

### **RAM: Random Access Memory**

*Volatile* primary storage for currently used programs, e.g. the operating system (OS). If the computer were to lose power, all the data and instructions in RAM would be lost.

### **ROM: Read Only Memory**

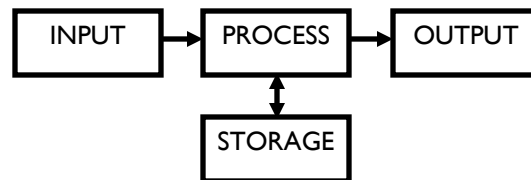
*Non-Volatile* primary storage for booting up the computer, and can include BIOS (Binary Input Output System). ROM is small FLASH memory and is usually set at the factory during manufacture. In the event of power loss, data will be retained.

### **CPU: Central Processing Unit**

The processor is a microchip which carries out all the calculations and processes in a computer system. The CPU Fetches data and instructions from RAM, Decodes and then Executes it. A CPU with a clock speed of 3.4 GHz can carry out 3.4 billion **FDE** cycles (calculations) per second. The more cores a CPU has, the more FDE cycles it can carry out at the same time.

### **Von Neumann Architecture**

A computer system uses input to process data before outputting it.



### **CPU Components**

The CPU is made up of several registers for storing binary values during the FDE cycle:

PC (Program Counter): stores the next instruction.

MAR (Memory Address Register): stores the memory address of the current instruction.

MDR (Memory Data Register): holds the data to be written or read from memory.

Accumulator: holds the running total of calculated values (in the ALU).

Other components of the CPU include:

ALU (Arithmetic and Logic Unit): carries out mathematical calculations and logic (AND, OR, NOT).

CU (Control Unit): maintains a regular clock speed and manages the flow of data around a CPU.

Cache: extremely fast access memory for regularly used instructions.

### **Embedded Systems**

An embedded system is a computer within another system (which is not a computer). E.g. a smart watch is a watch (not a computer) with a computer system embedded within it. Other examples include: a washing machine, MP3 player, digital cameras.

### **Secondary Storage**

*Non-volatile* storage required to store data when a computer system is turned off. When a computer is switched on, programs required are loaded from secondary storage into primary storage (RAM), e.g. the operating system (OS). There are currently three categories of secondary storage each with different comparable attributes:

#### Magnetic

Low cost, large capacity (usually TBs). Internal hard drives are durable but contain moving parts which can fail. Fast access, but not as fast as SSD. Non-portable.

#### Optical

Low cost, limited capacity (CD 750MB; DVD 4GB; Blu-ray 50GB). Can be slow to access. Non-durable and easily damaged. Portable.

#### Solid State (SSD)

Relatively expensive, and therefore smaller capacity (when compared to magnetic) (GBs/TBs). Fast access, and reliable. Durable, with no moving parts. Portable, e.g. USB thumb drives, SD cards.

### **Networks**

Two or more connected computers, either wired or wireless.

LAN (Local Area Network): a privately owned network over a small geographical area, e.g. school, business, library.

WAN (Wide Area Network): two or more LANs connected together over a large geographical area, e.g. the Internet, ATMs. The network is not owned by one company.

### **Client Server**

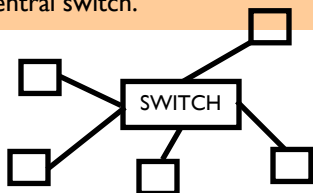
A network that includes a central server which manages user permissions, and provides storage, security and file access. Clients send requests to the server, and the server responds. This is very common in a small business, school, library. Client servers can be costly and require expertise to set up.

### **Peer to Peer (P2P)**

There is no server, and all devices (peers) have equal access with little or no security (which can be a disadvantage). Most homes use peer to peer networks because they are cheap and easy to set up.

### **Star Topology**

Computers, printers and servers all connected to a central switch.



### **Mesh Topology**

Computers connected to each other, and multiple routes to the server. Shared devices (e.g. printers) are connected to the server. This diagram is a partial mesh (as opposed to full mesh) where not all computers are connected to each other.

