

UCC 1100

Computer Fundamentals

Introduction To Computers

By

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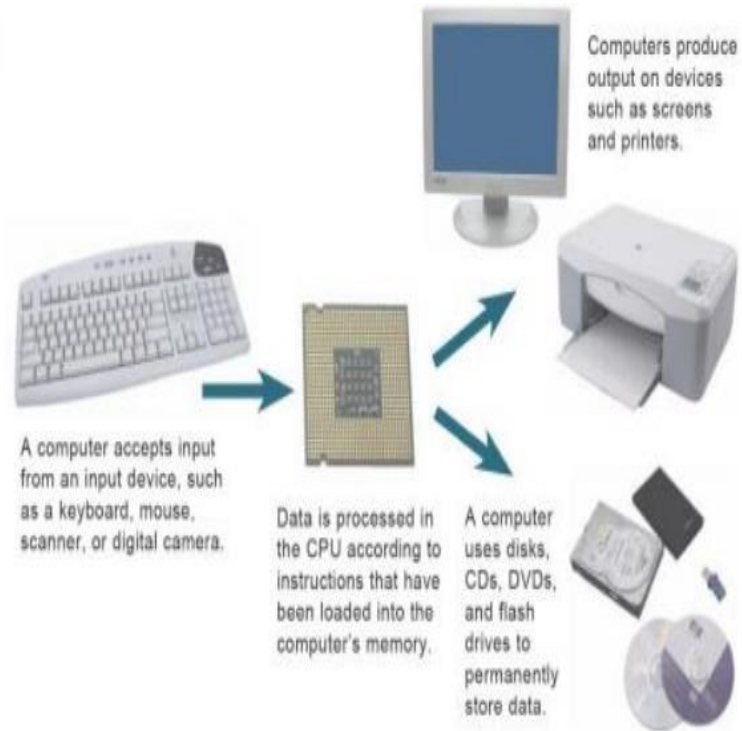
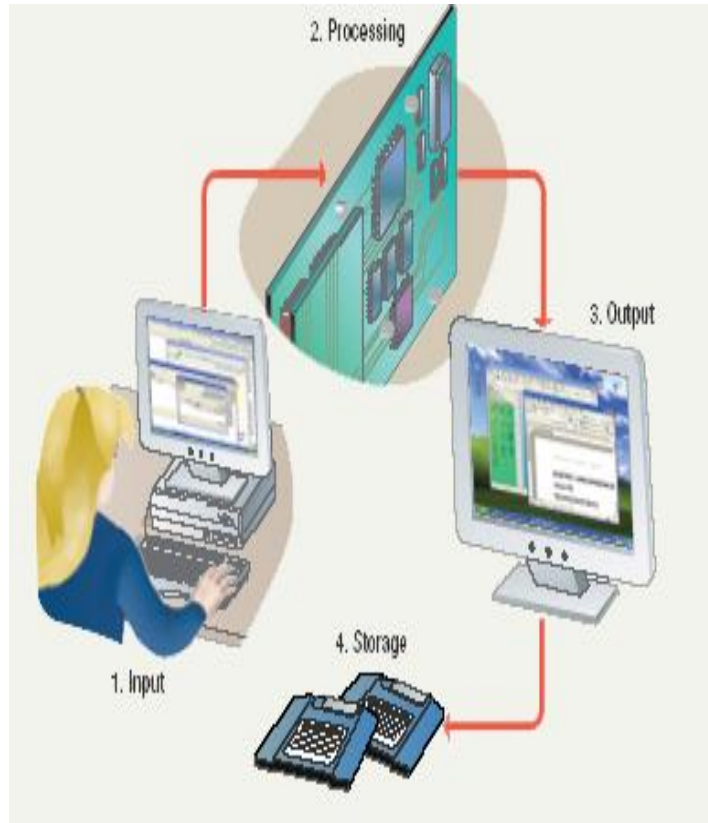
Definition

A computer: is an electronic device that processes data, into meaningful information that is useful to people.

A Computer: is an electronic device that accepts input, processes it, stores data, and produces output.

A Computer: an advanced electronic device that accepts input, processes it, stores data, and produces output.

Input, processing, storage, output



Input

- **Input:** Is whatever is typed, submitted or transmitted to a computer by a person, the environment, or another computer.

Examples of **Input**

- words and symbols
- numbers
- pictures
- audio signals from a microphone
- signals from another computer
- temperature, speed, pressures, etc. from sensors

Processing

- **Processing** - manipulation of data.
 - **Data** are symbols that represent raw facts, objects, and ideas about people, places, events, and things that are of importance in an organization.
 - A **computer program** or **software** is a series of instructions that tell a computer how to carry out a processing task.
- Examples of **Processing**
 - Arithmetic calculations
 - Sorting a list
 - Modifying pictures
 - Drawing graphs

Output

- Output - the result produced by a computer after processing the data.
- Output device –displays, prints, or transmits the results after processing.
- Examples of Output
 - images on a monitor
 - printed documents
 - sounds

Memory and Storage

- **Memory** - the area of a computer that temporarily holds data that is being processed or waiting to be processed, stored, or output.
- **Storage** - The area where data can be left on a permanent basis while it is not needed for processing.
- Examples of **Storage**
 - CD-ROM (Compact Disk Read-Only Memory)
 - Flash disks
 - Hard disks

Basic Functions Of A Computer

- **Accepts data (input):** Receives data from outside(input device) for processing.
- **Process data (Processing):** Performs operations or manipulations on data particularly numerical data.
- **Produce output (output)** Produces data from within for external use.
- **Stores results (Storage):** Holds data internally before, during and after processing. Hard disks, CD-ROM, DVD ROM, Tapes and others.

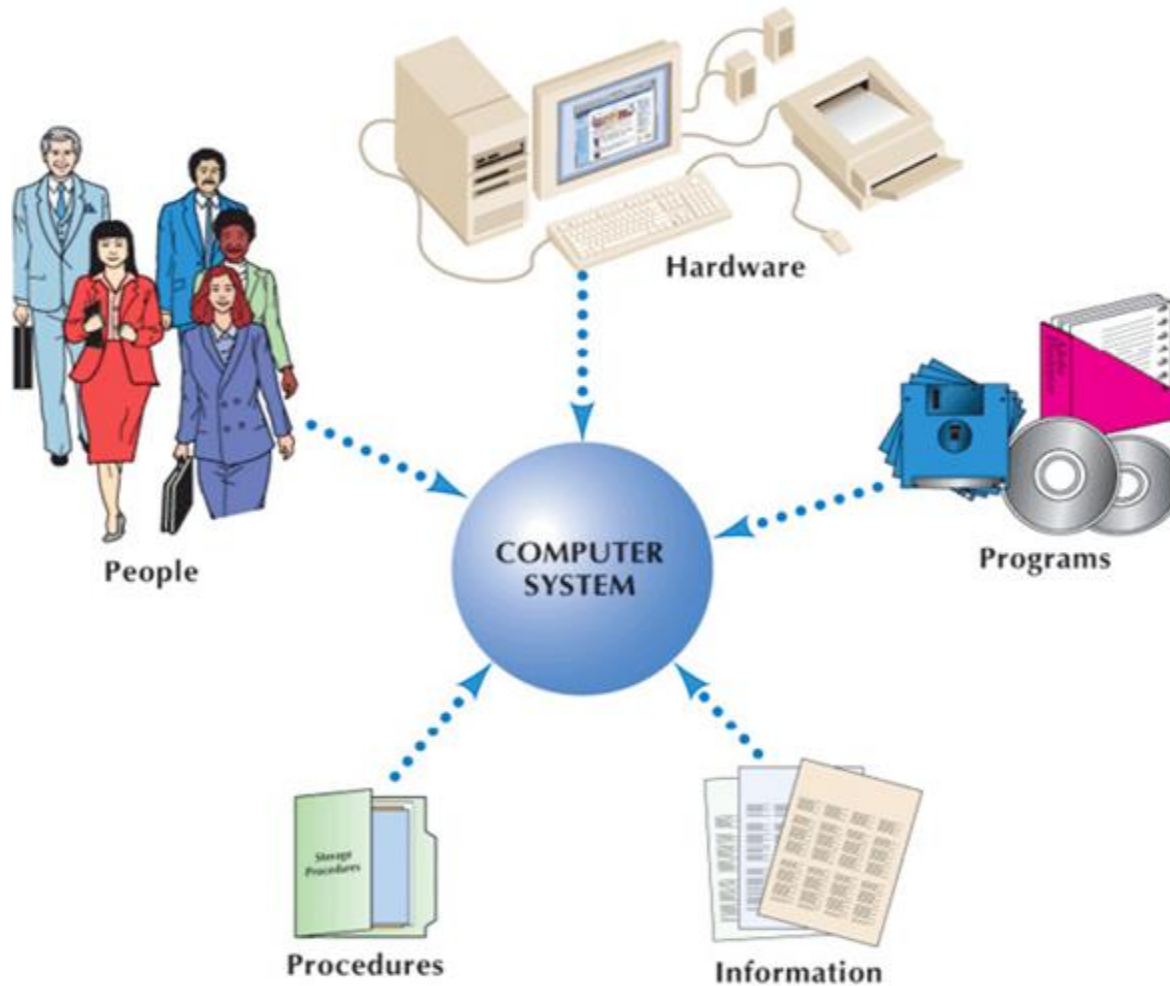
Computer System

Set of interrelated elements working together in an integrated way to achieve a set of objectives.

- **It consist of**

- **Hardware:** *computer itself and any equipment connected to it (tangible/physical components) that make up a computer system.*
- **Software:** *set of instruction that the computer follows in performing a task. Or is a series of instructions that tell a computer how to carry out a processing task.*
- **Data:** *facts that are used by program to produce useful information*
- **Procedures:** *policies that govern the operation of a computer system*
- **People:** *every computer needs people if its to be useful.*

5 Components of a Computer System

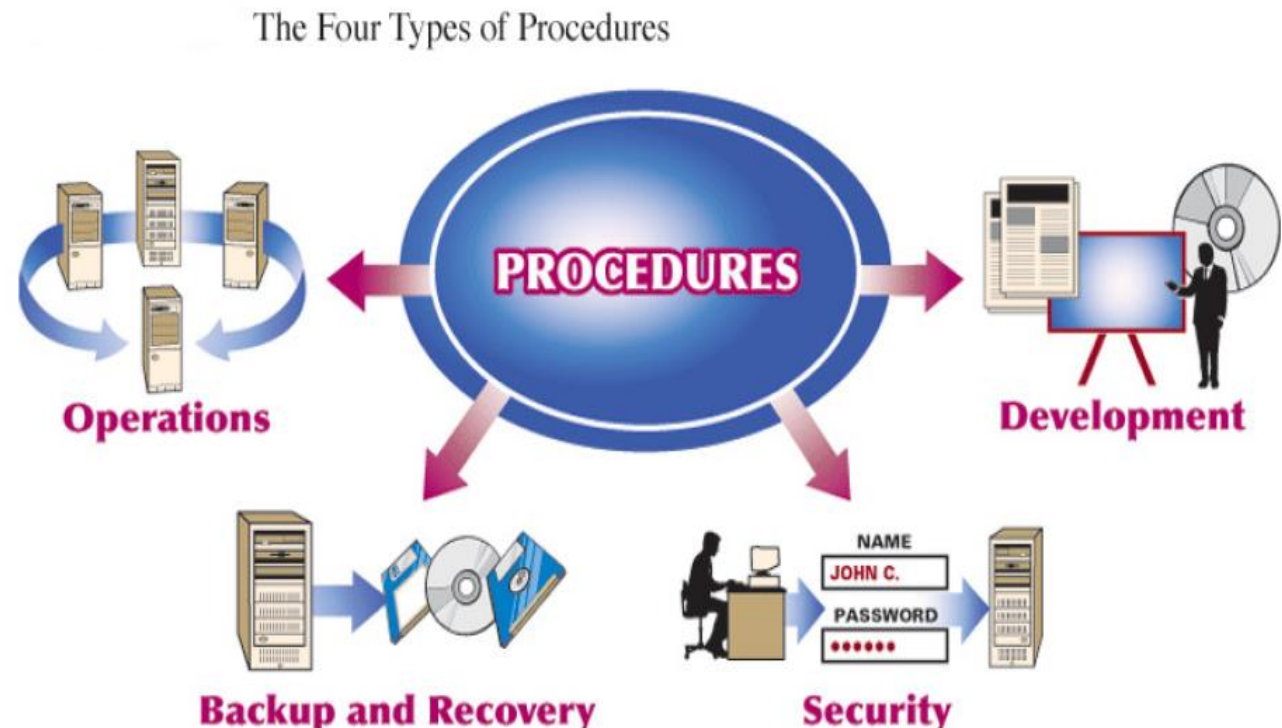


Components of a computer system : People

- Users and Creators of IT Applications
 - User (End User): The people who use computers in their jobs or personal lives
 - Programmer/Analyst: A person who has joint responsibility for determining system requirements and developing and implementing the systems.
 - Computer Engineer: Professional who designs, develops, and oversees the manufacturing of computer equipment.
 - Systems Engineer: Professional who installs and maintains hardware.

Components of a computer system: Procedure

- Procedure: A step-by-step process or a set of instructions for accomplishing specific results.
 - Operations
 - Backup and Recovery
 - Security
 - Development



Procedures cont'd...

- *Operations Procedure*: A procedure that describes how a computer system or application is used, how often it can be used, who is authorized to use it, and where the results of processing should go.
- *Backup Procedure*: A procedure that describes how and when to make extra copies of information or software to protect against losses.
- *Recovery Procedure*: An action taken when information or software must be restored.

Procedures cont'd...

- *Security Procedure*: A procedure designed to safeguard data centers, communications networks, computers, and other IT components from accidental intrusion or intentional damage.
- *Security Software*: Software that is designed to protect systems and data.
- *Development Procedure*: A procedure that explains how computer literates should describe user needs and develop applications to meet those needs.

Advantage of computers

- **Speed:** Computers work at very high speeds and are much faster than humans. Computer speed is measured in **Mega Hertz** (MHz).
- **Storage:** A computer can store a large amount of data permanently. User can use this data at any time. Text, graphic, pictures, audio and video files can be stored easily.
- **Processing:** A computer can process the given instructions. It can perform different types of processing like addition, subtraction, multiplication and division. It can also perform logical functions like comparing two numbers to decide which one is the bigger etc.
- **Accuracy:** Provide results without any error. Computers can process large amount of data and generate error-free results.

Advantage of computers

- **Communication:** Most computers today have the capability of communicating with other computers. We can connect two or more computers by a communication device such as modem.
- **Versatility:** Computers can do computations with all kinds of data including alphabets, pictures, sound images, voice, e.t.c.
- **Automation:** Computers work automatically, i.e. they do not need any supervision to do programmed routines.
- **Diligence:** Computers are diligent i.e. they have ability to perform the same task “over and over” without getting tired e.g. in industrial robotics, like those in Car assembly lines.
- **Artificial Intelligence:** Computers can respond to requests given to them and provide solutions.

Disadvantage Of Computers

- Create unemployment
- Health problems
- Expensive
- Laziness
- Sources of computer viruses
- Crackers
- Delicate
- Literate people
- Immoral activities
- Technology changes

Limitation Of Computers

- Vulnerable to data loss
- Have no common sense
- Need power in order to operate
- Technology change very often
- Computers are delicate

Uses of Computers

Personal and Home

Computers allow people with disabilities to do normal activities.

- Shopping online
- Playing games with other people
- Work from home
- Entertainment such as listening to music, watching videos etc.
- Enable communication through the use of (electronic mails) e-mails , chats etc.



Business Uses of Computers

- Computers allow companies to keep large amounts of information at hand by using databases
- Makes ordering and tracking resources quicker and easier.
- Allows people to have meetings from different locations.
- Helps in information management which eases the process of decision making .



Educational Uses of Computers

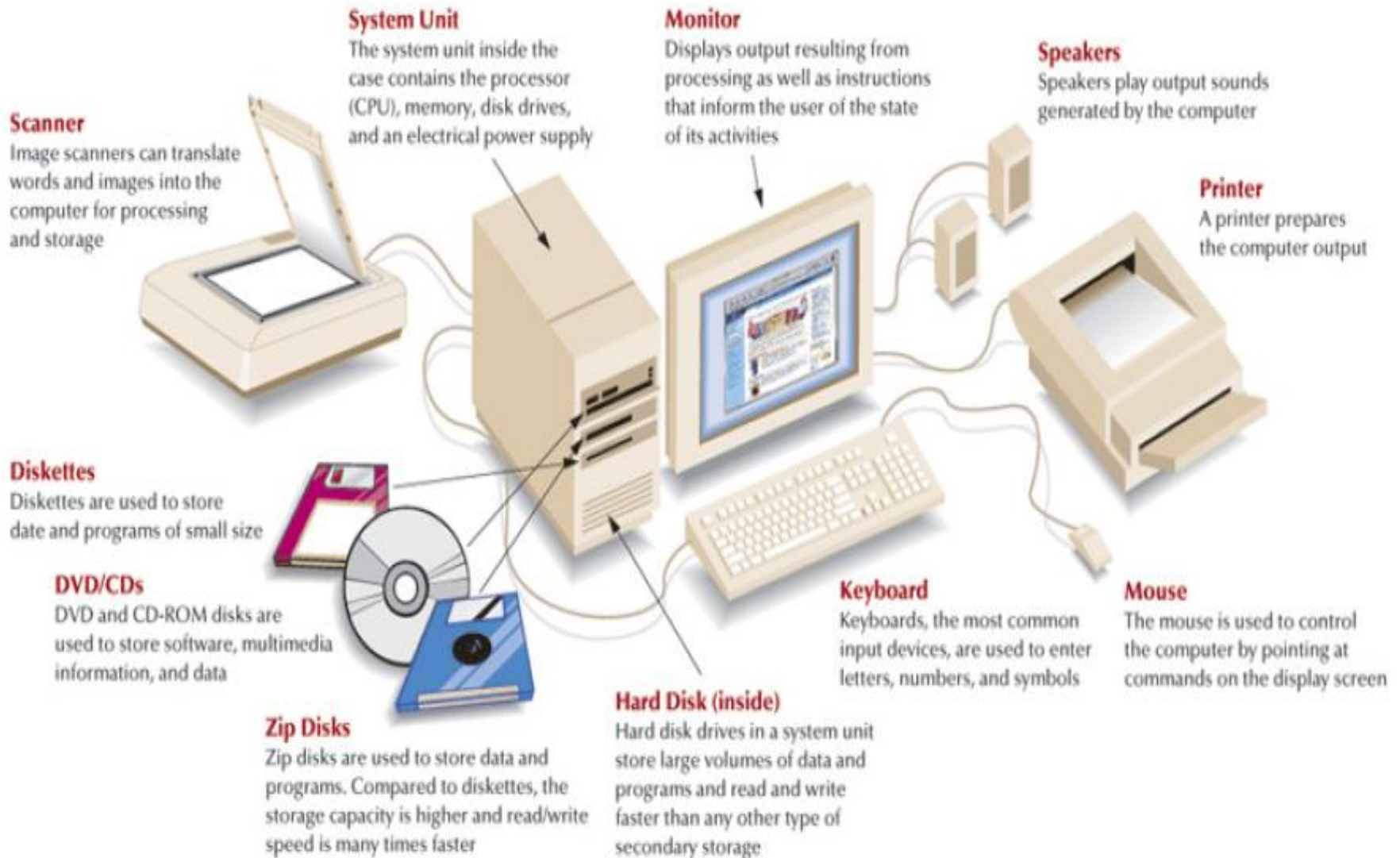
- The Internet allows access to hundreds of online research materials.
- Allows colleagues to correspond quickly about ongoing research.
- Eases the process of analyzing research data.



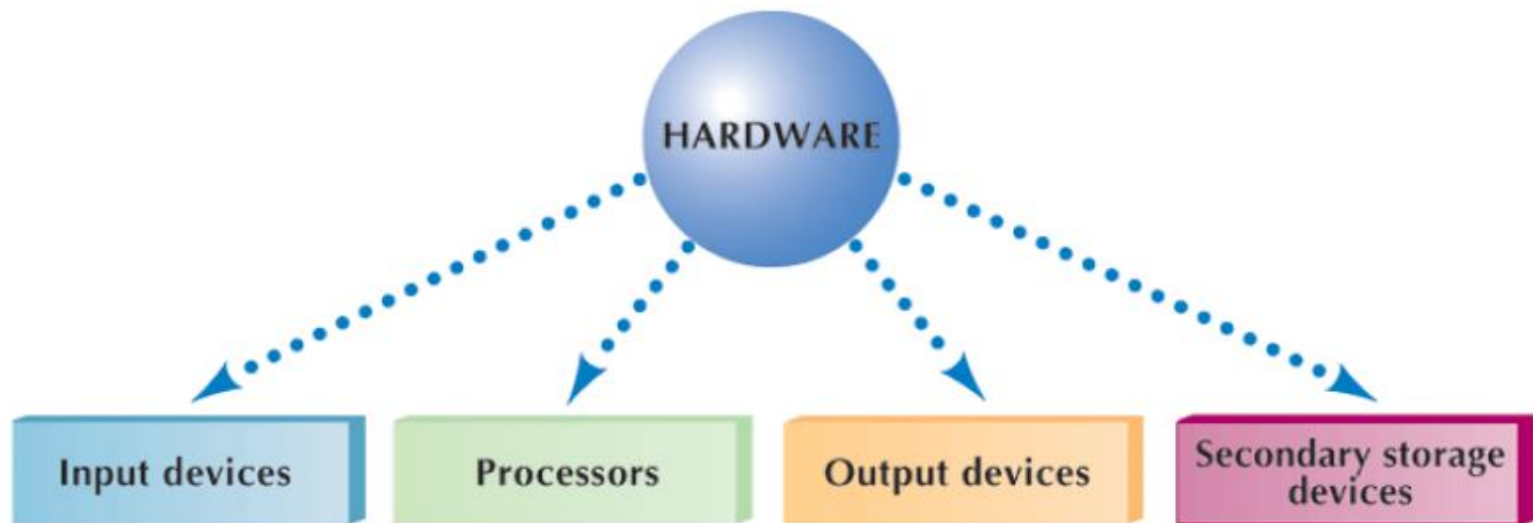
Data and Information

- **Data** is a collection of raw and unprocessed facts, figures, numbers, characters, images and symbols.
- **Information** is data that is organized, meaningful and useful. The process of transforming data (facts) into information is called data processing.
- Data is presented in the form that a computer understands (binary digits 0/1).
- A string of 8 bits is called a byte which represents a character.

Computer Hardware



Categories of hardware



Input Devices

- ***Input:*** The data or information entered into a computer
- The process of entering data/information into the computer for processing, storage and retrieval, or transmission.
- Example of input devices
 - Keyboards
 - Mouse
 - Touch screen
 - Digital camera
 - Scanner
 - Point of sale terminals
 - Bar code reader
 - Microphones
 - prerecorded sources like CD & DVS

Output Devices

- **Output:** The results of inputting and processing data and information returned by the computer, either directly to the person using the system or to secondary storage.
- Common forms of output are reports, schedules, budgets, newsletters among others. Examples of output devices include:
 - Printers
 - Plotters (prints large images (plan))
 - Speakers
 - Monitor
 - Projectors

Note: Communications devices (such as modems and network interface cards) perform both input and output, allowing computers to share information.

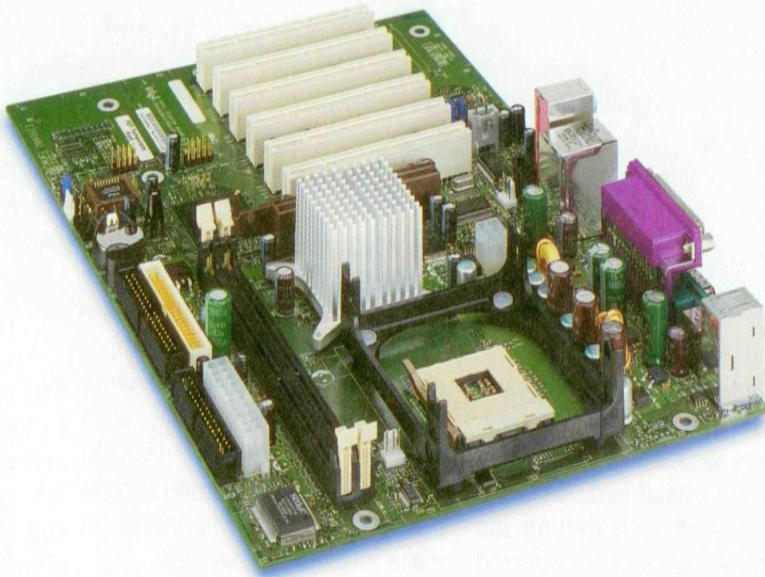
Processor (CPU)

- **Processor/Central Processing Unit (CPU):** A set of electronic circuits that perform the computer's processing actions.
- A chip is a collection of electronic components in a very small, self-contained package. Chips perform the computer's processing actions, including arithmetic calculations and the generation of lines, images, and sound.
- Examples of chips include sound chips which generate signals to be output as tones.



System board

- The processor/CPU can take several forms. Microcomputers contain a specific micro-processor chip as their CPU. This is put into a protective package, and then mounted onto a board contained within the computer. This board is called a **system board** or a **mother board**.



The system board contains other chips and circuitry that carry out processing.

Hardware cont'd

▣ Memory devices

- Memory is made up of one or more sets of chips that Store data or program instructions either temporarily or permanently. No processing takes place in memory. Instead, memory stores data, information and instructions. Memory is divided into **two types**:

a) Random Access Memory (RAM)

- ▣ RAM holds data and program instructions temporarily while the CPU works with them.
- ▣ RAM is volatile, meaning it holds data only when the power is on. When the power is off, RAM's contents are lost.
- ▣ More RAM results in a faster system.

Hardware cont'd

b) Read Only Memory (ROM)

- Permanent storage of programs.
- ROM is called non-volatile memory because it never loses its contents.
- Holds instructions that the computer needs to operate.
- This type of memory lets you store the data needed to start up or boot the computer
- Essential start-up data contained in ROM is a computer BIOS
- The BIOS includes instructions on how to load basic computer hardware and includes a test referred to as a POST (Power On Self Test) that helps verify the computer meets requirements to boot up properly.

Hardware cont'd

b) Read Only Memory (ROM)

- Permanent storage of programs.
- ROM is called non-volatile memory because it never loses its contents.
- Holds instructions that the computer needs to operate.

▫ Memory is measured in terms of:

- Kilobyte (KB) - 1,000 bytes
- Megabyte (MB) - 1,000,000 bytes
- Gigabyte (GB) - 1,000,000,000 bytes
- Terabyte (TB) - 1,000,000,000,000 bytes.

Bits and Bytes

- 1 **Bit** is a single 0 or 1.
- 1 **Byte** consists of 8 bits.
- 1 **Kilobyte** consists of 1,024 bytes approximately 1000 bytes.
- One **Megabyte** is 1,024 kilobytes or approximately million bytes.
- 1 **Gigabyte** is 1,024 megabytes or approximately 1 billion bytes
- 1 **Terabyte** is 1,024 gigabytes or approximately 1 trillion bytes.

Numeric Data Representation Codes

- ▣ **Numeric data** consists of numbers that represent quantities and that might be used in arithmetic operations
- ▣ Binary (0, 1) vs. decimal number system (0-9)

DECIMAL (BASE 10)	BINARY (BASE 2)
0	0
1	1
2	10
3	11
4	100
5	101
6	110
7	111
8	1000
9	1001
10	1010
11	1011
1000	1111101000

Character Data Representation Codes

- **Character data** is composed of letters, symbols, and numerals that will not be used in mathematical operations.
- The following are the most popular text code systems:
- **ASCII** (American Standard Code for Information Interchange) uses 7 bits to represent data.
- **Extended ASCII** uses 8 bits to represent data.
- **EBCDIC** (extended binary-coded decimal interchange code) uses 8 bits to represent data (used on old IBM mainframes)
- **Unicode** uses 16 bits to represent each letter, number or symbol.

	00100000	>	00111110	\	01011100
!	00100001	?	00111111]	01011101
"	00100010	@	01000000	^	01011110
#	00100011	A	01000001	_	01011111
\$	00100100	B	01000010	`	01100000
%	00100101	C	01000011	a	01100001
&	00100110	D	01000100	b	01100010
'	00100111	E	01000101	c	01100011
<	00101000	F	01000110	d	01100100
>	00101001	G	01000111	e	01100101
*	00101010	H	01001000	f	01100110
+	00101011	I	01001001	g	01100111
,	00101100	J	01001010	h	01101000
-	00101101	K	01001011	i	01101001
.	00101110	L	01001100	j	01101010
/	00101111	M	01001101	k	01101011
0	00110000	N	01001110	l	01101100
1	00110001	O	01001111	m	01101101
2	00110010	P	01010000	n	01101110
3	00110011	Q	01010001	o	01101111
4	00110100	R	01010010	p	01110000
5	00110101	S	01010011	q	01110001
6	00110110	T	01010100	r	01110010
7	00110111	U	01010101	s	01110011
8	00111000	V	01010110	t	01110100
9	00111001	W	01010111	u	01110101
:	00111010	X	01011000	v	01110110
;	00111011	Y	01011001	w	01110111
<	00111100	Z	01011010	x	01111000
=	00111101	[01011011	y	01111001

Storage Devices

- The purpose of storage is to hold data permanently, even when the computer is turned off.
- Storage devices hold data not currently being used by the CPU.
- Data is commonly stored on a magnetic or optical disk.
- A disk drive is a device that reads data from and writes data to a disk. Most new computers feature a floppy disk drive, a hard disk drive, and an optical disk drive.
- The most common optical storage devices are CDROM and DVD-ROM drives.

Computer Health and Safety issues

- Never use the computer in a dusty environment
- Water should be avoided near computers
- Never eat or drink in a computer room
- Do not smoke near computers
- Do not block the ventilation hole on a computer when its hot
- Computer room must be well ventilated
- Do not allow diskettes from outside (viruses)
- Do not switch the computer on and off abruptly
- Protect the machine using UPS and stabilizers
- When in doubt. Please ask an expert.

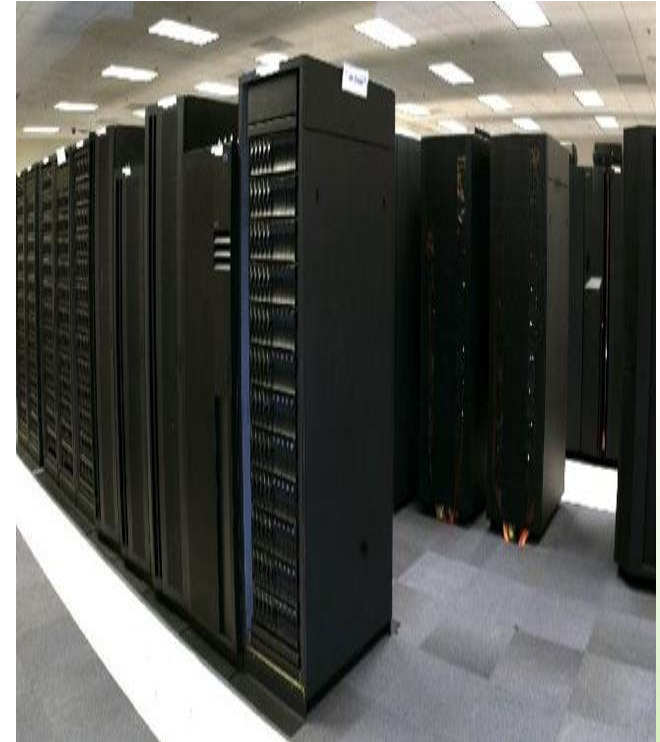
Classification of Computers

- Computers are classified according to;
 - ✚ **Size:** Some computers are designed for individual use while others are for organizations.
 - ✚ **Technology:** Some computers are more powerful than others in terms of the speed at which they operate as well as the technologies they use.
 - ✚ **Purpose:** Some computers are designed to handle lighter tasks compared to others that can handle heavier tasks
- Because of the above factors, we have computers of different prices, having different hardware as well as compatible with different software.

Classification of Computers According to size

▣ Supercomputers

- The most powerful computers made.
- Handle large and complex calculations.
- Because of their size and expense, supercomputers are relatively rare.
- These are used by research institutions, government agencies, and large businesses.



Classification of Computers According to size

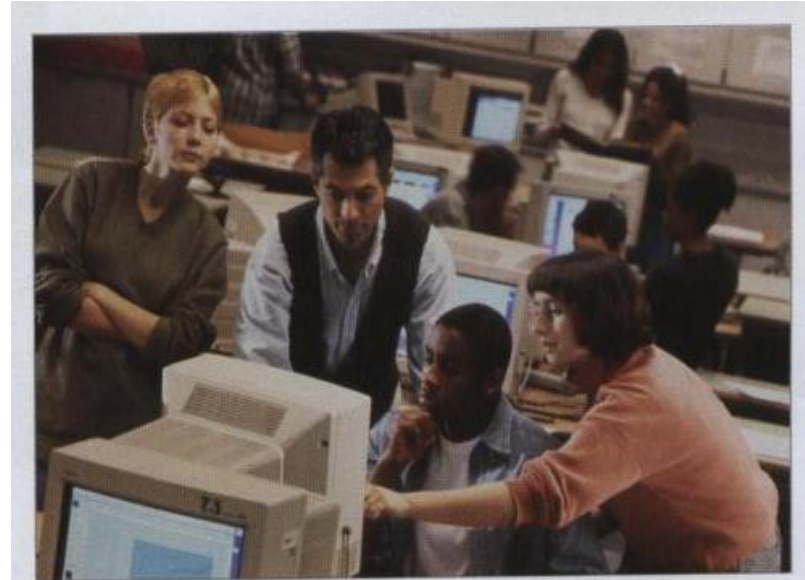
▣ Mainframe Computers

- Are slower, less powerful and less expensive than supercomputers.
- Are used by banks and many businesses to update inventory etc.
- Are used in large organizations where many users need access to shared data and programs.
- Can support thousands of users, handling massive amounts of input, output, and storage.



Micro computers/Personal Computers

- Computers can be shared by multiple users but can be used by only one person at a time.
- Types of computers in this category include;
 - Desktop computers
 - Workstations
 - Notebooks
 - Tablet computers
 - Handheld Computers
 - Smart phones



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FIGURE 1A.4

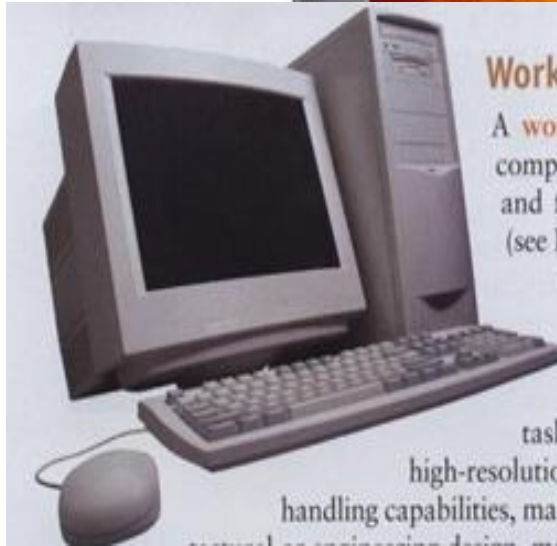
Many kinds of computers can be shared by multiple users but can be used by only one person at a time.



Microcomputers

- **Desktop computers**

- The most common type of computer
- Sits on the desk or floor
- Performs a variety of tasks including word processing, spreadsheets, databases, photographs and videos, play



Microcomputers

- **Workstations**

- Has more power and features than a standard desktop PC
- Have large, high resolution monitors
- Suitable for architectural engineering design, animation and video editing.



Microcomputers

- Notebook computers/ Laptops
 - Small portable computers
 - Weighs between 3 and 8 pounds
 - People frequently set these devices on their laps hence **laptop computers**
 - Operate on alternating current or special batteries
 - When not in use, device folds up for easy storage.



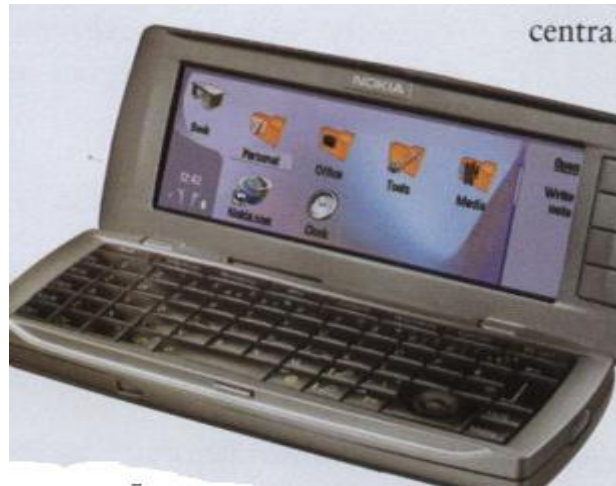
Microcomputers

- **Tablet computers**
 - One of the new development in portable computers
 - Input is through a pen
 - Run specialized versions of office products



Microcomputers

- Smart phones
 - Hybrid of cell phone and Personal Digital Assistants (PDAs)
 - Web surfing, e-mail access



Common Terms

- **Program:** set of computer instructions that enable the computer hardware to accomplish a task.
- **Application:** a program in which you do your work
- **Driver:** a file on a computer which tells it how to communicate with an add-on piece of equipment. E.g. sound drivers, network drivers etc.
- **Software:** set of instructions that the computer follow in performing a task.
- **Data processing:** process where data is transformed into information.
- **Information Communication Technology (ICT):** Scientific mean of sending and receiving information which requires sending understanding and sending feedback

Chapter Review Questions

1. Why are there different types of input devices?
2. Do all computers, regardless of size, have a processing unit? Why or why not?
3. Discuss the relationship between hardware and software.
4. Why do computers use binary numbering system?
5. What is the difference between data and programs?
6. What is the purpose of RAM? What is its relationship with secondary storage?
7. Why are some devices called peripheral equipment?
8. Why are procedures needed when managing computer systems?