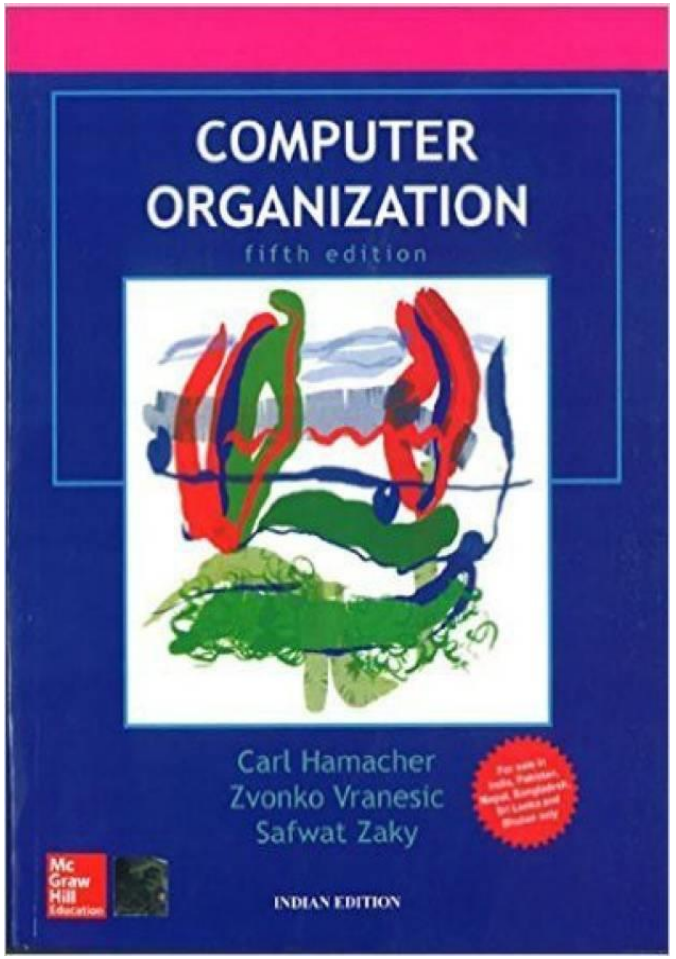
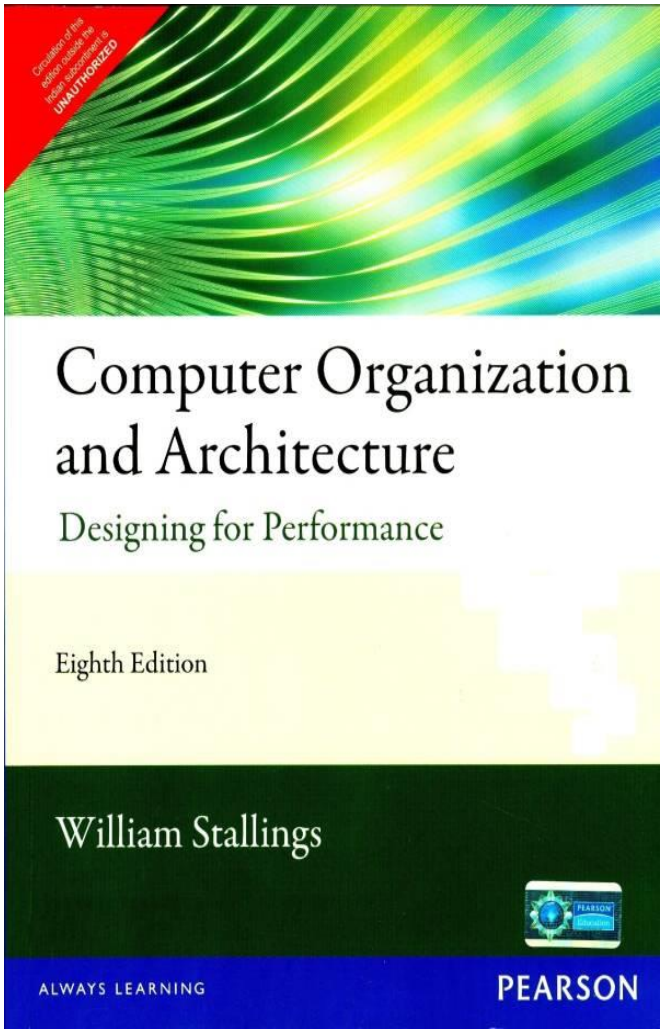
Text Books

- Computer Organization
  - Carl Hamacher, Zvonko Vranesic and Safwat Zaky
  - Fifth Edition, Tata McGraw-Hill.



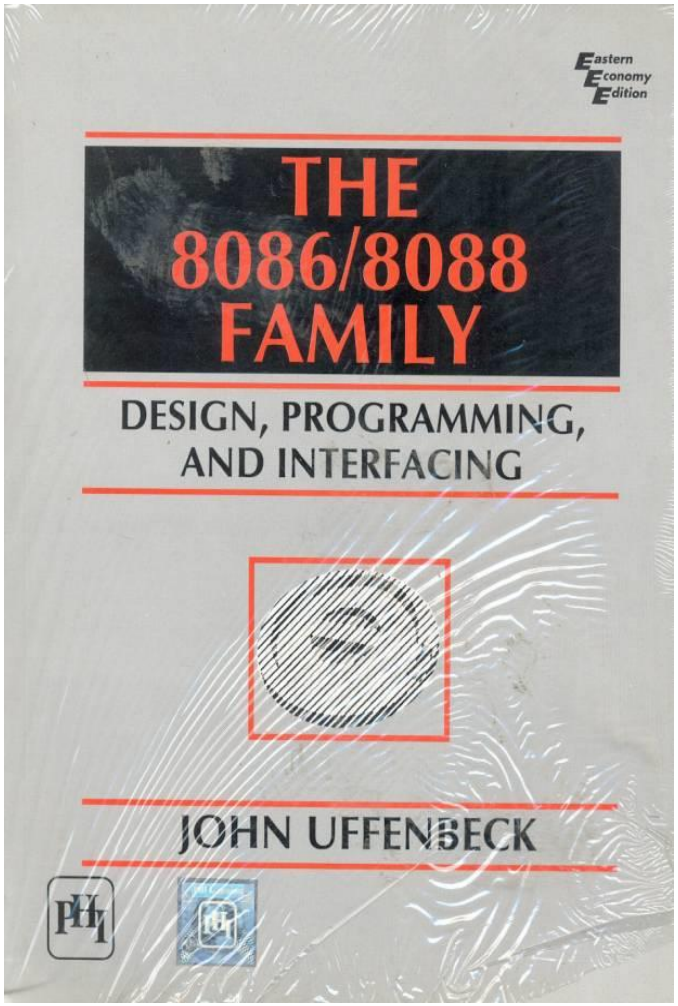
Text Books

- Computer Organization and Architecture: Designing for Performance
  - William Stallings
  - Eighth Edition, Pearson



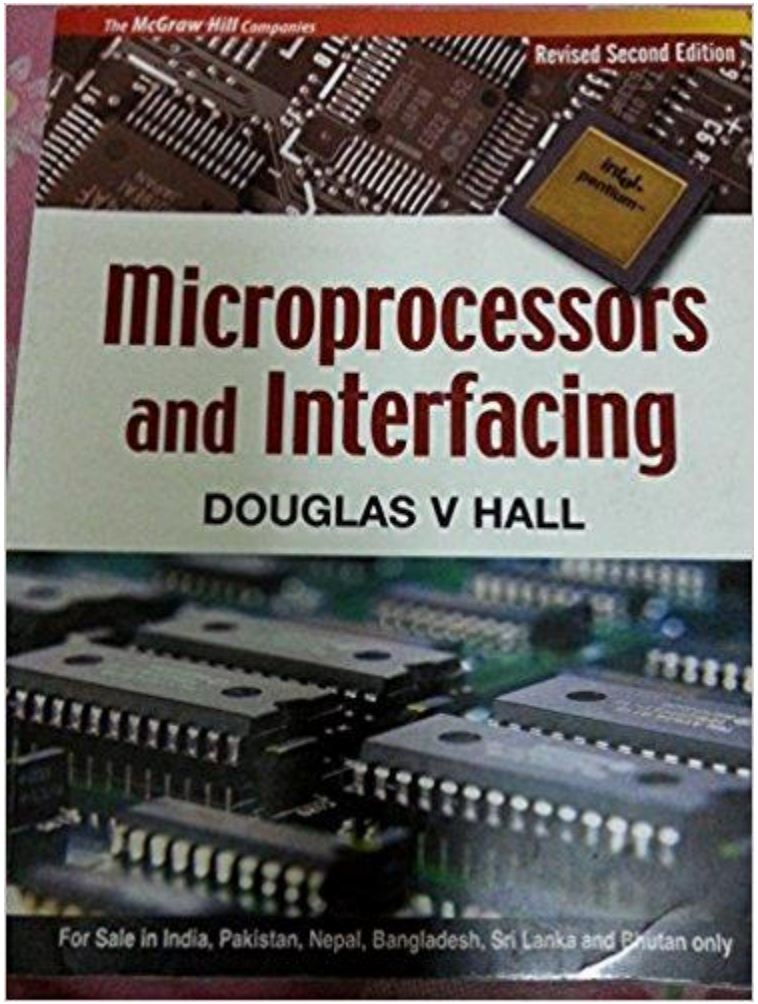
Text Books

- 8086/8088 family: Design Programming and Interfacing
  - John Uffenbeck
  - Pearson Education



Text Books

- Microprocessor and Interfacing
  - Douglas Hall
  - TMH Publication



Course Objective

1. Conceptualize the basics of organizational and architectural issues of a digital computer.

2. Analyze processor performance improvement using instruction level parallelism.

3. Learn the function of each element of a memory hierarchy.

Course Objective

4. Study various data transfer techniques in digital computer.

5. Articulate design issues in the development of processor or other components that satisfy design requirements and objectives.

6. Learn microprocessor architecture and study assembly language programming

Chapter 1

Introduction

Overview

Why to study computer organization and architecture?

Design better programs, including system software such as compilers, operating systems, and device drivers.

- **Optimize program behavior.**
- **Evaluate (benchmark) computer system performance.**
- **Understand time, space, and price tradeoffs.**

Overview

- Computer organization
  - **physical aspects of computer systems.**
  - **E.g., circuit design, control signals, memory types.**
  - ***How does a computer work?***
- Computer architecture
  - **Logical aspects of system as seen by the programmer.**
  - **E.g., instruction sets, instruction formats, data types, addressing modes.**
  - ***How do I design a computer?***

Computer Component

- At the most basic level, a computer is a device consisting of three pieces:

  - **A processor to interpret and execute programs**
  - **A memory to store both data and programs**
  - **A mechanism for transferring data to and from the outside world.**

Architecture & Organization

- All Intel x86 family share the same basic architecture
- The IBM System/370 family share the same basic architecture
- This gives code compatibility
  - At least backwards
- Organization differs between different versions

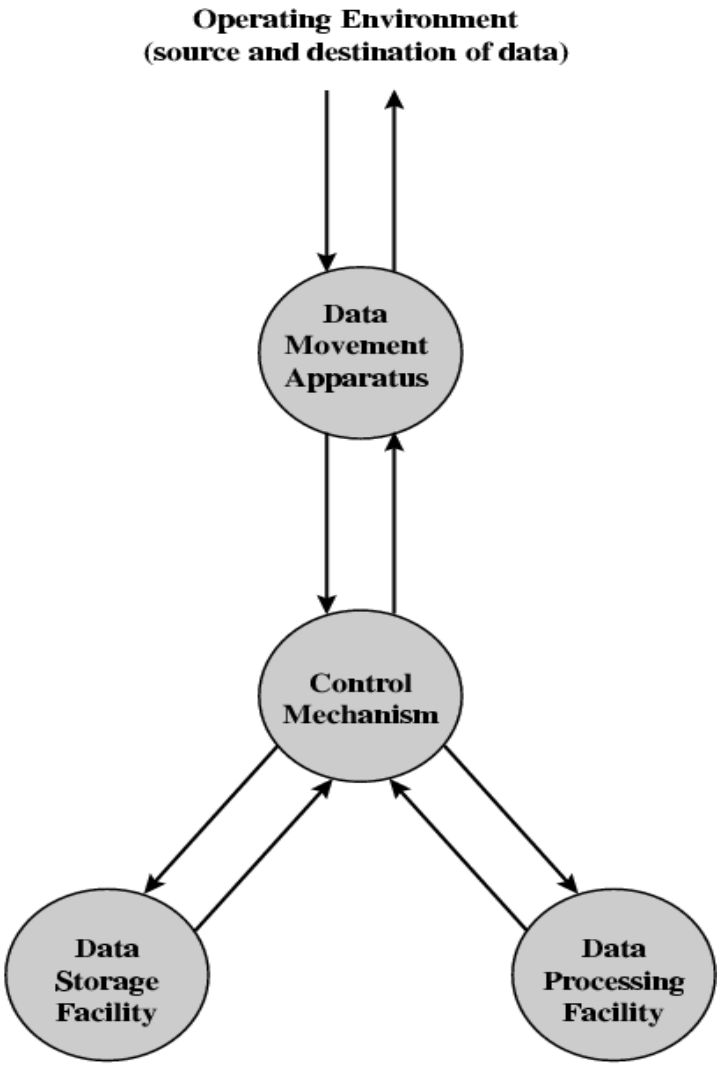
Structure & Function

- Structure is the way in which components relate to each other

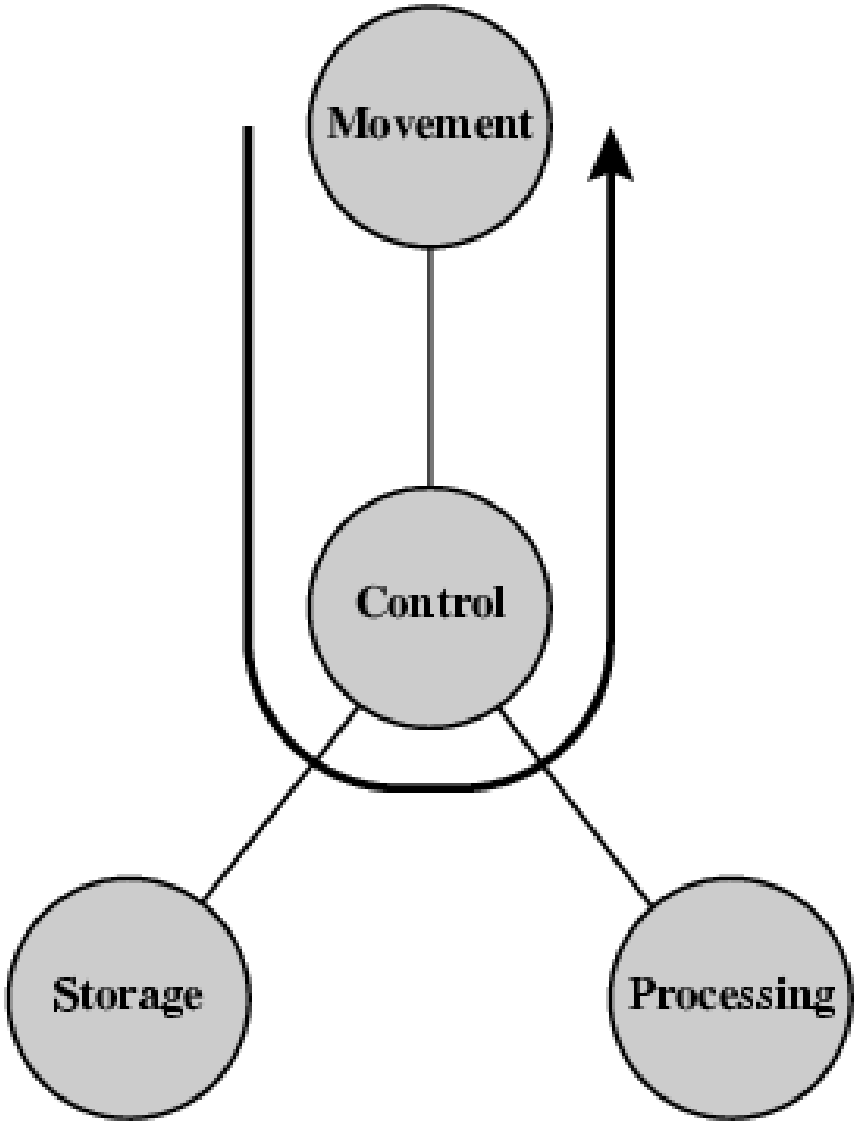
- Function is the operation of individual components as part of the structure

Function

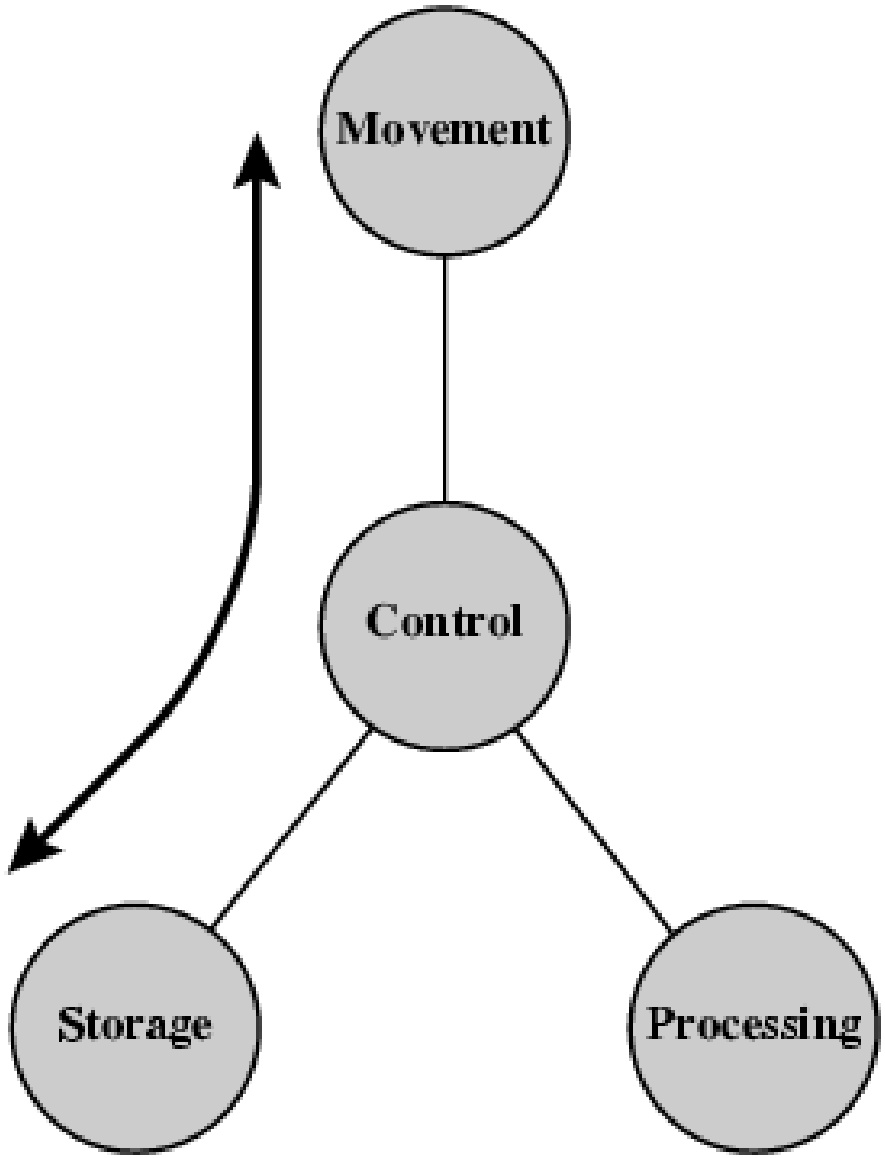
- All computer functions are:
  - Data processing
  - Data storage
  - Data movement
  - Control



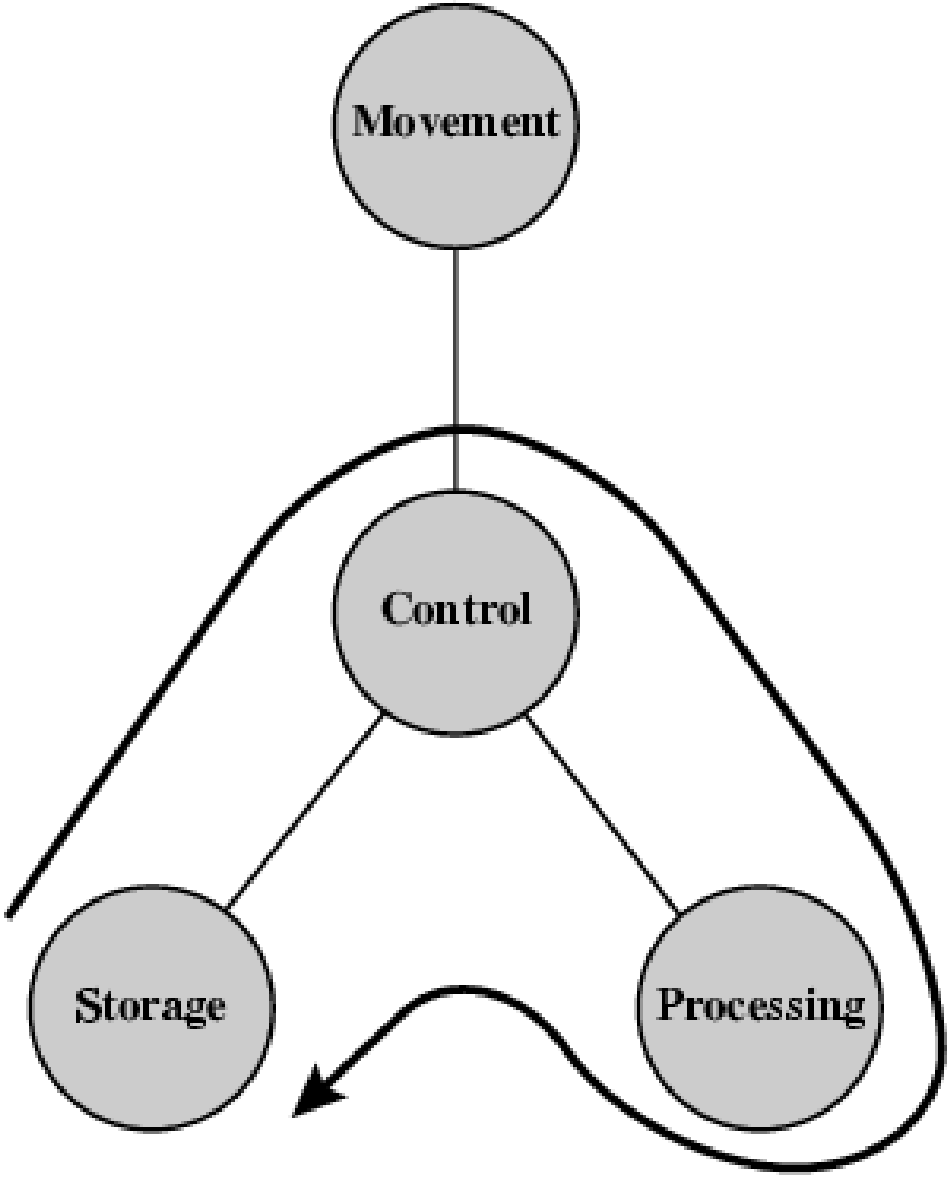
Operations (1) Data movement



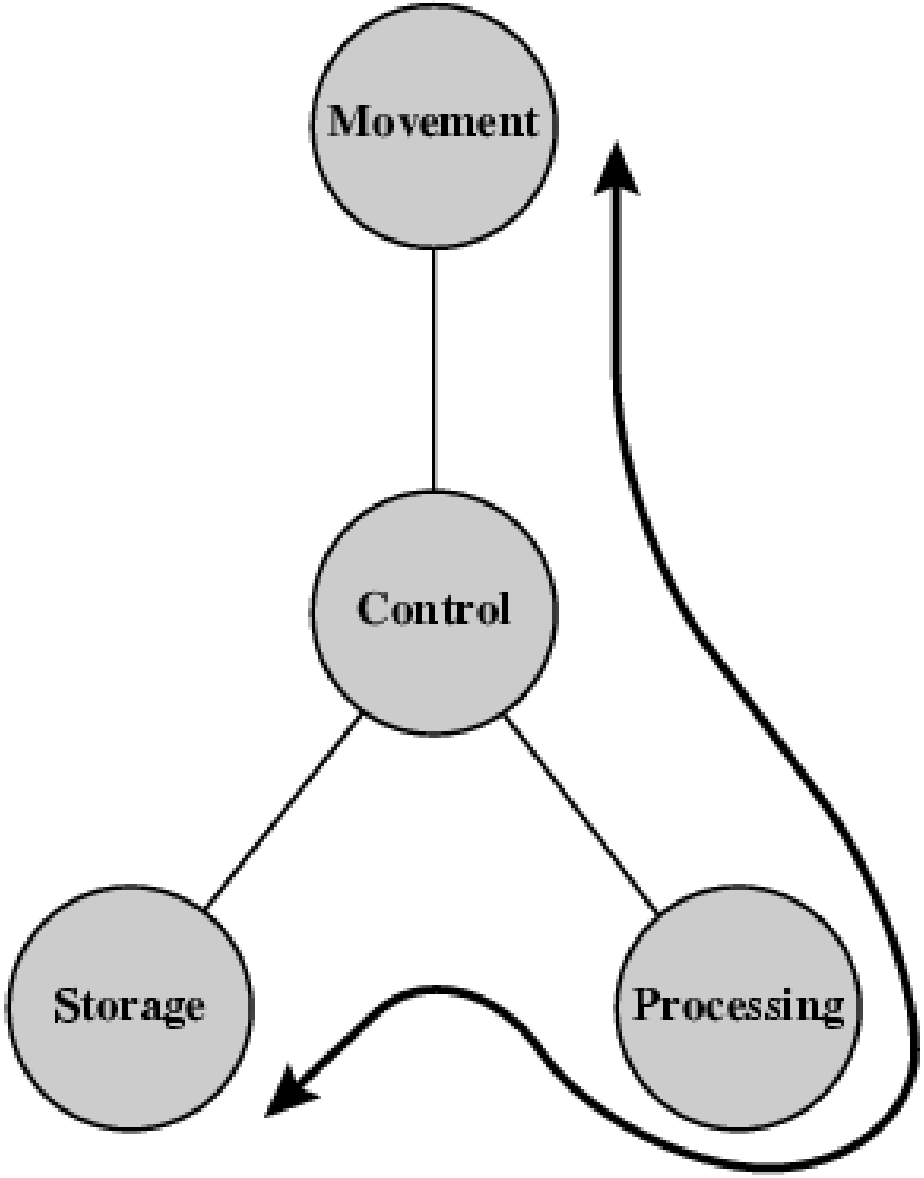
Operations (2) Storage



Operation (3) Processing from/to storage

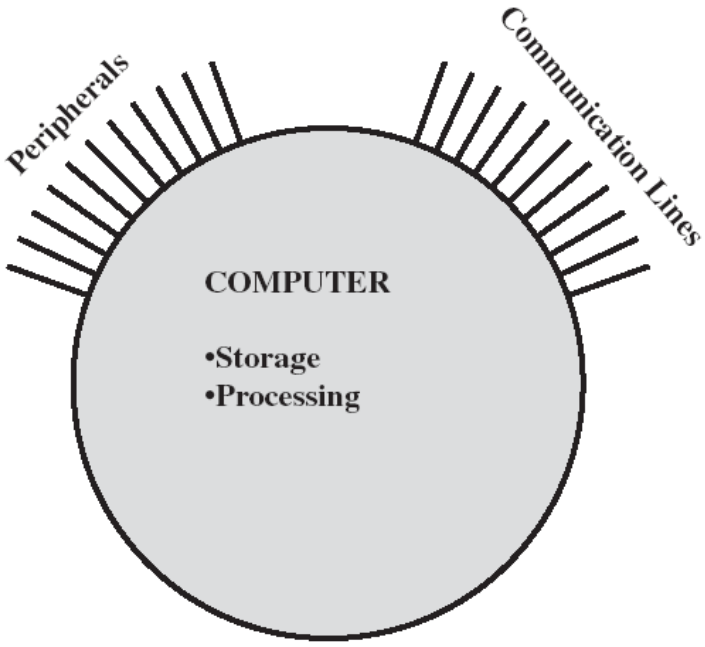


Operation (4)
Processing from storage to I/O

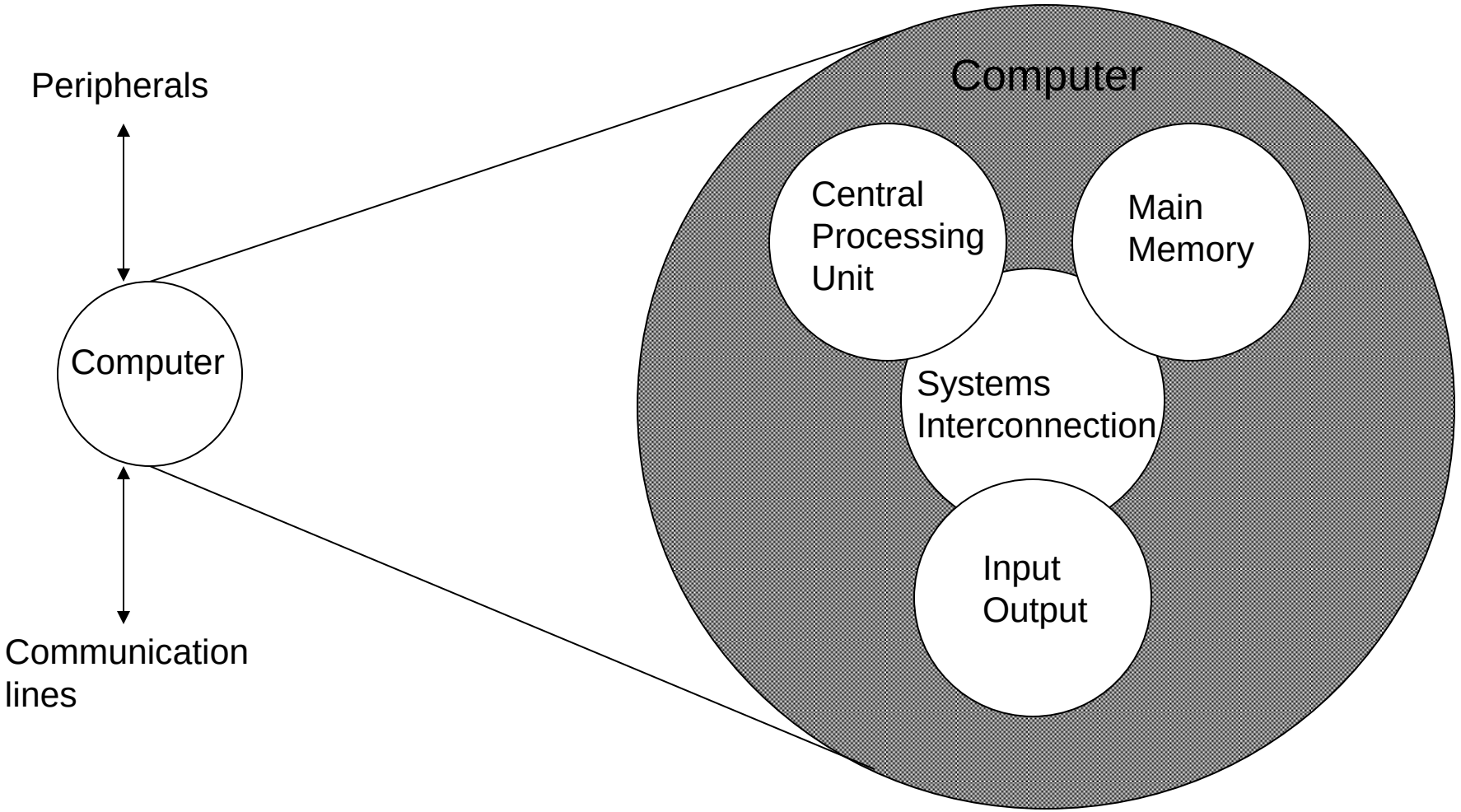


Structure

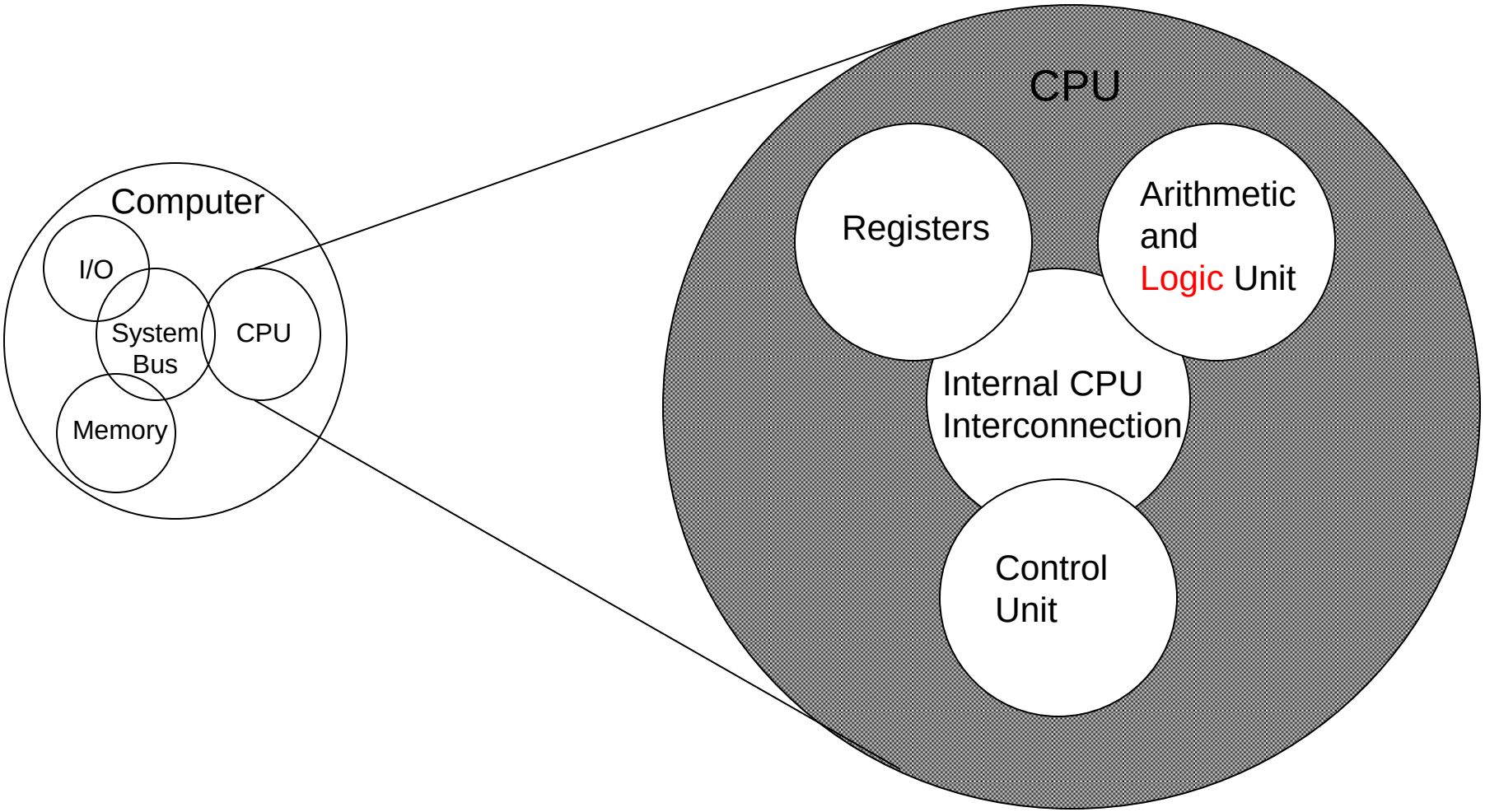
- The Computer
  - CPU
    - Controls the operation of the computer and performs its data processing functions.
  - Main memory
    - Stores data
  - I/O
    - Moves data between the computer and its external environment
  - System interconnection
    - Provides for communication among CPU, main memory, and I/O



Structure - Top Level



Structure - The CPU



Structure - The Control Unit