University of Duhok

Computer Skills

Department of Mathematic

First Year

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IT Lecture 2 - Hardware

Computer Essentials

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- **System unit (computer case)** – this contains all the basic computer components that do all the hard work.
- **Monitor** – to display results of processing.
- **Keyboard** – to enable text and commands to be input into the computer.
- **Mouse** – to enable the user to point and click at pictures and menus.

The System Unit

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The System Unit - cont.

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- Can be contained in a tower case or desktop case
- Consists of a motherboard which contains complex electronic circuits and silicon chips
- All the computer components plug into the motherboard either directly into slots or by cables

Central Processing Unit (CPU)

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- It is normally an Intel Pentium (or equivalent)
- It is one of the most important components within computer.
- It is also called the main 'brain' of the computer which is a small silicon chip.
- It determines how fast your computer will run and is measured by its gigahertz (GHz) or megahertz (MHz) speed
- For example, a 2.4 GHz Pentium is much than a 400 MHz Pentium CPU

Central Processing Unit (CPU)

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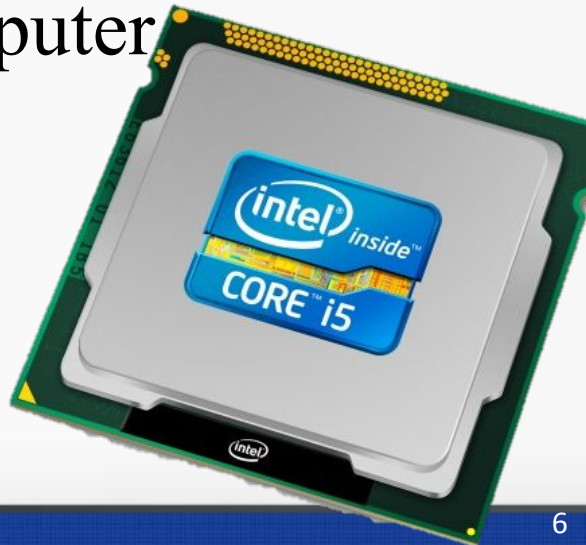
- CPU concerned with two main parts:
  - **The control unit** – responsible for logic control, fetches instructions from the computer's memory, decodes them and synchronizes the computer's operations.
  - **The arithmetic/logic unit (ALU)** that performs all the calculations within the computer.



Computer Main Memory

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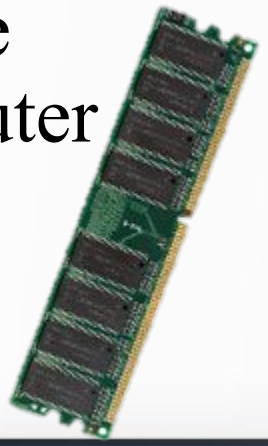
There are two kinds of memory:

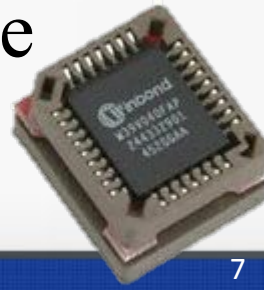
Random Access Memory (RAM)

- This is the computer's working memory
- The more RAM you have installed, the faster your computer will work



Read-Only Memory (ROM)

- Used to start computer and load Windows
- ROM can be accessed only by the CPU (central processing unit) and cannot be changed



What is RAM?

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- Used to store data on a temporary basis (e.g. software, text document etc.)
- CPU transfers data from the hard disk drive to RAM
- Data can then be processed
- Data stored in RAM is temporary
- When the computer is switched off, anything stored in RAM is lost
- This type of memory is called **volatile memory**

An Example of RAM

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- Switch on the computer
  - The processor transfers operating system software from the hard disk drive to RAM
  - The Windows desktop appears
- Double-click the Word icon
  - The processor transfers the software from the hard disk drive to RAM
- Open a Word document
  - The processor transfers the file data into RAM so you can see it and make changes to it
- If you don't SAVE the document, the changes will be lost when you switch off the computer!

What is ROM?

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- Is a special type of memory chip that holds software that can be read but not written to
- Used to store important data that the CPU needs to keep the PC running
- Often network cards and video cards also contain ROM chips
- Data stored in ROM
  - can only be accessed by the CPU and cannot be changed
  - permanent and is retained after the computer is switched off
  - can be used repeatedly
- This type of memory is called **non-volatile**

An Example of ROM - POST

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- **POST(Power On Self Test)**
- The first instruction executed during start up.
- It checks the computer components and that everything Works, which occurs as soon as you turn power on.
- If POST detects errors in the system, it will write error messages on the screen.
- If the monitor is not ready, or if the error is in the video card, it will also sound a pattern of beeps (for example 3 short and one long) to identify the error to the user
- If there is no error , then data is transferred to RAM to start up your operating software

An Example of ROM - CMOS

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- **CMOS (Complimentary Metal Oxide Semiconductor)**
- Is a computer chip on the motherboard, it is a RAM chip.
- This memory chip stores information about the computer components, as well as settings for those components.
- To retain the information in the CMOS chip, a CMOS battery on the motherboard supplies constant power to that CMOS chip.(add extra RAM, date and time)
- If the battery is removed from the mother board or runs out of juice (e.g. a dead CMOS battery), the CMOS would lose the information stored in it.

An Example of ROM - BIOS

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- **BIOS (Basic Input / Output System)**
- Is a computer chip on the motherboard.
- This chip contains a special program that helps the computer processor interact and control the other components in the computer
- Such as ordering of OS reading in (HDD, flash, internet).

An Example of ROM - BIOS

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- Without the BIOS, the processor would not know how to interact or interface with the computer components, and the computer would not be able to function.
- **Setup the BIOS program:**
  - You communicate with the BIOS programs and the CMOS memory through the so called setup program .
  - Typically, you reach the setup program by pressing [Delete] or [F2] immediately after you power up the computer.
- **Boot instructions** which calls the operating system, for example, windows, All these instructions are in ROM chips and they are activated one by one during start-up

Standard PC Memory

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- The amount of memory a computer needs has increased as computers have improved – look at the following minimum RAM requirements:
  - Windows 95 required 8 MB
  - Windows 98 required 16 MB
  - Windows XP requires 128 MB
  - Windows Vista (home basic) requires 512 MB
  - Windows 7 requires 1 GB
- If you want to run additional software, you will need to increase these capacities significantly!

Computer Performance

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- Two main factors will determine how quickly your computer works
  - The speed of the processor (measured in megahertz or gigahertz)
  - The amount of RAM installed (measured in megabytes or gigabytes)
- Each time you launch software, the program is transferred to RAM
- If you have several programs running at once, this may slow down your computer!

Video Card

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- Video Card is an internal circuit board
- It allows a display device such as a monitor to display images from the computer.
- The video cards, also called graphics accelerators,
- Can speed up both 2D and 3D graphics rendering.
- Programs such as photo editors and Web browsers may benefit from 2D acceleration.
- Video games will most likely benefit from the card's 3D acceleration

Sound Card or Audio Adaptor

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- is integrated circuit that provides a computer with the ability to produce and reproduce sounds.
- The sound card provides an input port for a microphone or other sound source and output ports to speakers and amplifiers.

Network card and Power supply

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- It allows the computer to communicate over a network and access the internet.
- It can either connect with an Ethernet cable or through a wireless connection (often called Wi-Fi)
- **Power supply** supplies power to an electrical device.
- It receives power from an electrical outlet and converts the current from AC (alternating current) to DC (direct current), which is what the computer requires .

How Memory stores data

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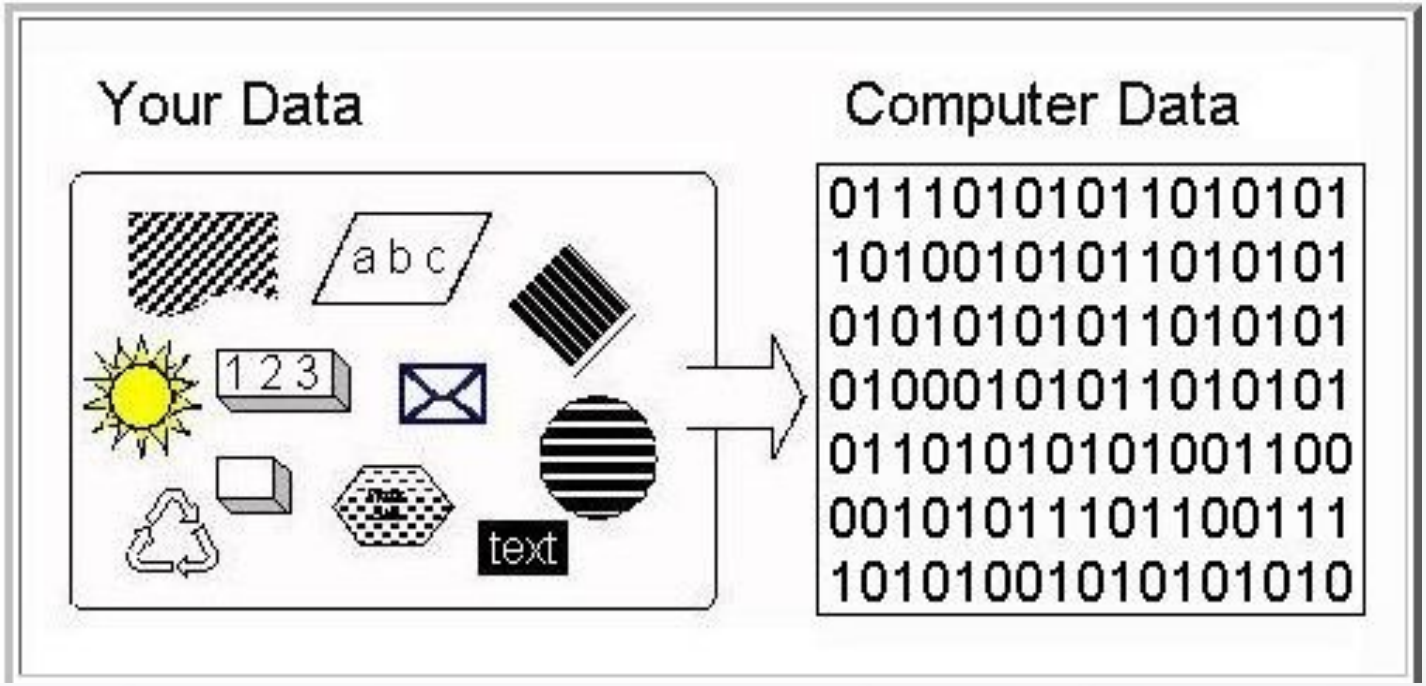
- Memory is used to store data or programs on temporary or permanent basis for use in a computer.
- It is stored data in bits (binary digit) which are the most basic form of memory.



How Memory is Measured

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- Computers work on a binary system, i.e. they process data in 1s or 0s. This 1 or 0 level of storage is called a **bit.**
- Memory is divided into millions of units called bytes
- 4 bits =1 nibble
- 8 bits= 1 Byte (Each byte contains 8 bits)
- 1 byte =1 Character
- 1024 bytes = 1 Kilobyte (KB)
- 1024 kB = 1 Megabyte (MB)
- 1024 MB = 1 Gigabyte (GB)
- 1024 GB = 1 Terabyte (TB)

Input Devices

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These are devices used to **put** data **in**to the computer

- Keyboard
- Mouse
- Tracker ball

- Microphone
- Light pen
- Scanner
- Joystick
- Digital camera

Output Devices – Monitors

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- Come in many screen sizes
- Picture is made up of millions of dots called pixels
- Picture quality depends on number of pixels going across and down the screen
- **Refresh rate** is the number of times the picture is drawn on screen
- Resolutions 800 × 600 is typical of a 15” ,1600 × 1200 is typical of larger screens
- Three different types

  - CRT (Cathode ray tube monitors)– similar to a TV screen
  - LCD (liquid-crystal display)monitors – much slimmer
  - LED (Light-emitting diode)- based video displa

Output Devices (2) – Printers

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Inkjet printers

- Mainly used by home users
- Monochrome and color printing
- Ink is forced through holes onto the paper
- Running cost quite high per page

Laser printers

- Standard in most offices
- Very high quality printing, very quickly
- Suitable for large volume printouts
- Running costs quite low due to high capacity cartridges

Output devices – printers / Speakers

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Dot matrix printers

- Steel pins hit an inked ribbon
- Very noisy and poorer print quality than inkjet or laser
- Used mainly by businesses for printing out multi-part invoices and wage slips etc.

Plotter

- Used mainly by architects for printing large drawings
- Several coloured pens are used to draw output on paper or opaque film

Input / Output Devices

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- **Speakers**
  - Connect to a sound card supplied with multimedia PCs
  - Quality of the sound produced can either be controlled on the speakers or from within software
- **Touch screen**
  - Allows the user to enter data by touching an area of the screen rather than typing at a keyboard
  - Used mainly in tourist offices, bus information kiosks and Job Centers
  - Increasingly used on mobile phones
- **Synthesizer**
  - Can be used as an input device to input music to a computer
  - Can be used as an output device, for example replicating human speech on telephone systems

Storage Devices

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- These are needed to store data on your computer
- Most popular devices are:
  - **Hard disk drive** – this stores all your programs and data
  - **CD-ROM drive –** software and games are normally supplied on CD-ROM disks. Data is read-only and cannot be changed
  - **floppy disk drive –** this stores smaller files
  - **CDR/CD-RW drive –** large amounts of data can be stored on a CDR or a CD-RW disk
  - **DVD drive –** these can be used to store movie data etc.

Storage Devices – Cont.

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- **Tape drive**
  - Uses data cartridges for backing up data
  - Very slow access compared with other options
- **Flash drives**
  - Plug into a USB port
  - Typical storage – up to several gigabytes

Removable Storage Comparison

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Device	Capacity
Floppy disk	1.44 MB
CD	700 MB
DVD	16 GB
Blue-ray	50 GB
Flash disk	64 GB
External Hard disk	2 TB

- **Any question**

THANK YOU