William Stallings
Computer Organization and Architecture

Chapter 1
Introduction

Architecture & Organization 1

- ⌘ 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

- 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
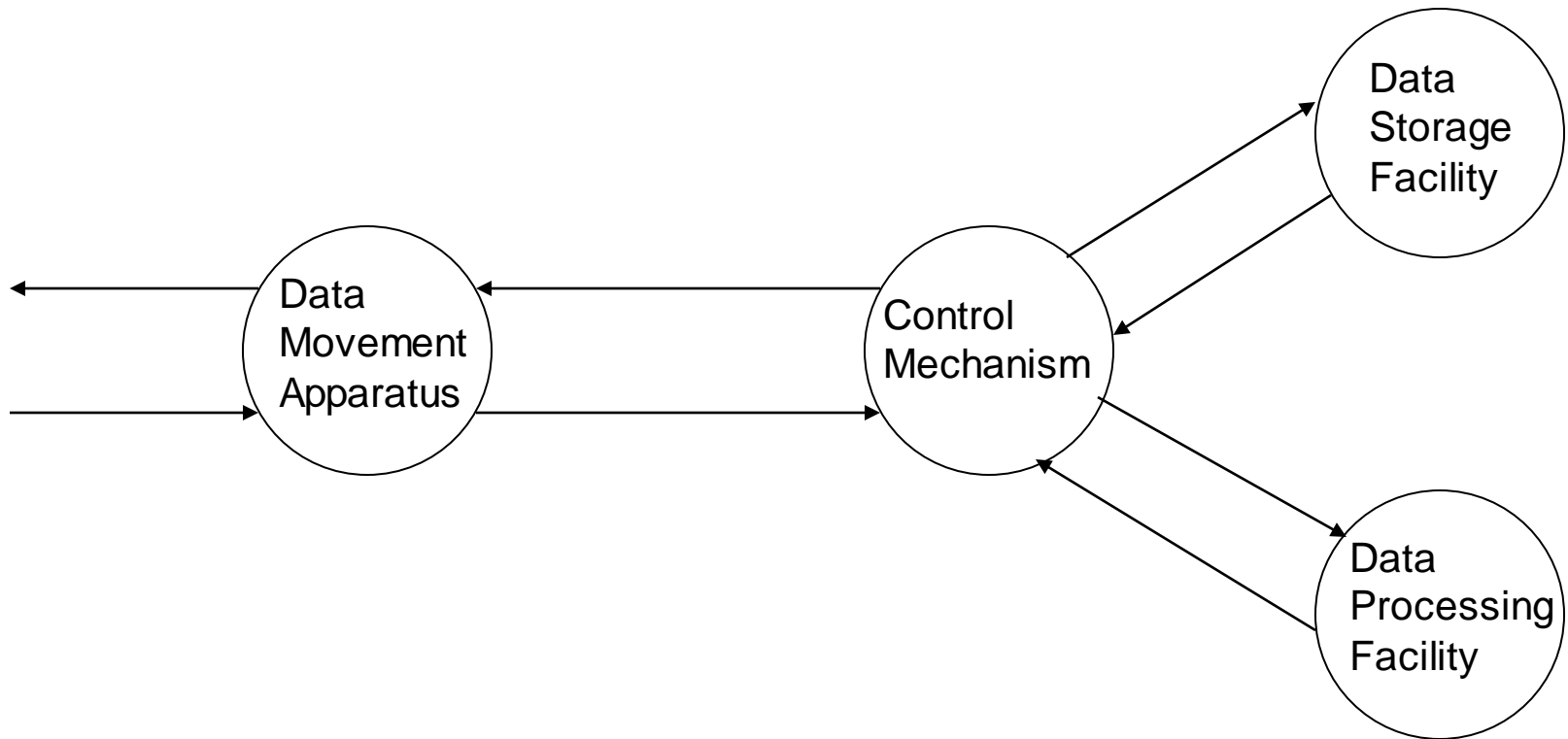
Function

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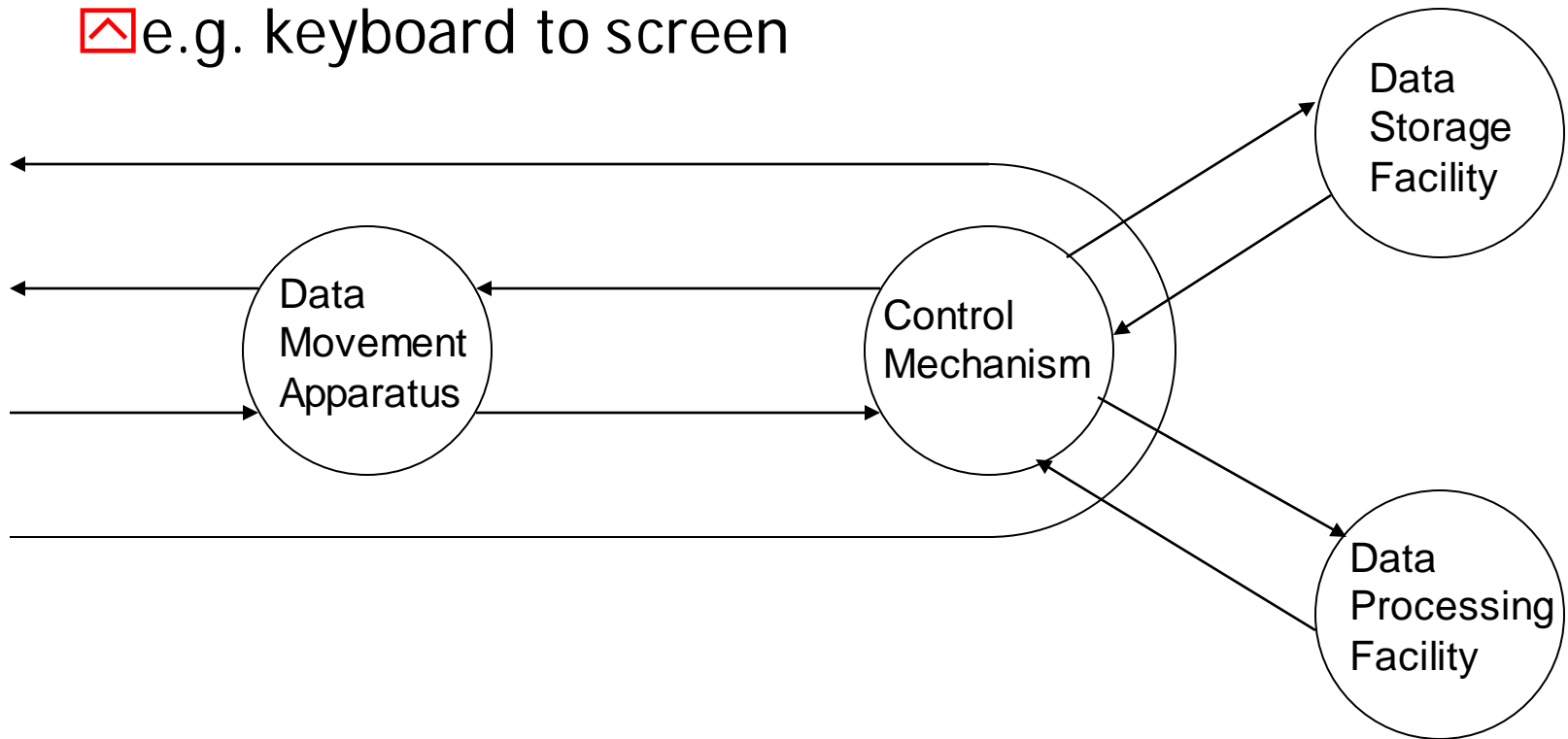- Data storage
- Data movement
- Control

Functional view

⌘ Functional view of a computer
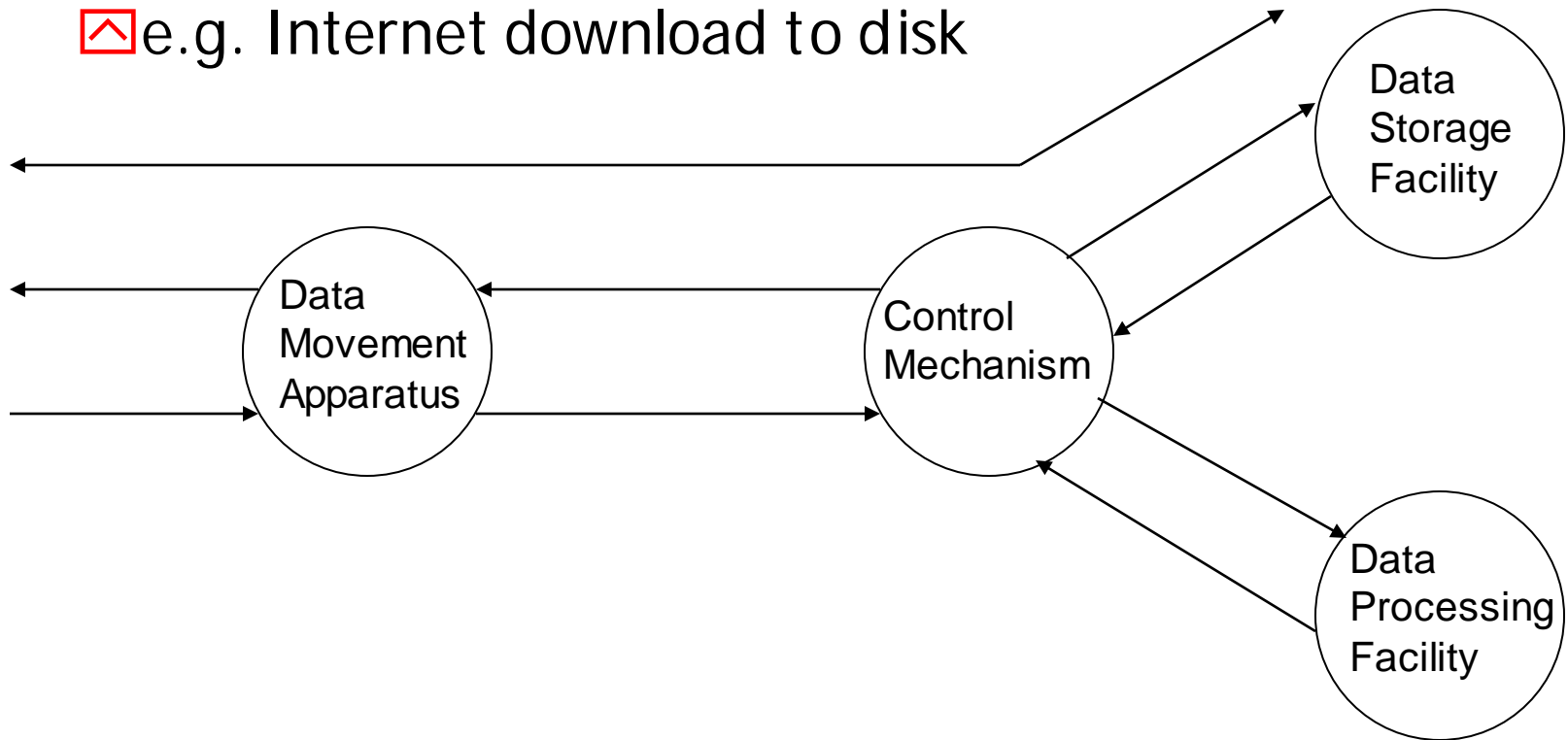
Operations (1)

⌘ Data movement

◇ e.g. keyboard to screen
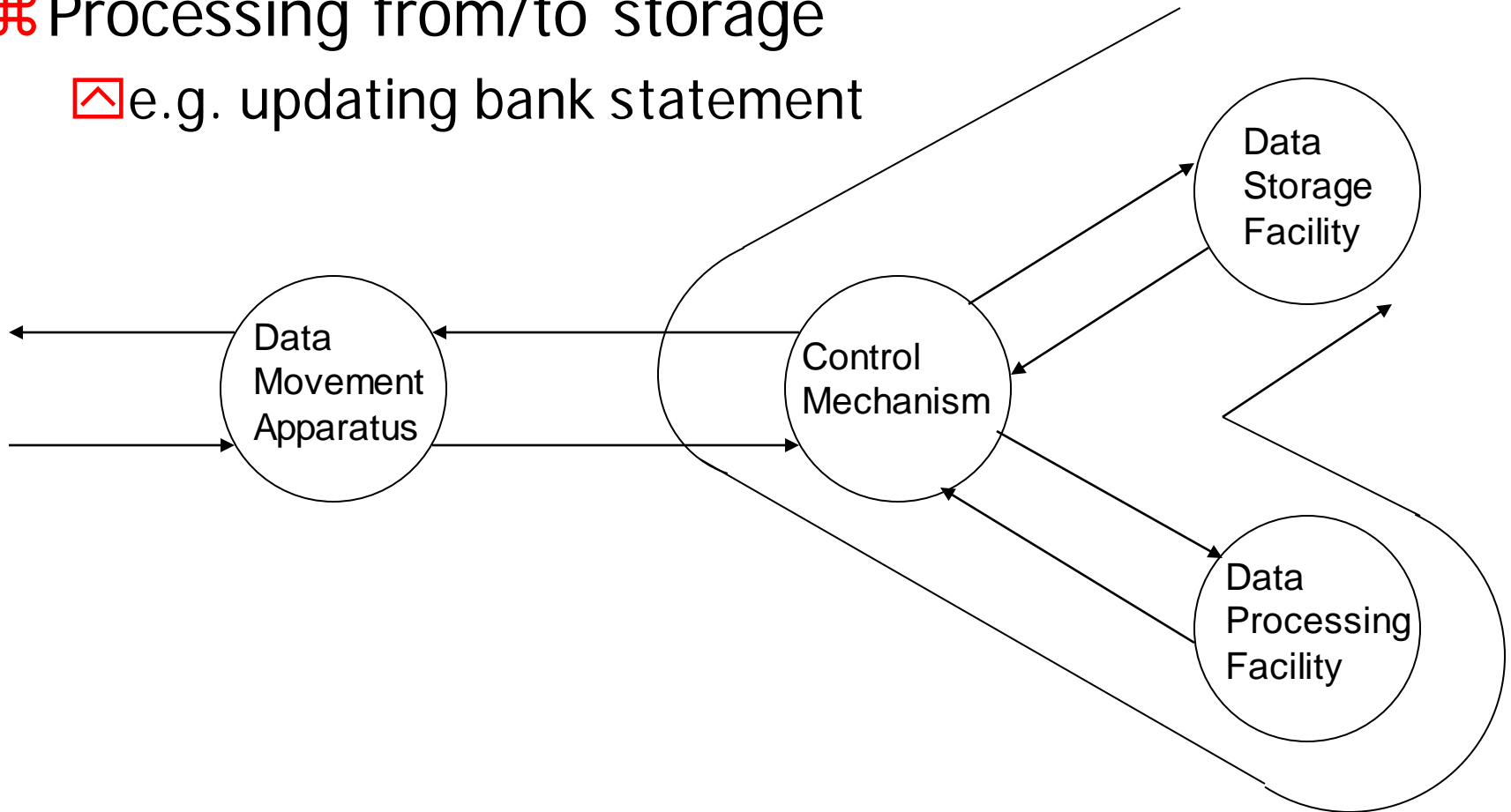
Operations (2)

- ⌘ Storage
  - ⌂ e.g. Internet download to disk

Operation (3)
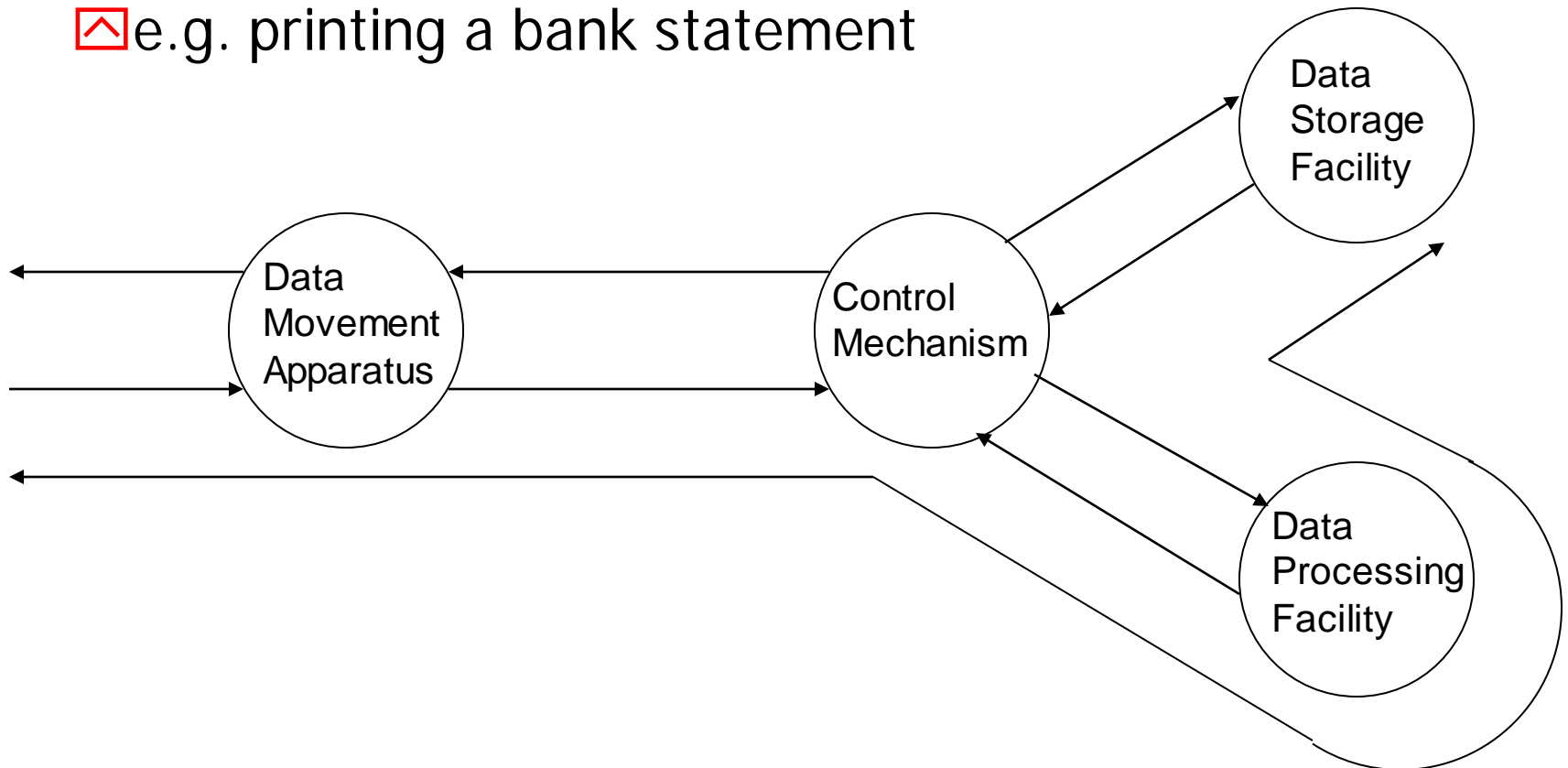
⌘ Processing from/to storage
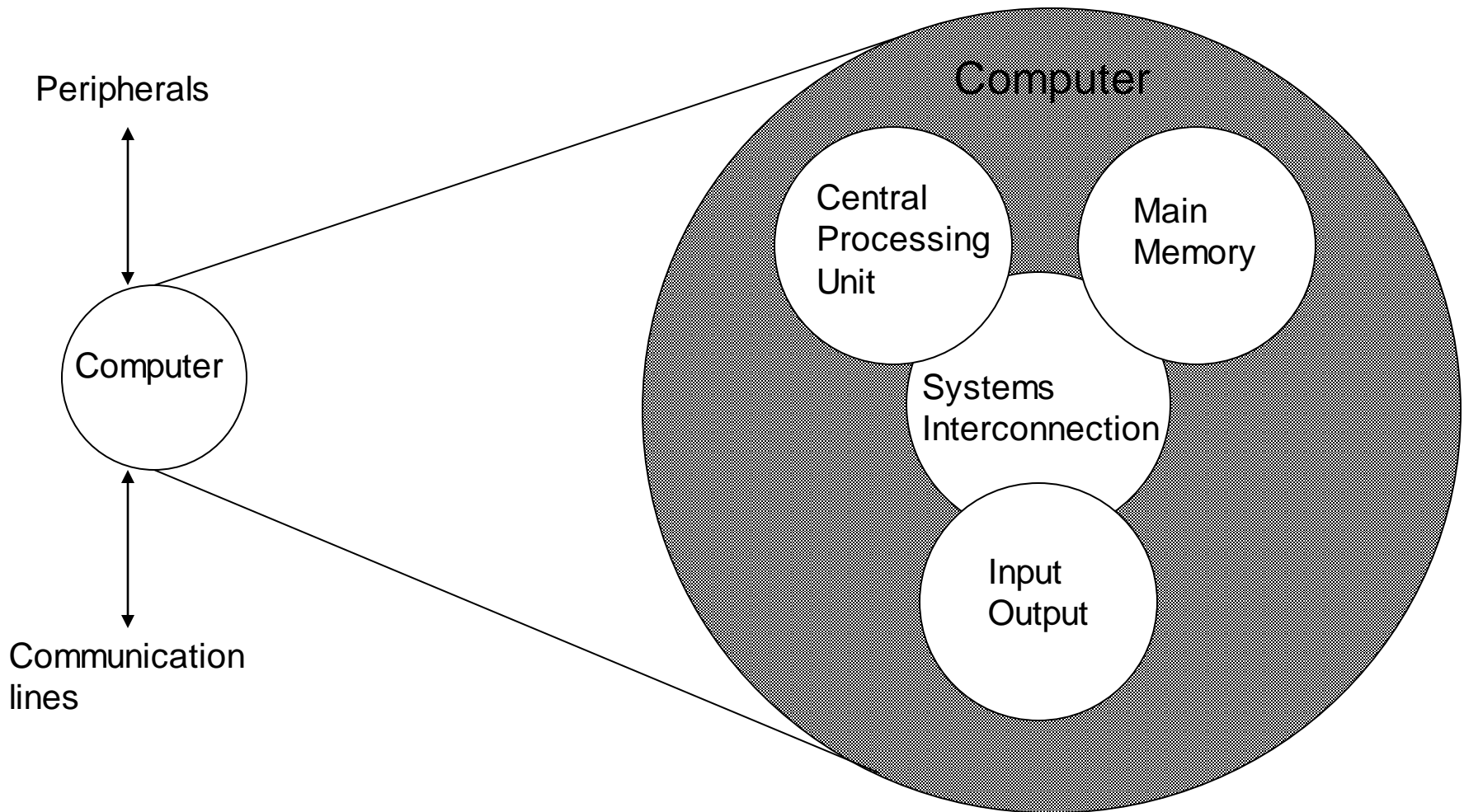
⬠ e.g. updating bank statement

Operation (4)

⌘ Processing from storage to I/O
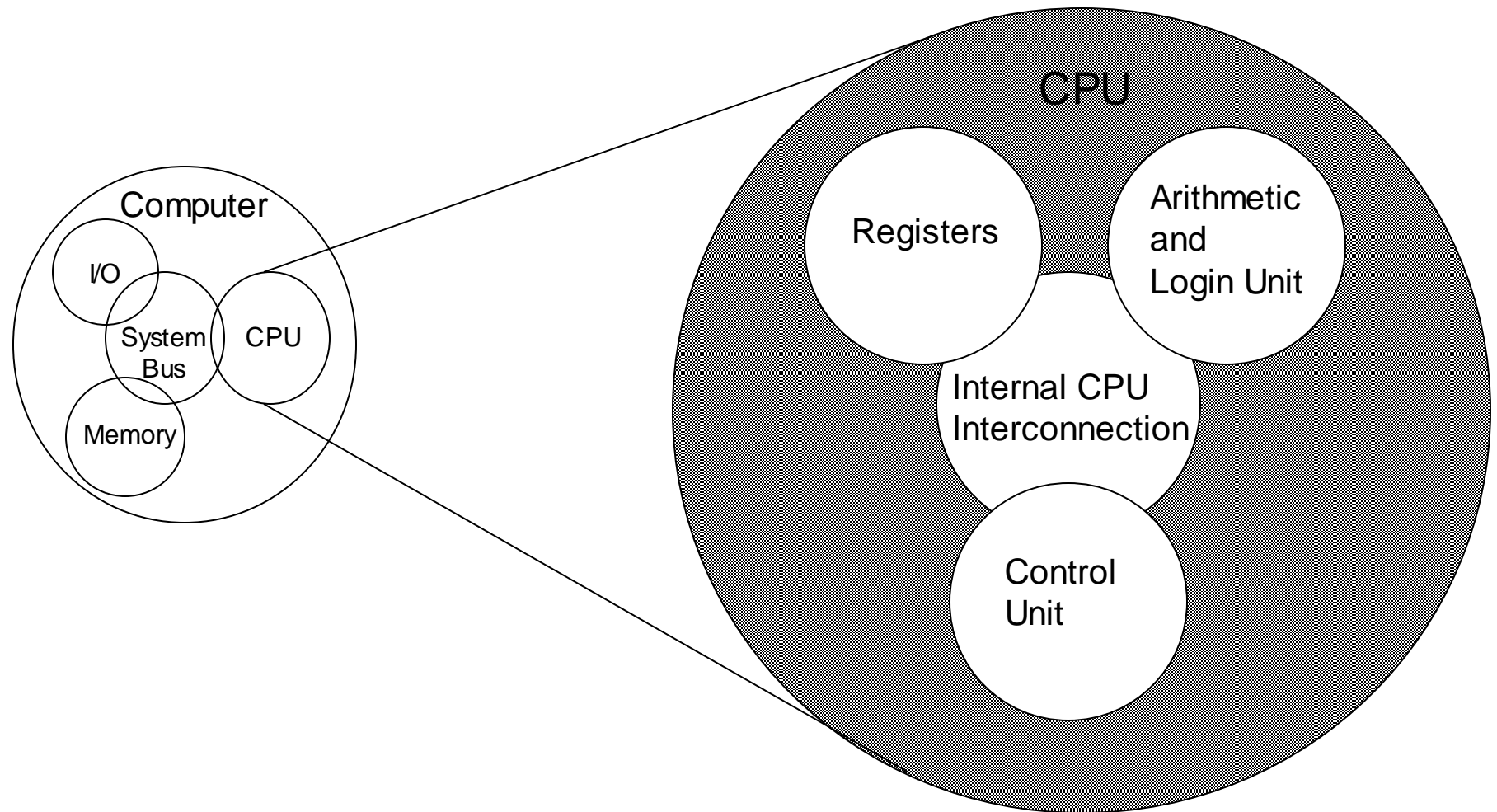
⌃ e.g. printing a bank statement

Structure - Top Level

Peripherals

Computer

Communication
lines

Computer

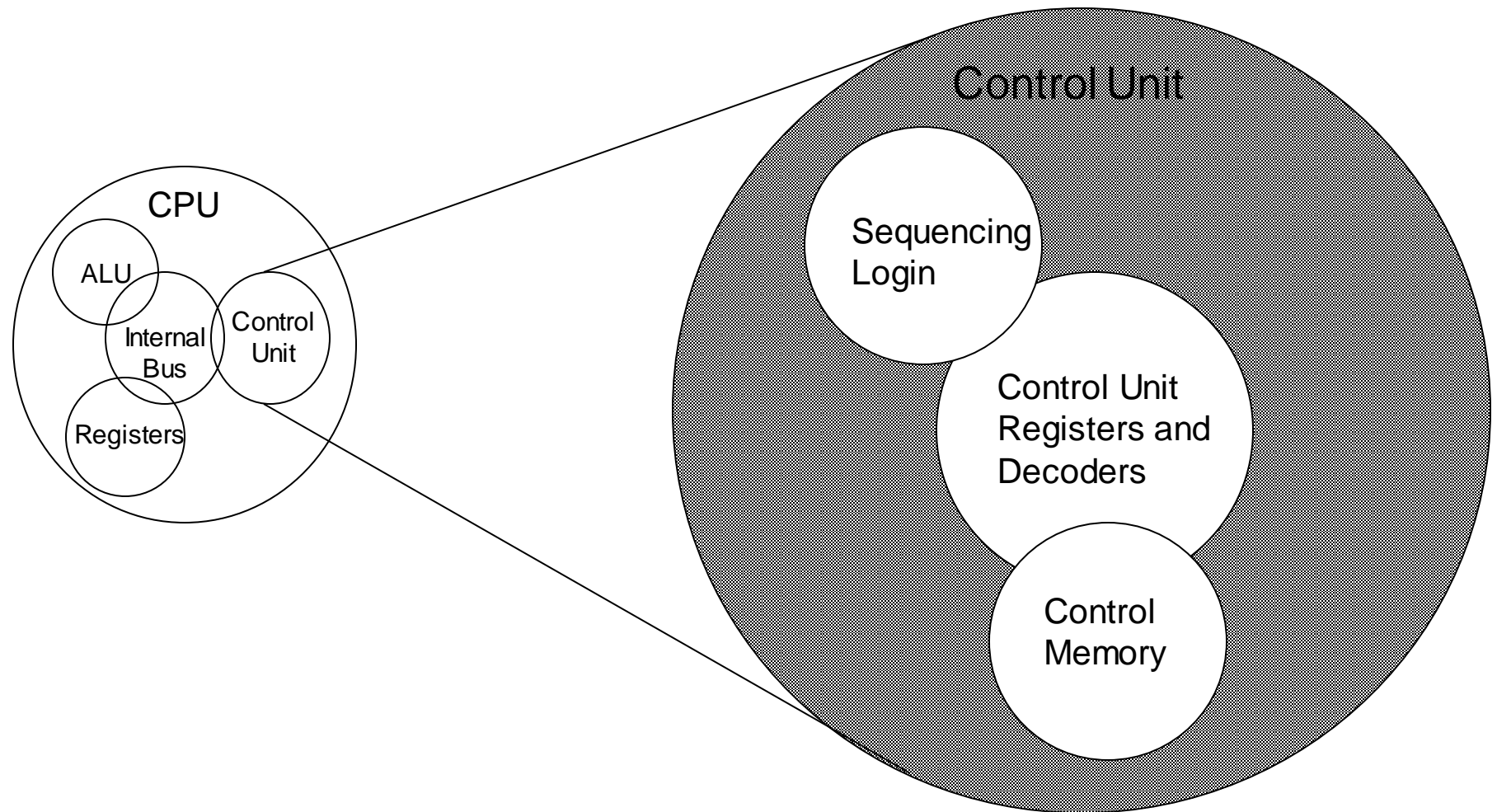Central
Processing
Unit

Main
Memory

Systems
Interconnection

Input
Output

Structure - The CPU

Structure - The Control Unit

Outline of the Book (1)

- 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)

- 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

⌘ http://www.shore.net/~ws/COA5e.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

Internet Resources
- Web sites to look for

⌘ WWW Computer Architecture Home Page

⌘ CPU Info Center

⌘ 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

- ⌘ comp.arch
- ⌘ comp.arch.arithmetic
- ⌘ comp.arch.storage