

Computer Science

Chapter Two



Chapter II

Hardware

Parts of hardware: -

1. **Central processing units (CPU):** it is also called microprocessor:
 - a. It's the brain of computer.
 - b. It interprets and executes the instruction contained in software program.
 - c. It determines how fast your computer will run.

Note: speed of CPU is determined by MHz

Parts of CPU: -

- a. Arithmetic & logic unit (ALU): Is a digital circuit that performs integer arithmetic and logical operations. The ALU is a fundamental building block of the central processing unit of a computer, and even the simplest microprocessors contain one for purposes such as maintaining timers. The processors found inside modern CPUs and graphics processing units (GPUs) accommodate very powerful and very complex ALUs; a single component may contain a number of ALUs.
- b. Register: A **register file** is an array of processor registers in a central processing unit (CPU). Modern integrated circuit-based register files are usually implemented by way of fast static RAMs with multiple ports. Such RAMs are distinguished by having dedicated read and write ports, whereas ordinary multiport SRAMs will usually read and write through the same ports.
- c. Control unit: ensure that the program instructions are followed in correct sequence. The control unit coordinates the components of a computer system. It fetches the code of all of the instructions in the program. It directs the operation of the other units by providing timing

and control signals. All computer resources are managed by the CU. It directs the flow of data between the Central Processing Unit (CPU) and the other devices. The control unit is the circuitry that controls the flow of data through the processor, and coordinates the activities of the other units within it. In a way, it is the "brain within the brain", as it controls what happens inside the processor, which in turn controls the rest of the computer. The examples of devices that require a control unit are CPUs and graphics processing units (GPUs). The control unit receives external instructions or commands which it converts into a sequence of control signals that the control unit applies to the data path to implement a sequence of register-transfer level operations.

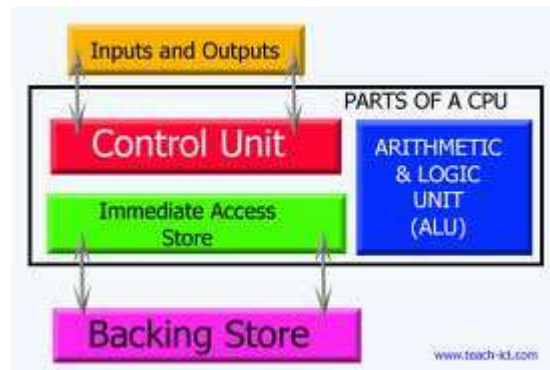


Fig: Parts of CPU

2. **Input devices:** allow you to input information to computer.

(Keyboard, mouse, scanners ... etc.)

Understanding some of the main devices for inputting data into a computer

Scanner: convert images or text into electronic information.

Voice input for PCs (microphones)

- Early voice recognition systems offered very poor results, due to the limitations of the software combined with hardware limitations. It takes an awful lot of CPU processing power to convert the spoken word into text which appears on the screen. Things are changing rapidly however and recent systems allow you to talk to a PC and see text appear on the screen. Most of these systems require an initial training period, where you train the software to respond to your particular voice. Whilst still not perfect this is a key technology of the future.

Web Cams

- Ever since it was invented, the Web has become increasingly interactive. You can now use a small digital movie camera (a Web cam) mounted on the PC monitor to allow two-way communication involving not just text communication but sound and video communication as well. While not yet considered a standard piece of PC kit, it is only a matter of time ...



Digital Cameras

- A digital camera can be used in the same way a traditional camera can, but instead of storing images on rolls of film which require developing, the images are stored digitally in memory housed within the camera. These pictures can easily be transferred to your computer and then manipulated within any graphics programs which you have installed on your computer. Currently they are limited by the quality of the image recorded and the number of pictures which you may store within the camera.

3. **Output devices:** allow you to output information from the computer.

Understanding common output devices

a. Visual display unit (VDU) or monitor:

The VDU (computer monitor or screen)

- The VDU (Visual Display Unit) is the computer screen used for outputting information in an understandable format for humans. Remember that at the end of the day the computer works in binary code (a series of on/off impulses). It is hard to realise that the original electronic computers did not have a screen.



We have two kind of monitor:

- i. Cathode ray tube (CRT).
- ii. A flat – panel display. Ex: LCD: liquid crystal display.

Flat screen monitors

- Traditional computer monitors are based on the same sort of technology which is used within a television screen.

More recently, flat screen computer monitors have become available. These take up a lot less room on a desk and use less energy than the traditional, more bulky monitors.



Screen size

- You should be aware that often if you specify a screen of a certain size, say a 17-inch screen, this is the size measured diagonally, not horizontally across the screen. If you are upgrading you should also ask for the "visible viewing area" of the screen.

Graphics for games

- Many games require very advanced graphics cards (boards) to be installed within your computer to make them run. These advanced graphics cards contain their own CPU which is dedicated purely to displaying the graphics on

Computer presentation projection devices

- These are projection devices which can be attached to your computer and are useful for displaying presentations to a group of people. They are best used in combination with presentation programs, such as Microsoft PowerPoint.

Characteristic of monitor: -

- i. Color: depending on the construction of monitor & graphic adapter.

Inkjet printers

- Inkjet printers work by using tiny jets to spray ink onto the paper. Inkjet printers are very quiet in operation and produce print quality comparable to that of laser printers, though laser printers still have the edge in terms of speed. Inkjet printers are ideal for low volume printing where high quality print is required and speed is not a high priority, e.g. printing letters in a small office or in the home.

Dot Matrix printers

- Dot matrix printers work by firing a row of pins through an ink ribbon onto the paper. The more pins the print head has the higher the quality of the print, most modern dot matrix printers have 24 pins. Unfortunately, dot matrix printers can generate a lot of noise and do not produce a very high quality of print, especially when printing graphics. As a result, the inkjet printer has now largely replaced the dot matrix printer. Dot matrix printers are used for high volume / low quality printing, e.g. printing company pay slips.



Note:

Printer Memory

- It is important to realise that most printers have their own memory chips, in the same way that each computer has its own memory. If you are printing very large graphics (i.e. pictures), and want the best quality output from your printer then you should consider adding more memory to your printer. This must only be done by a qualified person, and has the benefit of really speeding up the rate at which you can print pages in many cases.

Plotters

- A plotter is an output device similar to a printer, but normally allows you to print larger images. Their use is common in the design and research sector.

Speakers

- Most computers are sold with the capability to add a pair of speakers to your system unit. In fact, in some cases, the monitor may have speakers built directly into the unit. This enhances the value of educational and presentation products and can now be considered a standard PC component.

Note:

Input/Output devices

- Some devices are both input and output devices. A modem can be used for downloading information from web sites and receiving emails. It can also be used for uploading and sending emails. A touch screen can display a menu system (output device), and accept input when people touch the menus displayed on the screen.

Personal computer hardware are the component **devices** that are the building blocks of personal computers. These are typically installed into computer, or attached to it by a cable or through a port. In the latter case, they are also referred to as peripherals.

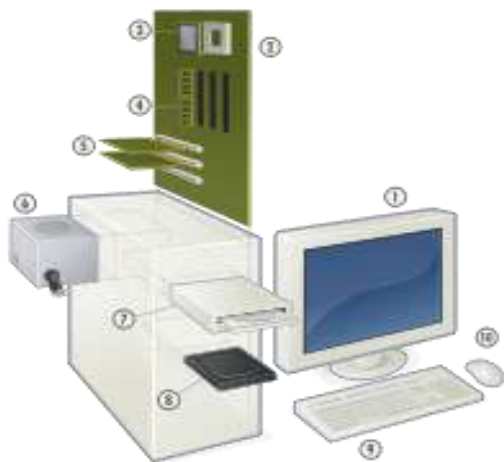


Fig show: Hardware of a modern personal computer

1. Monitor
2. .Motherboard
3. .CPU
4. . RAM
5. .Expansion cards
6. Power supply
7. Optical disc drive
8. Hard disk drive
9. . Keyboard
10. Mouse

H.W.

1. Explain the term CPU.
2. Distinguish between input & output devices,
Give two examples for each.
3. Compare between VGA & XVGA.