

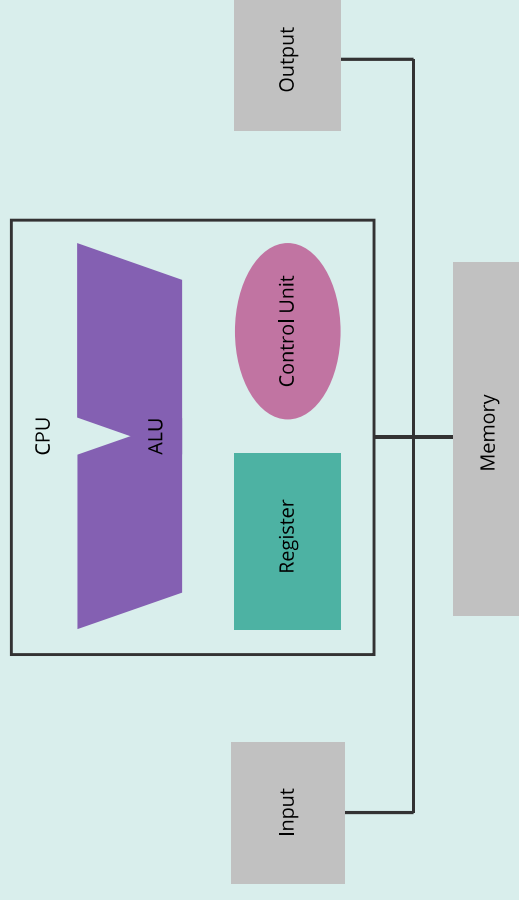
# Component 1: Hardware

## Key terminology

Term	Definition
Central processing unit (CPU)	The main component in a computer for processing data and instructions.
Control unit (CU)	Directs the flow of instructions and/or data and coordinates the other parts of the CPU. It generates clock ticks.
Arithmetic logic unit (ALU)	The ALU performs all the mathematical calculations / logical operations in the CPU.
Cache	Incredibly fast, but very expensive volatile memory used by the CPU.
Registers	Fast access storage locations found on the CPU where data or control information is temporarily stored.
Program counter (PC)	A counter that keeps track of the memory address of the instruction to be executed next.
Current instruction register (CIR)	A temporary holding area for the instruction that has just been fetched from memory.
Accumulator (ACC)	A register for temporary storage of arithmetic and logic data in the CPU.
Memory address register (MAR)	Stores the address in the main memory that is currently being read or written.
Memory data register (MDR)	Stores the data in the main memory that is currently being read or written.
Memory	Used for the temporary storage of currently running programs and data.
Clock speed	The number of FDE cycles that a CPU can carry out per second.
Cores	Some processors have multiple processors (cores) which can work in parallel, sequentially or can multitask.

## Central processing unit (CPU)

The typical Von Neumann architecture



## The Fetch-Decode-Execute (FDE) cycle

**Fetch** : The fetch cycle takes the address required from memory, stores it in the current instruction register and moves the program counter on one, so that it points at the next instruction.

**Execute** : Action(s) that occur during the execution cycle will depend on the instruction itself.

**Decode** : The control unit authenticates the instruction in the current instruction register. The instruction is decoded to determine the actions that needs to be carried out.

Performance is affected by greater

- cache size
- clock speed
- number of cores.

### Cache size

- Can store more data and instructions.
- It can provide instructions and data to the CPU at a much faster rate (than other system memory such as RAM).

### Clock speed

- The FDE cycle will run faster, resulting in more instructions being processed.

### Number of cores

- More instructions can be processed at the same time.

**NOTE:** Performance may be affected where one core is waiting on the result of another and therefore cannot carry out any more instructions.