

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

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Chapter 1  
Introduction

# Architecture & Organization 1

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- Architecture is those attributes visible to the programmer
  - Instruction set, number of bits used for data representation, I/O mechanisms, addressing techniques.
    - e.g. Is there a multiply instruction?
- Organization is how features are implemented
  - Control signals, interfaces, memory technology.
  - e.g. Is there a hardware multiply unit or is it done by repeated addition?

## Architecture & Organization 2

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- 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

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

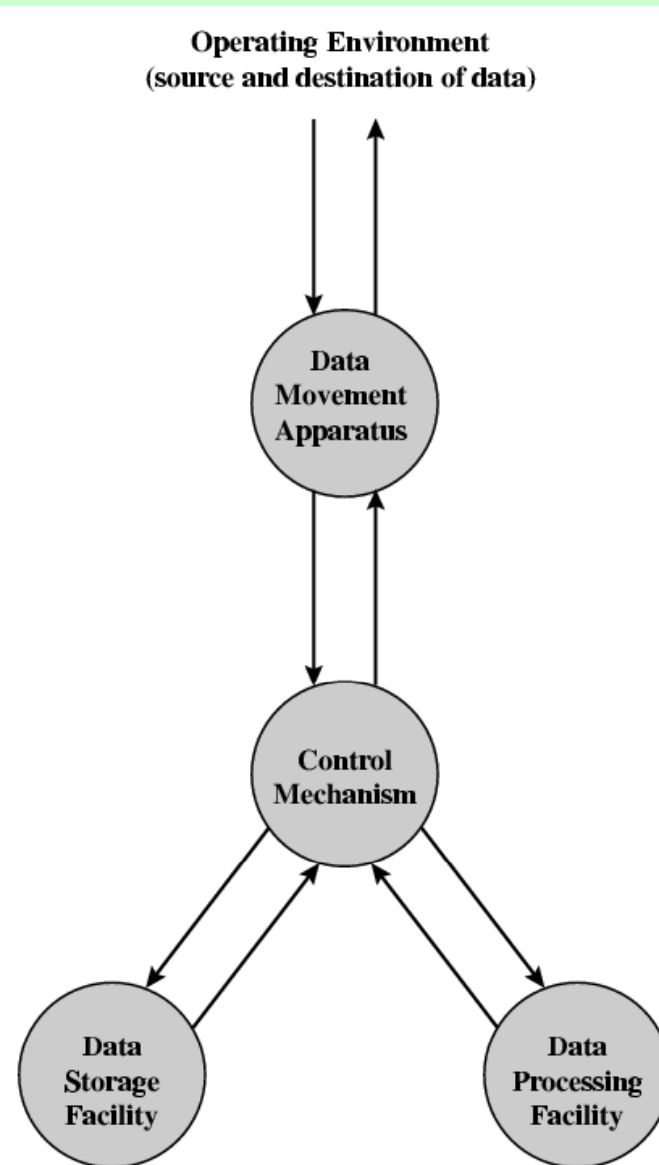
# Function

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

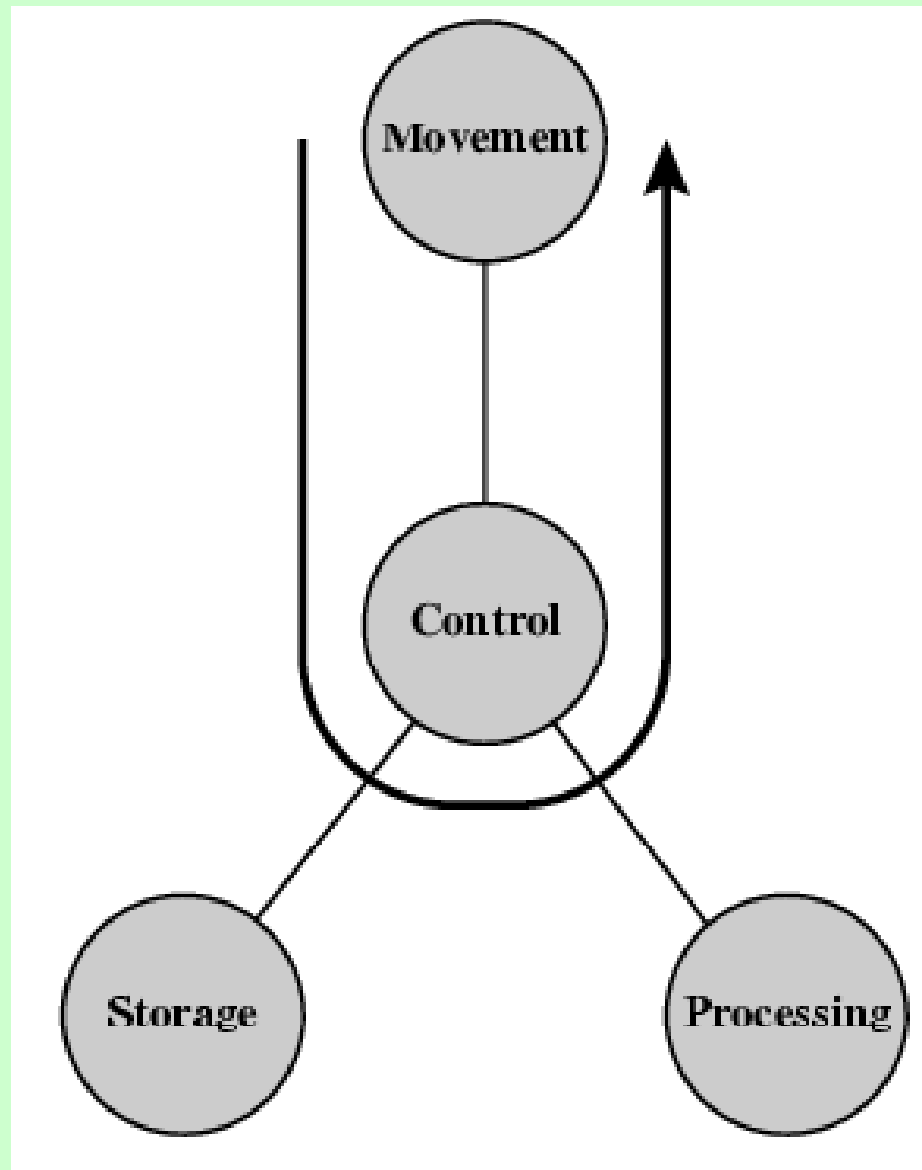
# Functional View

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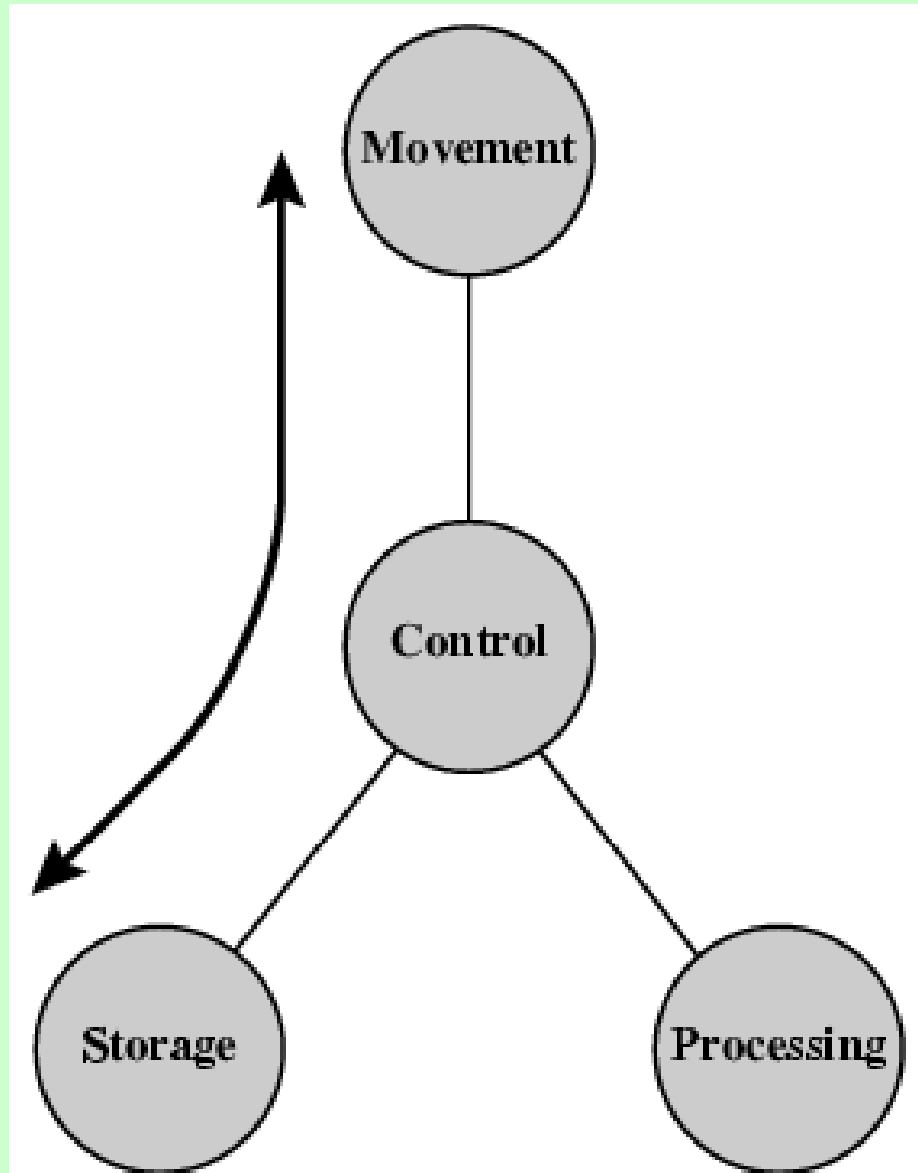
# Operations (a) Data movement

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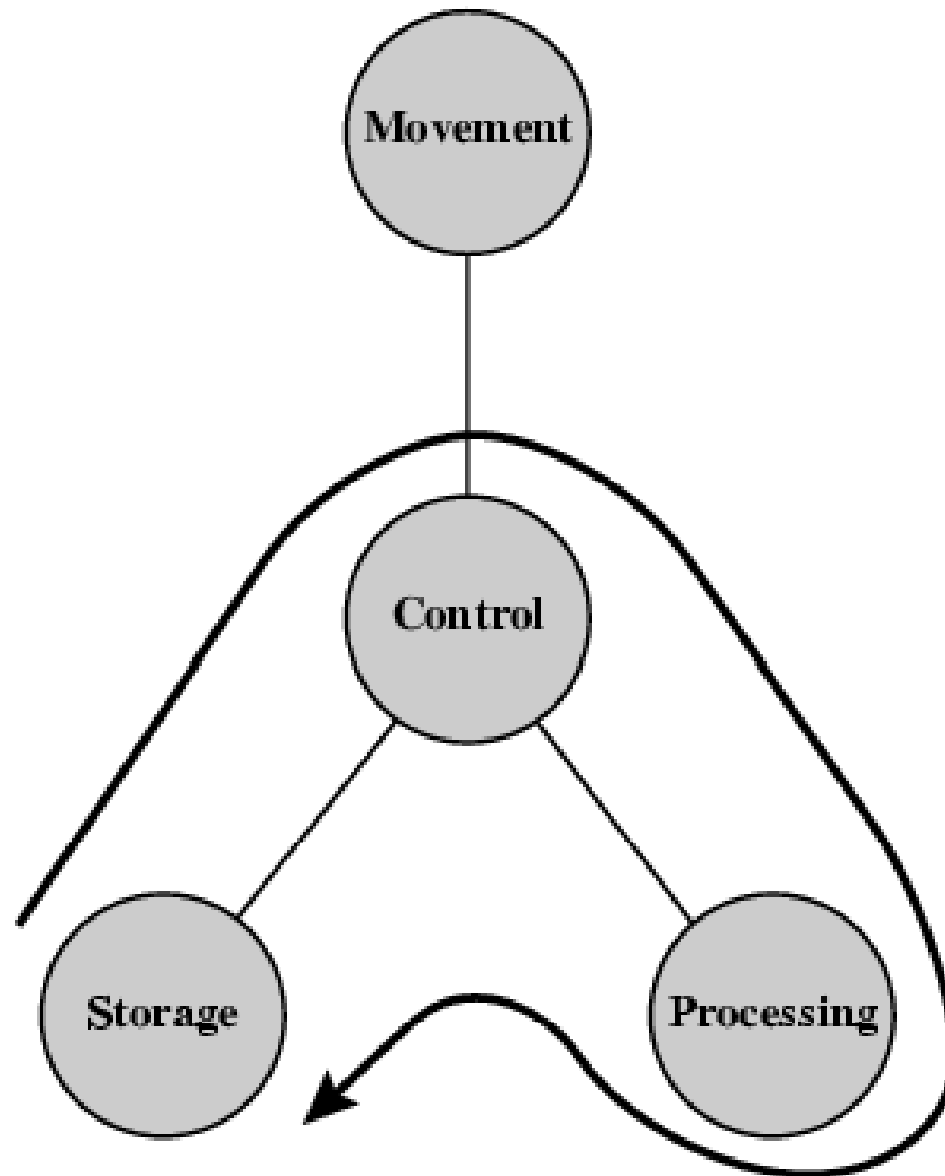
# Operations (b) Storage

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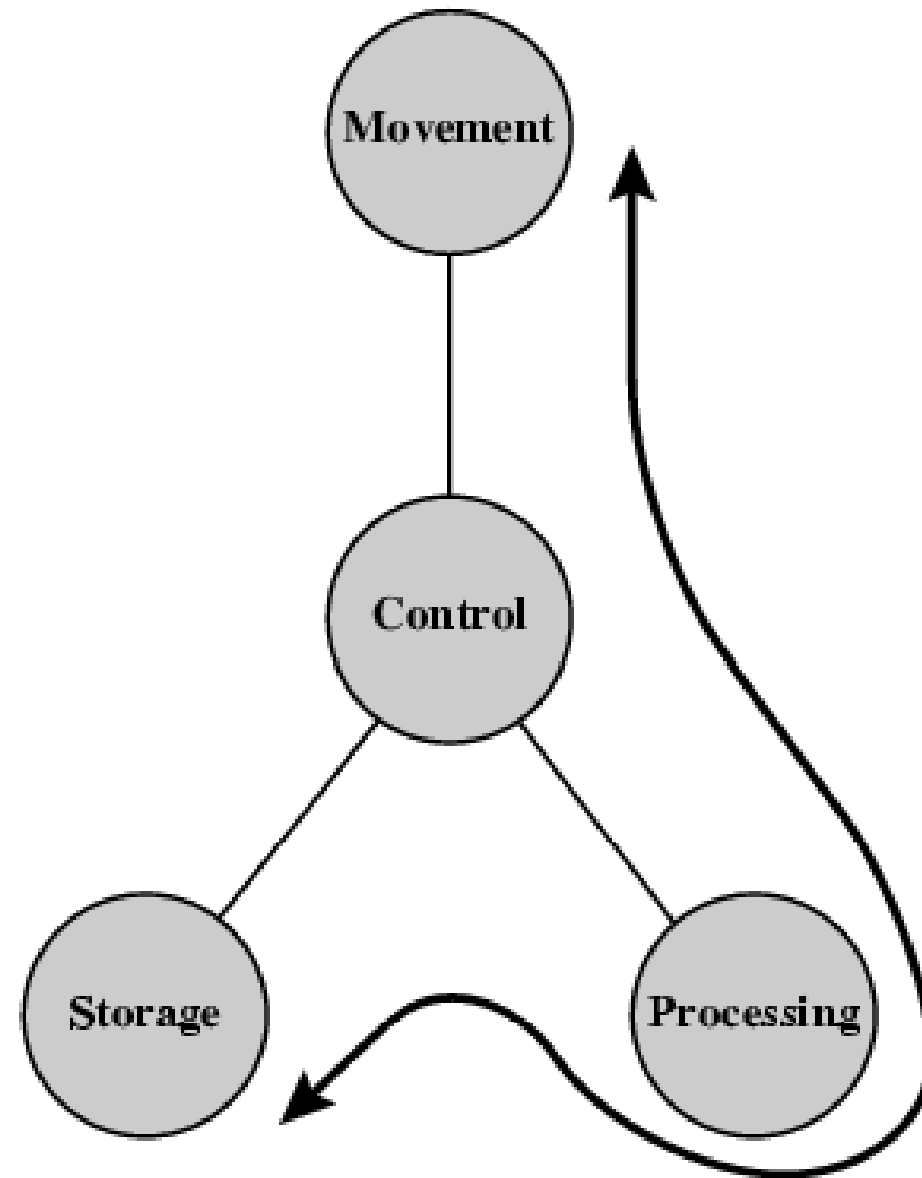


## Operation (c) Processing from/to storage

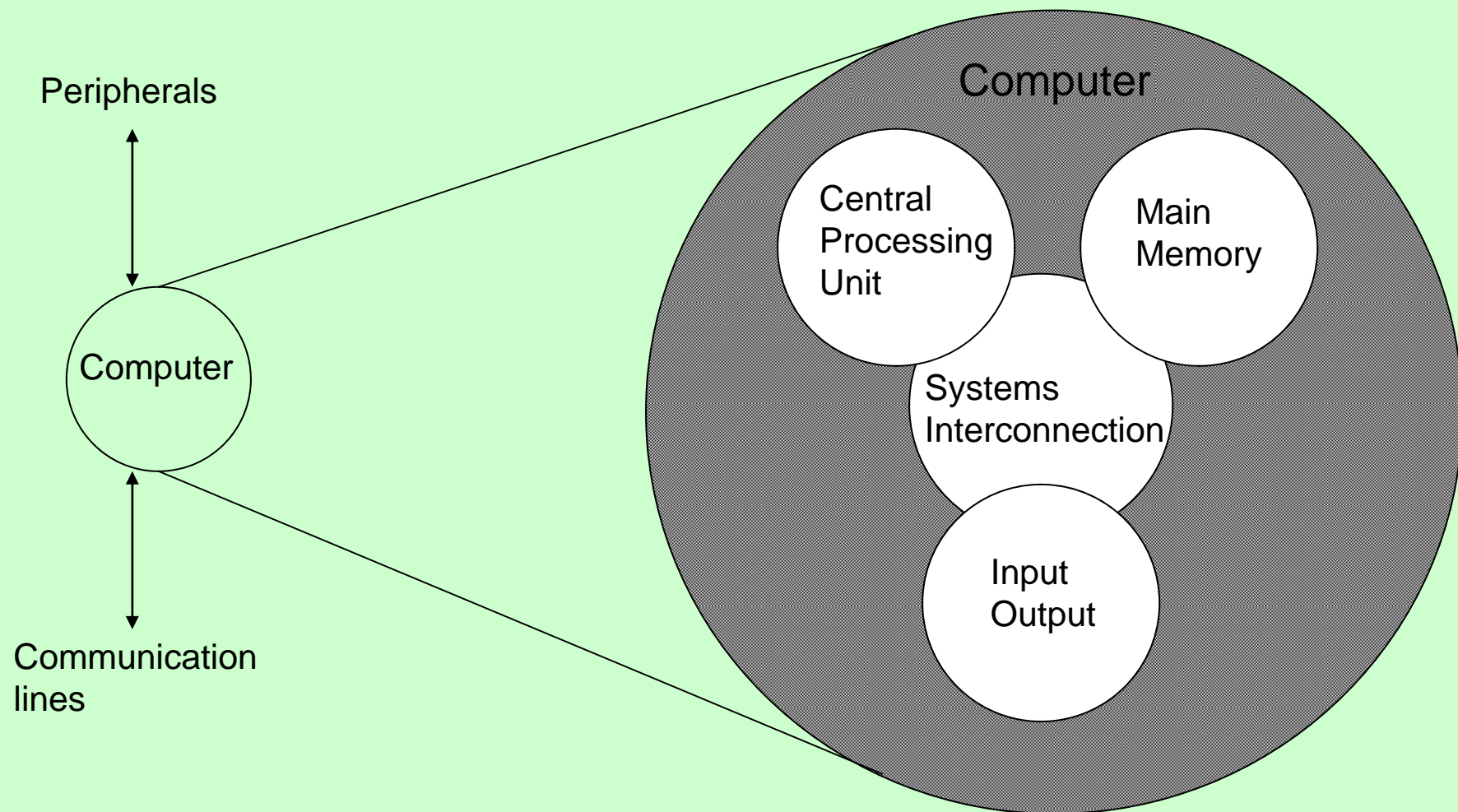


# Operation (d) Processing from storage to I/O

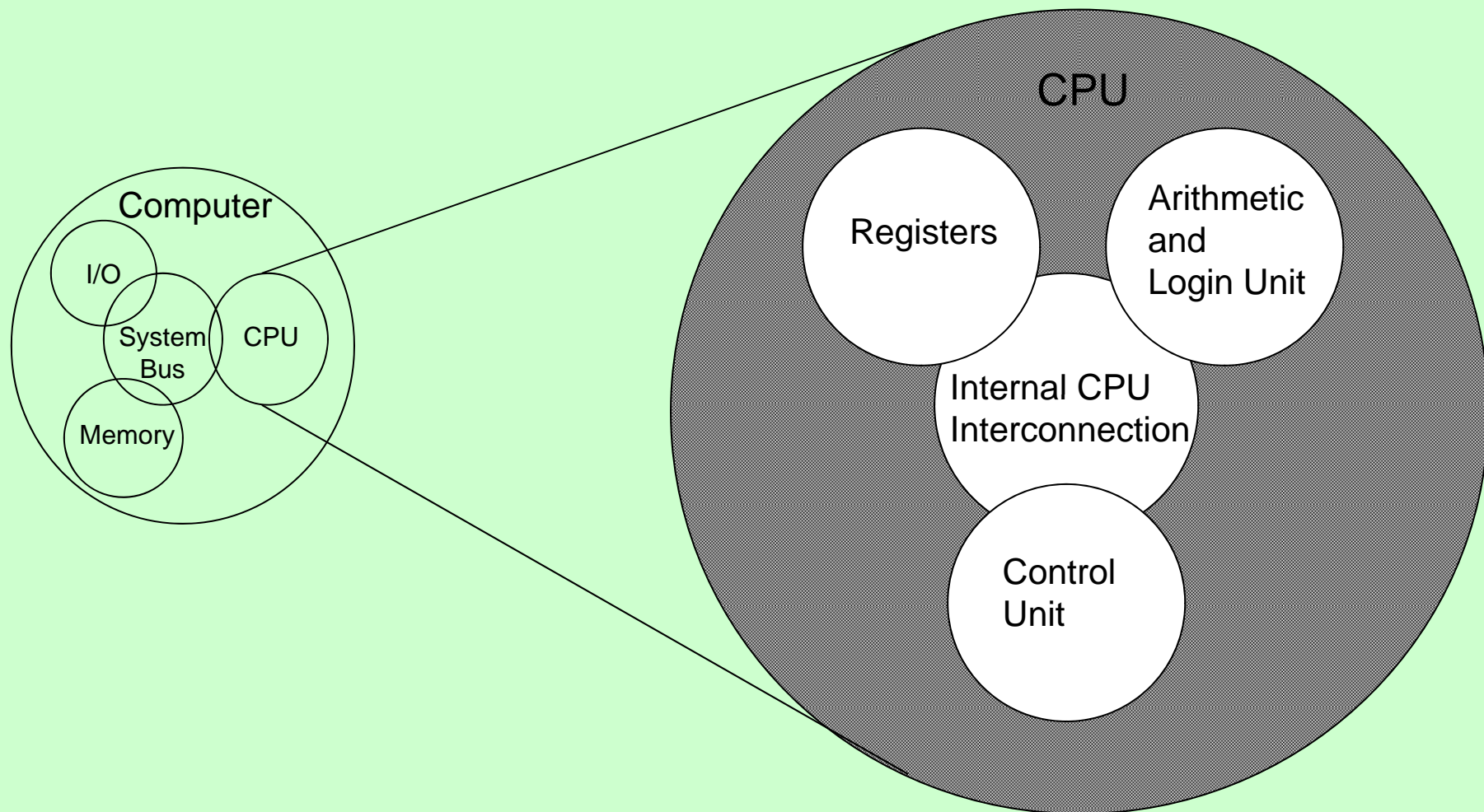
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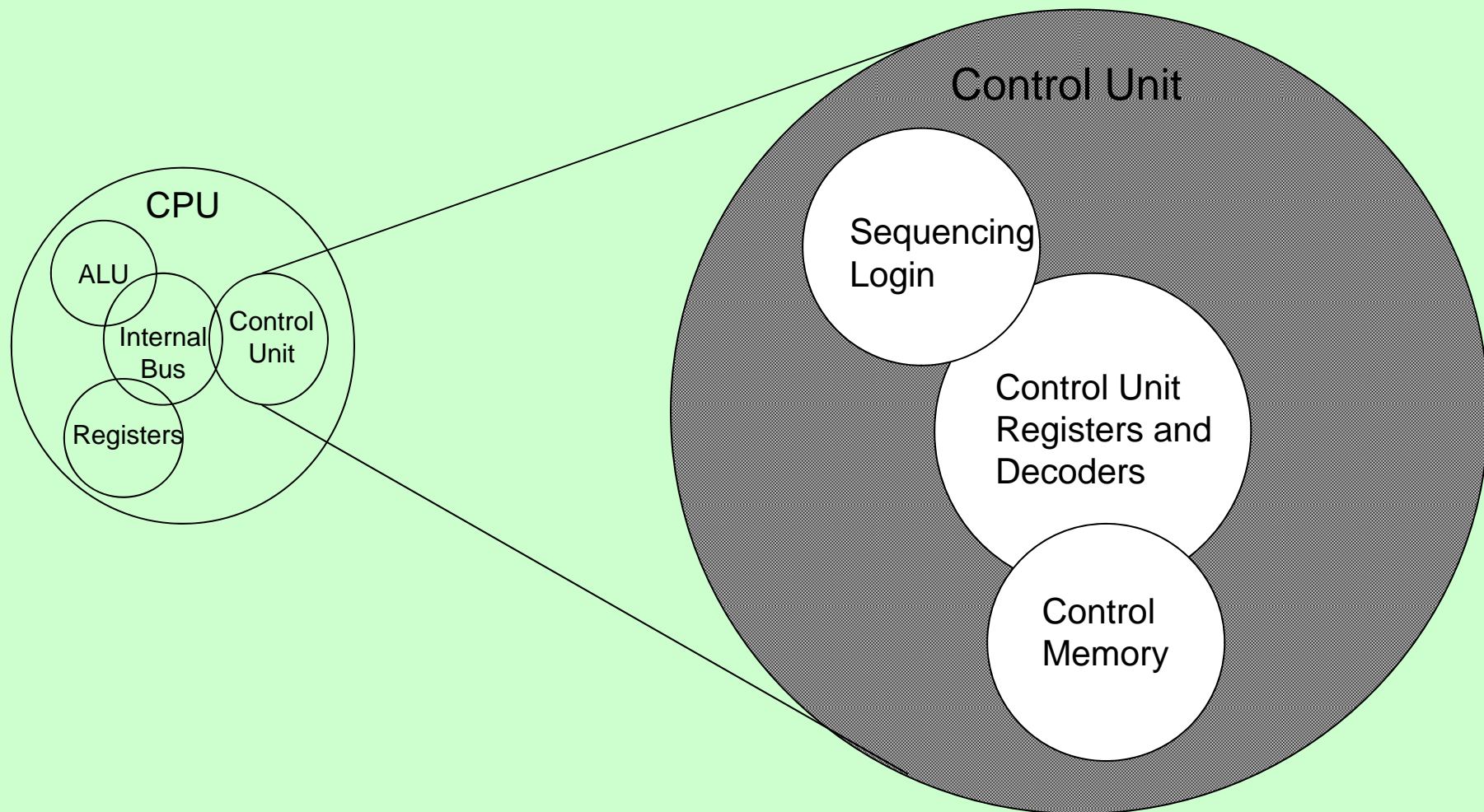
# Structure - Top Level



# Structure - The CPU



# Structure - The Control Unit



## Outline of the Book (1)

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- Computer Evolution and Performance
- Computer Interconnection Structures
- Internal Memory
- External Memory
- Input/Output
- Operating Systems Support
- Computer Arithmetic
- Instruction Sets

## Outline of the Book (2)

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- CPU Structure and Function
- Reduced Instruction Set Computers
- Superscalar Processors
- Control Unit Operation
- Microprogrammed Control
- Multiprocessors and Vector Processing
- Digital Logic (Appendix)

# Internet Resources

## - Web site for book

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- <http://WilliamStallings.com/COA/COA7e.html>
  - links to sites of interest
  - links to sites for courses that use the book
  - errata list for book
  - information on other books by W. Stallings
- <http://WilliamStallings.com/StudentSupport.html>
  - Math
  - How-to
  - Research resources
  - Misc



# Internet Resources

## - Web sites to look for

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- WWW Computer Architecture Home Page
- CPU Info Center
- Processor Emporium
- ACM Special Interest Group on Computer Architecture
- IEEE Technical Committee on Computer Architecture
- Intel Technology Journal
- Manufacturer's sites
  - Intel, IBM, etc.

# Internet Resources

## - Usenet News Groups

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- comp.arch
- comp.arch.arithmetic
- comp.arch.storage
- comp.parallel