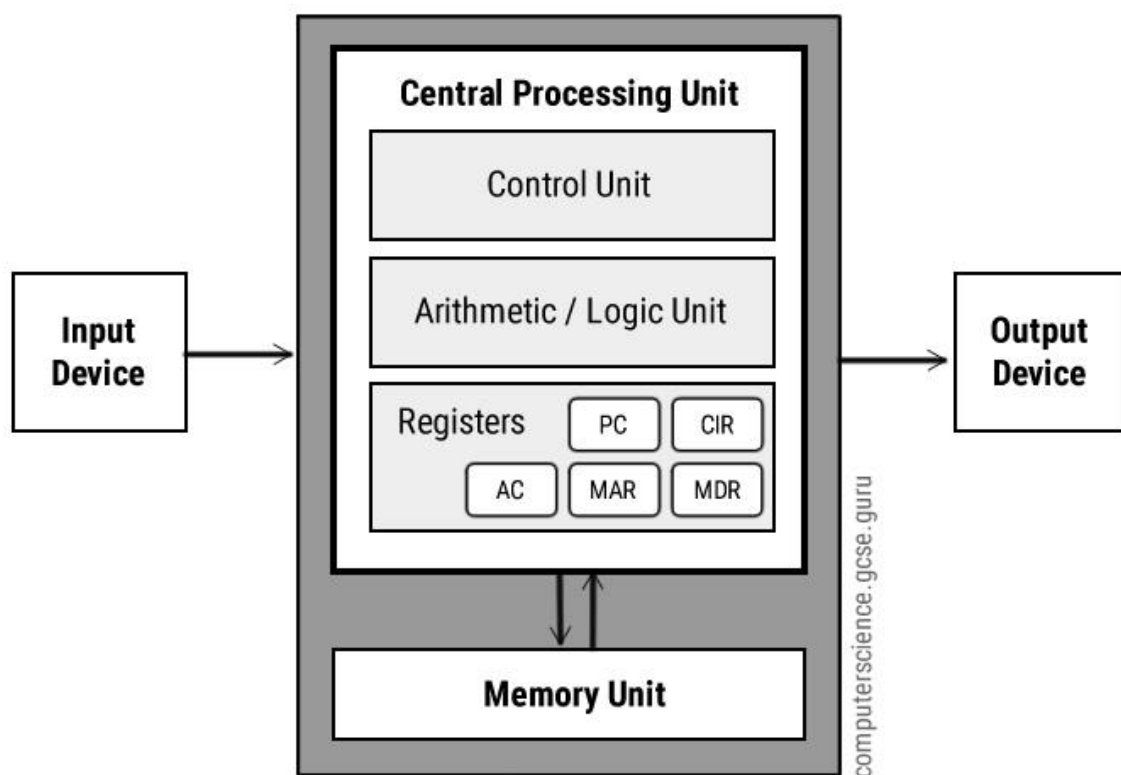


Von Neumann Architecture

Von Neumann architecture was first published by John von Neumann in 1945.

His computer architecture design consists of a Control Unit, [Arithmetic and Logic Unit \(ALU\)](#), Memory Unit, [Registers](#) and Inputs/Outputs.

Von Neumann architecture is based on the stored-program computer concept, where instruction data and program data are stored in the same memory. This design is still used in most computers produced today.



Central Processing Unit (CPU)

The [Central Processing Unit \(CPU\)](#) is the electronic circuit responsible for executing the instructions of a computer program.

It is sometimes referred to as the microprocessor or processor.

The CPU contains the ALU, CU and a variety of [registers](#).

Registers

Registers are high speed storage areas in the CPU. All data must be stored in a [register](#) before it can be processed.

MAR	Memory Address Register	Holds the memory location of data that needs to be accessed
MDR	Memory Data Register	Holds data that is being transferred to or from memory
AC	Accumulator	Where intermediate arithmetic and logic results are stored
PC	Program Counter	Contains the address of the next instruction to be executed
CIR	Current Instruction Register	Contains the current instruction during processing

Arithmetic and Logic Unit (ALU)

The ALU allows arithmetic (add, subtract etc) and logic (AND, OR, NOT etc) operations to be carried out.

Control Unit (CU)

The control unit controls the operation of the computer's ALU, memory and input/[output devices](#), telling them how to respond to the program instructions it has just read and interpreted from the memory unit.

The control unit also provides the timing and control signals required by other computer components.

Buses

[Buses](#) are the means by which data is transmitted from one part of a computer to another, connecting all major internal components to the CPU and memory.

A standard CPU system [bus](#) is comprised of a [control bus](#), [data bus](#) and [address bus](#).

Address Bus	Carries the addresses of data (but not the data) between the processor and memory
Data Bus	Carries data between the processor, the memory unit and the input/output devices
Control Bus	Carries control signals/commands from the CPU (and status signals from other devices) in order to control and coordinate all the activities within the computer

Memory Unit

The memory unit consists of [RAM](#), sometimes referred to as primary or main memory. Unlike a hard drive (secondary memory), this memory is fast and also directly accessible by the CPU.

RAM is split into partitions. Each partition consists of an address and its contents (both in [binary](#) form).

The address will uniquely identify every location in the memory.

Loading data from permanent memory (hard drive), into the faster and directly accessible temporary memory (RAM), allows the CPU to operate much quicker.