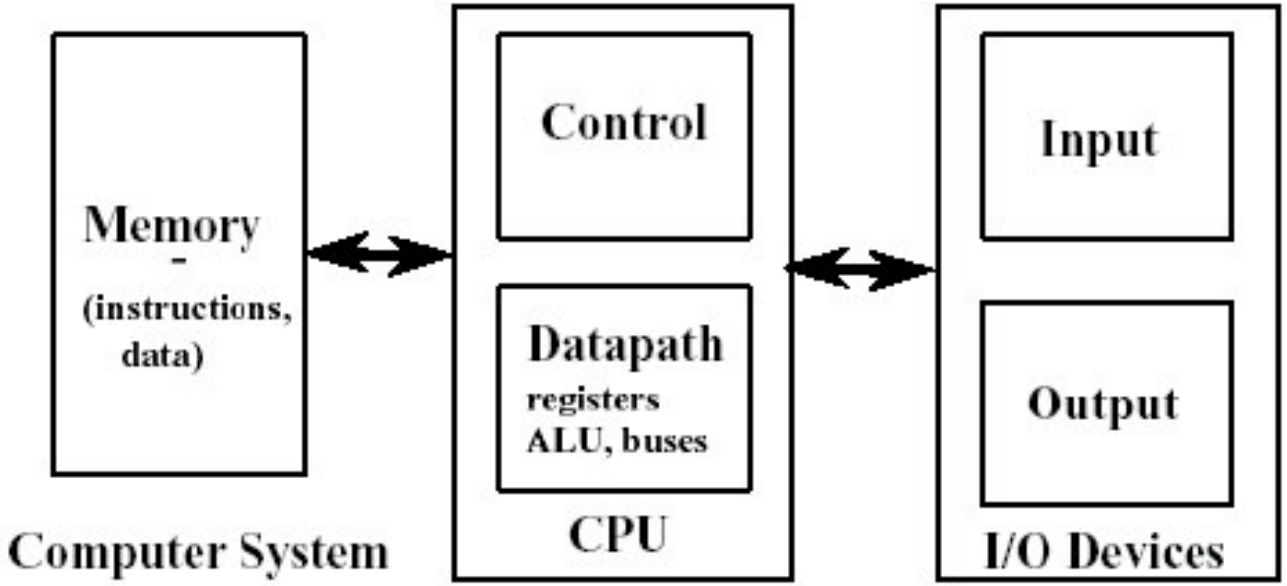
COMPUTER ORGANIZATION (IS F242)

LECT 03: COMPUTER ORGANIZATION

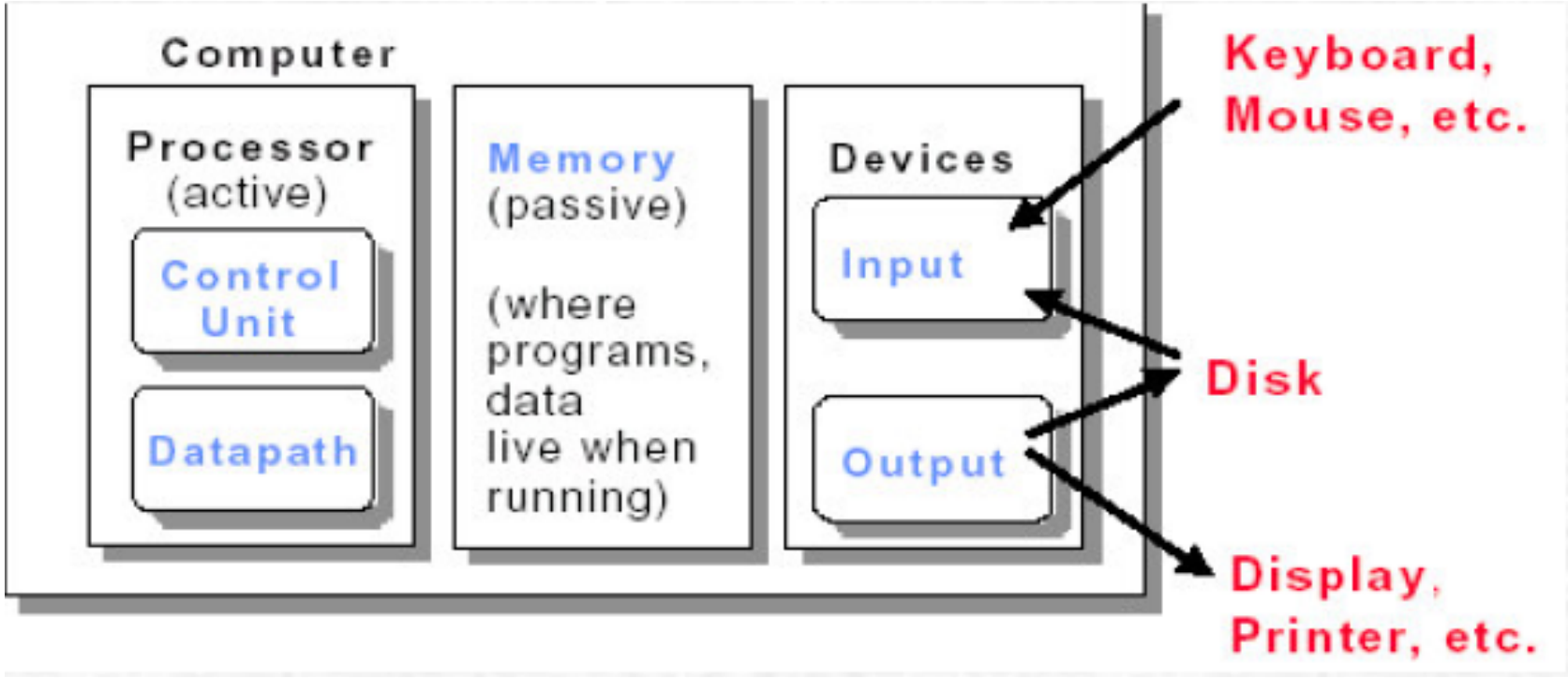
Von – Neumann Model

- Partitioning of the computing engine
  - CPU, Control Unit, Data path, Memory, Input / Output
- Stored Program Concept



Classic Components

- 5 basic components of a computer
- 1.Control Unit, 2. Datapath, 3. Memory, 4. Input 5. Output



Why CO?

- To understand computer system's functional components, characteristics, performance & interactions
- To structure a program so that it runs more efficiently on a real machine
- To understand the tradeoff among various components, such as CPU clock speed vs. memory size
- To use in other areas like embedded systems
  - Ex. Automobile Electronic Controller, Cell phone etc.

Architecture

- Architecture is those attributes visible to the programmer
  - Instruction set
  - Number of bits used for data representation
  - I/O mechanisms
  - Addressing techniques
  - Architecture Question:
    - Is there a multiply instruction available?

Organization

- Organization is how features are implemented
  - Control signals
  - Interfaces
  - Memory technology
  - Organization Question:
    - Is there a hardware multiply unit or is it done by repeated addition?

Architecture Vs. Organisation

Computer Architecture = Instruction set Architecture
+ Machine Organisation + …

ISA is the attributes of a [computing] system as seen by the programmer, i.e., the conceptual structure and functional behavior, as distinct from the organisation of the data flows that controls the logic design and the physical implementation.

Amdahl, Blaaw, and Brooks, 1964