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
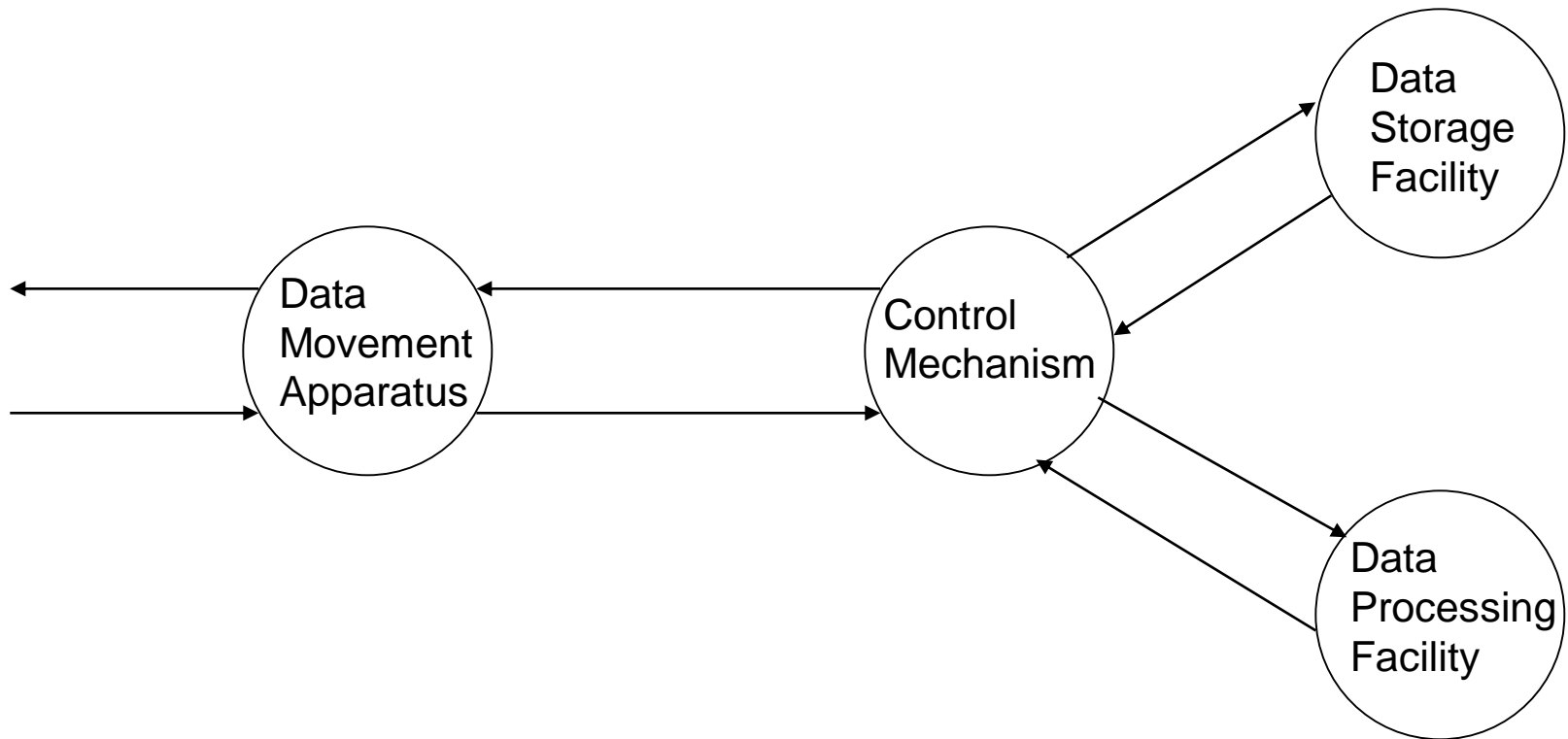
- ⌘ All computer functions are:
  - ☒ Data processing
  - ☒ Data storage
  - ☒ Data movement
  - ☒ Control
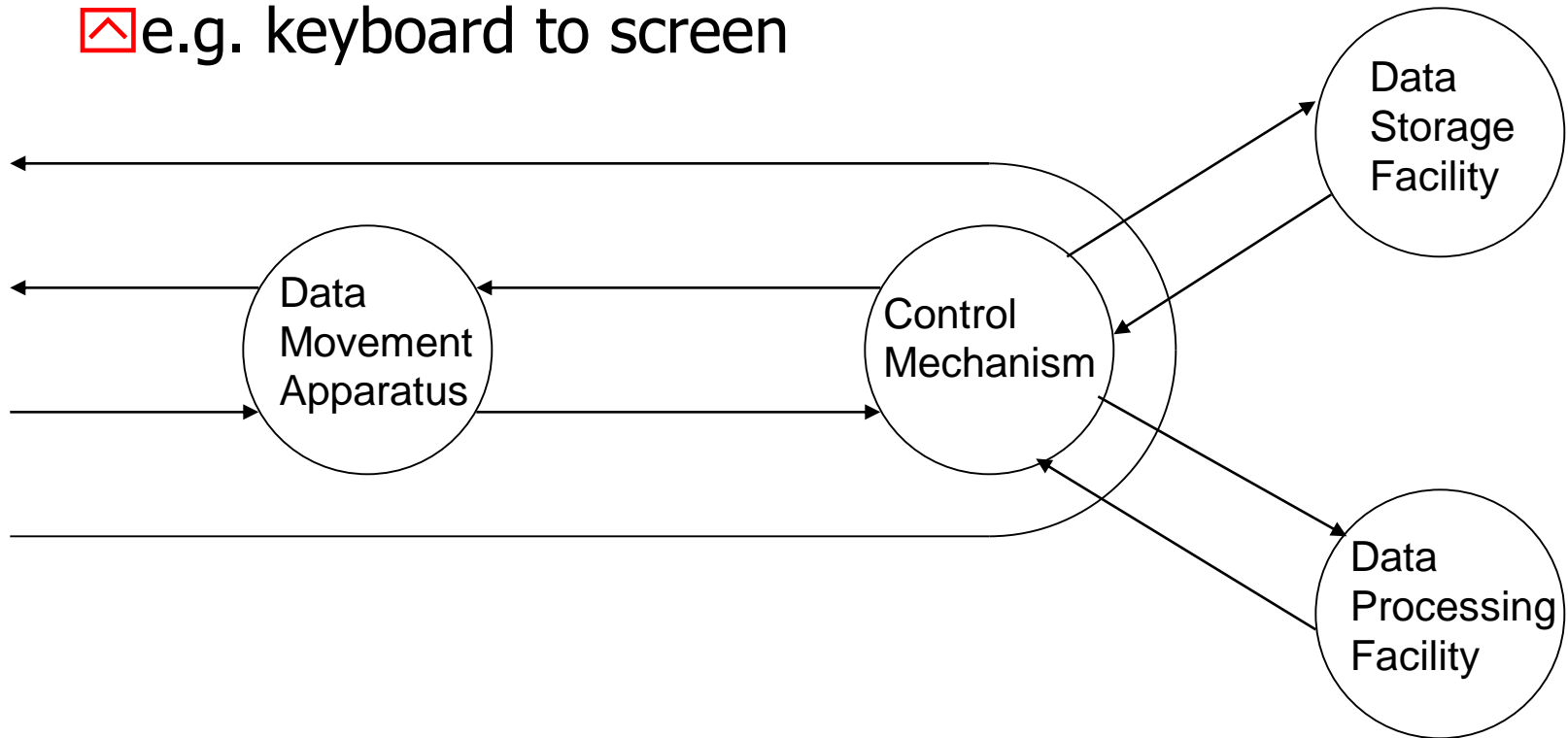
Functional view

 Functional view of a computer

Operations (1)

⌘ Data movement

▱ e.g. keyboard to screen

Operations (2)

⌘ Storage

◁ e.g. Internet download to disk
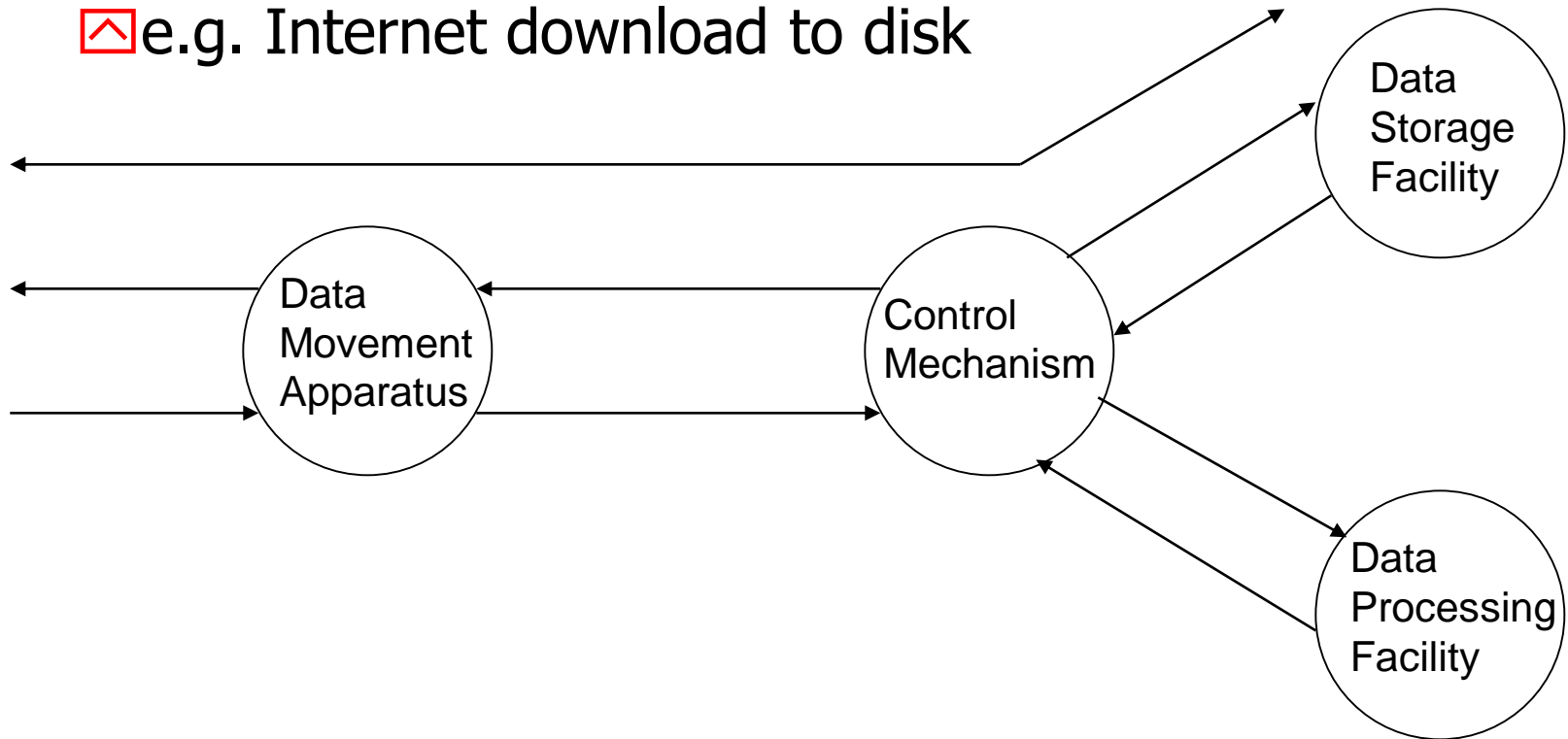
Operation (3)

⌘ Processing from/to storage

◻ e.g. updating bank statement
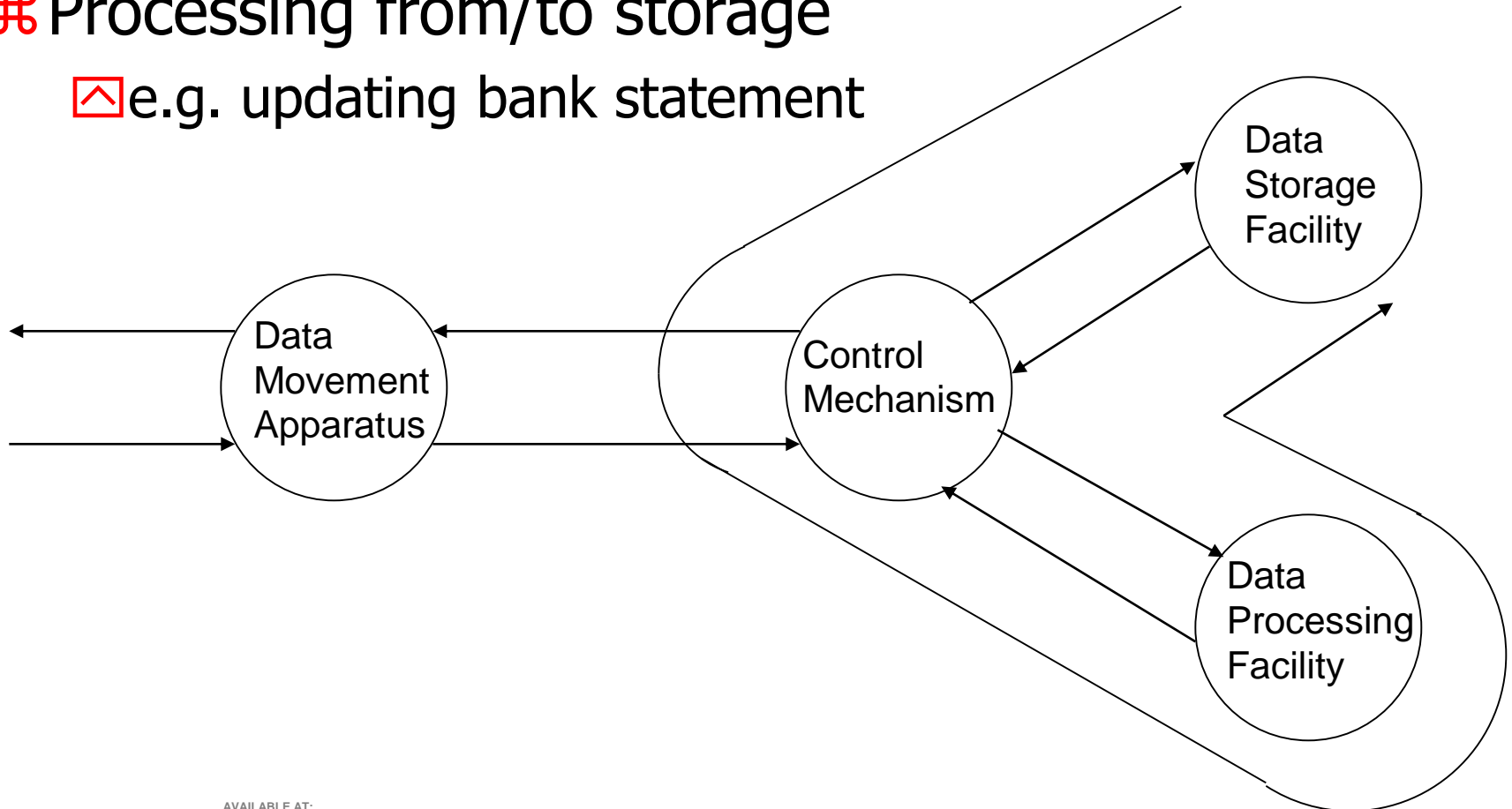
Operation (4)

⌘ Processing from storage to I/O
  ⌂ e.g. printing a bank statement
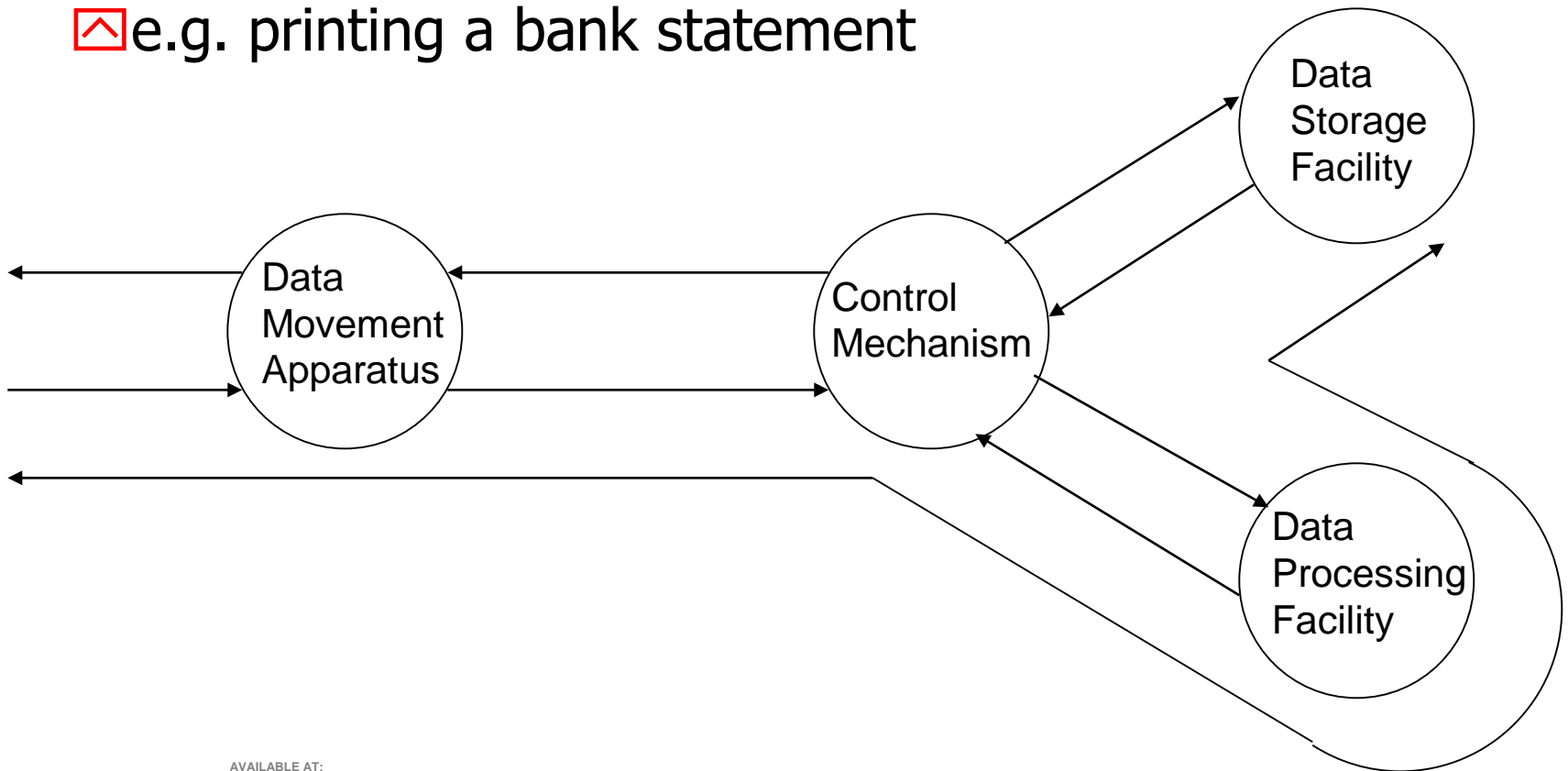
Structure - Top Level

Peripherals

Computer

Communication
lines

Computer

Central
Processing
Unit

Main
Memory

Systems
Interconnection

Input
Output
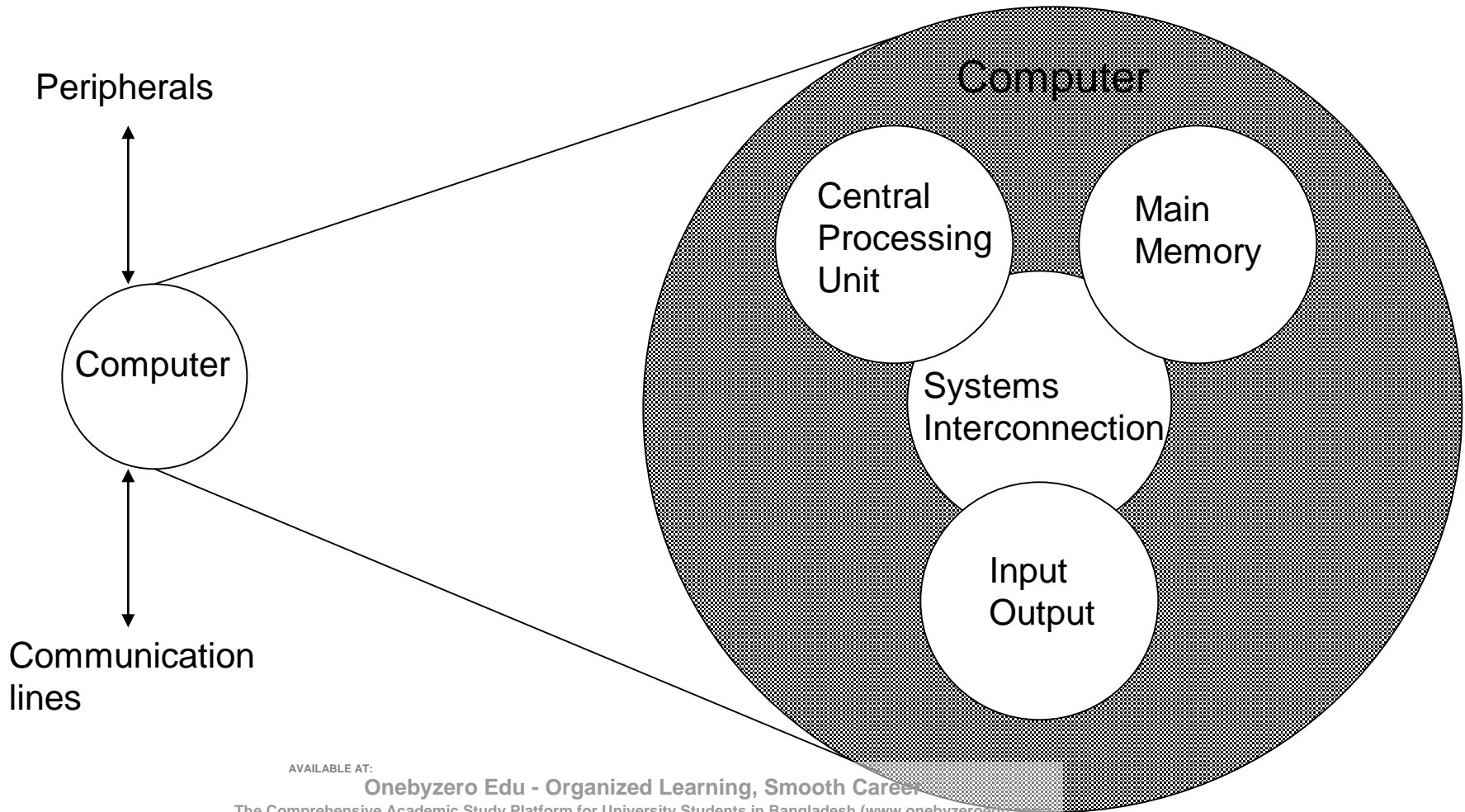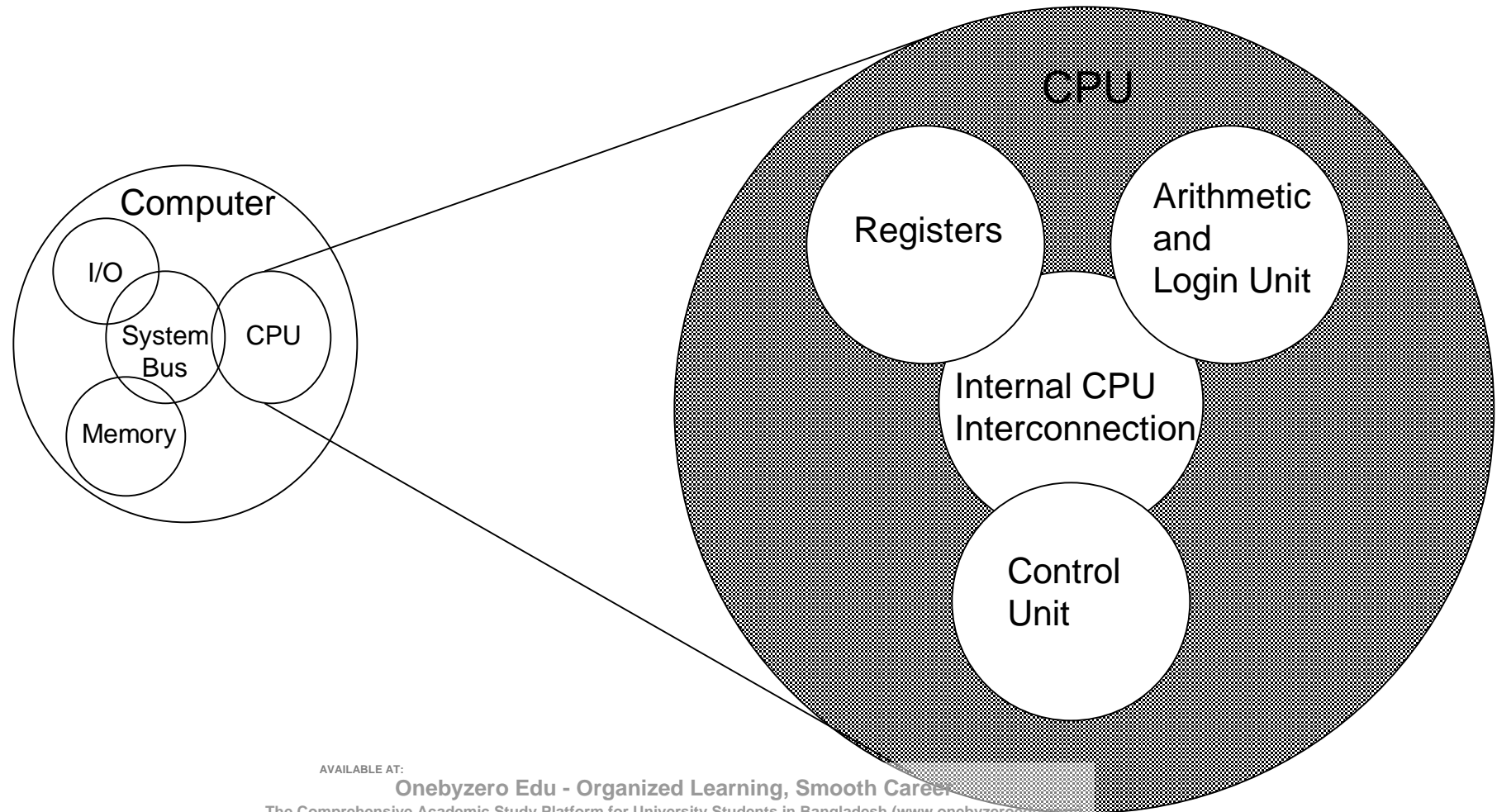
Structure - The CPU

Structure - The Control Unit
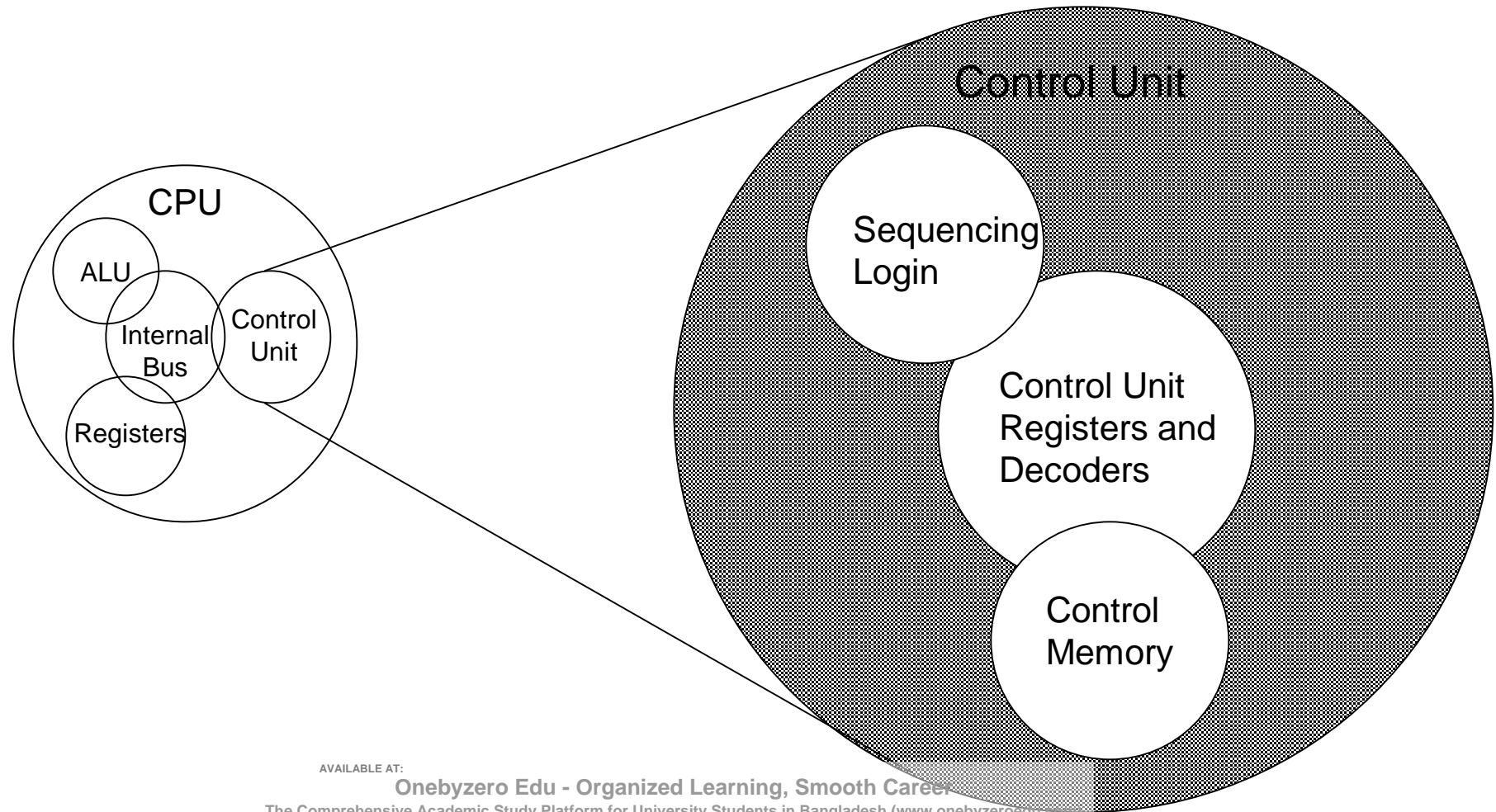
Outline of the Book (1)

- 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 Procesors
- ⌘ 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