COURSE: UCS1502 - MICROPROCESSORS AND INTERFACING

Memory and I/O interfacing

S. Angel Deborah
Assistant Professor, Dept. of CSE

Learning Objective

- To understand the interfacing of memory and I/O.

Overview

- Memory Interfacing
- Problems on memory interfacing
- I/O interfacing
- Problems on I/O interfacing

Memory Interfacing

- Interface 2 chips of 16Kx8 EPROM and 2 chips of 32Kx8 RAM with 8086. Allocate higher address range to EPROM and lower address range to RAM.

Memory Interfacing

- Interface 2 chips of 16Kx8 EPROM and 2 chips of 32Kx8 RAM with 8086. Allocate higher address range to EPROM and lower address range to RAM.

- 2 chips of 16Kx8 EPROM
- Total size = 32K
- Asked to allocate 32K in the higher address range
- So ????? To FFFFF

- Total 32K locations = 32X1024 = 32768 = 8000H
- So to find ????? (starting address = HIGHEST LOCATION – SIZE + 1) ;
- FFFFF – 8000 + 1 = **F8000**

- **F8000 To FFFFF**

Memory Interfacing

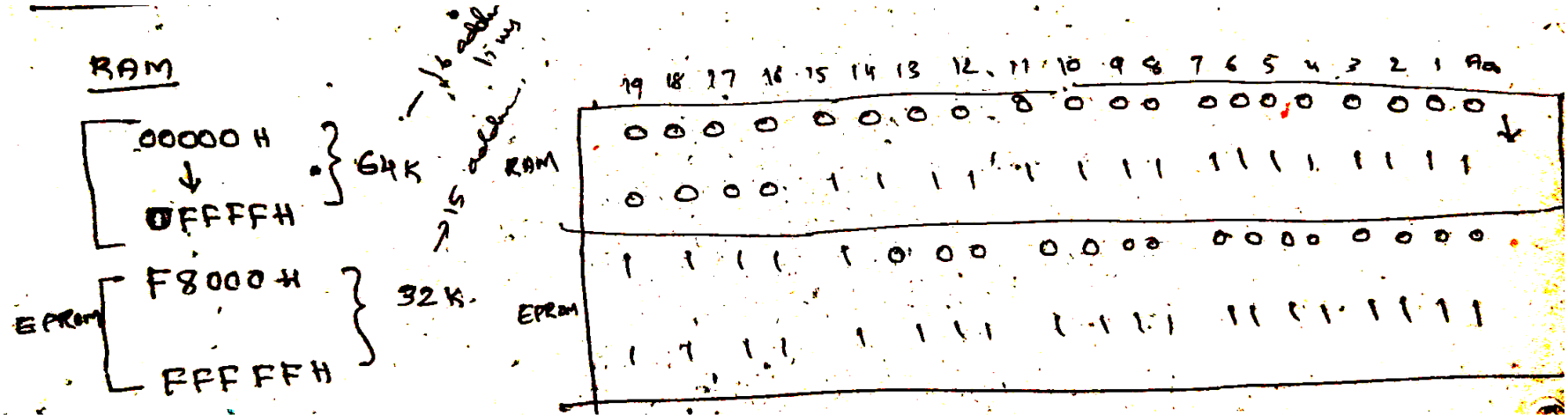
- Interface 2 chips of 16Kx8 EPROM and 2 chips of 32Kx8 RAM with 8086. Allocate higher address range to EPROM and lower address range to RAM.

- 2 chips of 32Kx8 RAM
- Total size = 64K
- Asked to allocate 64K in the lower address range
- So 00000 To ?????

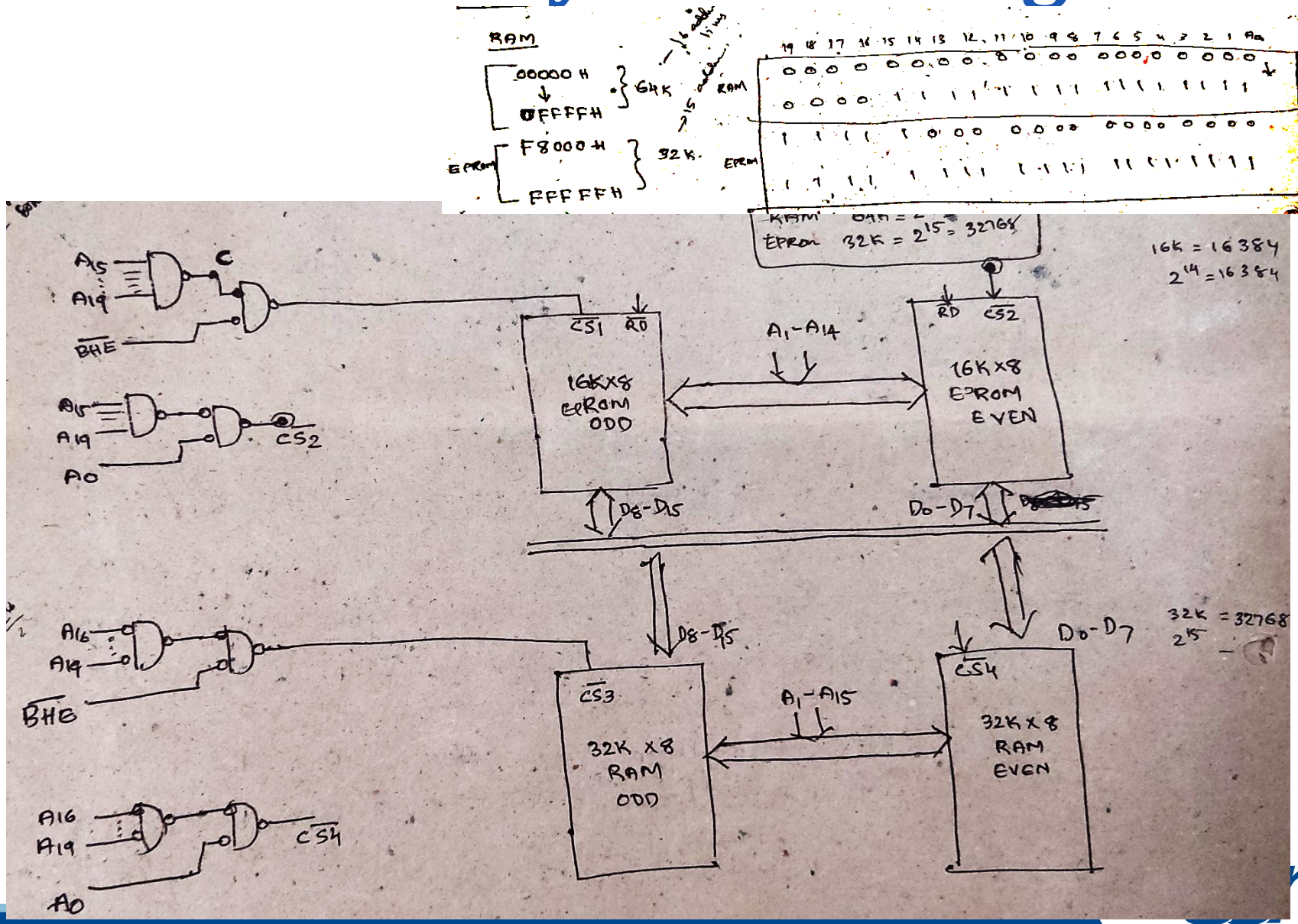
- Total 64K locations = 64X1024 = 65536 = 10000H
- So to find ????? (Ending address = Starting address + SIZE - 1) ;
- 00000 + 10000 - 1 = **FFFF**

- **00000 To 0FFFF**

Memory Interfacing

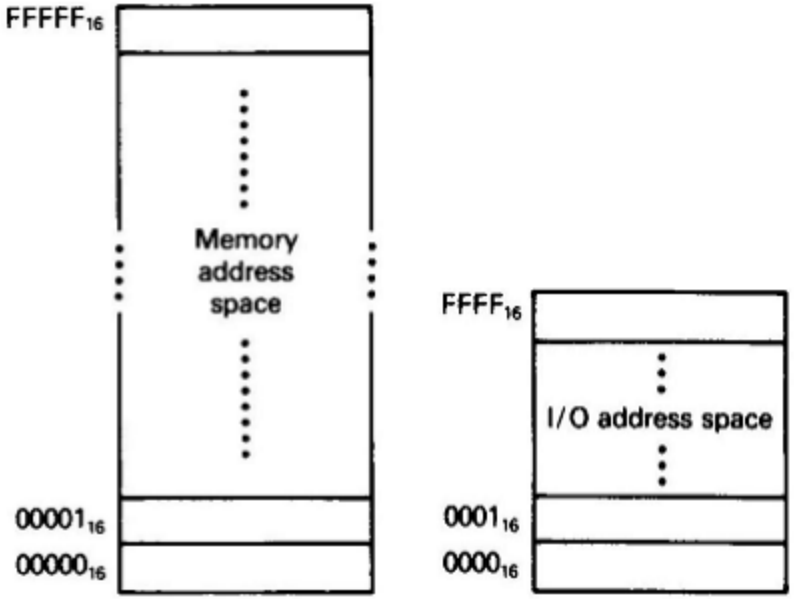


Memory Interfacing



I/O Interfacing

- 2 ways of interfacing
- Memory mapped I/O
- I/O mapped I/O (isolated I/O or peripheral mapped I/O)

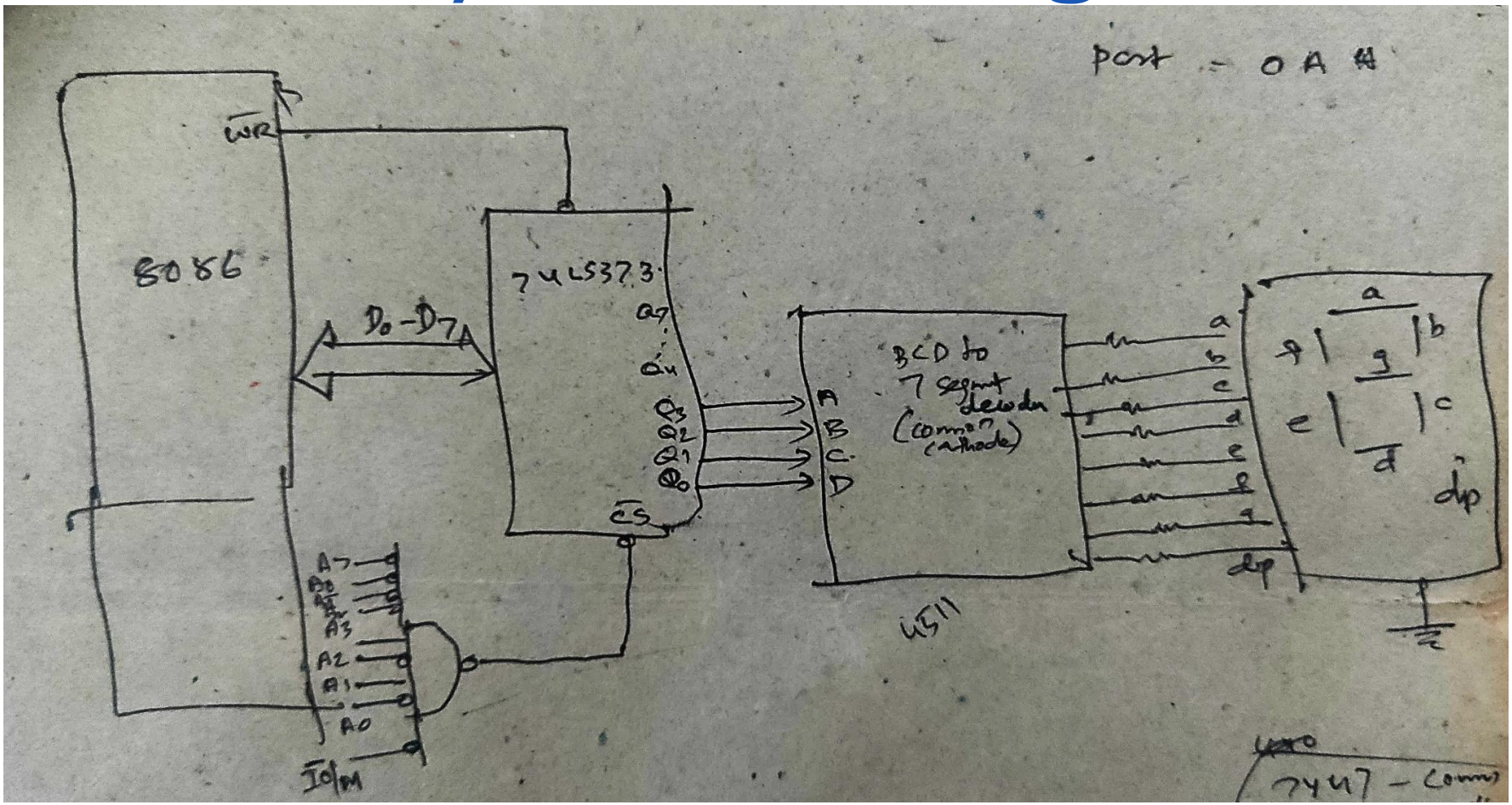


Memory mapped I/O	I/O mapped I/O
1. 20-bit addresses are provided for IO devices.	1. 8-bit or 16-bit address are provided for IO devices
2. The IO ports or peripherals can be treated like memory locations and so all instructions related to memory can be used for data transfer	2. Only IN and OUT instructions can be used for data transfer between IO device and the processor.
3.In memory mapped ports, the data can be moved from any register to port and vice-versa	3. In IO mapped ports, the data transfer can take only between the accumulator and the ports
4. When memory mapping is used for IO devices, the full memory address space cannot be used for addressing memory.	4.When IO mapping is used for IO devices, then the full address space can be used for addressing memory.
5. For accessing memory mapped devices, the processor executes the memory read or write cycle. During this cycle, M/IO' is asserted high.	5. For accessing IO mapped devices, the processor executes the IO read or write cycle. During this cycle, M/IO' is asserted low.
6. The Input-Output device data are also given to the Arithmetic Logical Unit	6. The ALU operations are not directly applicable to Input-Output data.

I/O Interfacing

- Design an 8086 interface and write ALP for displaying the count from 0 to 9 continuously in a 7 segment LED display. Select the port address suitably. Use I/O mapped I/O for interfacing.

I/O Interfacing




```
LABEL1:   MOV AL,00
LABEL2:   OUT 0AH,AL
          CALL DELAY
          INC AL
          CMP AL, 0A
          JZ LABEL1
          JMP LABEL2
```

Check Your Understanding

- What is the difference between memory mapped I/O and I/O mapped I/O?

References

- Doughlas V. Hall, “Microprocessors and Interfacing, Programming and Hardware”, Second Edition, TMH.

Thank you