilizing more than one computer processor. Below are some examples of multiprocessing Operating Systems. Linux, Unix, Windows 2000
- **Multitasking** - An Operating system that is capable of allowing multiple software processes to run at the same time. Below are some examples of multitasking Operating Systems. Unix, Windows 2000
- **Multithreading** - Operating systems that allow different parts of software program to run concurrently. Operating systems that would fall into this category are: Linux, Windows 2000

UTILITY AND APPLICATION PROGRAMS

- **Utility software** (also known as *service program*, *service routine*, *tool*, or *utility routine*) is computer software designed to help manage and tune the computer hardware, operating system or application software by performing a single task or a small range of tasks.
- **Utility Programs** perform tasks related to the maintaining of your computer's health - hardware or data.
- Some utility software has been integrated into most major operating systems.
- Examples, Disk Defragmenter, Registry cleaners, Antivirus, File Management, Data Recovery, Data Back up, Data Compression, and Memory management.

Application Software/Programs

- ***Applications software*** allows you to perform a particular task or solve a specific problem.

Examples of application Software.

- **Word Processor** Provides the tools for entering and revising text, adding graphical elements, formatting and printing documents.
- **Spreadsheets** Provides the tools for working with numbers and allows you to create and edit electronic spreadsheets in managing and analyzing information.

Examples of application Software

- **Database Management** Provides the tools for management of a collection of interrelated facts.
- Data can be stored, updated, manipulated, retrieved, and reported in a variety of ways.
- **Presentation Graphics** Provides the tools for creating graphics that represent data in a visual, easily understood format.
- **Communication Software** Provides the tools for connecting one computer with another to enable sending and receiving information and sharing files and resources. **Internet Browser** Provides access to the Internet through a service provider by using a graphical interface.

Relationship Between Software

- As important as applications software may be, it is not able to directly communicate with hardware devices.
- Another type of software required is the operating systems software. ***OS software*** is the set of programs that lies between applications software and the hardware devices.
- Think of the cross section of an onion. The inner core of the onion represents the hardware devices, and the applications software represents the outside layer. The middle layer is the OS software. The instructions must be passed from the outer layer through the middle layer before reaching the inner layer.
- All computers, regardless of size, require the OS. As soon as your personal computer is turned on, the OS software is loaded into RAM in order to use your computer devices and other software.

INFORMATION NETWORKS

- A **computer network** is a group of interconnected computers.
- **Advantages of Networks**:
- **Speed**. Sharing and transferring files within Networks are very rapid. Thus saving time, while maintaining the integrity of the file.
- **Cost**. Individually licensed copies of many popular software programs can be costly. Networkable versions are available at considerable savings. Shared programs, on a network allows for easier upgrading of the program on one single file server, instead of upgrading individual workstations.

Advantages of Networks:

- **Security**. Sensitive files and programs on a network are passwords protected (established for specific directories to restrict access to authorized users) or designated as "copy inhibit," so that you do not have to worry about illegal copying of programs.
- **Centralized Software Management**. Software can be loaded on one computer (the file server) eliminating that need to spend time and energy.
- **Resource Sharing**. Resources such as, printers, fax machines and modems can be shared.

Characteristics of a Computer Network

- The primary purpose of a computer network is to share resources:
- You can play a CD music from one computer while sitting on another computer
- You may have a computer with a CD writer or a backup system but the other computer doesn't have it; In this case, you can burn CDs or make backups on a computer that has one of these but using data from a computer that doesn't have a CD writer or a backup system
- You may have a computer that doesn't have a DVD player. In this case, you can place a movie DVD on the computer that has a DVD player, and then view the movie on a computer that lacks a DVD player

Characteristics of a Computer Network Cont.

- You can connect a printer (or a scanner, or a fax machine) to one computer and let other computers of the network print (or scan, or fax) to that printer (or scanner, or fax machine)
- You can place a CD with pictures on one computer and let other computers access those pictures
- You can create files and store them in one computer, then access those files from the other computer(s) connected to it

Disadvantages of Networks

- One server breaking down may affect a number of computers
- vulnerable to hackers, Crackers and viruses
- Cabling and installation may be expensive
- a network manager may need to be employed to run the network
- Could degrade in performance

Types of networks

- 1. A **local area network (LAN)** supplies networking capability to a group of computers in close proximity to each other such as in an office building, a school, or a home.
- A LAN is useful for sharing resources like files, printers, games or other applications.
- A LAN in turn often connects to other LANs, and to the Internet or other WAN.

Types of networks

- **2.Wide-Area Network**
- The term Wide Area Network (WAN) usually refers to a network which covers a large geographical area.
- A computer network that spans a relatively large geographical area.
- Typically, a WAN consists of two or more local-area networks (LANs).
- Computers connected to a wide-area network are often connected through public networks, such as the telephone system.
- They can also be connected through leased lines or satellites.
- The largest WAN in existence is the Internet.

Types of networks Cont'd

- **CAN - Campus Area Network**

campus network is a computer network made up of an interconnection of local area networks (LANs) within a limited geographical area. The networking equipments (switches, routers) and transmission media (optical fiber, copper plant, Cat5 cabling etc) are almost entirely owned (by the campus tenant / owner: an enterprise, university, government etc).

- In the case of a university campus-based campus network, the network is likely to link a variety of campus buildings including; academic departments, the university library and student residence halls.

Types of networks cont'd

- A **personal area network** (**PAN**) is a computer network used for communication among computer devices, including telephones and personal digital assistants in proximity to an individual's body. The devices may or may not belong to the person in question. The reach of a PAN is typically a few meters. PANs can be used for communication among the personal devices themselves (intrapersonal communication), or for connecting to a higher level network and the Internet (an uplink).
- Personal area networks may be wired with computer buses such as USB and FireWire. A **wireless personal area network** (**WPAN**) can also be made possible with network technologies such as Bluetooth.

Metropolitan area network (MAN)

A **metropolitan area network** (**MAN**) is a computer network that usually spans a city or a large campus. A MAN usually interconnects a number of local area networks (LANs) using a high-capacity backbone technology, such as fiber-optical links, and provides up-link services to wide area networks(or WAN) and the Internet.

A MAN is optimized for a larger geographical area than a LAN, ranging from several blocks of buildings to entire cities. MANs can also depend on communications channels of moderate-to-high data rates.

A MAN might be owned and operated by a single organization, but it usually will be used by many individuals and organizations. MANs might also be owned and operated as public utilities. They will often provide means for internetworking of local networks.

E-Mail - Electronic Mail

- Send mail electronically via the Internet
- Requires an account on a mail server and supporting software on your PC
- The username and password will allow you to access your account
- All e-mail programs allow you to Send, Compose, Reply, and Forward mail

Obtaining an E-mail Account

- You will need an e-mail server (post office) in order to send and receive e-mail.
- You can obtain an account in school
- You can pay for an account through an ISP such as MTN
- You can get free accounts:
  - www.hotmail.com
  - www.yahoo.com

Privacy and Terms of Agreement

- E-mail is less private than US mail
  - If you need privacy, send a letter
- Every mail server has terms that you must agree to
  - No copyright infringements
  - No harassing or stalking
  - No junk mail or spamming
  - No intentional sending of viruses

The Mail Folders

- ***Inbox*** – new messages as well as messages that have been read
- ***Outbox*** – messages not yet sent
- ***Sent items*** – messages that have been sent (moved here from outbox)
- ***Deleted items*** – messages deleted from any folder
- ***Custom folders*** – additional folders created by the user

An E-mail Address

- Every e-mail address is unique and consists of two parts, a user name and a host computer
- The @ sign is required
- The host computer can be omitted if you are logged onto the same network or host computer

Additional E-mail Capabilities

- Address Book
  - Contains the e-mail addresses of frequent contacts
  - Enables you to enter an alias; e.g., “Bob” instead of the complete address
- Distribution List
  - A set of e-mail addresses stored under one name
  - Ideal for your professor to e-mail the class

What is the Internet?

- The Internet is a worldwide network of connected computers.

- This allows the sharing of electronic information and resources.

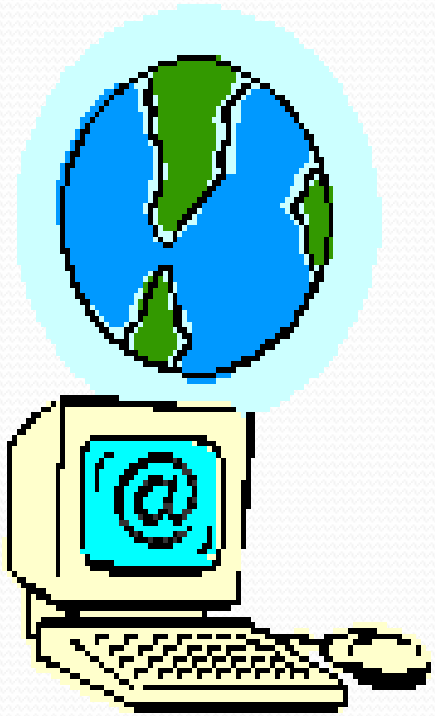
What is the Internet?

- The Internet is considered the LARGEST telecommunications system ever created.

- A common set of rules, known as protocols, allow the transport and viewing of files and documents found on computers connected to the Internet.

What is the World Wide Web?

- The World Wide Web (or WWW) is one part of the Internet.



The World Wide Web (WWW)

- The World Wide Web is a hypertext-based system.

- Hypertext allows users to click on buttons or highlighted text using a mouse to go to other Web pages containing text, sound, pictures, or video.

What is a Web Site?

- A web site is similar to a magazine with articles. It is a collection of web pages.
- A home page is “the front cover” that tells what is inside.
- A web page is an individual page that can be found on a web site.

Web Browsers

- A browser lets you access the WWW and “browse” the Internet for information.

- You use the browser to maneuver through web pages.

Parts of a Web Browser

- Title Bar: Lists the title of the web page that you are viewing. There are three buttons to the right of the title bar which reduce, maximize, or close the screen.

- Content Area: Displays the current web page that is open on the browser.

Parts of a Web Browser

- Address Field: Shows the URL (Web address) of the web page that is currently displayed.

- Status Indicator: Shows whether or not the Web page has completely loaded and can be viewed.

Parts of a Web Browser

- Progress Bar: Indicates how much of the web page has loaded for viewing.

- Status Message Field: Tells you the status of the web page. Indicates when the web page is done and open for viewing.

Parts of a Web Browser

- Scroll Bar: This is used to move up or down on the web page.

Web Browsers

- A browser “reads” the WWW pages, which are written in Hypertext Markup Language (HTML), and converts them into a readable form.

- To look at an example of HTML, click the VIEW menu at the top of a browser screen. This brings down a sub-menu screen. Click on SOURCE. After viewing, click on X (the close screen button) to close the source box.

How to Access Web Pages

Here are three ways to access a web page:

1. Type the Uniform Resource Locator (URL) in the address box.
2. Click on hypertext links on a web page.
3. Use a search tool such as a keyword search engine or web directory.

How to Access Web Pages: Type the URL in the Address Box

- Type the Uniform Resource Locator (web address) in the browser address box.
- Click GO (or press the ENTER button on the keyboard).
- The web address must be correct (no misspellings, extra spaces, etc.) to go to the correct web page.

How to Access Web Pages: Click on Hypertext Links

When you place the mouse cursor over a link, the arrow will change into a hand.

Click on the link to go to another web page.

Use your BACK button to return to the original web page.

How to Access Web Pages: Use a Search Tool

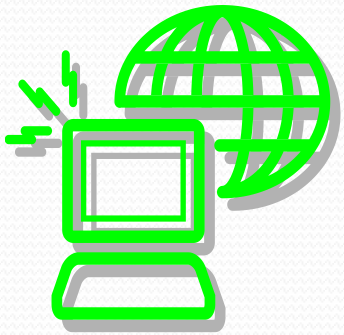
Search tools help you find information on the WWW.

No single search tool finds every web site or web page in existence. Different search tools search different and overlapping parts of the web.

How to Access Web Pages: Use a Search Tool

Examples of search tools include:

- Google
- AltaVista
- Yahoo!
- Lycos



COMPUTER ETHICS

- What is ethical behavior?
- How do we make ethical decisions?

Ethical Decisions

- Ethical decisions are made based on ethical princilples.
- Ethical principles are ideas of behavior that are commonly acceptable to society.

Why Should We Care About Ethics?

- We make a number of ethical decisions daily.
- Some unethical decisions can put us on the wrong side of the law.
- Decisions can affect our career and reputation.
- Obliged to uphold the principles of the society in which we live.

Ten Commandments of Computing - Computer Ethics Institute

- Thou shall not use a computer to harm other people
- Thou shall not interfere with other people's computer work
- Thou shall not snoop around in other people's computer files
- Thou shall not use a computer to steal
- Thou shall not use a computer to bear false witness

Ten Commandments - Continued

- Thou shall not copy or use proprietary software for which you have not paid
- Thou shall not use other people's computer resources without authorization and proper compensation
- Thou shall not appropriate other people's intellectual output
- Thou shall think about the social consequences of the program you are writing or the system you are designing
- Thou shall always use a computer in ways that show consideration and respect for your fellow humans

Basic Computer Security

Computer security is the process of the protection of computing systems and the data that they store or access.

Why Computer Security

- The Internet is a dangerous place
  - Systems are constantly being scanned for weak or vulnerable points so that they can be exploited.
- Information is one of the most important assets for majority of organizations and individuals.

Sources of computer security include; fire, Sabotage, Natural disasters, viruses etc.

Measures that can be taken to reduce threats to computers:

- **Never share passwords or passphrases:** Pick strong passwords and keep them private. Never share your passwords even with friends, family, or computer support personnel.
- **Beware of email or attachments from unknown people, or with a strange subject line:** Never open an attachment you weren't expecting, and if you do not know the sender of an attachment, delete the message without reading it.

Measures that can be taken to reduce threats to computers: cont,d

- Do not download unfamiliar software off the Internet, Obtain software from reputable sources, and then check the software thoroughly, using reputable virus detection software on a locked disk, for signs of infection before copying it to a hard disk.
- **Do not click random links:** Do not click any link that you can't verify. To avoid viruses spread via email or instant messaging (IM).
- **Log out of or lock your computer when stepping away, even for a moment:** Forgetting to log out poses a security risk with any computer that is accessible to other people.

Computer Viruses

Types of Infection

Assignment

Viruses

A virus is a small piece of
software or piece of program that is capable of replicating itself.

2 main characteristics of viruses

- It must execute itself.
- It must **replicate/duplicate/repeat** itself.

Virus

Virus might attach itself to a program such as spreadsheet. Each time the spreadsheet program runs, the virus runs too and replicate itself.

E-mail Viruses

- Moves around in e-mail messages
- Usually replicate itself by automatically mailing itself to dozens of people in the victim's email address book.
- Example "MELISSA VIRUS"
- Example "I LOVE YOU VIRUS"

Why do people do it ?

- For some people creating viruses seems to be thrill/excitement/adventure.
- Thrill of watching things blow up.

Viruses

- Viruses show us how vulnerable we are
- A properly engineered virus can have an amazing effect on the Internet
- They show how sophisticated and interconnected human beings have become.

Symptoms of Infection

- Programs take longer to load than normal.
- Computer's hard drive constantly runs out of free space.
- The floppy disk drive or hard drive runs when you are not using it.
- New files keep appearing on the system and you don't know where it come from.

Symptoms of Infection Cont..

- Strange sounds or beeping noises come from the computer.
- Strange graphics are displayed on your computer monitor.
- Unable to access the hard drive when booting from the floppy drive.
- Program sizes keep changing.

Protection

- TO protect yourself you need to be "Proactive" about Security issues. Being reactive won't solve anything; Specially at crunch time and deadlines!! In matter of fact it can make the problem much more complex to solve, and the situation much worse, resulting in a complete Nightmare!!
- Best Measures are the preventative ones.

Protection Measures

- You need to basically to do **four** steps to keep your computer and your data secure:
  1. Get the latest Anti-Virus Software.
  2. Make sure you have the latest security patches and hot fixes using Windows Update.
  3. Use a Host-Based Firewall.
  4. BACKUP your Important Files.

Conclusion

Be aware of the new infections out there.

Take precaution measures.

Always backup your data.

Keep up-to-date on new Anti virus software.

Simply avoid programs from unknown sources.

WISHING YOU SUCCESS