

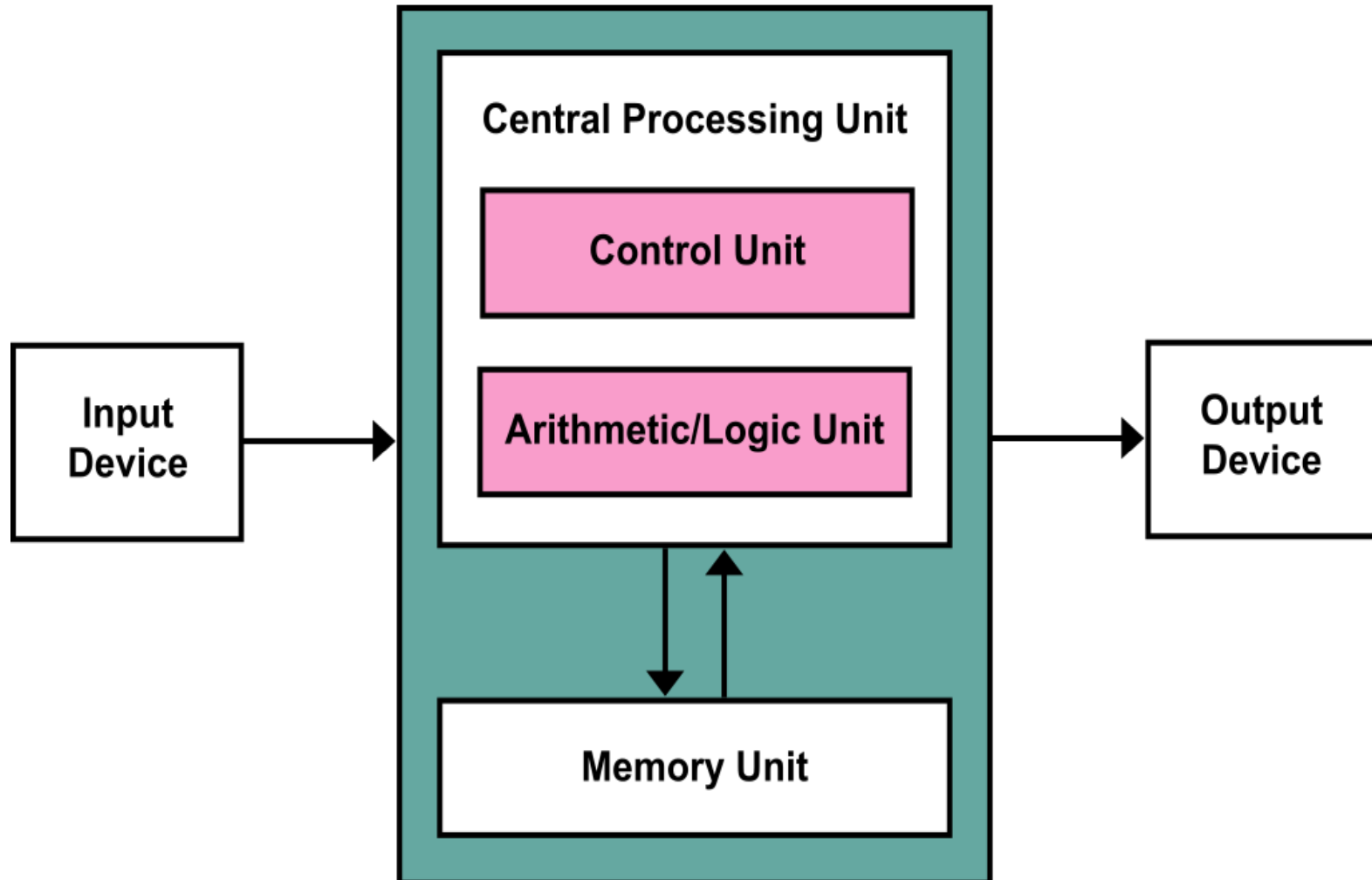
Introduction

- A major defining point in the history of computing notes the realisation in 1944 to 1945 that data and instructions to manipulate data were logically the same and could be stored in the same place.
- The computer design built upon this principle which became known as the Von Neumann architecture is still the basis for computer today

Von Neumann model

- The von Neumann architecture, which is also known as the von Neumann model and the Princeton architecture is a computer architecture based on that described in 1945 by the mathematician and physicist John Von Neumann





- This describes a design architecture for an electronic digital computer with parts consisting of
 - A processing unit that contains an arithmetic logic unit and processor registers
 - A control unit that contains an instruction register and program counter
 - Memory that stores data and instructions
 - External mass storage
 - Input and output mechanisms
- The term "von Neumann architecture" has evolved to mean any stored-program computer in which an instruction fetch and a data operation cannot occur at the same time because they share a common memory.

Central Processing Unit (CPU)

- Central Processing Unit (CPU) consists of the following features –
 - CPU is considered as the brain of the computer.
 - CPU performs all types of data processing operations.
 - It stores data, intermediate results, and instructions (program).
 - It controls the operation of all parts of the computer.
- CPU itself has following three components.
 - Memory or Storage Unit
 - Control Unit
 - ALU(Arithmetic Logic Unit)

- The control unit determines the order in which instruction should be executed and controls the retrieval of the proper operands.
- it interpret the instructions of the machine .
- the execution of each instruction is determined by a sequence of control signals produced by the control unit.
- ALUs performs all mathematical and Boolean operations .
- The registers are temporary storage locations to quickly store and transfer the data and instructions being used.
- A CPU that is implemented on a single chip is called a microprocessor.

Control Unit

- This unit controls the operations of all parts of the computer but does not carry out any actual data processing operations.
- Functions of this unit are –
 - It is responsible for controlling the transfer of data and instructions among other units of a computer.
 - It manages and coordinates all the units of the computer.
 - It obtains the instructions from the memory, interprets them, and directs the operation of the computer.
 - It communicates with Input/Output devices for transfer of data or results from storage.
 - It does not process or store data.

ALU (Arithmetic Logic Unit)

- This unit consists of two subsections namely,
 - Arithmetic Section
 - Logic Section
- Arithmetic Section
 - Function of arithmetic section is to perform arithmetic operations like addition, subtraction, multiplication, and division. All complex operations are done by making repetitive use of the above operations.
- Logic Section
 - Function of logic section is to perform logic operations such as comparing, selecting, matching, and merging of data.

Memory Unit

- The computer's memory is used to store program instructions and data .
- Two of the commonly used the type of memories are
 - RAM (Random Access Memory) and
 - ROM (Read Only Memory)
- RAM stores the data and general purpose programs that the machine executes.
- RAM is temporary that is, it contents can be changed at any time and it is erased when power to the computer is turned off.
- ROM is permanent and is used to store the initial boot up instructions of the machine