

Lecture 1

Computer Technology

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Assistant Prof. Dr. Emad I Abdul Kareem

College of Education

Computer Science Department

الجامعة المستنصرية | Mustansiriyah University



LECTURE ONE

COMPUTER CONCEPTS AND THEIR APPLICATIONS

1.1 Introduction and Definition of Computer

The 20th century saw the birth of one of the most important tools widely in use today called a computer. Today, computers are used for communication, management, research, drawing and design as well as entertainment.

This 21st century is being referred to as the *digital age*

A **computer** is an electronic device that accepts user input (*data*) and **processes** it under the influence of a set of instructions referred to as *programs* to produce the desired output generally referred to as *information*.

- *Data* are the raw facts may not make much meaning to the user.
- *Programs* are set of instructions that instruct a computer what to do.
- *Information* is result after data has been processed.

1.2 Computer Parts

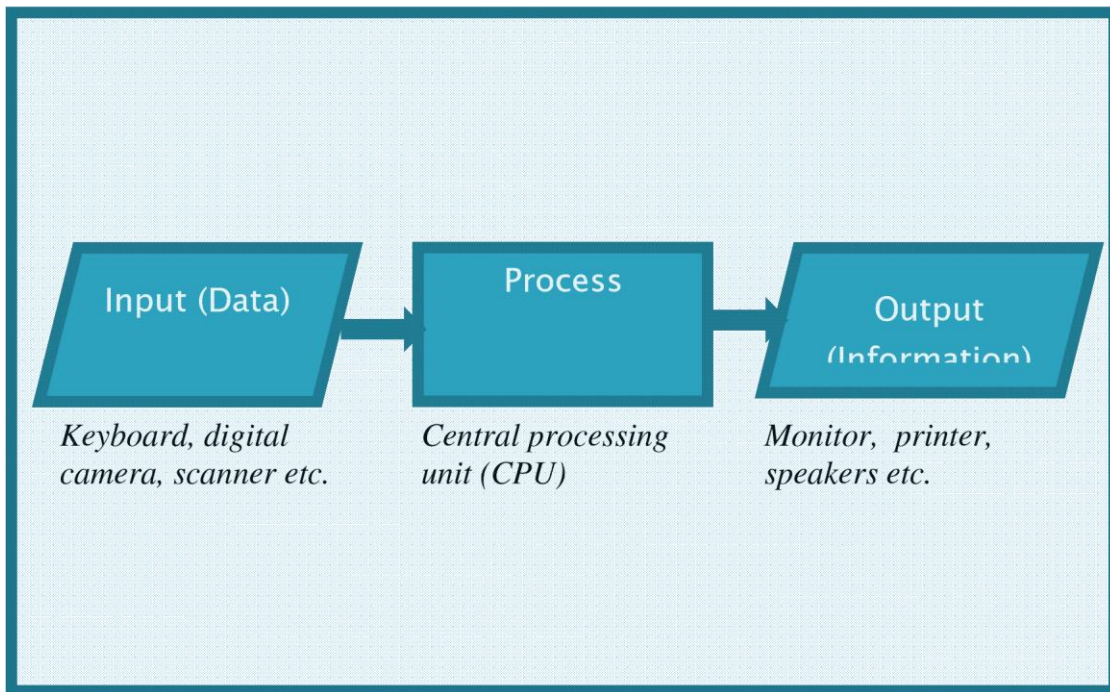
There are 4 basic types of computer parts:

- a) *Input devices* - parts of the computer that allow information or data to be given to the computer like keyboard or a mouse.
- b) *Storage devices* – parts of the computer that hold information. The primary storage device is the computer's memory called RAM (random access memory). It remembers everything that is read, input, or output. But, because

the computer's memory is on a temporary area—it forgets everything when turned off—it must have another place to store information permanently. This secondary storage device is usually a disk.

- c) Processing device – part of the computer that processes and controls the flow of information; it actually does the work. The one part of the computer that handles this job is the central processing unit or CPU.
- d) Output devices - parts of the computer that gives out information generated by the computer, like a monitor, printer or speaker.


Input – Process - Output



1.3 Computers and their Functions

Computer - An electronic device that receives data and computes high-speed mathematical or logical operations or that assembles, stores, correlates, or otherwise processes and presents information.

A computer has four functions:

<i>The Information Processing Cycle</i>			
	accepts data	Input	
	processes data	Processing	
	Produces output	Output	
	Stores results	Storage	

What makes a computer powerful?

	Speed	A computer can do billions of actions per second.
	Reliability	Failures are usually due to human error, one way or another. (Blush for us all!)
	Storage	A computer can keep huge amounts of data.

Glossary of Basic Concepts

GUI – A Graphical User Interface – which uses visual displays to eliminate the need for typing commands.

Formatting – The process of preparing a disc so that it can store information. During formatting, sectors, tracks, a director and the FAT are created on the disc.

Sector – disc space normally 512 bytes long.

Track – A track is also a data storage ring on a computer floppy diskette or hard disk drive that is capable of containing information. a track goes all around the platter and is used to help locate and retrieve information from a disk or diskette.

Directory- an area on disc where information relating to a group of files is kept.

FAT – the File Allocation Table – an area on disc where information is kept on which part of the disc the file is to be found.

Directory tree – a pictorial representation of your disc's structure.

Boot – to start up the computer and load the DOS.

BIOS – The BASIC Input/Output System. It allows the core of the operating system to communicate with the hardware.

Bit – a binary digit, the smallest unit of information that can be stores either as 1 or 0.

Byte – a grouping of binary digits (0 or 1) which represent information.

CPU – the Central Processing Unit – the main chip that executes all commands.

Disc – a device which you can store programs and data

Cold boot – the process of starting your PC by switching it on.

Warm boot - the process of starting your PC by using the Ctrl+Alt+Del key combination.

File – the name given to an area on disc containing a program or data.

Filename – the name given to a file. It must not exceed 8-characters in length and can have up to 3-characters.

File extension – the optional three-letter suffix following the period in a filename.

Processor – The electronic device which performs calculations.

Prompt – A symbol that appears on a monitor to indicate that DOS is ready to receive input or commands, such as A> or C>.

Peripheral – A device attached to a PC.

Path – The drive and directories that DOS should look in for files. A path tells DOS how to locate a file within the directory structure. E.g.
C:\SPREADSH\SSFILES\SALARY.TMP

Port – an Input/Output address through which your PC interacts with external devices.

Program – a set of instructions which cause a computer to perform certain tasks.

Hardcopy – Output on paper

Hardware – the visible, tangible equipment that makes up a computer system.

Software – the non- visible, non-tangible programs and instructions that control your PC's functionality

Root directory – The main disc directory under which a number of sub-directories can be created.

ROM – Read Only Memory – the microcomputer's non-volatile memory. Data are written into this memory at manufacture and are not affected by power loss.

RAM – Random Access Memory – the microcomputer's volatile memory. Data held in it is lost when power is switched off.

Memory – Storage elements organized into addressable locations that can hold data and instructions in a PC.

Megabyte – MB – 1024 kilobytes of information or storage space.

Megahertz – MHz – Speed of processor in million of cycles/second.

Mouse – a devise used to manipulate a pointer around the display.

Monitor – the display devices connected to a PC. Also known as the Screen, VDU.

Microprocessor – A PC's calculating chip.

Multitasking – Running more than one computer application at the same time. An operating system that permits multitasking allows the user to be printing a document from one program while working in another, as well as downloading content from the Internet in the background.

Backbone - A cable to which multiple nodes or workstations are attached.

Bit - Binary digit in the binary numbering system. Its value can be 0 or 1. In an 8-bit character scheme, it takes 8 bits to make a byte (character) of data.

Client/Server - A networking system in which one or more file servers (Server) provide services; such as network management, application and centralized data storage for workstations (Clients).

Hub - A hardware device that contains multiple independent but connected modules of network and internetwork equipment. Hubs can be active (where they repeat signals sent through them) or passive (where they do not repeat but merely split signals sent through them).

Infrared - Electromagnetic waves whose frequency range is above that of microwaves, but below that of the visible spectrum.

Intranet - Network internal to an organization that uses Internet protocols.

Internet - A global network of networks used to exchange information using the TCP/IP protocol. It allows for electronic mail and the accessing and retrieval of information from remote sources.

LAN (Local Area Network) - A network connecting computers in a relatively small area *such as a building*.

MAN (Metropolitan Area Network) - A network connecting computers over a large geographical area, such as a city or school district.

Modem (Modulator/Demodulator) - Devices that convert digital and analog signals.

Modems allow computer data (digital) to be transmitted over voice-grade telephone lines (analog).

Multiplexer - A device that allows multiple logical signals to be transmitted simultaneously across a single physical channel.

Network Modem - A modem connected to a Local Area Network (LAN) that is accessible from any workstation on the network.

Network Interface Card (NIC) - A board that provides network communication capabilities to and from a computer.

Network Operating System (NOS) - Operating system designed to pass information and communicate between more than one computer. Examples include AppleShare, Novell NetWare, and Windows NT Server.

Node - End point of a network connection. Nodes include any device attached to a network such as file servers, printers, or workstations.

Node Devices - Any computer or peripheral that is connected to the network.

Peer-to-Peer Network - A network in which resources and files are shared without a centralized management source.

Physical Topology - The physical layout of the network; how the cables are arranged; and how the computers are connected.

Point-to-Point - A direct link between two objects in a network.

Ports - A connection point for a cable.

Protocol - A formal description of a set of rules and conventions that govern how devices on a network exchange information.

Repeater - A device used in a network to strengthen a signal as it is passed along the network cable.

Star Topology - LAN topology in which each node on a network is connected directly to a central network hub or concentrator.

Star-Wired Ring - Network topology that connects network devices (such as computers and printers) in a complete circle.

Topology - There are two types of topology: physical and logical. The physical topology of a network refers to the configuration of cables, computers, and other peripherals. Logical topology is the method used to pass the information between workstations. Issues involving logical topologies are discussed on the Protocol chapter

Tree Topology - LAN topology similar to linear bus topology, except that tree networks can contain branches with multiple nodes.

WAN (Wide Area Network) - A network connecting computers within very large areas, such as states, countries, and the world.

Workstation - A computer connected to a network at which users interact with software stored on the network.

Business Information Systems: Information systems within a business organization that support one of the traditional functions of business such as marketing, finance, or production. Business information systems can be either operations or management information systems.

Control: The systems component that evaluates feedback to determine whether the system is moving toward the achievement of its goal and then makes any necessary adjustments to the input and processing components of the system to ensure that proper output is produced.

Cross-Functional Information System: Information systems that cross the boundaries of functional business areas in order to support business processes across the organization.

Data: Facts or observations about physical phenomena or business transactions. More specifically, data are objective measurements of the *attributes* (characteristics) of *entities*, such as people, places, things, and events.

Data or Information Processing: The act of converting data into information.

Data Resources: Data, model, and knowledge bases

Decision Support Systems (DSS): An information system that utilizes decision models, a database, and a decision maker's own insights in an ad hoc, interactive analytical modeling process to reach a specific decision by a specific decision maker.

Enterprise Collaboration Systems: Enhance collaboration among networked teams and workgroups

Executive Information Systems (EIS): Information systems that provides strategic information tailored to needs of top management.

Expert System: A computer-based information system that uses its knowledge about a specific complex application area to act as an expert consultant to users. The system consists of a knowledge base and software modules that perform inferences on the knowledge, and communicates answers to a user's questions.

Feedback: Data or information concerning the components and operations of a systems performance.

Hardware Resources: Includes all physical devices and materials used in information processing (machines and media).

Information: Data that has been placed into a meaningful context for an end user.

Information System Activities: Input, processing, output, storage, and control

Information System Model: An information system uses people, hardware, software, network, and data resources to perform input, processing, output, storage, and control activities that transform data resources into information products.

Integrated Information Systems

Information systems that combine the capabilities of several types of information systems.

Knowledge Management System: Collect, organize, and disseminate business know-how within a company.

Management Information System: Information systems designed to provide information needed for effective decision-making by managers.

Management Support System: Include executive information systems, decision support systems, and management information systems.

Network Resources: Network resources include communications media and network support.

Operations Support Systems: Include office automation systems, transaction processing systems, and process control systems.

People Resources: IS Specialists and end users.

Process Control Systems: Computer-based systems that control an ongoing physical process such as petrochemical production.

Programs: A set of instructions that cause a computer to perform a particular task.

Procedures: Set of instructions used by people to complete a task.

Strategic Information Systems: Information systems that provide a firm with competitive products and services that give it a strategic advantage over its competitors in the marketplace.

Subsystem: A system that is a component of a larger system

System: A system is a *group of interrelated components* working together toward a common goal by accepting inputs and producing outputs in an organized transformation process.

Transaction Processing Systems (TPS): Information systems that process data arising from the occurrence of business transactions.

Types of Information Systems: Information systems can be classified into operations, management, and other categories

1.5 Application of Computer, Advantages and Disadvantages

Computers have become important tools in our day-to-day's operations. Some of the areas computers are used are in:

Engineering

In engineering computers are used for designing using computer aided design (CAD) software. Modelling and testing processes etc.

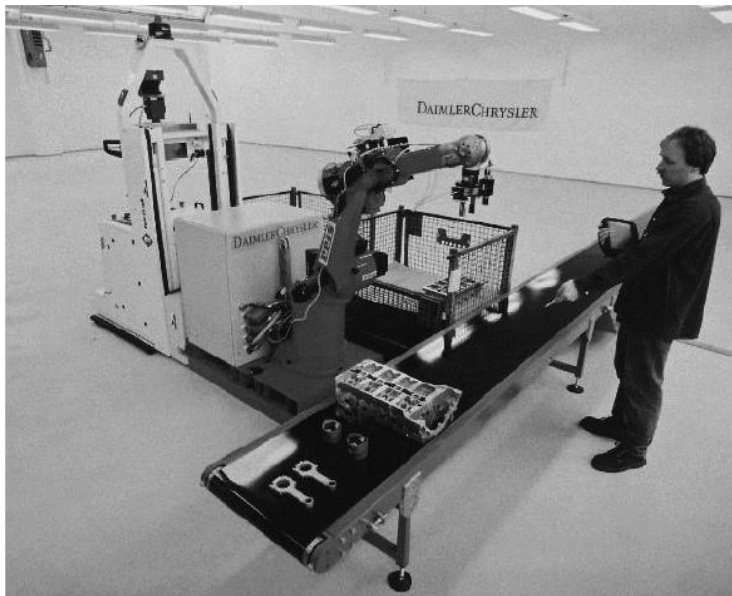
In Biosystems engineering, computers are being used for biometric analysis, genetic engineering and cloning etc.

Space exploration would hardly be impossible without the assistance of computers.

Manufacturing

Computers have made industrial processes more efficient through optimization scheduling, process control, and using robots to perform automated manufacturing process control which are otherwise dangerous to human beings.

Automobile assembly robot at work



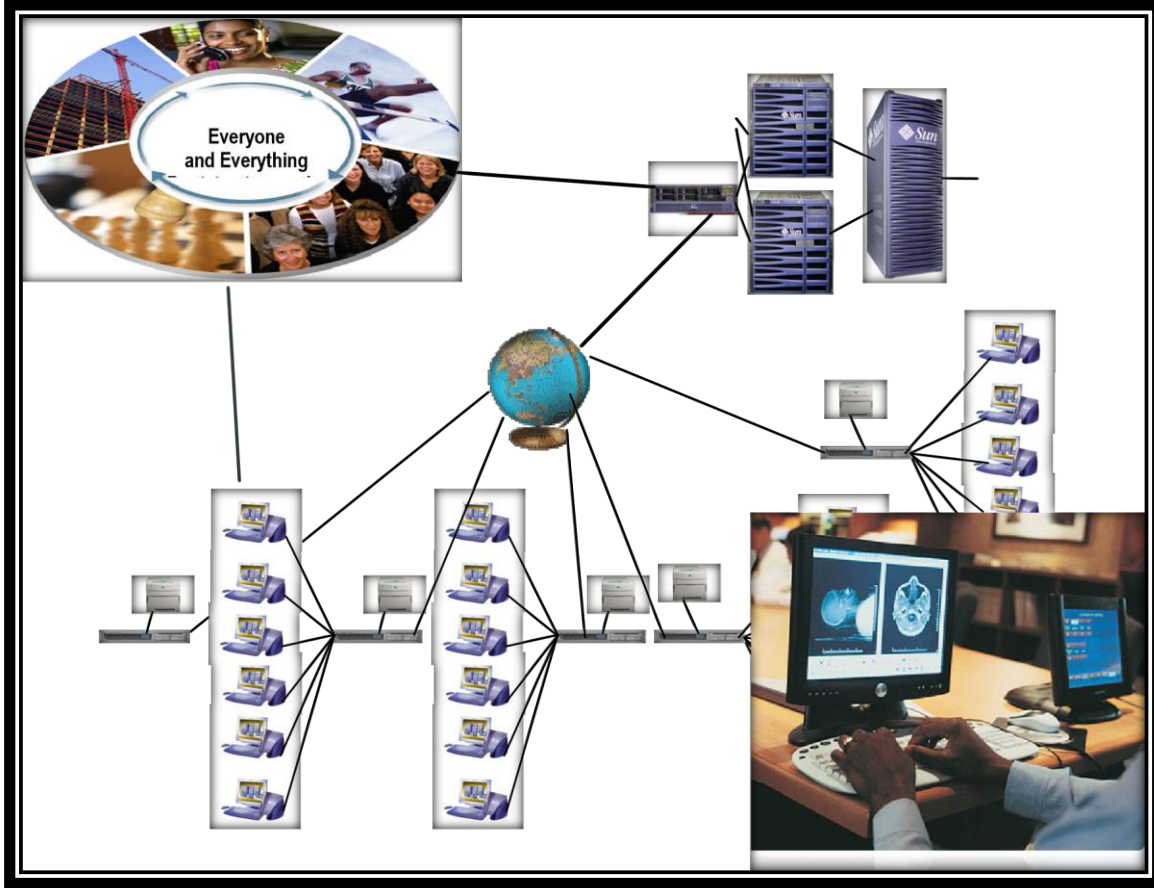
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A wire repair robot at work



Communication

The integration of computers and communication technologies is what is being referred to as ICT. This merger has resulted to more efficient communication using computers and other handheld devices such as mobile phones used to facilitate sending and receiving of messages over the internet. Computers also control many telecommunications equipment.



Education and research

Computers are used in educational institution as teaching aid, online teaching especially in open and distance learning and to enhance management.

Internet contains a lot of information for researchers, scholars and teachers/lecturers.

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Computers in education



16 Fundamentals of Computing

Other application areas

Law enforcement to carry out biometric mapping activities like fingerprint matching and store forensic information.

Banking to keep client accounts details and issue cash transaction services at the automated teller machines (ATM).

System Software

Does fundamental tasks such as computer boot up and system control. System software are further classified into:

1. Operating system

2. Utility software
3. Network software
4. Firmware

Operating System

An operating system is a program that manages the computer hardware resources and controls the execution of application programs. Examples are:

1. Microsoft Windows 98/2000/Me/2003/Vista
2. UNIX
3. Linux
4. MacOS

Utility Software

Utility software also called service programs are special programs used to enhance perform both at system and user levels.

System level utilities optimizes system performance while application level utilities help in smooth running of application programs. Examples are

1. Norton utility
2. McAfee suites

Network Software

Networking software enables computers and other peripheral devices connected on a network to communicate and share resources. Examples are:

1. Novell Netware
2. UNIX

3. Windows NT based operating systems

Firmware

Firmware, also referred to as stored logic is an integration of both hardware and software on a single silicon chip. These are mostly packaged as *ROM chips*.

Advantages and disadvantages of computer

In this lecture, you will be introduced to the advantages and disadvantages of computers.

Advantages of computers

Large storage of data in small amount of space.

Quick and accurate calculations than humans.

Continuously work with repetitive work(contusive environment)

Simulation of dangerous situations.

Disadvantages

Expensive to introduce.

Health hazards.

Downtime-.

Redundancy in the work place.

It can lead to misuse of information.

1.5 DOS, Windows, File and Extension Programs

Below is a comparison of DOS and Windows

Comparison of DOS and Windows

DOS	WINDOWS
Command line interface	GUI
Terminate and stay resident (TSR) memory – one at a time	The memory is dynamic – can load many programs at the same time
Does not allow multi-tasking – run only one program job at a time	Allows multi-tasking – run many programs/jobs simultaneously
Filename is limited to only 8.3 characters	Filename has upto 128 characters - 128.3, 4 characters
No spaces in filename	Allows spaces in filename
Commands keyed-in through the keyboard	Commands keyed-in through the mouse
Not user friendly	User friendly

File extensions and programs

FILE EXTENSION	PROGRAM
.XLS	Excel
.DOC	Winword, MS-Word
.RTF	Winword, MS-Word
.BAT	Batchfile
.DAT	Data files
.INI	Initialization files, text files
.COM	Command interpreter
.TMP	Temporary files
.HTML	Internet explorer

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