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Introduction to Computer Organization

Ms. Ashwini Gulhane

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Chapter Outline

- System Organization
- CPU Organization
- Memory Organization and Interfacing
- I/O Organization and Interfacing
- Relatively Simple Computer
- 8085-based Computer

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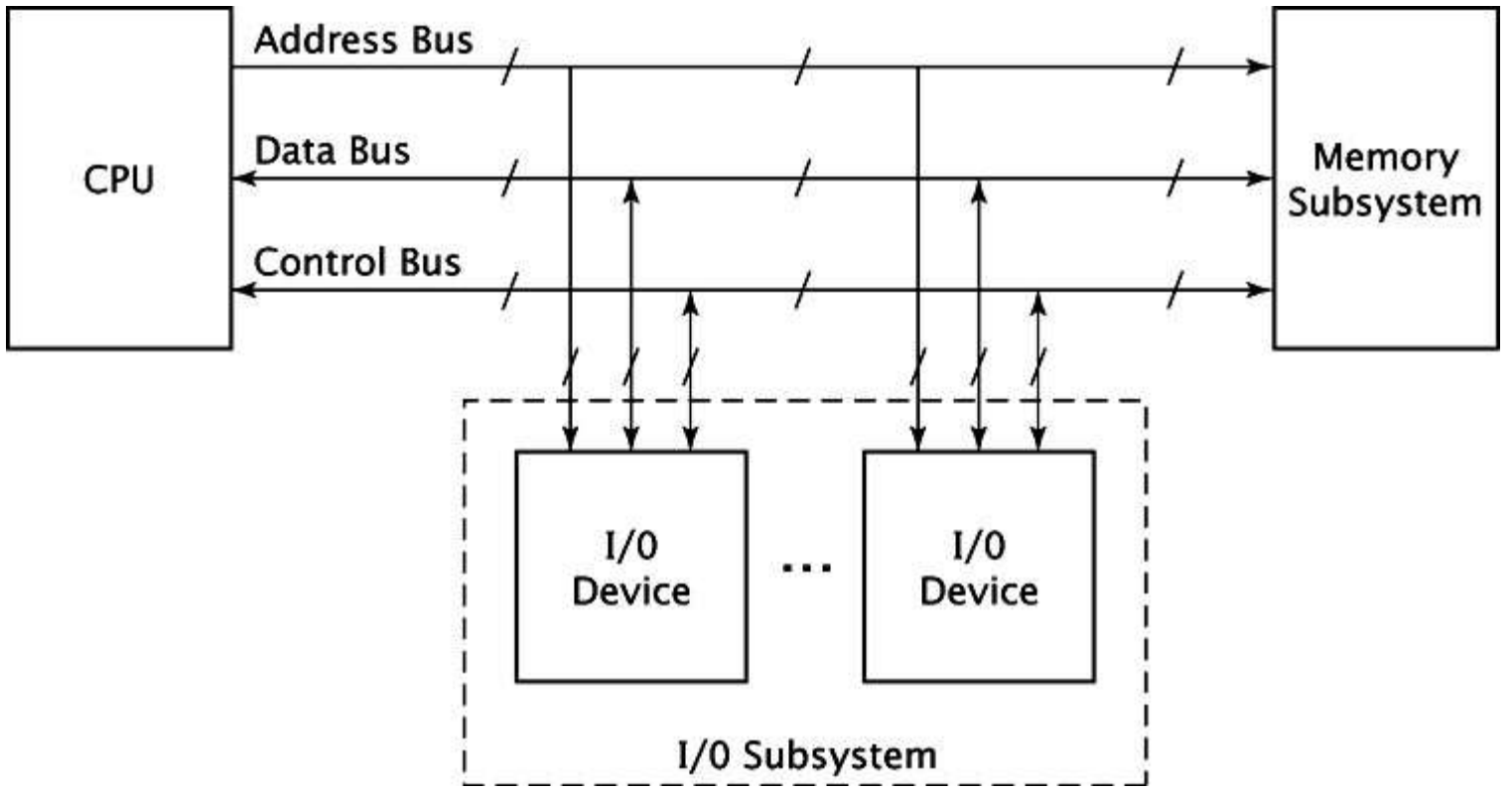
Basic Computer Organization



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System Components

- CPU/Microprocessor
- Memory Subsystem
- I/O Subsystem

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System Buses

- Address Bus
- Data Bus
- Control Bus

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Instruction Cycle

- Fetch
- Decode
- Execute

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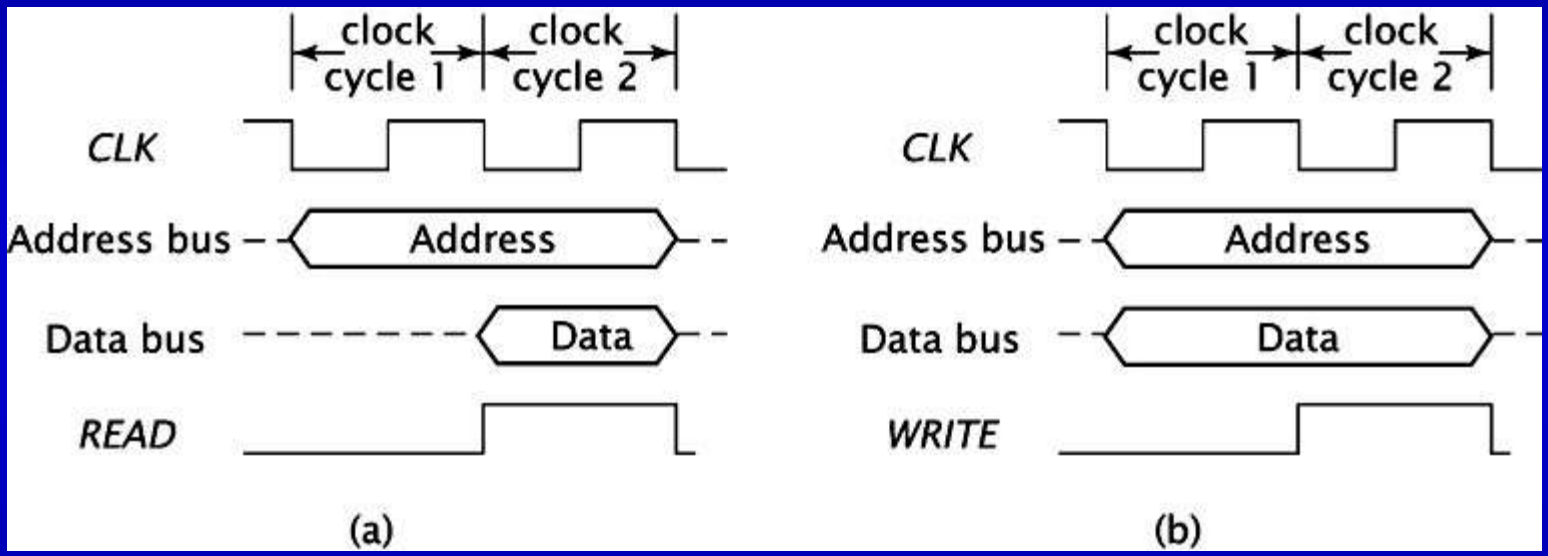
Instruction Fetch



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Types of I/O Organization

- Isolated I/O
- Memory-mapped I/O

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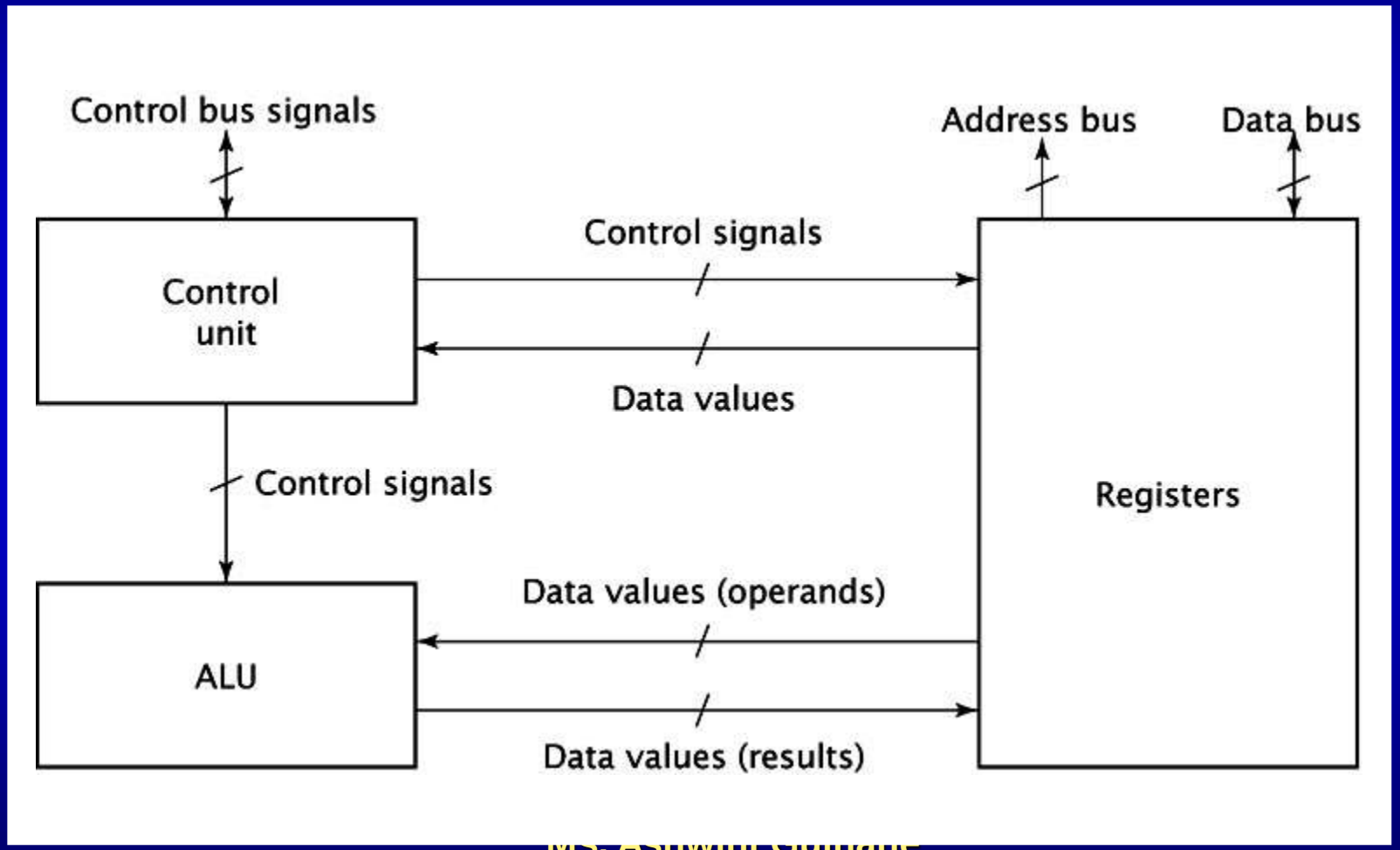
CPU Organization



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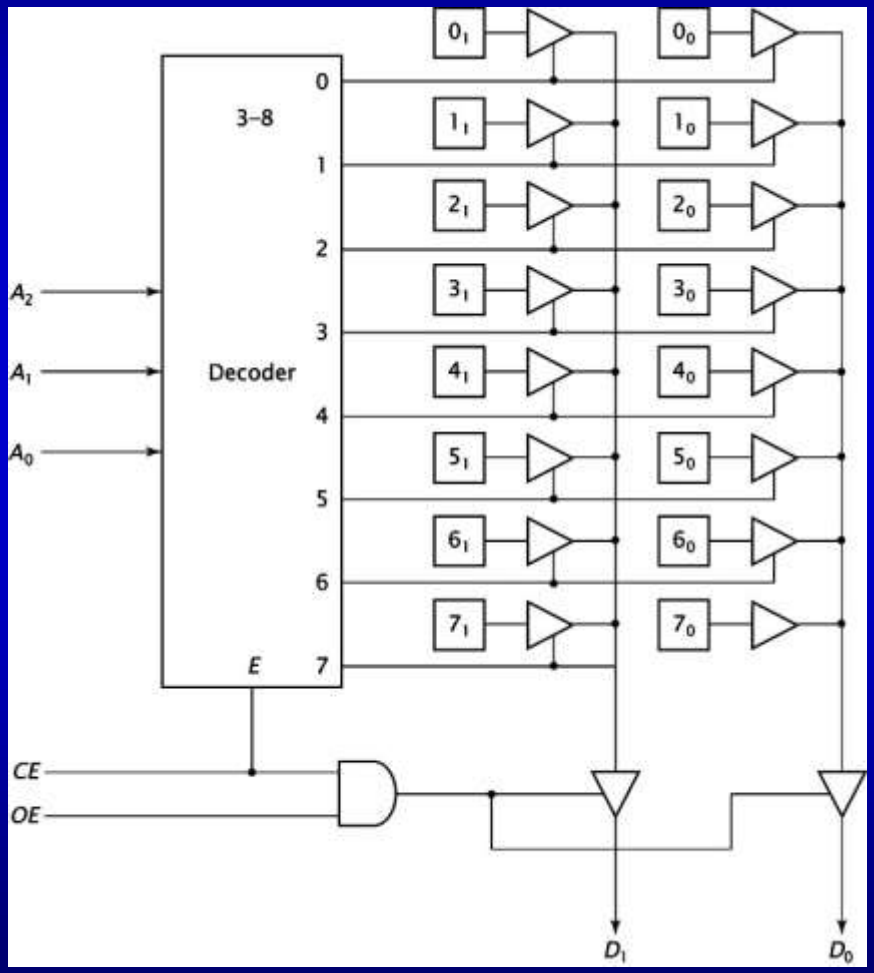
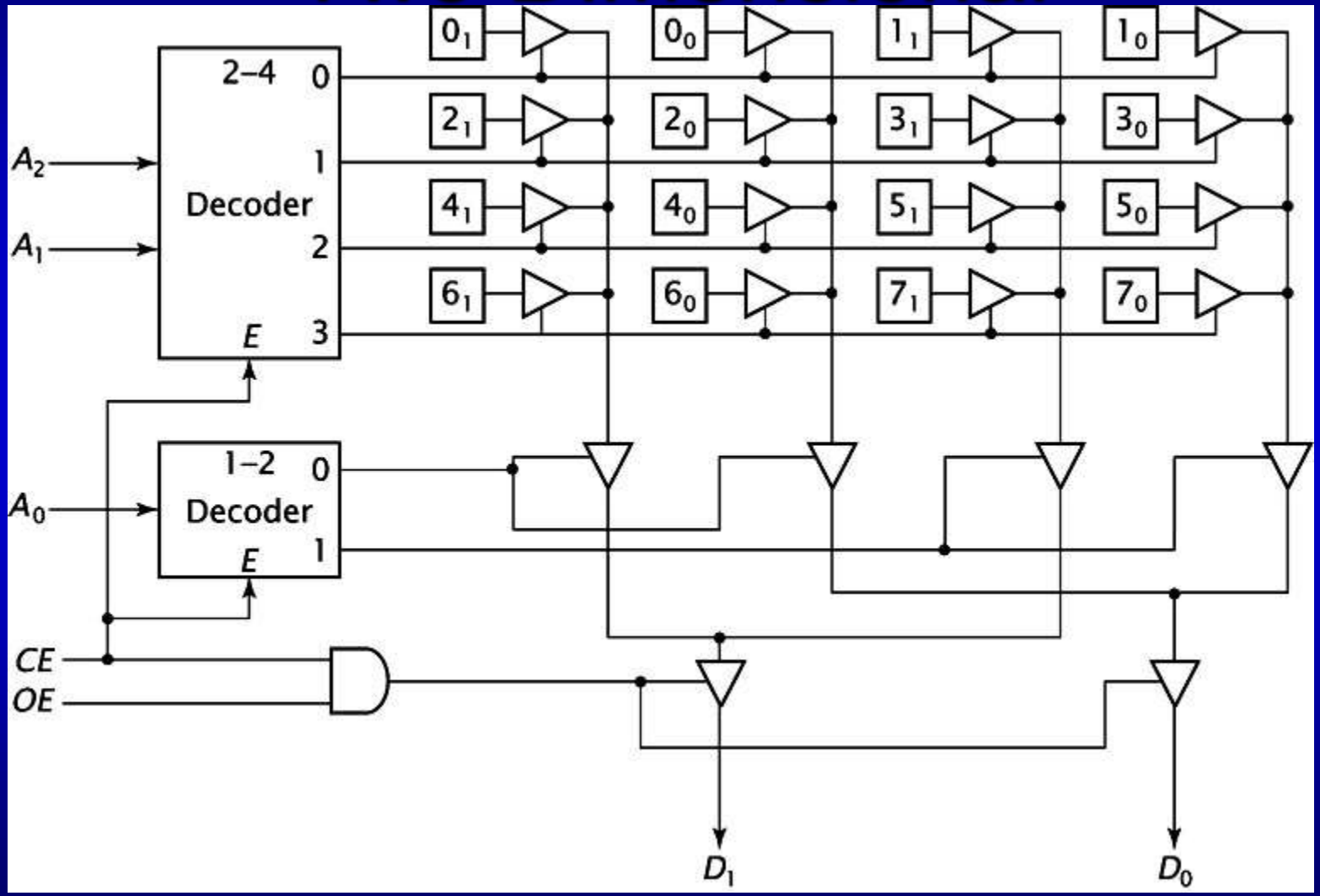
Types of Memory

- Static RAM
- Dynamic RAM
- ROM
- PROM
- EPROM
- EEPROM

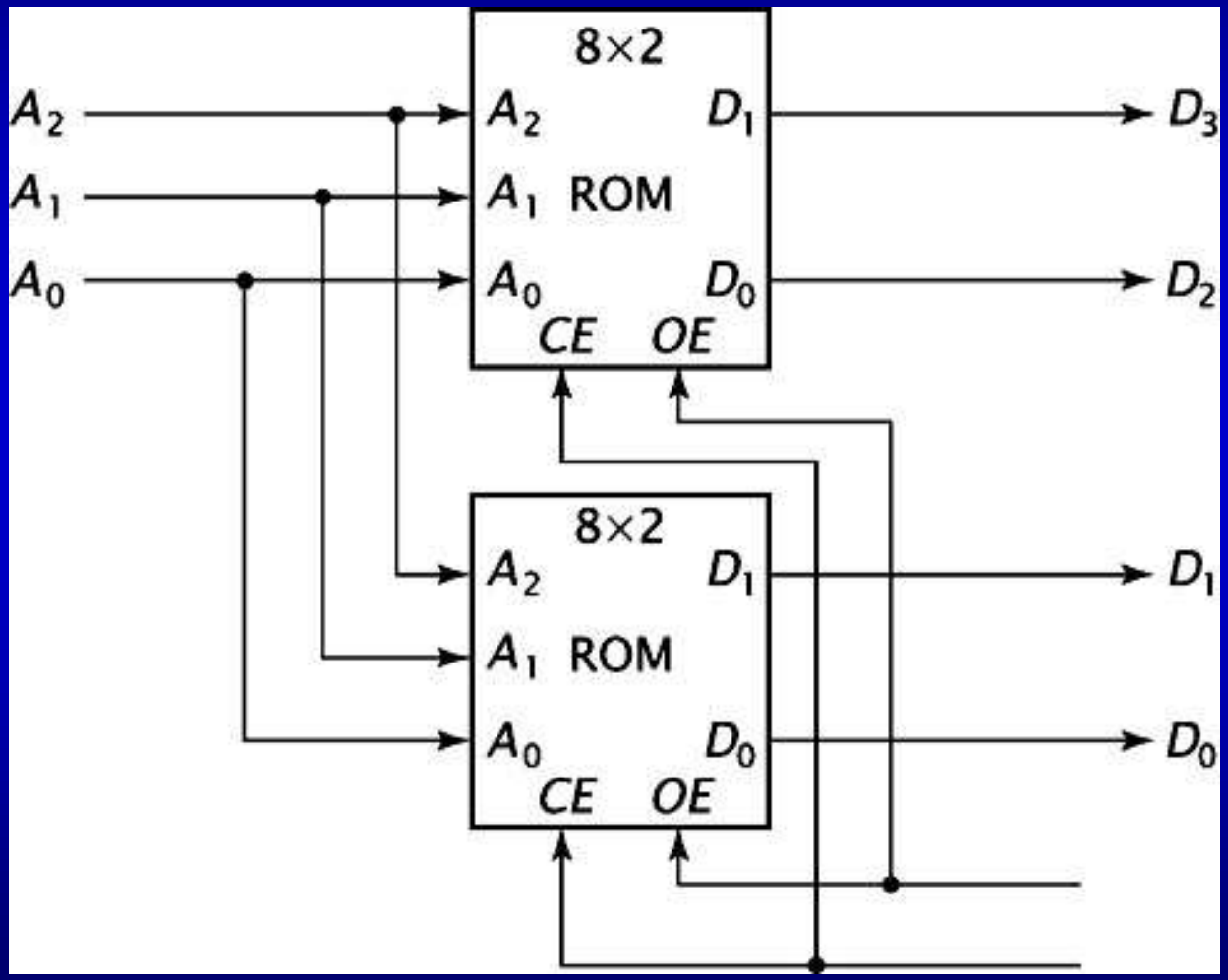
Memory Chip Organization - Linear



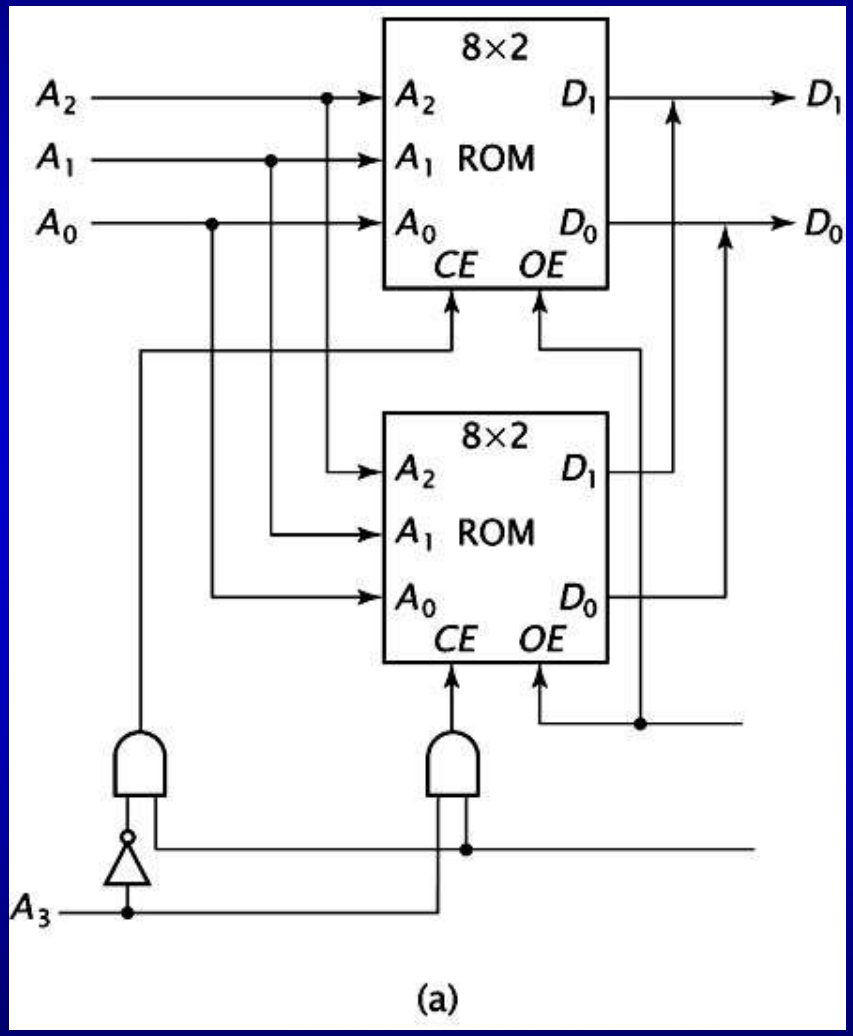
Memory Chip Organization - Two Dimensional



Combining Memory Chips to Increase Word Size



Combining Memory Chips to Increase Address Space



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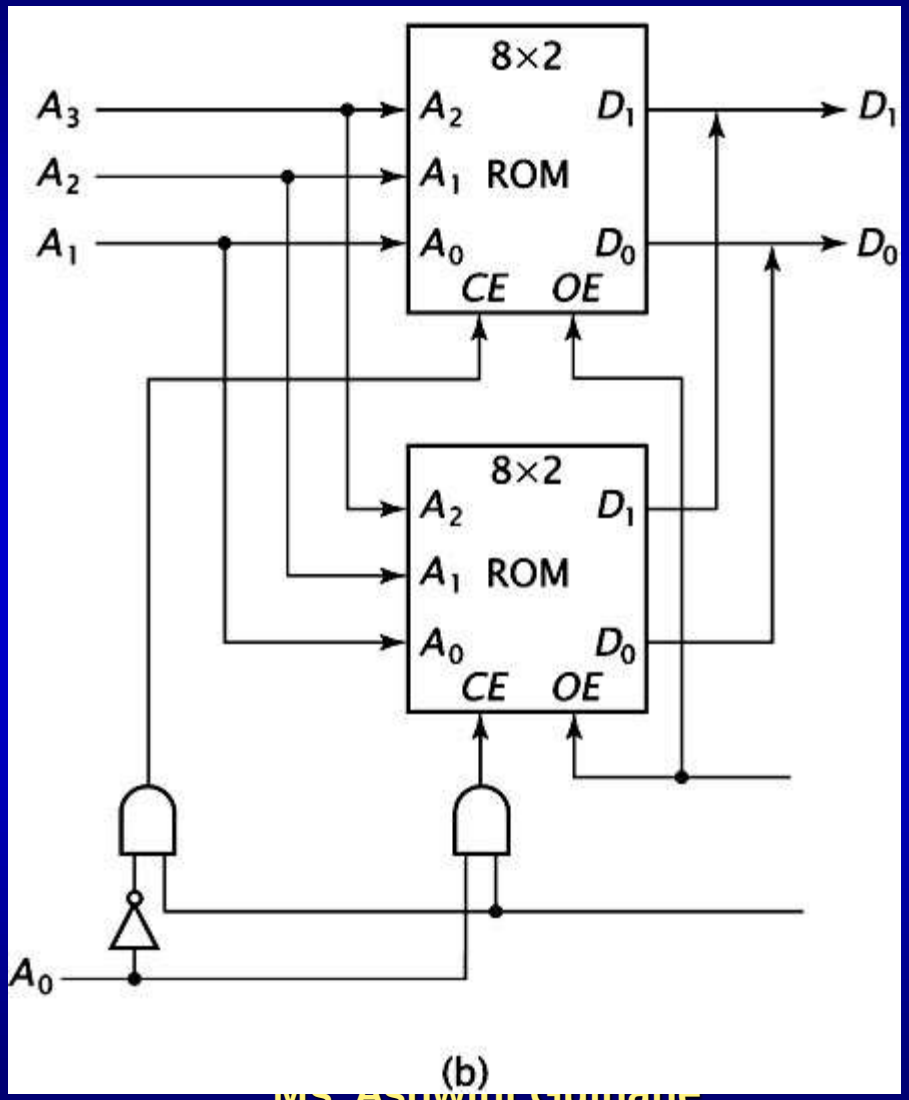
Low-order Interleaving



(b)

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von Neumann Architecture

- Instructions and data mixed
- Used in modern computers

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Harvard Architecture

- Instructions and data separate
- Used in low-level cache memory design

Big Endian Data Organization

- Most significant byte first

Memory Address	Data (in hex)
100	01
101	02
102	03
103	04

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Little Endian Data Organization

- Least significant byte first

Memory Address	Data (in hex)
100	04
101	03
102	02
103	01

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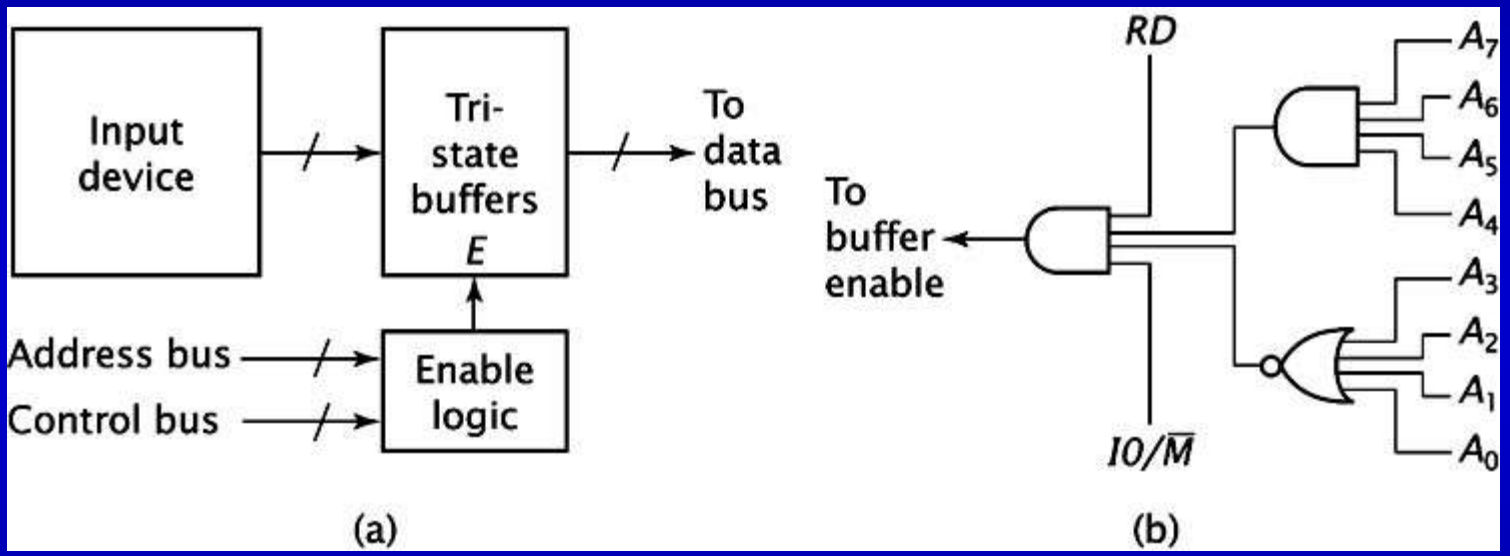
Input Device Organization



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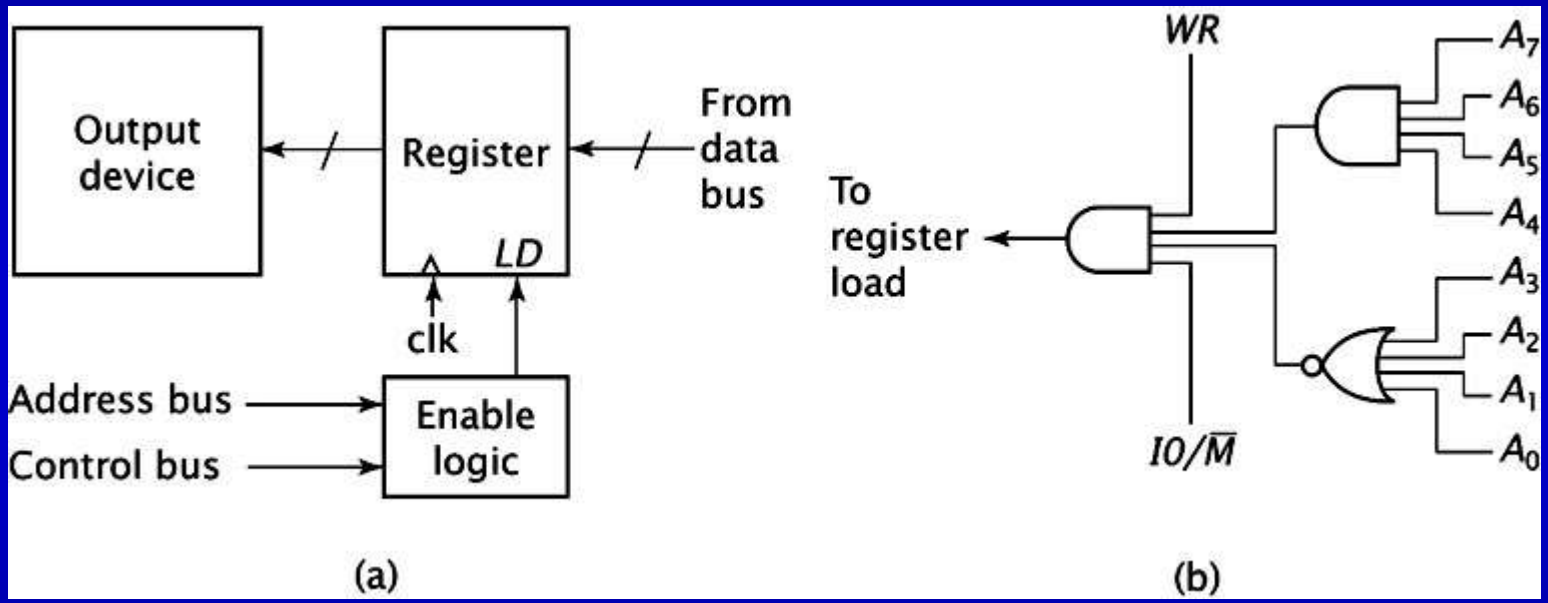
Output Device Organization



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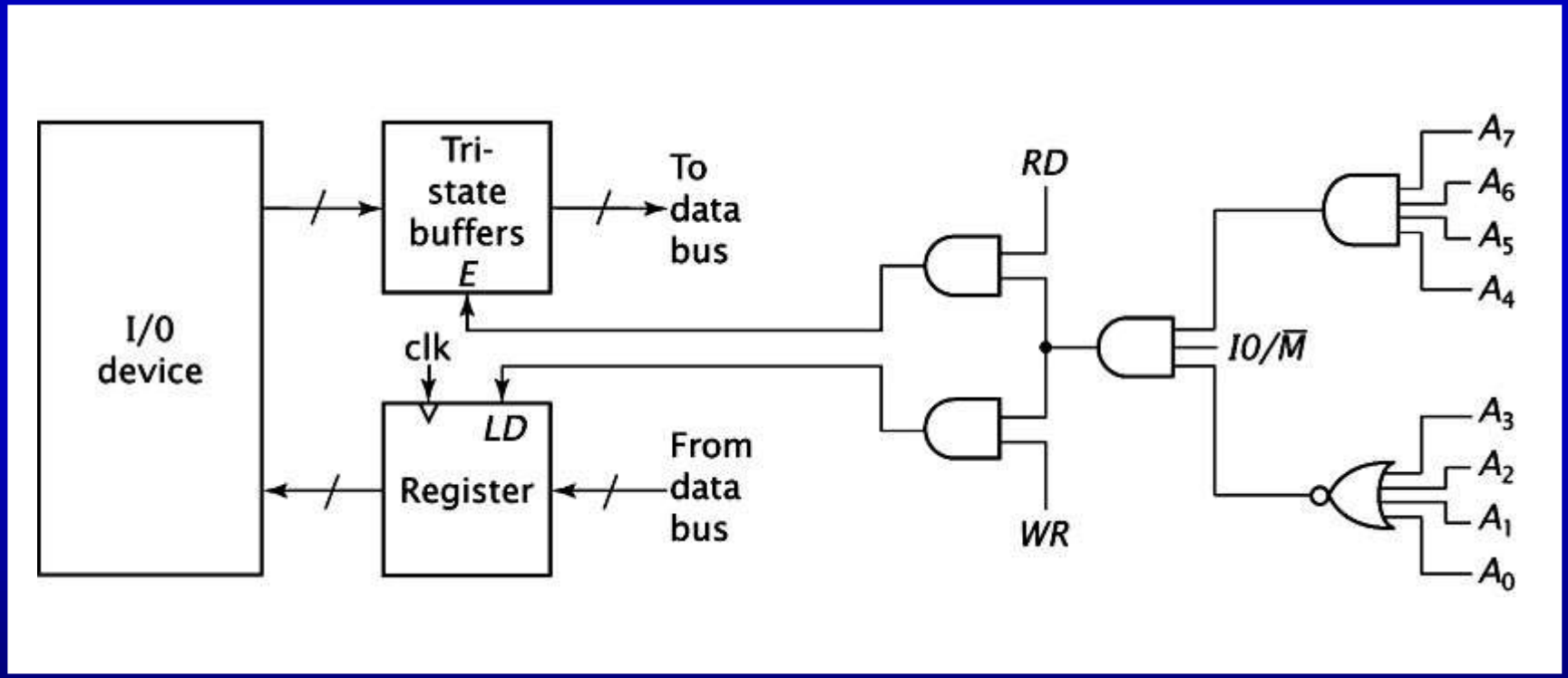
Bidirectional I/O Device Organization



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I/O Interface Enhancements

- READY signal
- Interrupts
- DMA

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Relatively Simple Computer Specifications

- Relatively Simple CPU
- 8K ROM starting at 0000H
- 8K RAM starting at 2000H
- Memory-mapped, bidirectional I/O port at 8000H

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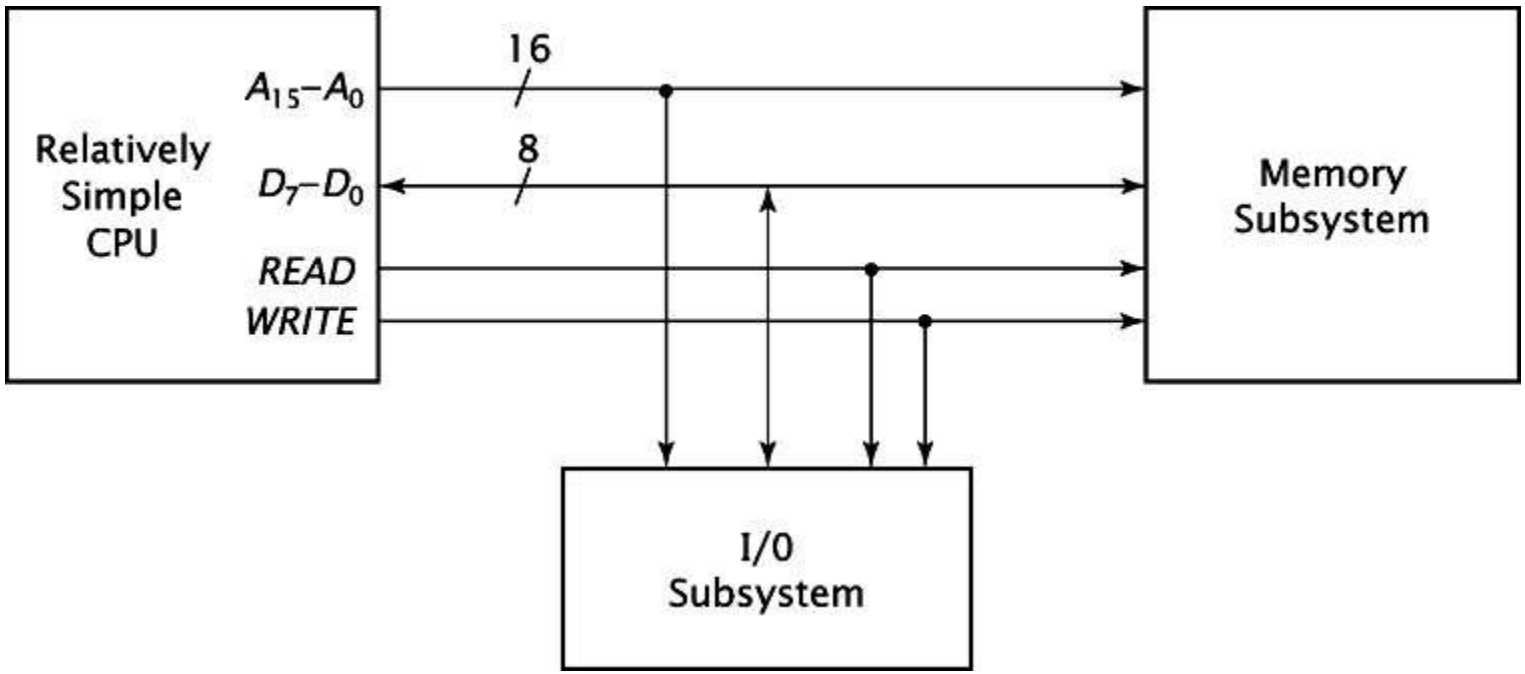
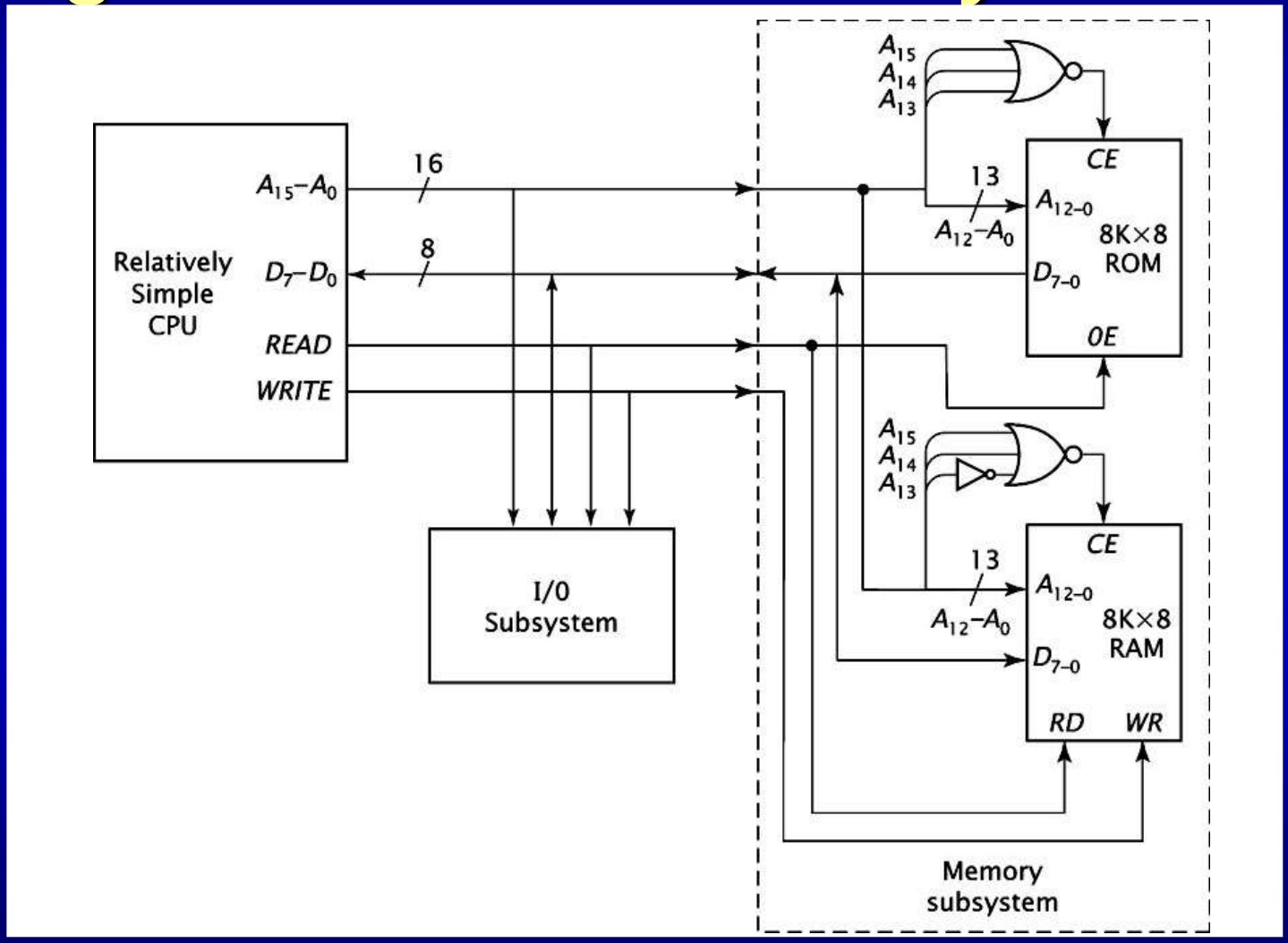
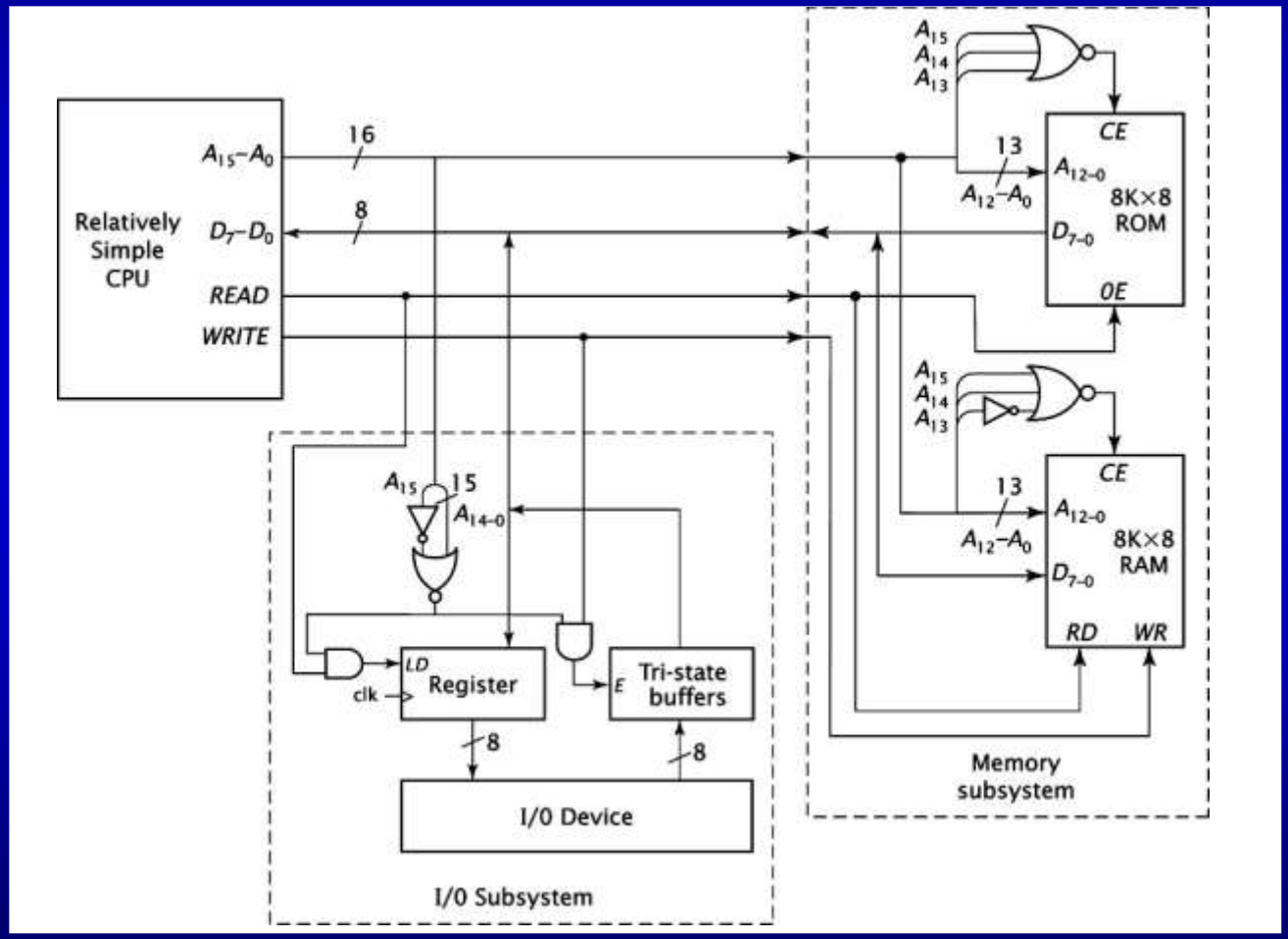
Relatively Simple Computer Organization - CPU Details



Relatively Simple Computer Organization - Memory Details



Relatively Simple Computer Organization - Final Design



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INCLUDE EXTERNAL ANIMATION FROM JAVA SIMULATOR HERE

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8085-based Computer Specifications

- 2K EPROM starting at 0000H
- 256 bytes RAM starting at 2000H
- Four 8-bit I/O ports at 00H, 01H, 19H, and 1AH
- One 6-bit I/O port at 1BH

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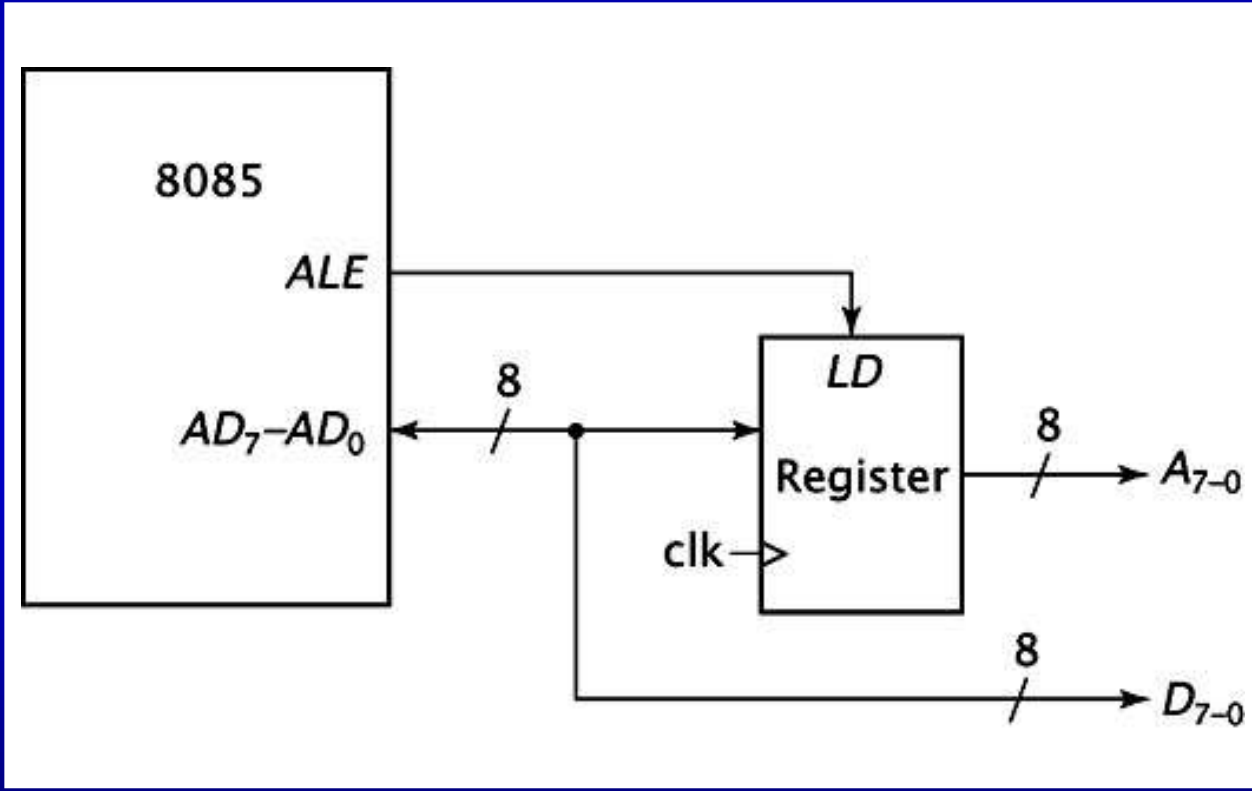
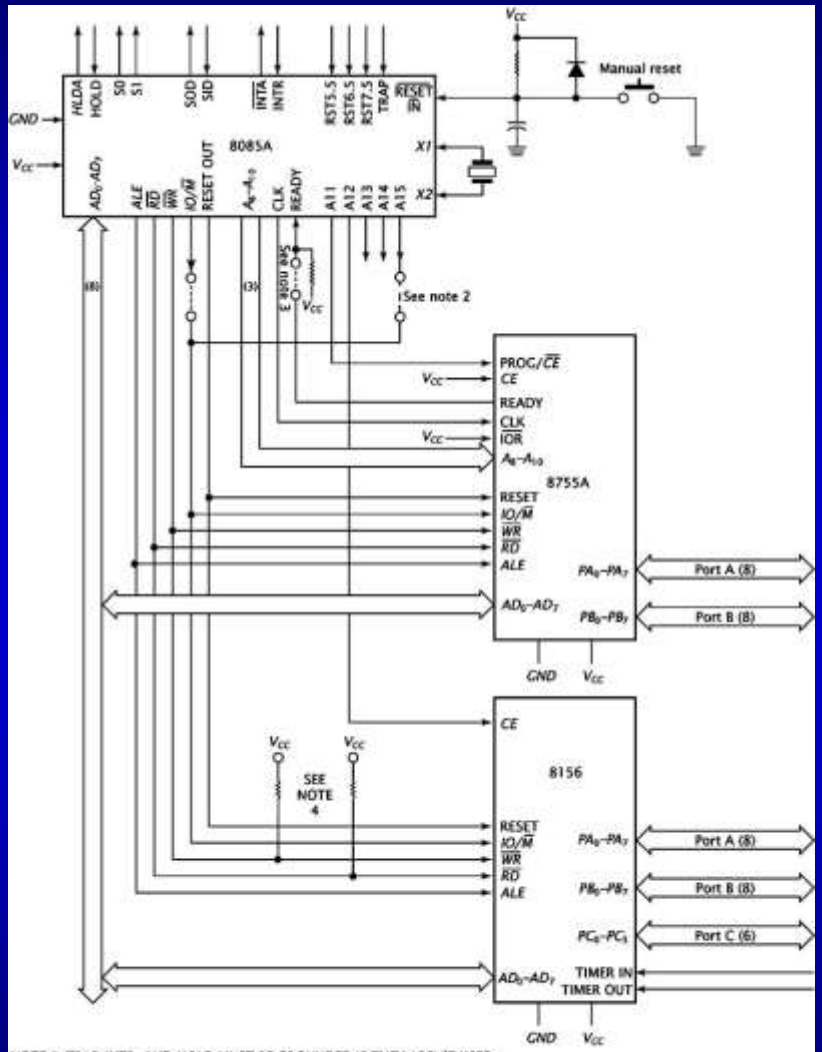
Demultiplexing the AD signals



8085-based Computer Organization



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Summary

- Basic Computer Organization
- CPU Organization
- Memory Chip Internal Organization
- Memory Subsystem Organization
- I/O Port Organization and Interfacing