

# CSE3323: Computer Organization and Architecture

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INTRODUCTION

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# History

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# First computing system

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- The first computing system designed in the early 1940s was **ENIAC** (Electronic Numerical Integrator and Computer).
- It consisted of 18,000 buzzing electronic switches called vacuum tubes.
- ENIAC was a large, modular computer, composed of individual panels to perform different functions.
- It could add, subtract, and hold a ten-digit decimal number in memory.
- It could perform conditional jump and it was programmable
- Programming was done manually by plugging cables and setting switches.
- It was designed by Ursinus College physics professor John Mauchly and J. Presper Eckert of the University of Pennsylvania.



Image Source: wikipedia

# Basics

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# Basic units of a Computer system

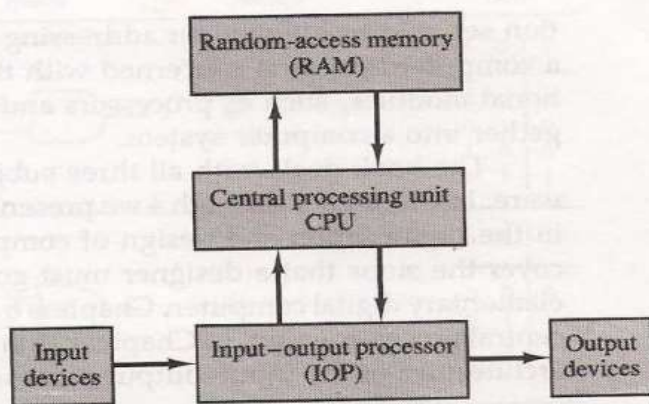


Figure 1-1 Block diagram of a digital computer.

- A computer system is composed of hardware and software.
- A computer consists of five main components namely, Input unit, Central Processing Unit, Memory unit Arithmetic & logical unit, Control unit and an Output unit.
- Computer has Four major functions:
  - Data storage
  - Data processing
  - Data flow
  - Control
- Memory unit stores data.
- Central Processing unit (CPU) controls the operation and performs data processing.
- Input output unit controls data flow through the system.
- BUS system controls the communication and interconnections between CPU memory and input output devices.

# Computer Architecture VS Computer Organization

Computer Architecture	Computer Organization
Computer Architecture is concerned with the way hardware components are connected together to form a computer system.	Computer Organization is concerned with the structure and behavior of a computer system as seen by the user.
It acts as the interface between hardware and software.	It deals with the components of a connection in a system.
Computer Architecture helps us to understand the functionalities of a system.	Computer Organization tells us how exactly all the units in the system are arranged and interconnected.
Architecture involves Logic (Instruction sets, Addressing modes, Data types, Cache optimization)	Organization involves Physical Components (Circuit design, Adders, Signals, Peripherals)
A programmer can view architecture in terms of instructions, addressing modes and registers.	Whereas Organization expresses the realization of architecture.
While designing a computer system architecture is considered first.	An organization is done on the basis of architecture.

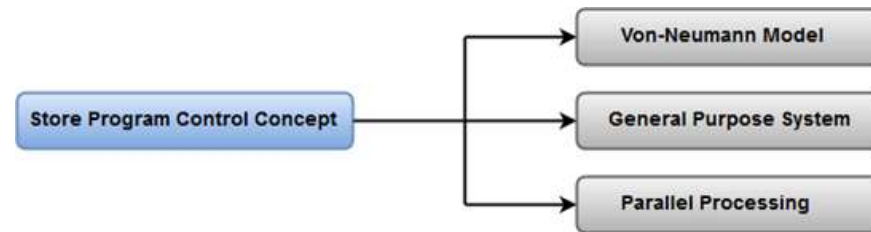
Source: <https://www.javatpoint.com/>

# General System Architecture

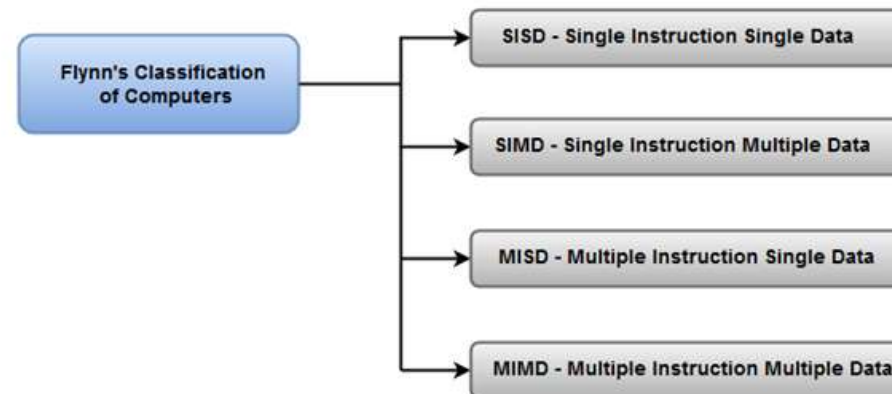
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In Computer Architecture, the General System Architecture is divided into two major classification units.

- Store Program Control Concept



- Flynn's Classification of Computers

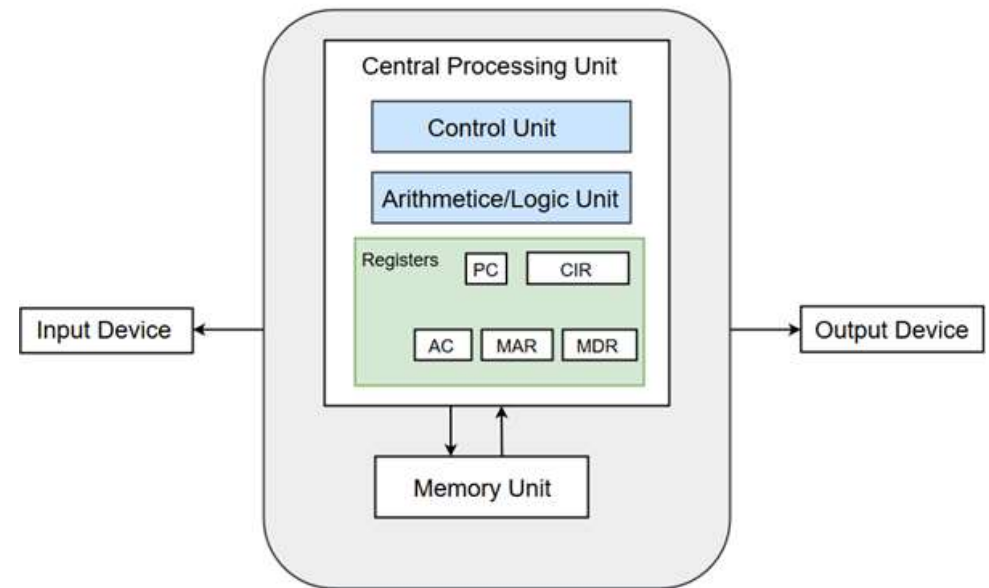


# Store Program Control Concept: Von-Neumann Model

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- The term Stored Program Control Concept refers to the storage of instructions in computer memory to enable it to perform a variety of tasks in sequence or intermittently.
- Here instruction data and program data are stored in the same memory.
- Components of Von-Neumann Model:
  - Central Processing Unit
  - Buses
  - Memory Unit

**Von-Neumann Basic Structure:**



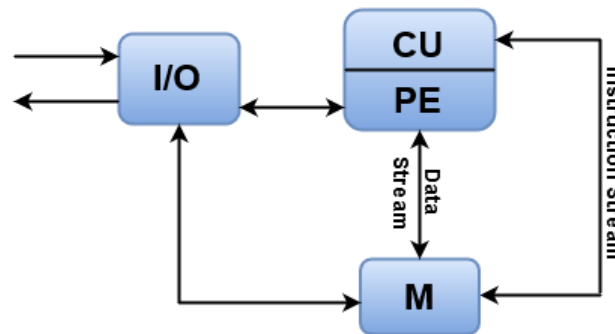


# Flynn's Classification of Computers: SSID

M.J. Flynn proposed a classification for the organization of a computer system by the number of instruction

- **SISD** stands for '**Single Instruction and Single Data Stream**'. It represents the organization of a single computer containing a control unit, a processor unit, and a memory unit.
- Instructions are executed sequentially, and the system may or may not have internal parallel processing capabilities.
- Most conventional computers have SISD architecture like the traditional Von-Neumann computers.

**SISD:**



# Hierarchy

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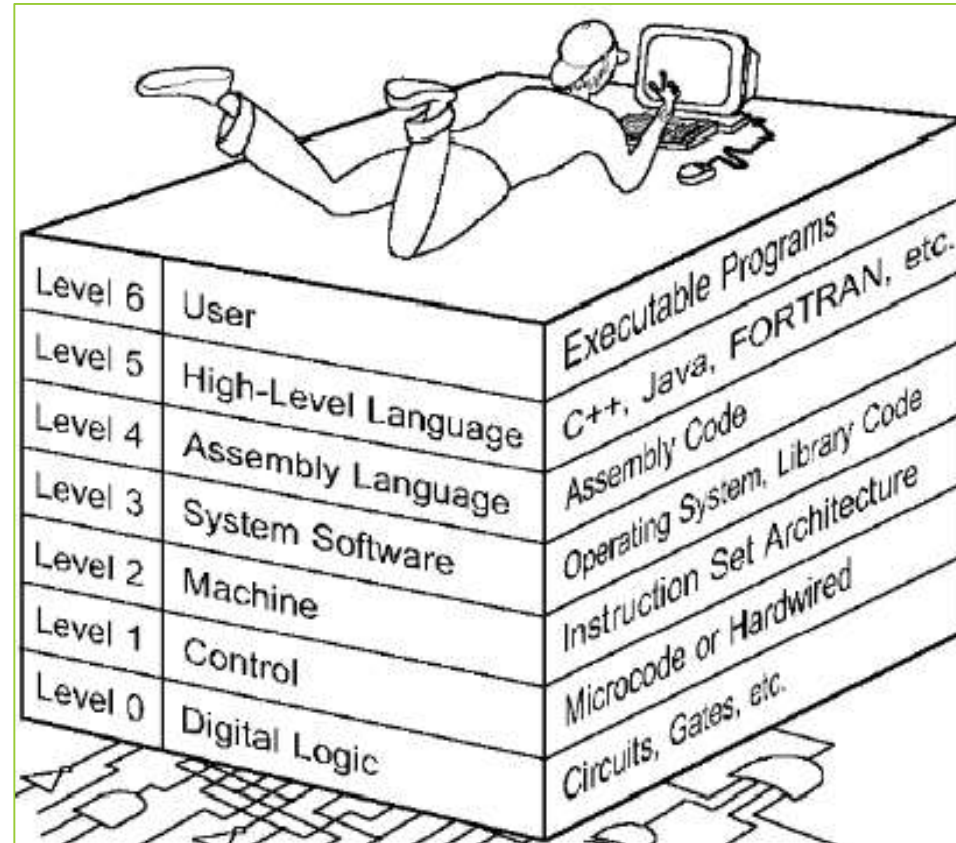


Image Source: Youtube

Thanks to:

- I. <https://en.wikipedia.org/wiki/ENIAC>
- II. <https://www.javatpoint.com/>