Module 1

CONCEPTS RELATED TO INFORMATION AND COMMUNICATION TECHNOLOGIES

1.1 Hardware Concepts

➢Computer elements are categorized as software and hardware.

➢Physical parts of the computer are called as **Hardware**.

➢Motherboard, RAM, display card, hard disk, keyboard, mouse, printer, scanner are examples of hardware

Computer Types

➢According to size and capacity: macro computers, mini computers, micro computers

➢According to functions: servers, desktop computers, workstations

➢New categories: mobile computers, notebook, laptops

Servers

➢Companies and organizations need servers for management of database applications, e-mail services, web services, file and printer operations.

➢Servers work permanently, safe and secure

Desktop Computers

➢Used for daily operations of employees in organizations

➢Used for texting, calculation, presentation, Internet access and games in homes

Workstations

➤Used as servers within the network

➤Used for single operations (e.g. Graphic applications)

Network Computer

➢Cheap personal computers used in networks

➢Consists of main hardware

➢Managed centrally

➢Called as thin client

➢Recent name is network information processor

Laptops

➢Called as laptop, notebook or portable computers

➢Support users that are required to travel frequently and carry computers

➢Generally having weight from 1 to 4 kg

➢Operate from 3 to 7 hours with the batteries

Tablet PC

➢A tablet PC is a portable PC that is a hybrid between a personal digital assistant (PDA) and notebook PC. Equipped with a touch screen interface, a tablet PC usually has a software application used to run a virtual keyboard. However, many tablet PCs support external keyboards.

➢Tablet PCs have built-in Web browsing capabilities, multiple connectivity options, capacitive touch screens and multimedia - including high definition (HD) support.

Personal Digital Assistants

Personal digital assistant is a term for a small, mobile, handheld device that provides computing and information storage and retrieval capabilities for personal or business use, often for keeping schedules, calendars and address book information handy.

Mobile Phones

➤A mobile phone is a wireless handheld device that allows users to make calls and send text messages, among other features.

➤The earliest generation of mobile phones could only make and receive calls.

➤Today's mobile phones, however, are packed with many additional features, such as Web browsers, games, cameras, video players and even navigational systems.

Portable Media Center

Portable media center is a term for a handheld multimedia device that can play digital music, image, and movie files that have been downloaded from the Internet or stored on a personal computer.

Main Components of Personal Computers

Central Processing Unit (CPU)

➤The central processing unit (CPU) is the unit, which performs most of the processing inside a computer. To control instructions and data flow to and from other parts of the computer, the CPU relies heavily on a chip set, which is a group of microchips located on the motherboard.

➤ The CPU has two typical components:

➤**Control Unit:** extracts instructions from memory and decodes and executes them.

➤**Arithmetic Logic Unit (ALU):** handles arithmetic and logical operations.
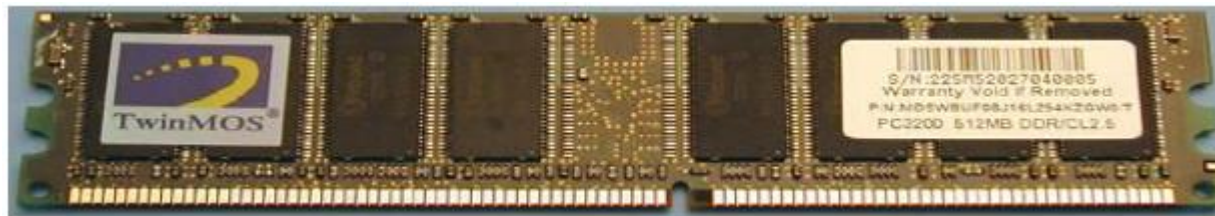
Motherboard

A motherboard is a computer's main circuit board, and it includes the following attached to a fixed planar surface:

◦ Input/output ports

◦ Peripheral connections

◦ PCI expansion slots

◦ Bus and power connectors

◦ Heat sinks and mounting points for fans and major components, including the central processing unit (CPU) and optional coprocessors

◦ Supporting chipset for CPU, bus and external components

◦ BIOS

◦ Memory sockets for RAM, ROM and cache

◦ Interconnecting circuitry

Random Access Memory (RAM)

➢Random access memory (RAM) is a type of data storage used in computers that is generally located on the motherboard.

➢This type of memory is volatile and all information that was stored in RAM is lost when the computer is turned off.

➢Volatile memory is temporary memory while ROM (read-only memory) is non-volatile and holds data permanently when the power is turned off.

Graphics Card

➢A graphics card is a type of display adapter or video card installed within most computing devices to display graphical data with high clarity, color, definition and overall appearance.

➢A graphics card provides high-quality visual display by processing and executing graphical data using advanced graphical techniques, features and functions.

Hard Disk

➢A hard disk is part of a unit, often called a "disk drive," "hard drive," or "hard disk drive," that stores and provides relatively quick access to large amounts of data on an electromagnetically charged surface or set of surfaces.

➢Today's computers typically come with a hard disk that contains several billion bytes (gigabytes) of storage.

CD-ROM Driver

➢Also called a CD-ROM player, it is a device that can read information from a CD-ROM.

➢Short for Compact Disc-Read Only Memory, a CD-ROM (shown right) is an optical disc which contains audio or software data whose memory is read only. A CD-ROM Drive or optical drive is the device used to read them.

Sound Card

➢Alternatively referred to as an audio output device, sound board, or audio card.

➢A sound card is an expansion card or IC for producing sound on a computer that can be heard through speakers or headphones.

Computer Case

➤ The computer case serves mainly as a way to physically mount and contain all of the actual components inside of a computer.

➤ Cases typically come bundled with a power supply.

Keyboard

A computer keyboard is defined as the set of typewriter-like keys that enables you to enter data into a computer or other devices. Computer keyboards are similar to electric-typewriters but contain additional typing keys.

Standard Classification

The standard selection of keys typically found on computer keyboards can be classified as follows:

Alphanumeric keys: The standard letters and numbers.

Punctuation keys: The comma, period, semicolon, and similiar keys.

Special keys: This includes the function keys, control keys, arrow keys, caps Lock key, and so on.

Mouse

A mouse is a small device that a computer user pushes across a desk surface in order to point to a place on a display screen and to select one or more actions to take from that position.

Monitor

➢The term "monitor" is often used synonymously with "computer screen" or "display."

➢The monitor displays the computer's user interface and open programs, allowing the user to interact with the computer, typically using the keyboard and mouse.

What Parts of a Computer Affect Its Speed?

CPU

➢You may have heard the term "clock speed." It refers to the speed of your computer's central processing unit or CPU. Often called the brain of the computer, the CPU processes the instructions that programmers write when they create applications.

➢Hardware makers measure a CPU's clock speed using a unit called gigahertz. A CPU running at 3GHz processes data faster than one running at 1GHz. The speed at which data flows from the CPU to applications also affects the computer's speed.

What Parts of a Computer Affect Its Speed?

Hard Drive

➢If your computer did not need to read stored data, it would not need a hard drive. Because it does, the computer must retrieve bits of information from a disk that spins at thousands of revolutions per second.

➢The hard drive's speed determines how long it takes an application to access the data it needs.

➢If you need a computer that retrieves data very fast, you can connect multiple hard drives into an array that acts as a unit. Hardware makers call this a redundant array of independent disks, or RAID.

What Parts of a Computer Affect Its Speed?

Memory

➢Your computer has two types of memory: random access memory and read only memory.

➢Computer users frequently upgrade RAM by purchasing small sticks of memory and inserting them into their computers.

➢Memory affects computer speed because the CPU must move information into memory and retrieve data from it when running applications. If you have a lot of memory, the CPU can move larger chunks of it faster.

➢Computers also use your hard drive as a virtual memory area when your RAM cannot hold any more data. When this happens, it takes a little longer for your computer to perform a task. Ensuring that your computer has sufficient RAM reduces its use of virtual memory.

Considerations

➤Other computer components also affect its speed.

➤If you run 3-D games or video editing programs, your graphic card's speed may become important.

➤Your CD or DVD drive also determines how long it takes your computer to retrieve data from those storage mediums.

➤You don't necessarily need to purchase a computer that has the fastest CPU, memory, hard drive and graphics card; your choice should take into account what you use your computer for. If you don't play computer games, you may not need the fastest graphics card. On the other hand, if your applications need to access stored data frequently, you may wish to purchase a faster hard drive.

Computer Storage Measures

➢Computer storage is measured in **bytes**, **kilobytes** (KB), **megabytes** (MB), **gigabytes** (GB) and increasingly **terabytes** (TB).

➢One byte is one character of information, and is comprised of eight bits (or eight digital 1's or 0's).

➢Technically a kilobyte is 1024 bytes, a megabyte 1024 kilobytes, a gigabyte 1024 megabytes, and a terabyte 1024 gigabytes.

Computer Storage Devices

Internal Hard Drive

➢An internal hard drive is the primary storage device located inside a computer system.

➢It usually contains pre-installed software applications, the operating system and other files.

➢Most desktop computers have several internal hard drives, allowing them to provide greater data storage.

➢On the other hand, laptop computers can only accommodate one internal hard drive, forcing the user to add an external storage device to store data that exceeds the laptop's internal capacity.
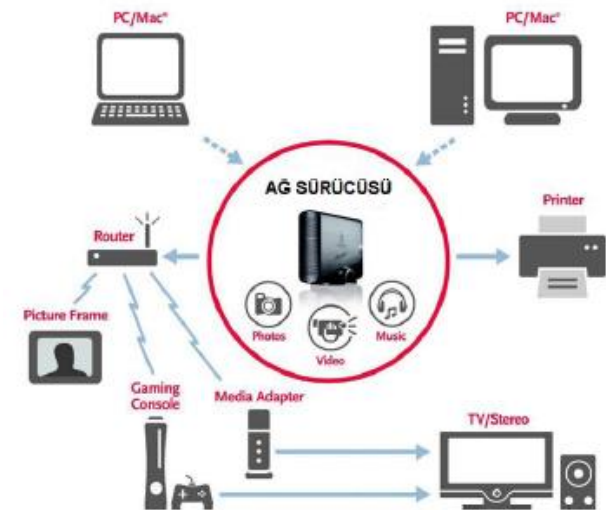
External Hard Drive

➤An external hard drive is a storage device located outside of a computer that is connected through a USB cable or wireless connection.

➤An external hard drive is usually used to store media that a user needs to be portable, for backups, and when the internal drive of the computer is already at its full memory capacity.

➤These devices have a high storage capacity compared to flash drives and are mostly used for backing up numerous computer files or serving as a network drive to store shared content.

Network Drive

➤ Network drive is type of computer drive that is installed and operated over a computer network - usually a local area network (LAN).

➤ It is shared across all /or selected users on the network and provides the same data storage and access services as a standard disk drive.

➤ Based on the permissions users can copy, edit, upload and delete data on the drive. Besides the server, a network drive can also be installed on a computer, external / portable drive, NAS or any network enabled storage drive.
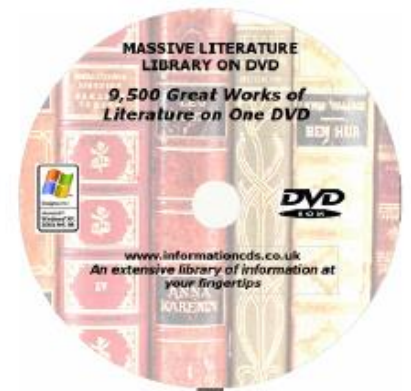
CD-ROM

➢Stands for "Compact Disc Read-Only Memory."

➢A CD-ROM is a CD that can be read by a computer with an optical drive.

➢The "ROM" part of the term means the data on the disc is "read-only," or cannot be altered or erased.

➢Because of this feature and their large capacity, CD-ROMs are a great media format for retail software.

➢The first CD-ROMs could hold about 600 MB of data, but now they can hold up to 700 MB.

DVD-ROM

➢Digital versatile disc-read only memory (DVD-ROM) is a read-only digital versatile disc (DVD) commonly used for storing large software applications.

➢It is similar to a compact disk-read only memory (CD-ROM) but has a larger capacity. A DVD-ROM stores around 4.38 GB of data. A CD-ROM usually stores 650 MB of data.

➢A DVD-ROM permanently stores data files which cannot be changed, written over or erased. A personal computer (PC) with a DVD-ROM or a DVD-RAM drive is designed to read a DVD-ROM disc. Generally a DVD-ROM disc is not equipped to be used with a DVD drive connected to a home theater system or television. But many DVD-ROM drives can generally read a DVD movie disc.

➢A DVD-ROM is one of the various types of DVDs. A blank DVD is generally a DVD-R or DVD+R, which has a read-write format. The +R or -R references the format standards and is a rewritable or recordable DVD.

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USB Flash Drive

➢A USB flash drive is a device used for data storage that includes a flash memory and an integrated Universal Serial Bus (USB) interface.

➢Most USB flash drives are removable and rewritable.

➢Physically, they are small, durable and reliable. The larger their storage space, the faster they tend to operate.

➢USB flash drives are mechanically very robust because there are no moving parts.

➢They derive the power to operate from the device to which they are connected (typically a computer) via the USB port

Memory Card

➤Alternatively referred to as a flash memory card, a Memory card is a type of storage media that is often used to store photos, videos, or other data in electronic devices.

➤Devices that commonly use a memory card include digital cameras, digital camcorders, handheld computers, MP3 players, PDAs, cell phones, game consoles, and printers.

Online Data Storage

➢Online data storage refers to the practice of storing electronic data with a third party service accessed via the Internet. It is an alternative to traditional local storage (such as disk or tape drives) and portable storage (such as optical media or flash drives). It can also be called "hosted storage," "Internet storage" or "cloud storage."

➢In recent years, the number of vendors offering online data storage for both consumers and businesses has increased dramatically. Some services store only a particular kind of data, such as photos, music or backup data, while others will allow users to store any type of file. Most of these vendors offer a small amount of storage for free with additional storage capacity available for a fee, usually paid on a monthly or annual basis.

Major Input Devices

Mouse: A mouse is a small device that a computer user pushes across a desk surface in order to point to a place on a display screen and to select one or more actions to take from that position.

Keyboard

➢A computer keyboard is defined as the set of typewriter-like keys that enables you to enter data into a computer or other devices. Computer keyboards are similar to electric-typewriters but contain additional typing keys.

➢**Standard Classification**

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Trackball

➢A trackball is a computer cursor control device used in many notebook and laptop computers. The trackball is usually located in front of the keyboard toward the user.

➢Essentially, the trackball is an upside-down mouse that rotates in place within a socket.

➢The user rolls the ball to direct the cursor to the desired place on the screen and can click one of two buttons (identical to mouse buttons) near the trackball to select desktop objects or position the cursor for text entry.

Trackpad

➤A trackpad is an input pointing device that has a specialized flat surface capable of detecting finger contact.

➤The surface is capable of translating the position and motion of the user's finger to a relative position on the screen of the device.

➤Featured in laptops, portable media players and other personal digital assistants, the trackpad is an excellent alternative to other pointing devices, such as the mouse, when desk space is limited.
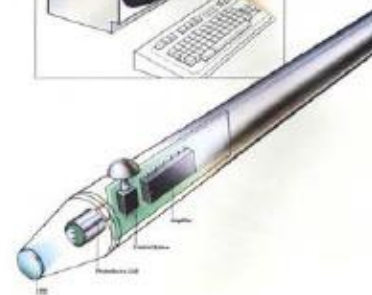
➤A trackpad is also known as a touch pad or glide pad.

Scanner

➢A scanner is an input device that scans documents such as photographs and pages of text.

➢When a document is scanned, it is converted into a digital format. This creates an electronic version of the document that can be viewed and edited on a computer.

Light pen

➢A light pen is a light-sensitive computer input device, basically a stylus, that is used to select text, draw pictures and interact with user interface elements on a computer screen or monitor.

➢The light pen works well with CRT monitors because of the way such monitors scan the screen, which is one pixel at a time, giving the computer a way to keep track of the expected scanning time by the electron beam and infer the pen's position based on the latest timestamp of the scanning.

Stylus

➤ In computing, a **stylus** is a pen-shaped instrument used with graphics tablets or devices that utilize touchscreen input. It is used to write or draw on a screen, similar to how you would on a sheet of paper.

➤ Originally, the stylus was not commonly found or used with devices other than graphics tablets and PDAs.

Joystick

➢A joystick is an input device that can be used for controlling the movement of the cursor or a pointer in a computer device.

➢The pointer/cursor movement is controlled by maneuvering a lever on the joystick.

➢The input device is mostly used for gaming applications and, sometimes, in graphics applications.

➢A joystick also can be helpful as an input device for people with movement disabilities.

Digital Camera and Web Camera

➢A **digital camera** records and stores photographic images in digital form. Many current models are also able to capture sound or video, in addition to still images. Capture is usually accomplished by use of a photosensor, using a charged coupled device (CCD).

➢A **webcam** – short for 'web camera' – is a digital camera that's connected to a computer. It can send live pictures from wherever it's sited to another location by means of the internet. Many desktop computer screens and laptops come with a built-in camera and microphone, but if yours doesn't, you can add a separate webcam at any time

Microphone

➤A microphone is a device that captures audio by converting sound waves into an electrical signal. This signal can be amplified as an analog signal or may be converted to a digital signal, which can be processed by a computer or other digital audio device.

➤Computer microphones are used for a variety of purposes, from recording audio, to conferencing and podcasting.

Major Output Devices

➢**Monitor:** The monitor displays the computer's user interface and open programs, allowing the user to interact with the computer, typically using the keyboard and mouse.

➢The screen size is measured from one corner to the opposite corner diagonally. Common screen sizes for desktop display screens are 12, 14, 17, 19, and 21 inches.

➢**Screen resolution is the number of pixels**

➢The image on your computer screen is built up from thousands or millions of pixels. The screen creates the image you see by changing the colours of these tiny square elements.

➢The screen resolution tells you how many pixels your screen can display horizontally and vertically. It's written in the form *1024 x 768*. In this example, the screen can show 1,024 pixels horizontally, and 768 vertically:

Printer

➤A printer is an output device that prints paper documents. This includes text documents, images, or a combination of both.

➤The two most common types of printers are inkjet and laser printers. Inkjet printers are commonly used by consumers, while laser printers are a typical choice for businesses. Dot matrix printers, which have become increasingly rare, are still used for basic text printing.

➤The printed output produced by a printer is often called a hard copy, which is the physical version of an electronic document. While some printers can only print black and white hard copies, most printers today can produce color prints.

Headphones and Speakers

➢**Headphones** are a hardware output device that either plug into your computer line out or your speakers to privately listen to audio without disturbing others.

➢**Speakers** are one of the most common output devices used with computer systems. Some speakers are designed to work specifically with computers, while others can be hooked up to any type of sound system. Regardless of their design, the purpose of speakers is to produce audio output that can be heard by the listener.

Devices Both Support Input and Output Functions

➢Modems are used for data transfer from one computer network to another computer network through telephone lines. The computer network works in digital mode, while analog technology is used for carrying massages across phone lines.

➢**Modulator** converts information from **digital mode to analog mode** at the transmitting end and demodulator converts the same from **analog to digital at receiving end**. The process of converting analog signals of one computer network into digital signals of another computer network so they can be processed by a receiving computer is **referred to as digitizing.**

Touchscreen

A touchscreen is a display that also serves as an input device.

Some touchscreens require a proprietary pen for input, though most modern touchscreens detect human touch.

Since touchscreen devices accept input directly through the screen, they do not require external input devices, such as mice and keyboards. This makes touchscreens ideal for computer kiosks, as well as portable devices, such as tablets and smartphones.