

William Stallings
Computer Organization
and Architecture
7th Edition

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

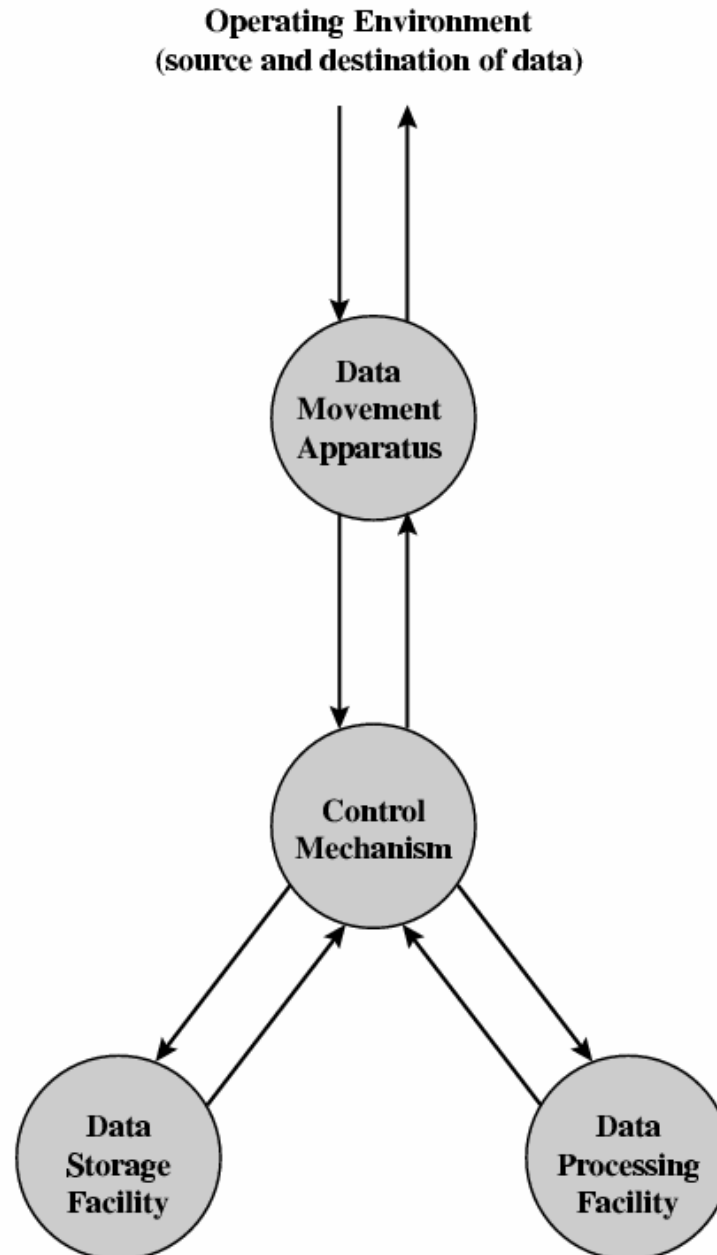


Function

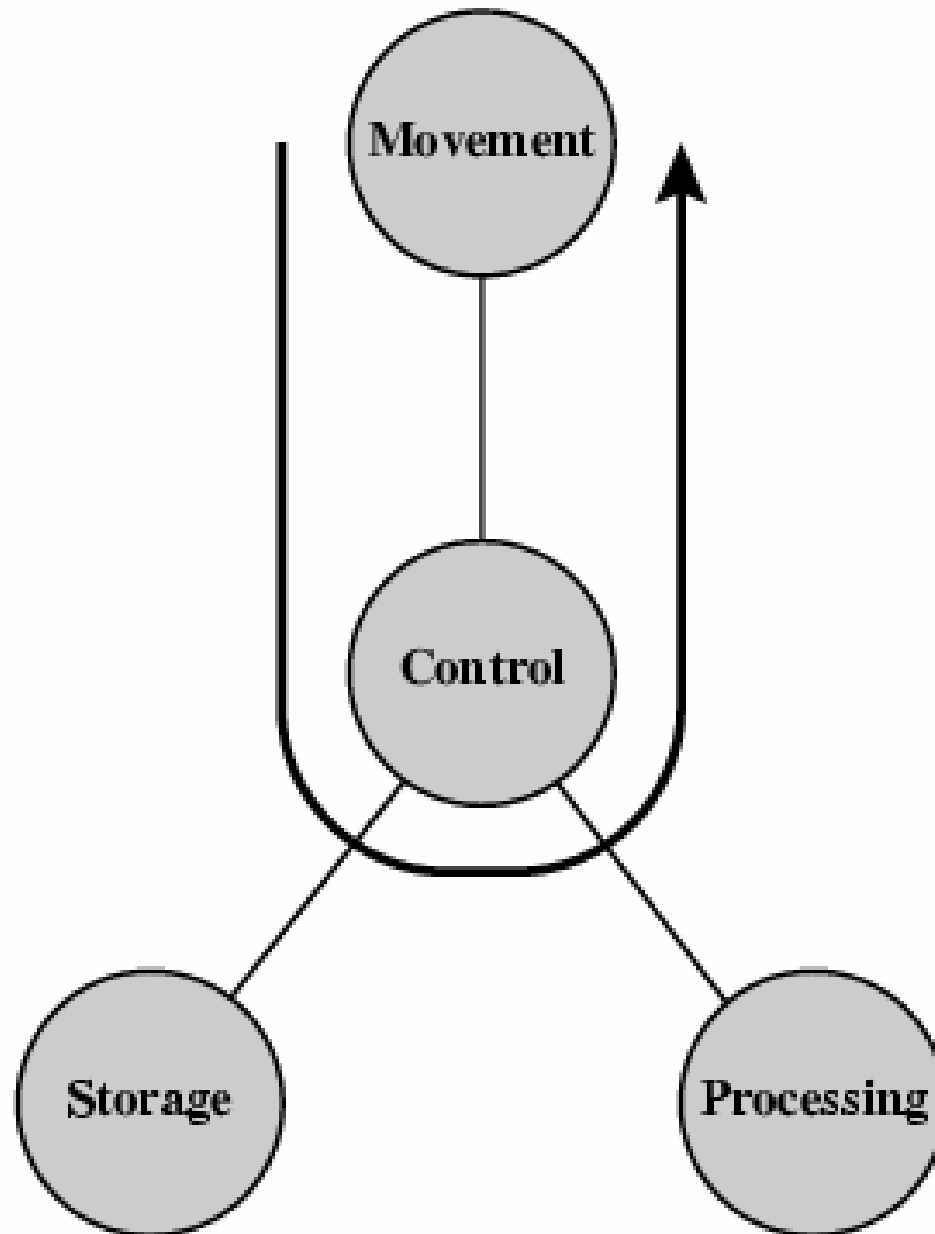
- All computer functions are:
 - Data processing
 - Data storage
 - Data movement
 - Control



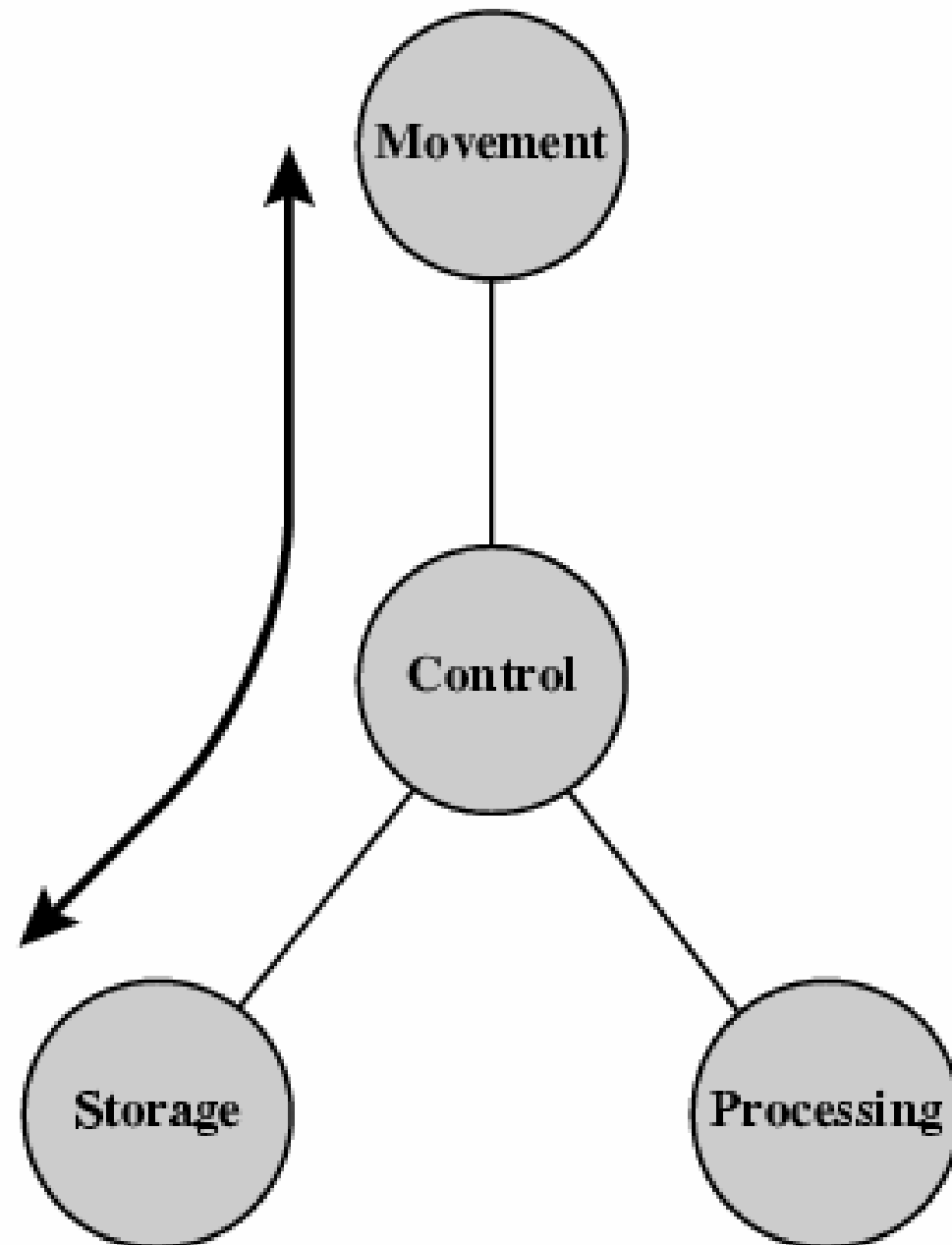
Functional View



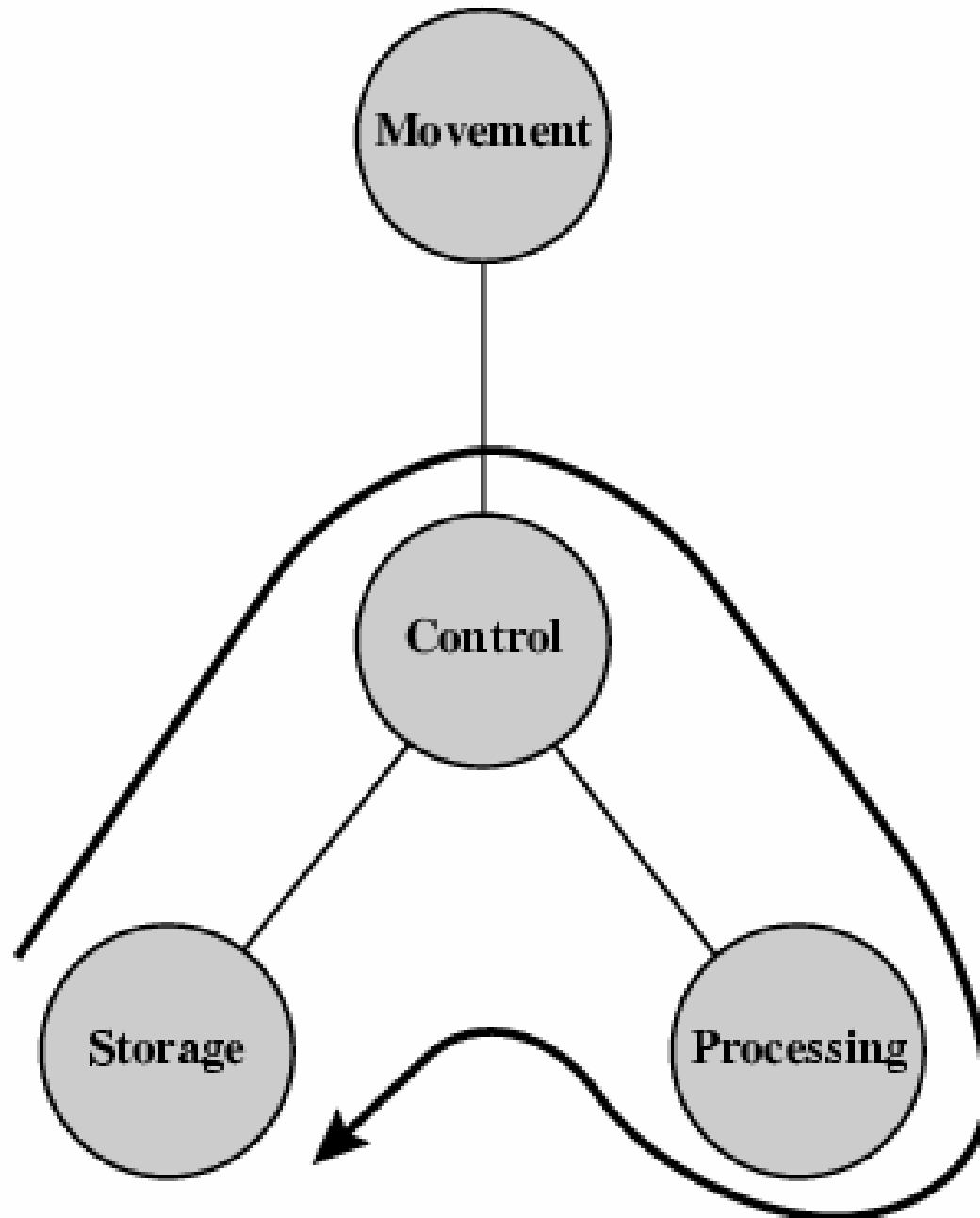
Operations (a) Data movement



Operations (b) Storage

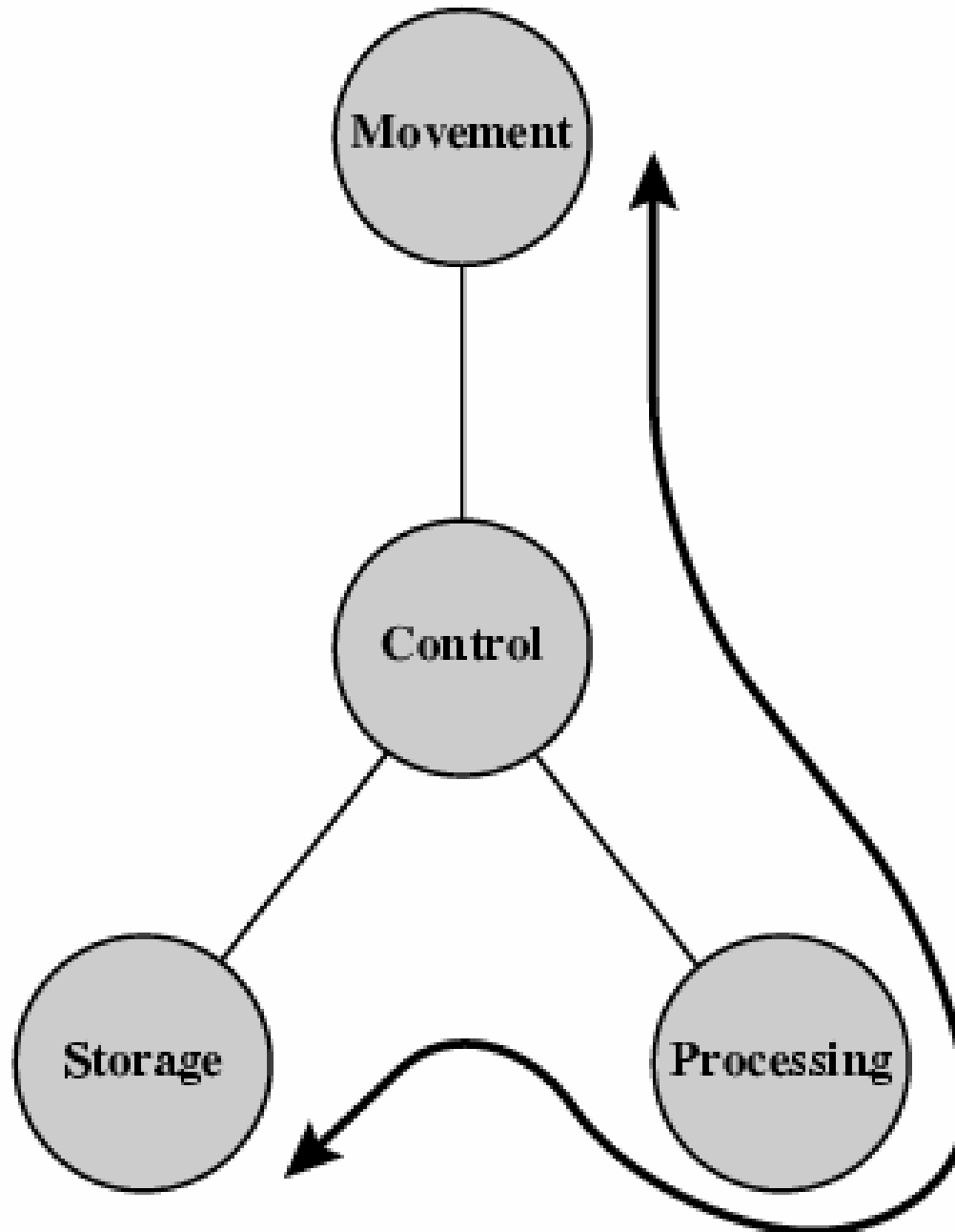


Operation (c) Processing from/to storage

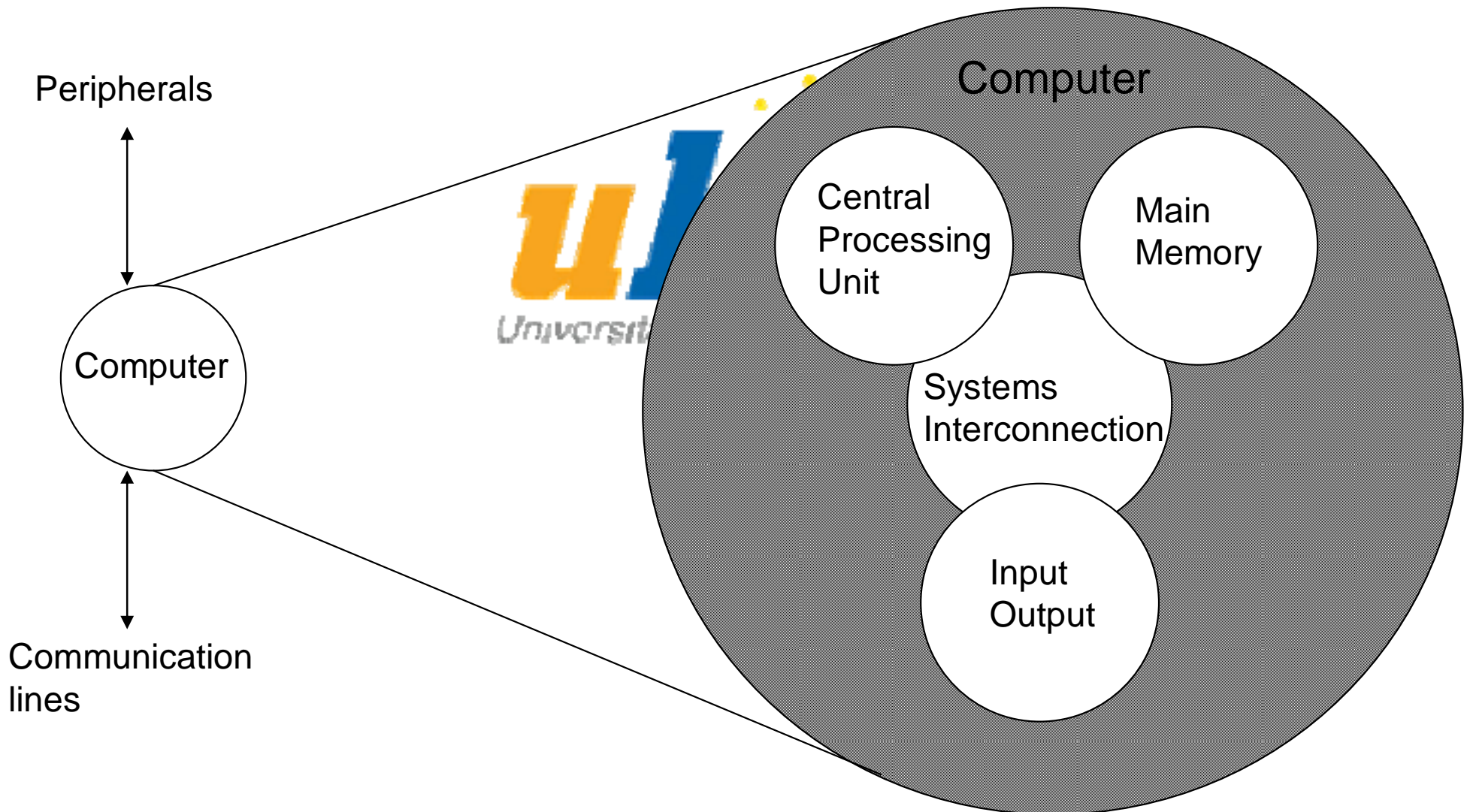


Operation (d)

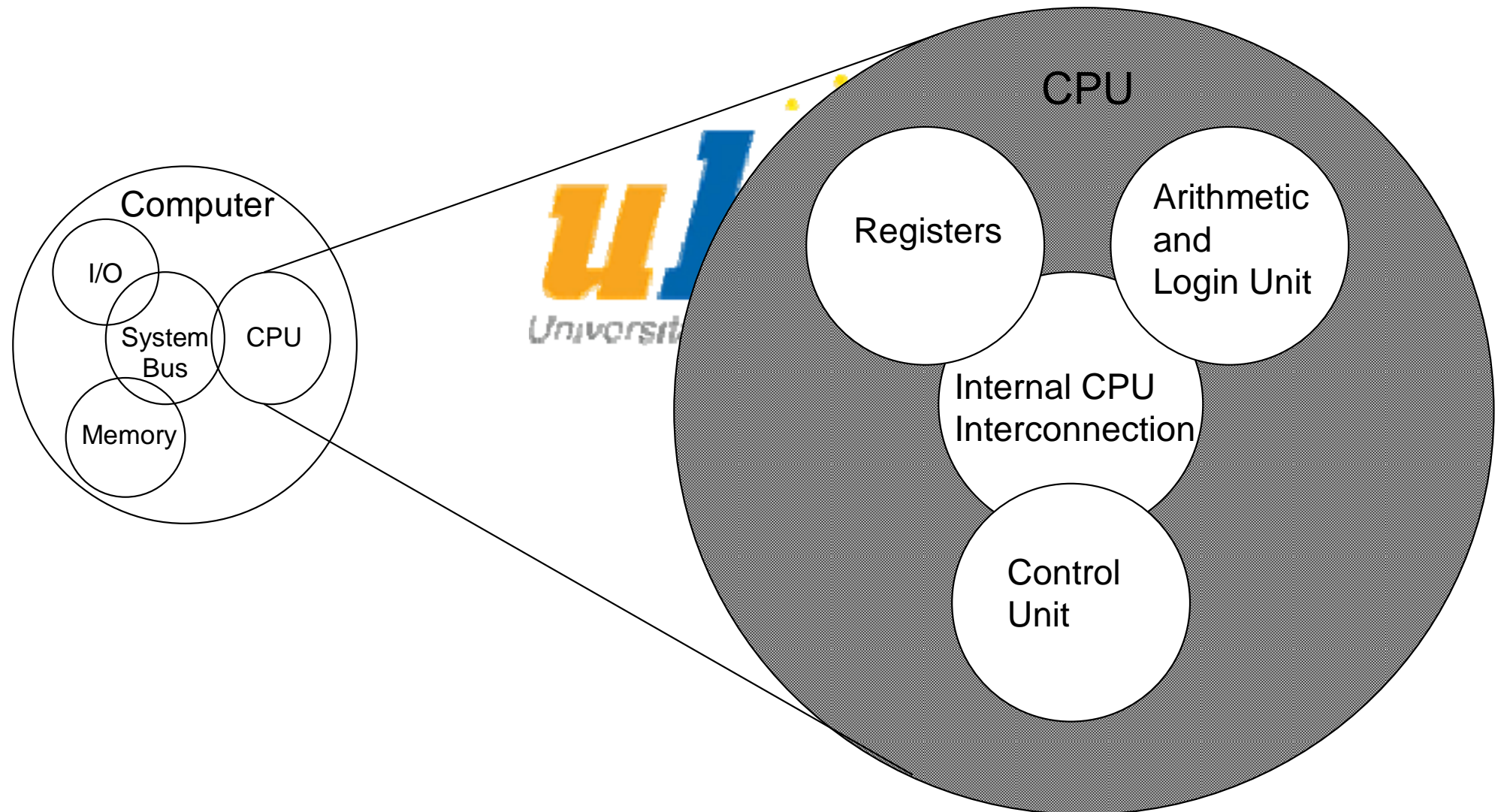
Processing from storage to I/O



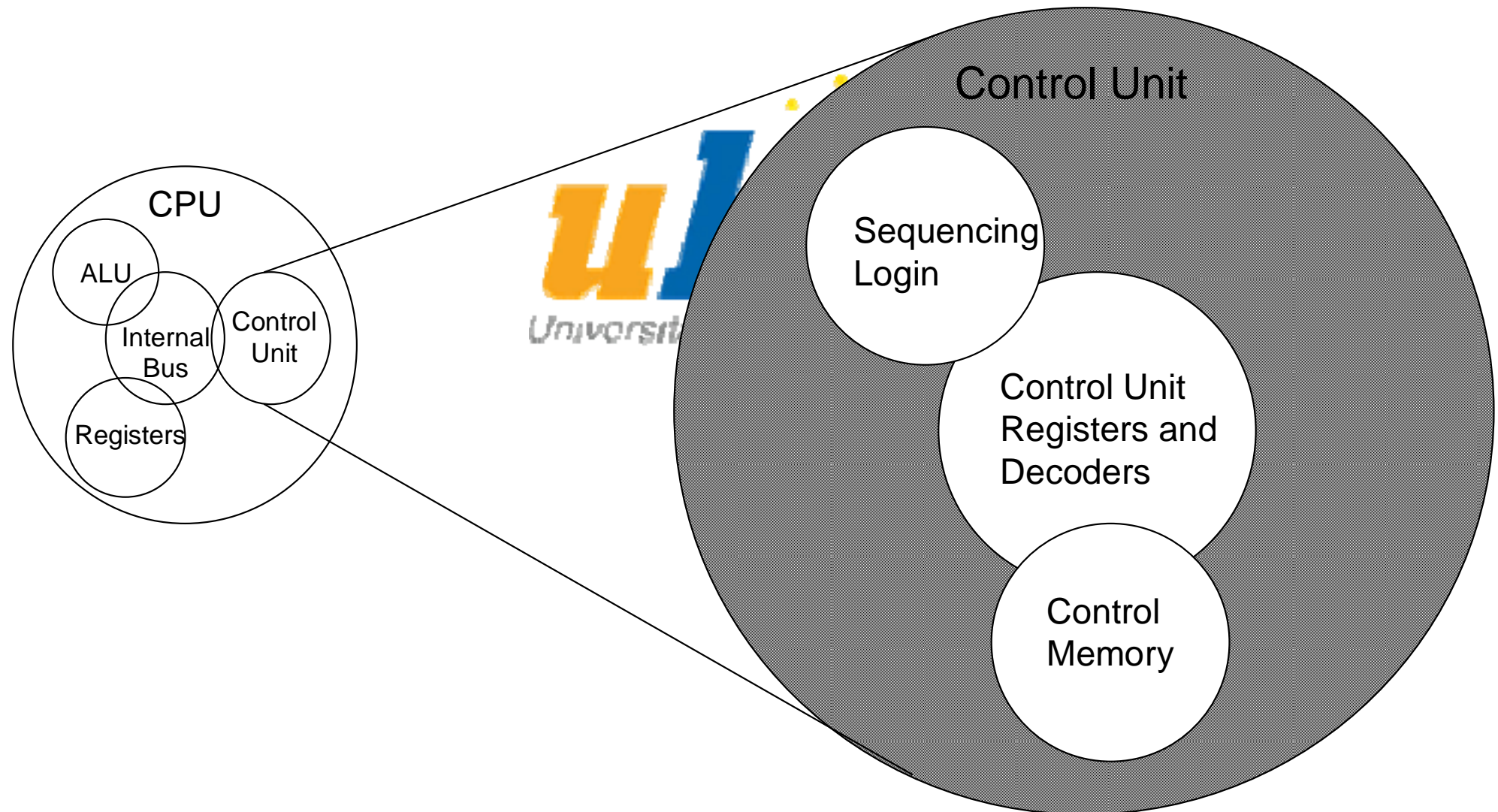
Structure - Top Level



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://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

- 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

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

