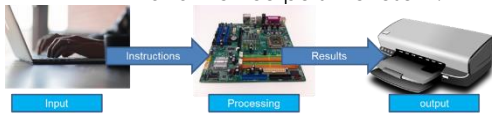


What is a Computer?

"A computer is generally considered to be a programmable machine, often electronic, which takes in data, processes it and then outputs the result".



There are actually a lot of devices that can be considered computers (or at least to contain a computer). A washing machine can be programmed, has buttons to input data, a CPU to process the instructions and motors/values which produce different outputs. By definition it is therefore a computer.



Input and Output Devices

All of the devices shown on the right are **input devices**. They all send data/instructions to the computer system. For example, the games controller will send directional data/instructions, the scanner will send image data and the microphone will send sound data to the system.



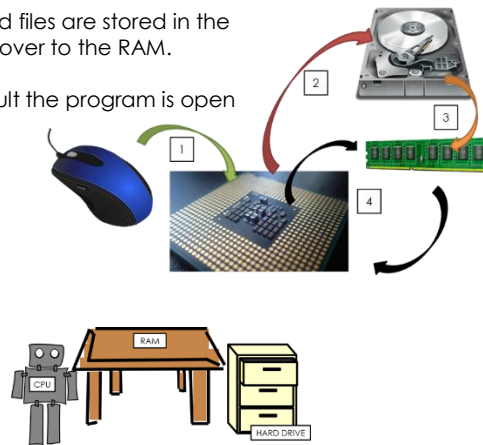
All of the devices shown on the left are **output devices**. They all output information (processed data) from the computer system to the user. For example, the monitor will display images and the speakers will output sound.

Key Vocabulary

Key Word	Definition
Input device	Piece of equipment that helps put data / commands into a computer.
Output device	Piece of equipment that helps get information out of a computer.
Process	Decisions and Calculations made by a computer
CPU	Central Processing Unit
RAM	Random Access Memory
Motherboard	Main circuit board – components are connected to this
Hard drive	The computer's file storage
I/O Devices	The input devices send data to the CPU, the output devices receive information from the CPU.

How does a computer actually work?

1. Firstly, when you double click a program's icon, the mouse (input device) sends an instruction (input) to the CPU requesting that the program is loaded.
2. The CPU will decode this instruction and then execute it. Now, because all programs and files are stored in the hard drive, it sends a signal to the hard drive requesting that the program files are copied over to the RAM.
3. The hard drive accepts this request and loads the program onto the RAM.
4. The CPU can now directly access and process the program files, at speed, and as a result the program is open and ready to use by the computer user.



The Office Worker Analogy (comparison)

- Imagine that the office worker is the CPU, their drawers are the hard drive and their desk is the RAM.
- The worker (CPU) has just been asked to do some work by their boss. So, they go to their drawers (the hard drive) to find the relevant documents that they need to work on.
- Now, because the drawer is low down with little space, it is not comfortable to work at those documents while they're in the drawer (hard drive). Work would be slow!
- The worker therefore decides to bring the documents onto the desk (RAM), which is at the right height for working, so that they (the CPU) can carry out their task efficiently, at speed.



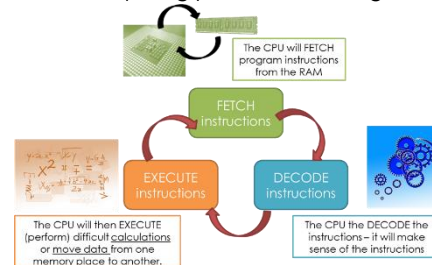
The CPU

- It is known as the brain of the computer.
- Its job is to process data, by carrying out calculations, performing logic and coordinating input and output signals.
- It is located on the motherboard and will often have a heat sink and fan positioned on top of it, to keep it cool, as it gets very hot, when in use!

Clock Speed

- The CPU's speed is determined by its clock speed
- This is the number of instructions the CPU can process in one second.
- It is measured in Hertz (cycles per second).
- CPUs currently run at about 3 Gigahertz, which means 3 billion Fetch-Decode-Execute cycles per second!

When the CPU processes instructions, it performs the **Fetch-Decode-Execute** cycle, which unsurprisingly consists of 3 stages.



What's inside a Computer?

Component	Image	Description
CPU (Heat Sink and Fan)		- Known as the Brain of the computer - Responsible for processing data & instructions - Gets hot very quickly and so often comes with a heat sink and fan to extract the excess heat.
RAM		- The computer's short-term memory. - Stores programs that are currently in use. - Fast data access speeds - Needs electricity in order to store data
Hard Drive		- The computer's long-term memory. - All programs and user files are stored there. - Does not require electricity to store data.
Motherboard		- Large circuit board which connects all of the other components together, allowing them to communicate with one another. - The CPU and RAM actually slot into this component.
Power Supply Unit (PSU)		- Provides the components of a computer with electricity. - Often has a fan to manage the heat that it generates.
Graphics Card		- Contains a GPU which provides extra processing power, specifically for rendering screen images at speed. - Similar to a CPU, it is often accompanied with a heat sink and fan to extract heat.
Sound Card		- Converts digital audio signals to analogue and vice-versa. - Allows the computer to interface with a variety of sound devices.
Network Interface Card		- Converts a computer's data signals into a form that can be transmitted across a network (and vice-versa).