BCN1043

COMPUTER ARCHITECTURE & ORGANIZATION

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Faculty of Computer Systems & Software Engineering

Learning outcomes

- Understand the architecture and organization of a computer system and how the component interacts.
- Able to explain the computer component and their interaction

Chapter 1 - Introduction

- Computer and System
- Computer Architecture and Organization
- Components of a Computer System
- Interaction Between Computer Components
- Computer Language

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Computer ?

- is capable of admitting data, process it, produces result and store

- Can operate by using the sequence of instructions

Computer – Diagrammatic representation

Computer System?

usually includes a computer and peripherals such as input and output devices and secondary storage

Chapter 1

Introduction

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- **Computer Architecture and Organization**
- Components of a Computer System
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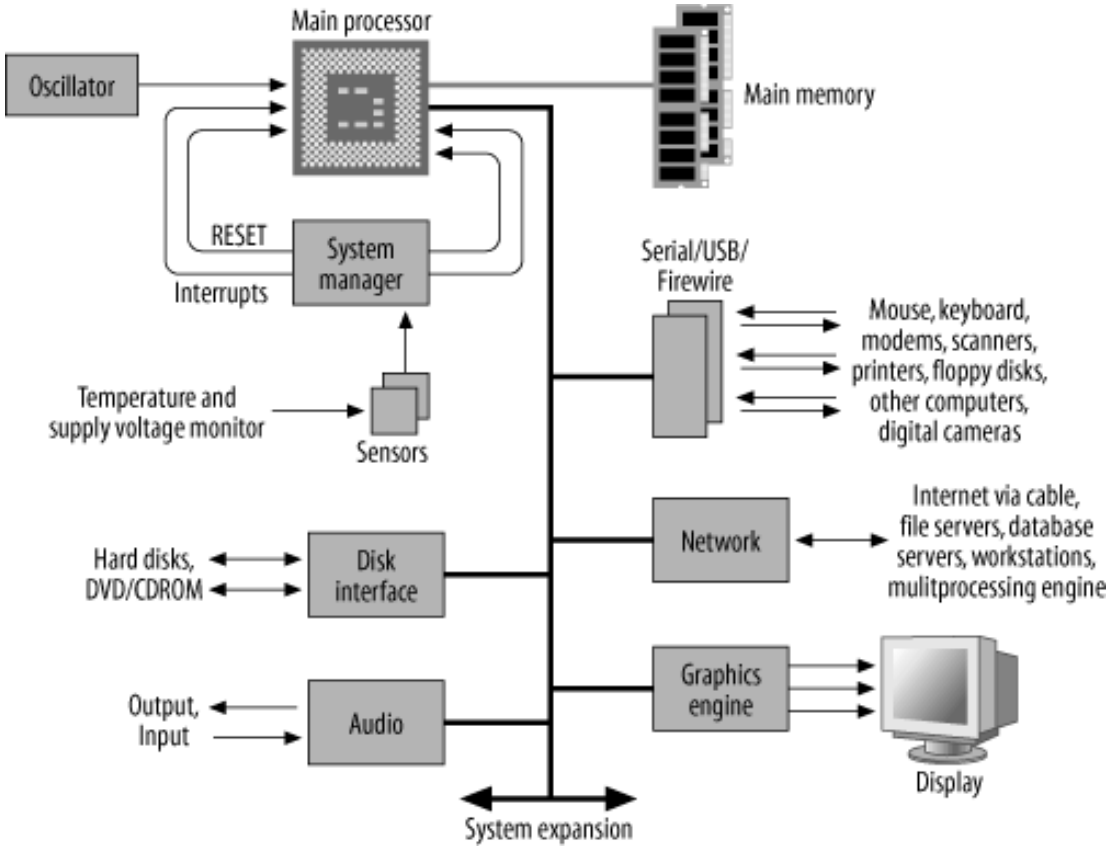
Computer Architecture

- design and functioning arrangement of computer system
- practical art of choosing the interconnecting hardware components to meet the goals of functional and performance issues
- **Attributes** that are visible to the programmer that can impact the logical implementation of a program

Attributes - Computer Architecture

- Instruction set
- Input/Output mechanisms
- number of bits in various data representation,
- Techniques to address the memory

Computer Architecture - Example



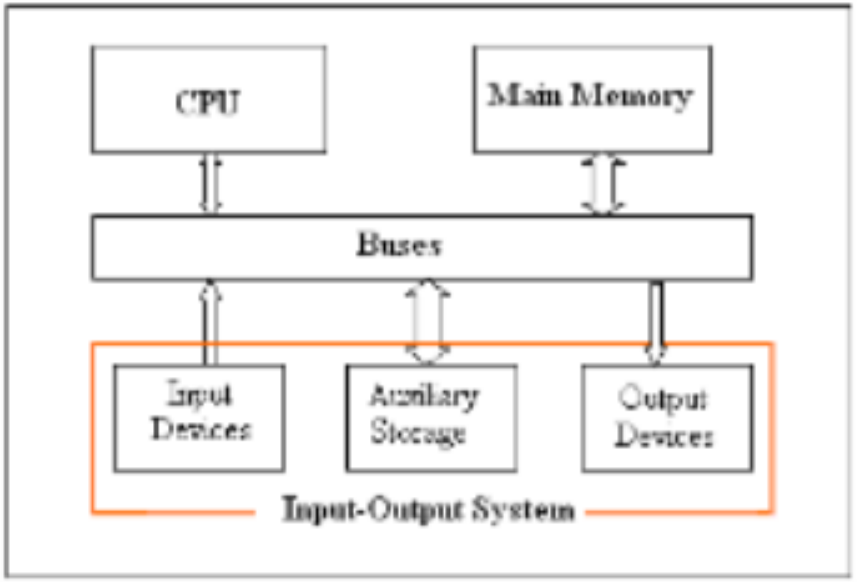
Source: https://www.safaribooksonline.com/

Computer Organization?

- is how architecture is implemented
- Explains the functional units and interconnections
- describes the data paths, data processing elements and data storage elements
- hardware attributes that the programmer can view

Attributes - Computer Organization

- Interfacing between computer and peripherals
- control signals
- Technologies in memory



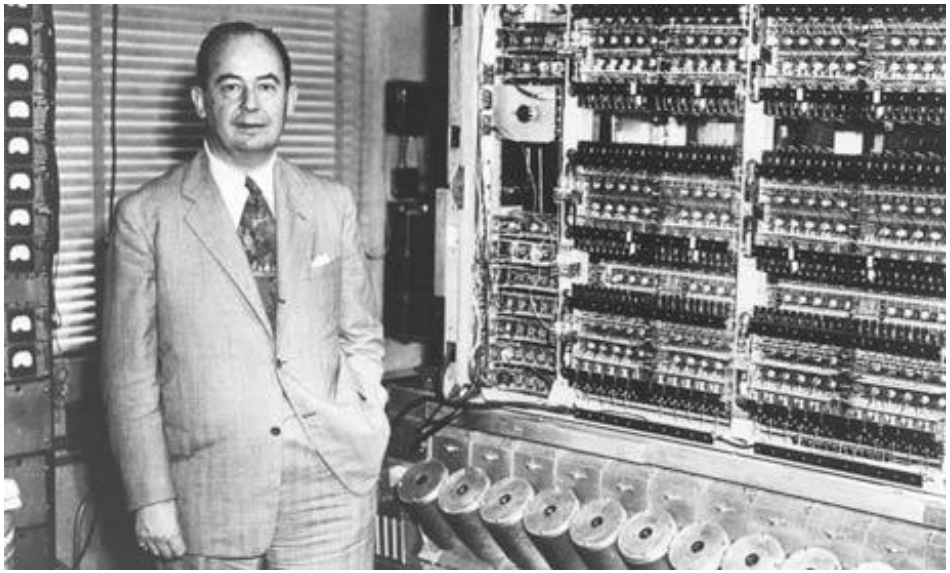
Why to study Computer Architecture and Organization?

- Understand the computer system's functional components and their characteristic in order to achieve high performance system
- Understand the computer architecture to structure/organize a program so that it runs more efficiently
- Able to choose the most cost effective computer in any computing field

Computer Architecture and organization – an example - Von Neumann Machine

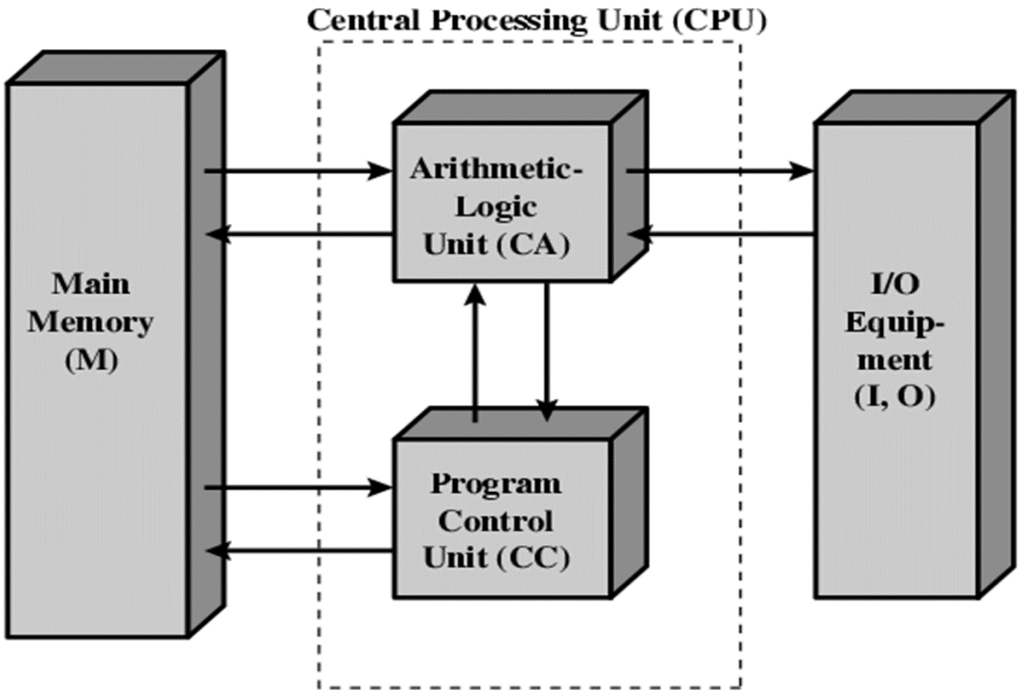
- Von Neumann machine is an example of computer architecture and organization used by modern computers as a reference
- Developed by John von Neumann in the 1940s
- December 28, 1903 – February 8, 1957
- Von Neumann machines is a computer's category based on von Neumann architecture (stored-program concept).
  - Data and program can be stored in the same space (memory)
- Thus, the machines itself can alter either its programs or its internal data.

Computer Architecture and organization -Von Neumann



Source: https://qph.ec.quoracdn.net/

Computer Architecture and organization – Von Neumann Architecture



Source: William Stallings, Computer Organization and Architecture,10th Edn

Computer Architecture and organization – Von Neumann Architecture

Architecture of von Neumann consists of

- *Main memory* stores both data and instruction
- *Arithmetic and Logic Unit (ALU)* works on data bits
- *Control unit* interpreting instruction from memory and executing
- *Input and output devices*

Chapter 1

Will continue…