

William Stallings  
Computer Organization  
and Architecture  
9<sup>th</sup> Edition

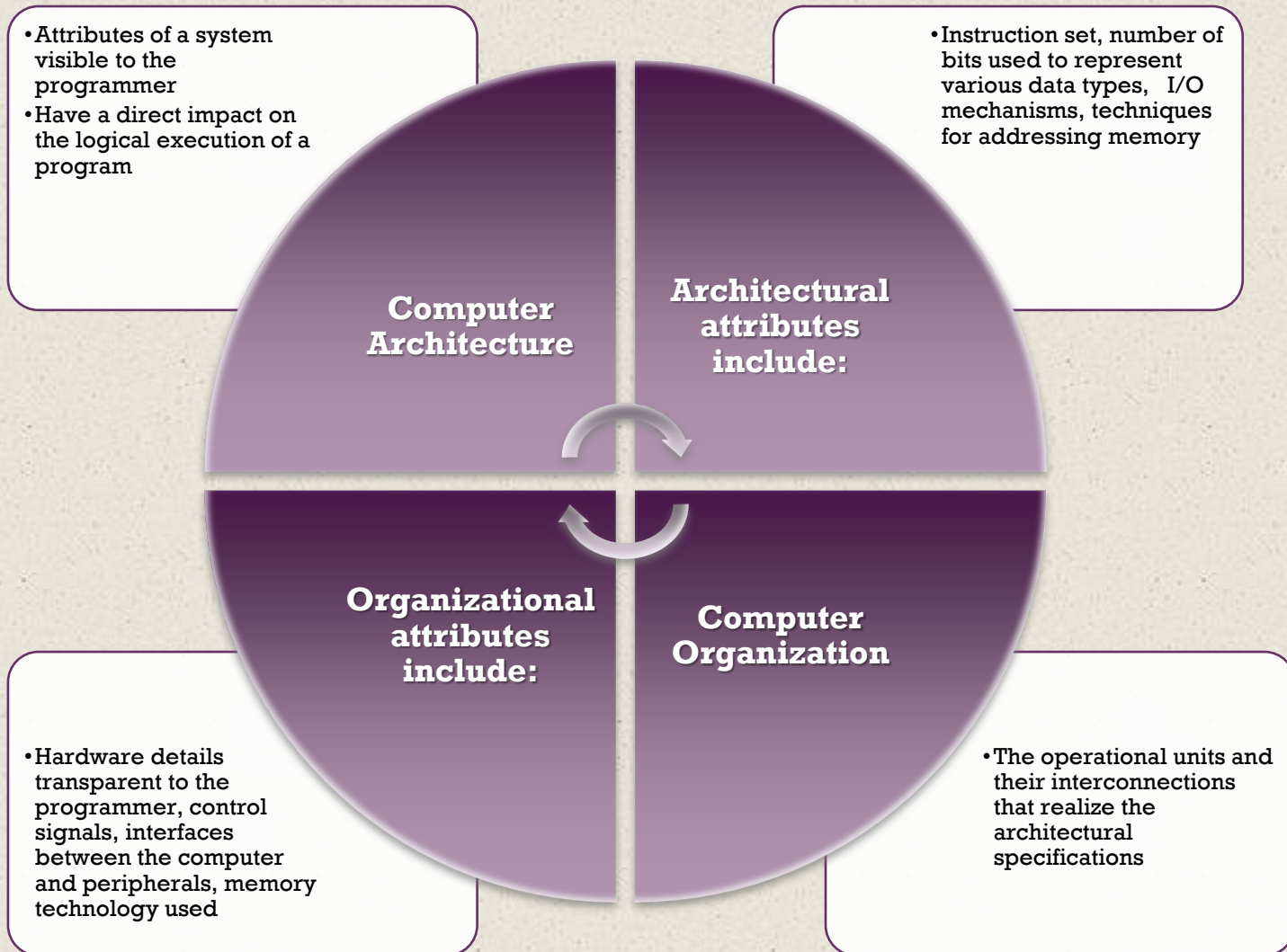


# + Chapter 1

## Introduction

# Computer Architecture

## Computer Organization





# IBM System 370 Architecture

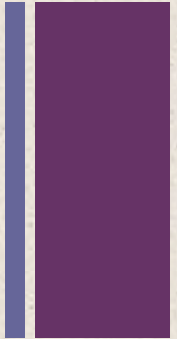


- IBM System/370 architecture
  - Was introduced in 1970
  - Included a number of models
  - Could upgrade to a more expensive, faster model without having to abandon original software
  - New models are introduced with improved technology, but retain the same architecture so that the customer's software investment is protected
  - Architecture has survived to this day as the architecture of IBM's mainframe product line



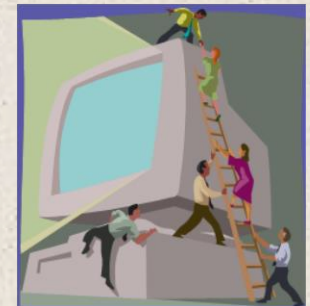


# + Structure and Function



- Hierarchical system
  - Set of interrelated subsystems
- Hierarchical nature of complex systems is essential to both their design and their description
- Designer need only deal with a particular level of the system at a time
  - Concerned with structure and function at each level

- Structure
  - The way in which components relate to each other
- Function
  - The operation of individual components as part of the structure

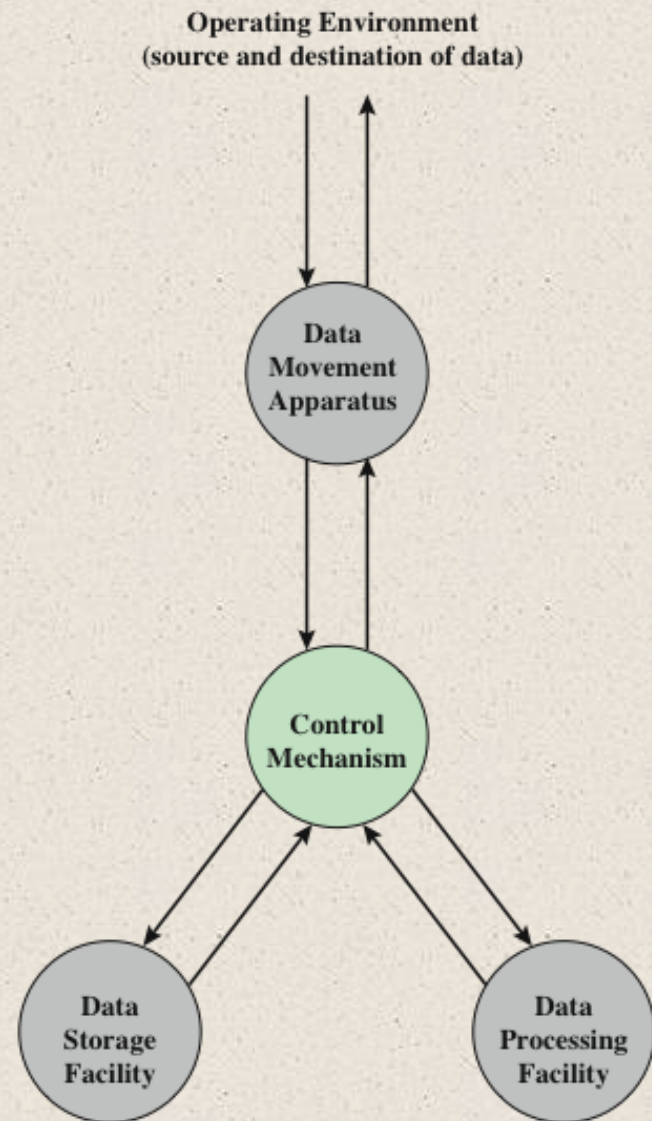




# Function

A computer can perform four basic functions:

- Data processing
- Data storage
- Data movement
- Control

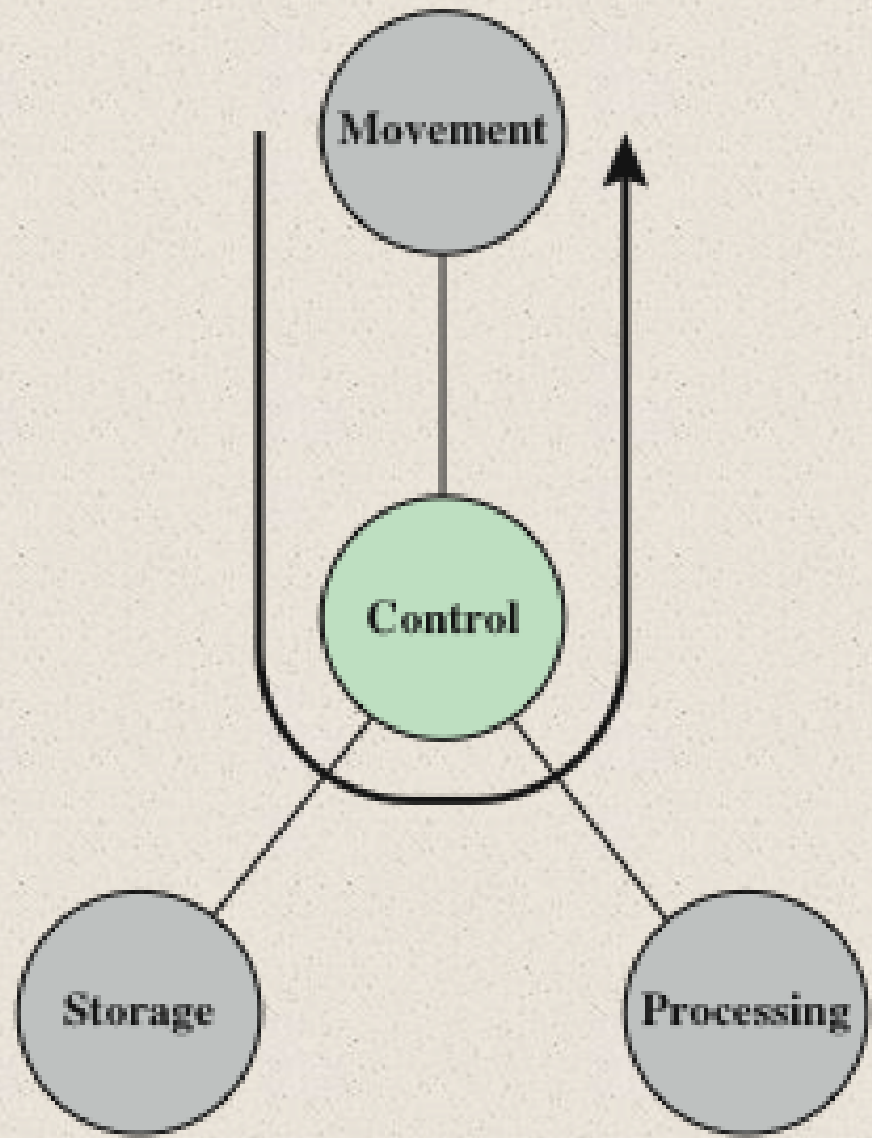


**Figure 1.1 A Functional View of the Computer**



## Operations

(a)  
Data movement



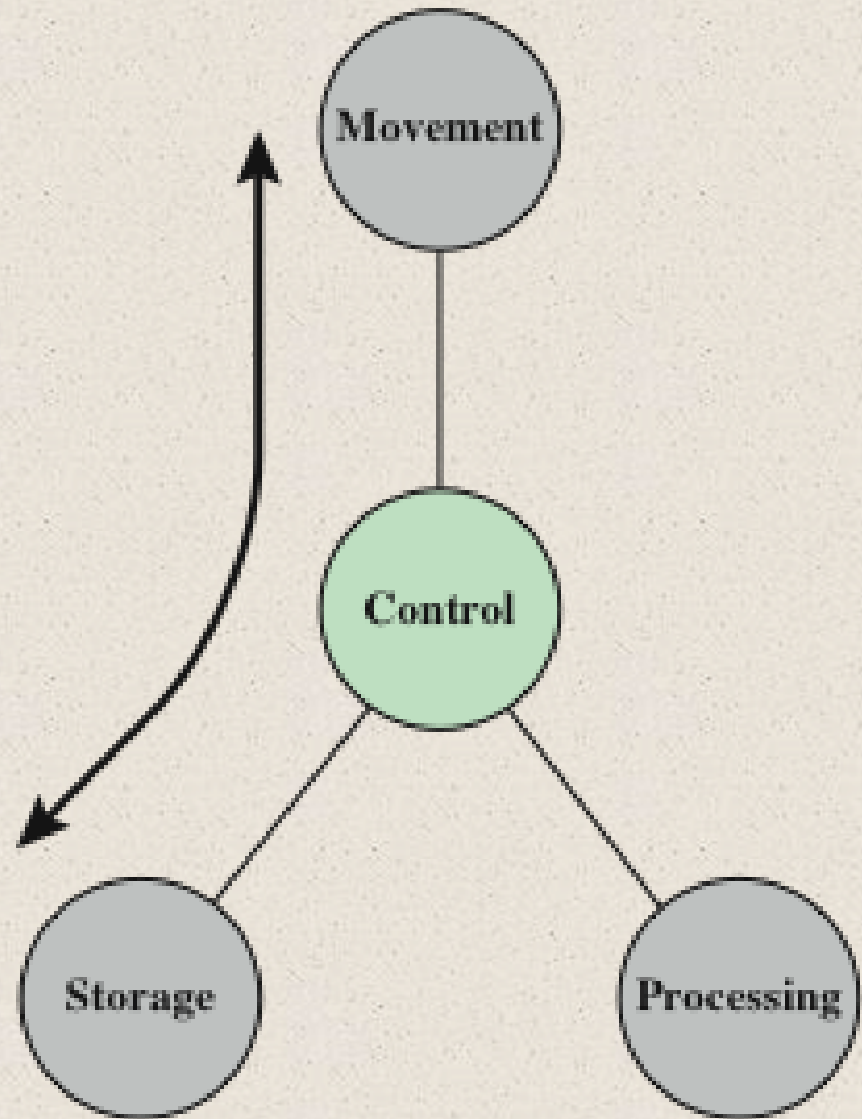
(a)

Figure 1.2 Possible Computer Operations



## Operations

(b)  
Data storage



(b)

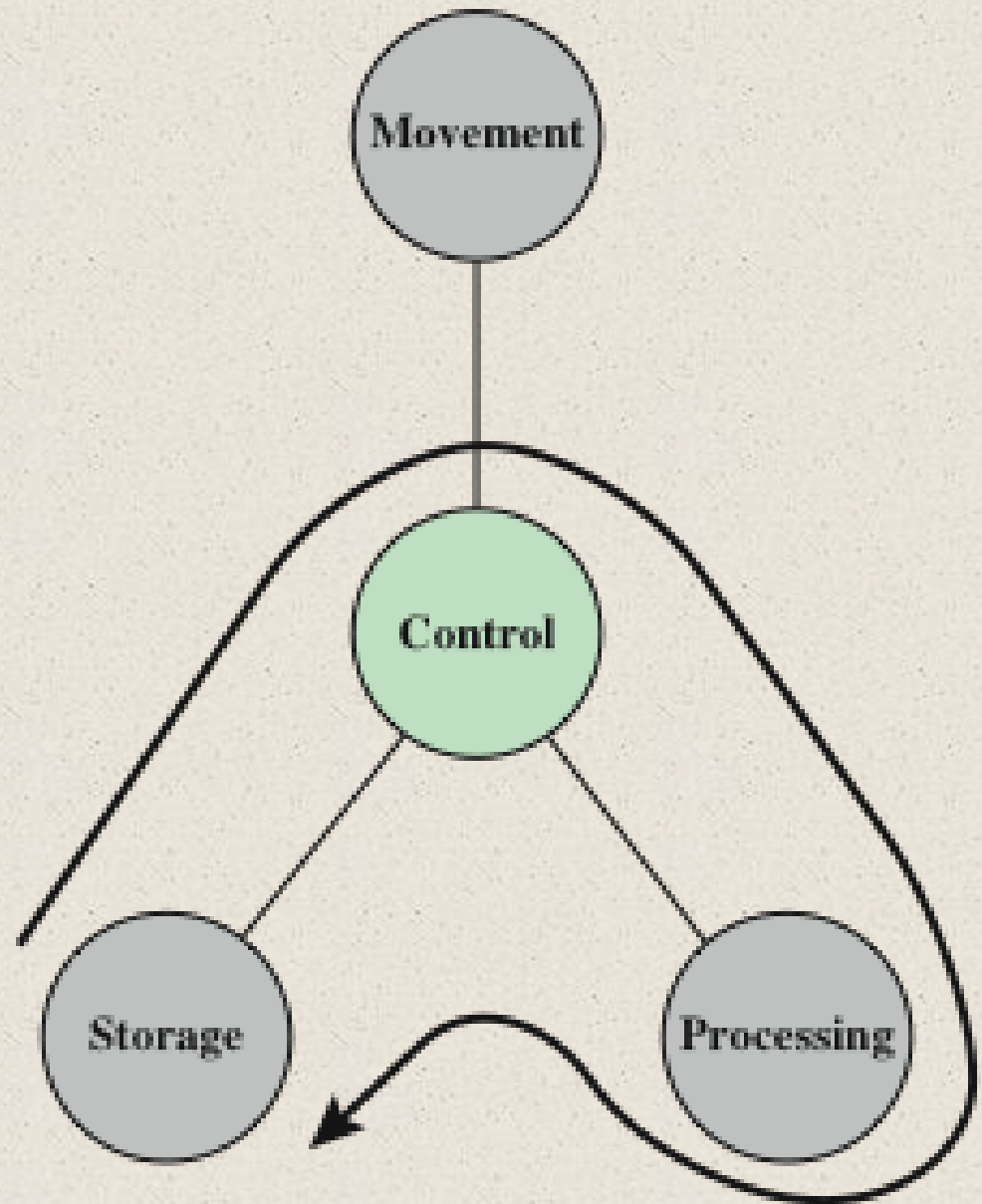
Figure 1.2 Possible Computer Operations



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## Operations

(c)  
Data movement



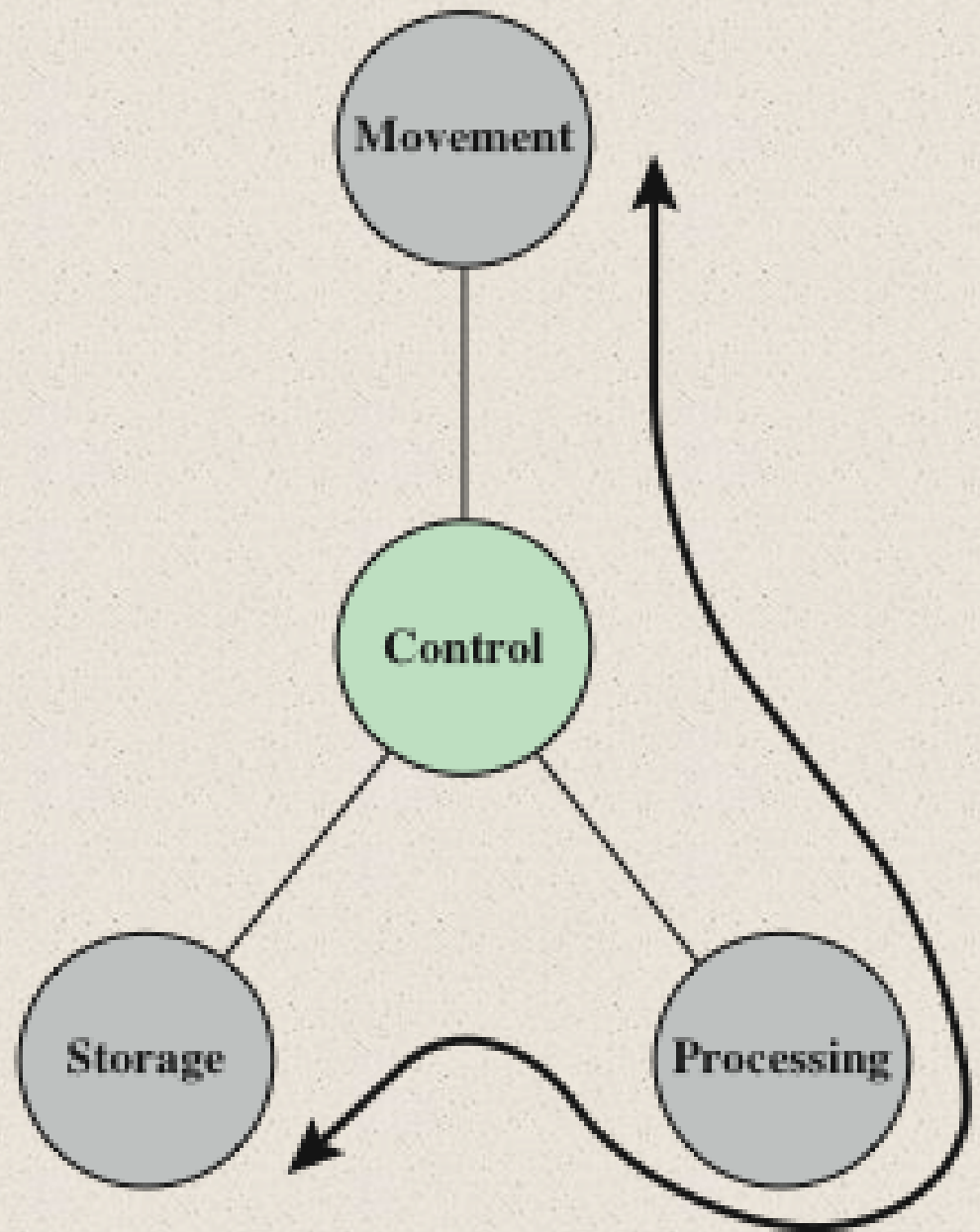
(c)

Figure 1.2 Possible Computer Operations

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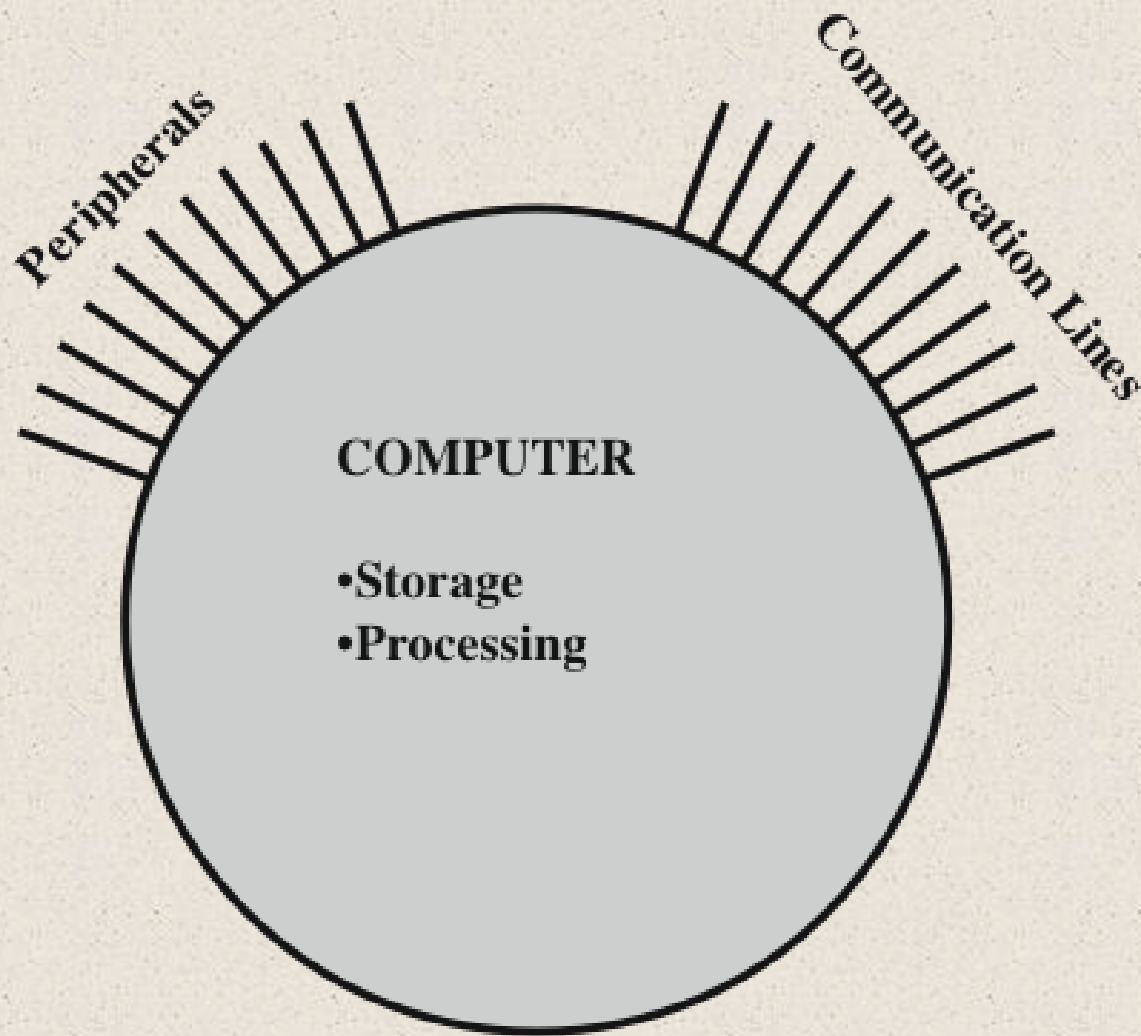
## Operations

(d)  
Control



(d)

Figure 1.2 Possible Computer Operations



# The Computer

**Figure 1.3 The Computer**

# Structure

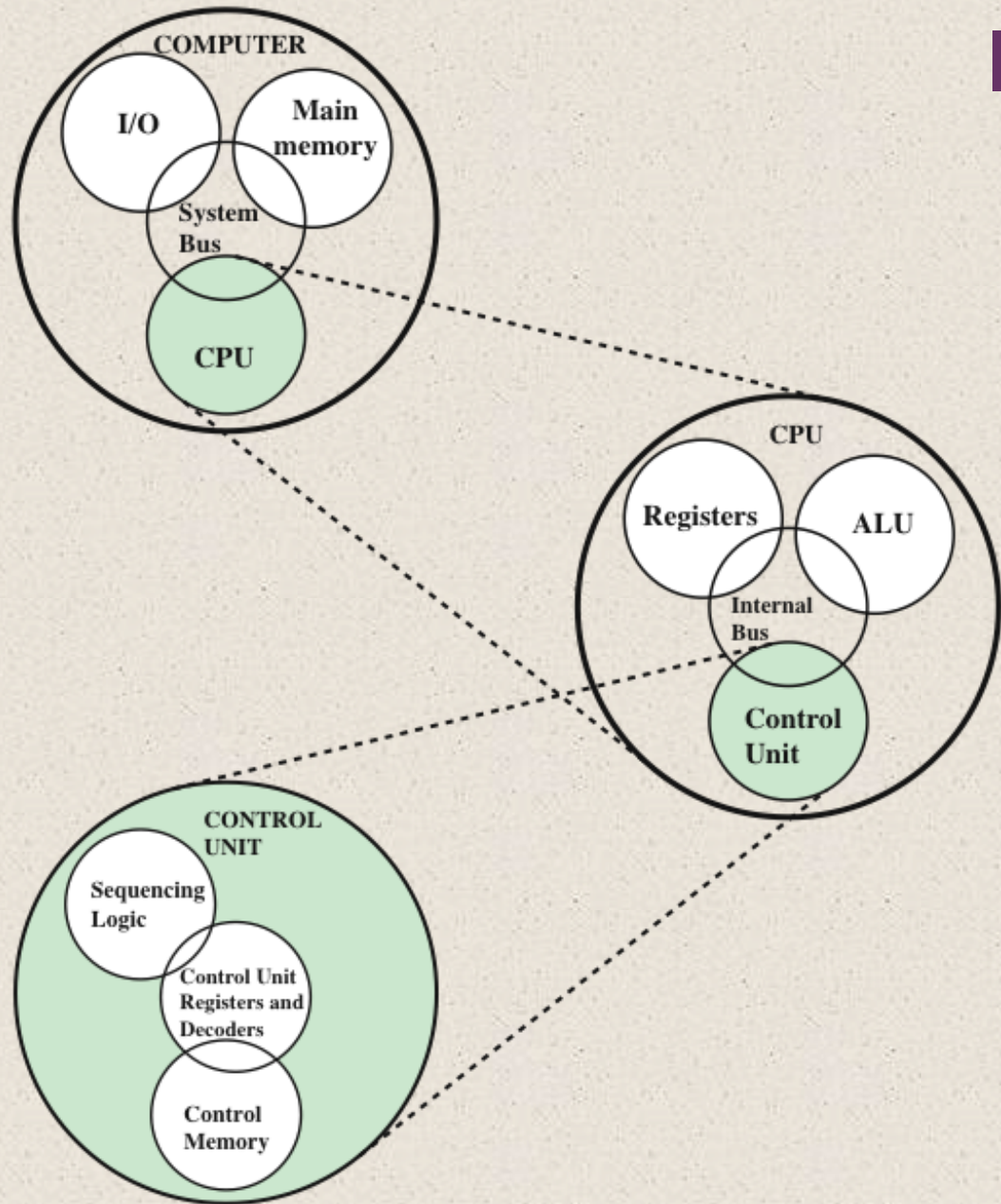
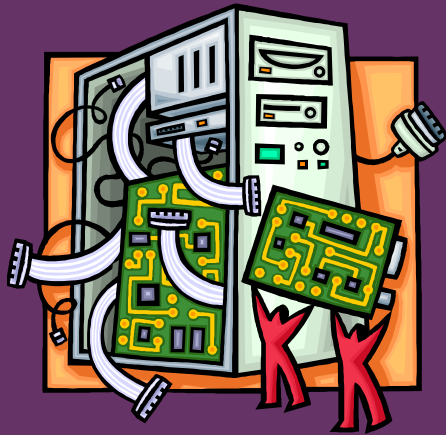


Figure 1.4 A Top-Down View of a Computer



There are four  
main structural  
components  
of the computer:



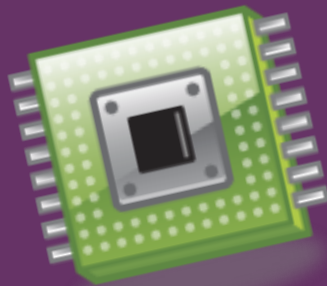
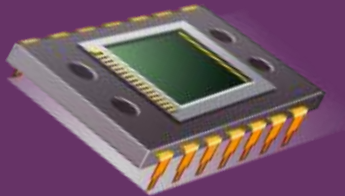
- ★ CPU – controls the operation of the computer and performs its data processing functions
- ★ Main Memory – stores data
- ★ I/O – moves data between the computer and its external environment
- ★ System Interconnection – some mechanism that provides for communication among CPU, main memory, and I/O





# CPU

## Major structural components:



- Control Unit
  - Controls the operation of the CPU and hence the computer
- Arithmetic and Logic Unit (ALU)
  - Performs the computer's data processing function
- Registers
  - Provide storage internal to the CPU
- CPU Interconnection
  - Some mechanism that provides for communication among the control unit, ALU, and registers

# + Summary

## Chapter 1

- Computer Organization
- Computer Architecture
- Function
  - Data processing
  - Data storage
  - Data movement
  - Control

## Introduction

- Structure
  - CPU
  - Main memory
  - I/O
  - System interconnection
- CPU structural components
  - Control unit
  - ALU
  - Registers
  - CPU interconnection

# + Internet Resources

## - Web site for book



### ■ <http://WilliamStallings.com/COA/COA9e.html>

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