



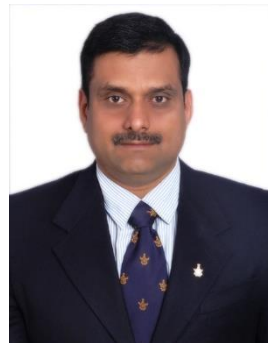
Microprocessors and Interfaces: 2021-22

Lecture 25 :

Memory Interface

Part 3 : 8086 Memory Interface

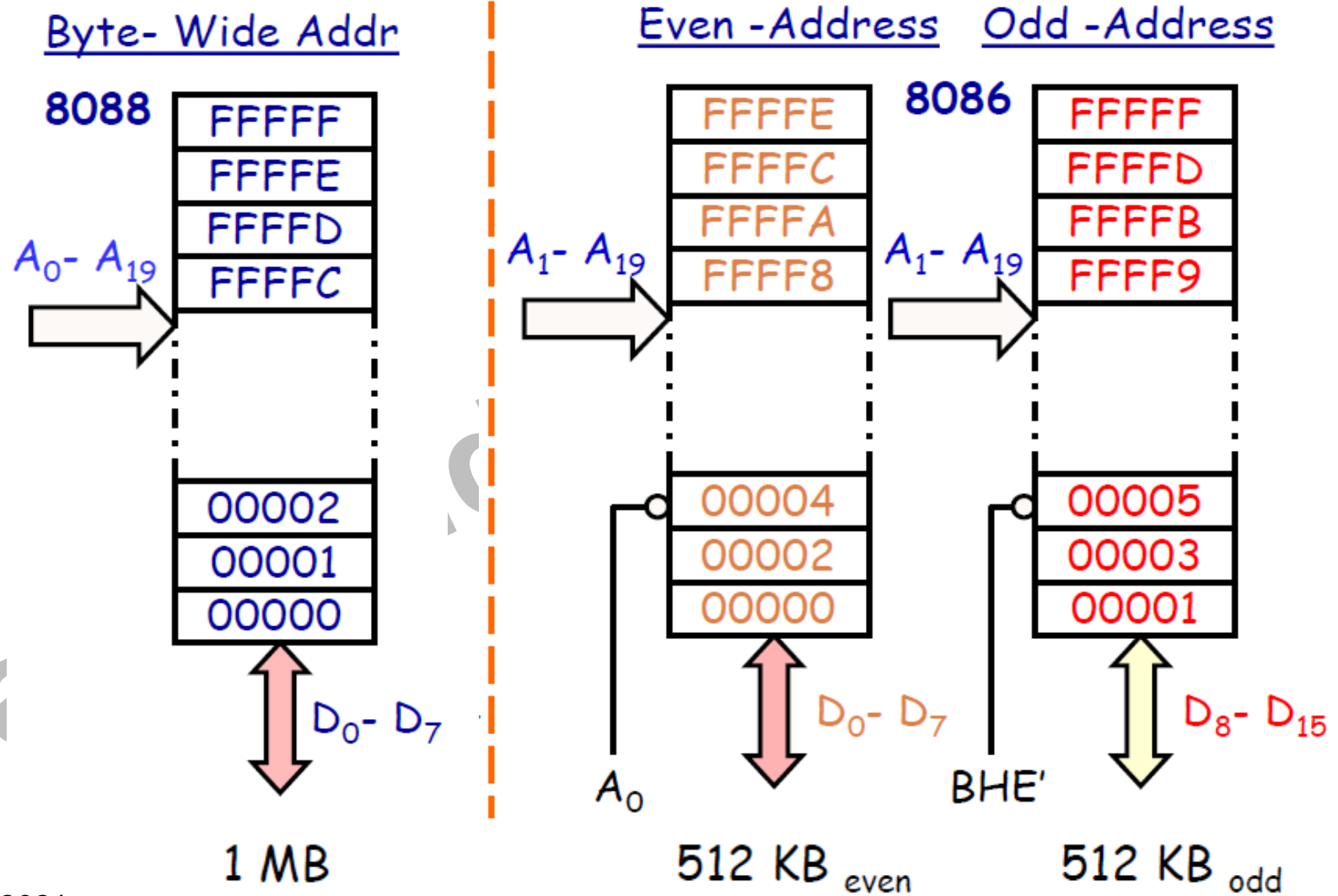
By Dr. Sanjay Vidhyadharan



Memory Interfacing: 8086

- 8086 has 20 bit address bus
- 1 MB each address represent a byte
- Ex: An Instruction as MOV [437AH], BX
- Word written to two consecutive locations 0437AH & 0437BH
- To complete the write in one cycle memory set up as two banks
- 512 K bytes each
- ODD Bank &
- EVEN Bank

Memory Interfacing: 8086



Memory Interfacing: 8086

BHE'	A ₀	Selection
0	0	Whole Word
0	1	High byte to/from odd address
1	0	Low byte to/from even address
1	1	No Selection

Memory Interfacing: 8086

Address	Data Type	BHE'	A ₀	Bus Cycles	Data lines used
00000	Byte	1	0	one	D ₀ -D ₇
00000	Word	0	0	one	D ₀ -D ₁₅
00001	Byte	0	1	one	D ₈ -D ₁₅
00001	Word	0	1	first	D ₈ -D ₁₅
		1	0	second	D ₀ -D ₇

Memory Interfacing: 8086

If memory chips available are only 2KB each. Do the interfacing for 8086

Ex: Interface

4K 2716 (ROM) starting at 00000H

8K 6116 (SRAM) starting at 08000H

Memory Interfacing: 8086

Memory Requirements:

2716 –size 2K

ROM –4k

Number of 2716 –**2**

6116 –size 2k

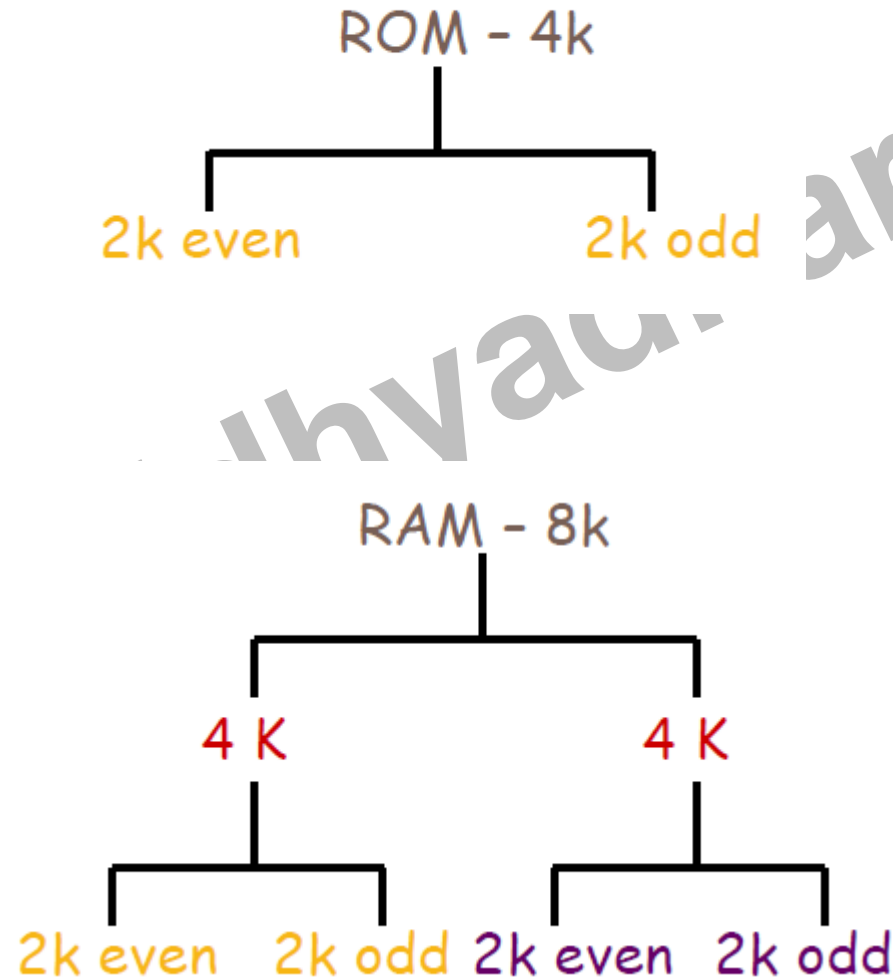
RAM –8k

Number of 6116 - **4**

ROM –4k

RAM –8k

Memory Interfacing: 8086



Memory Interfacing: 8086

Memory Map

ROM_{1E} - 00000_H, 00002_H, 00004_H 00FFE_H

ROM₁₀ - 00001_H, 00003_H, 00005_H 00FFF_H

RAM_{1E} - 08000_H, 08002_H, 08004_H 08FFE_H

RAM₁₀ - 08001_H, 08003_H, 08005_H 08FFF_H

RAM_{2E} - 09000_H, 09002_H, 09004_H 09FFE_H

RAM₂₀ - 09001_H, 09003_H, 09005_H 09FFF_H

Memory Interfacing: 8086

ROM₁

00000_H - 00FFF_H

A ₁₅	A ₁₄	A ₁₃	A ₁₂	A ₁₁	A ₁₀	A ₉	A ₈	A ₇	A ₆	A ₅	A ₄	A ₃	A ₂	A ₁	A ₀
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1

RAM₁

08000_H - 08FFF_H

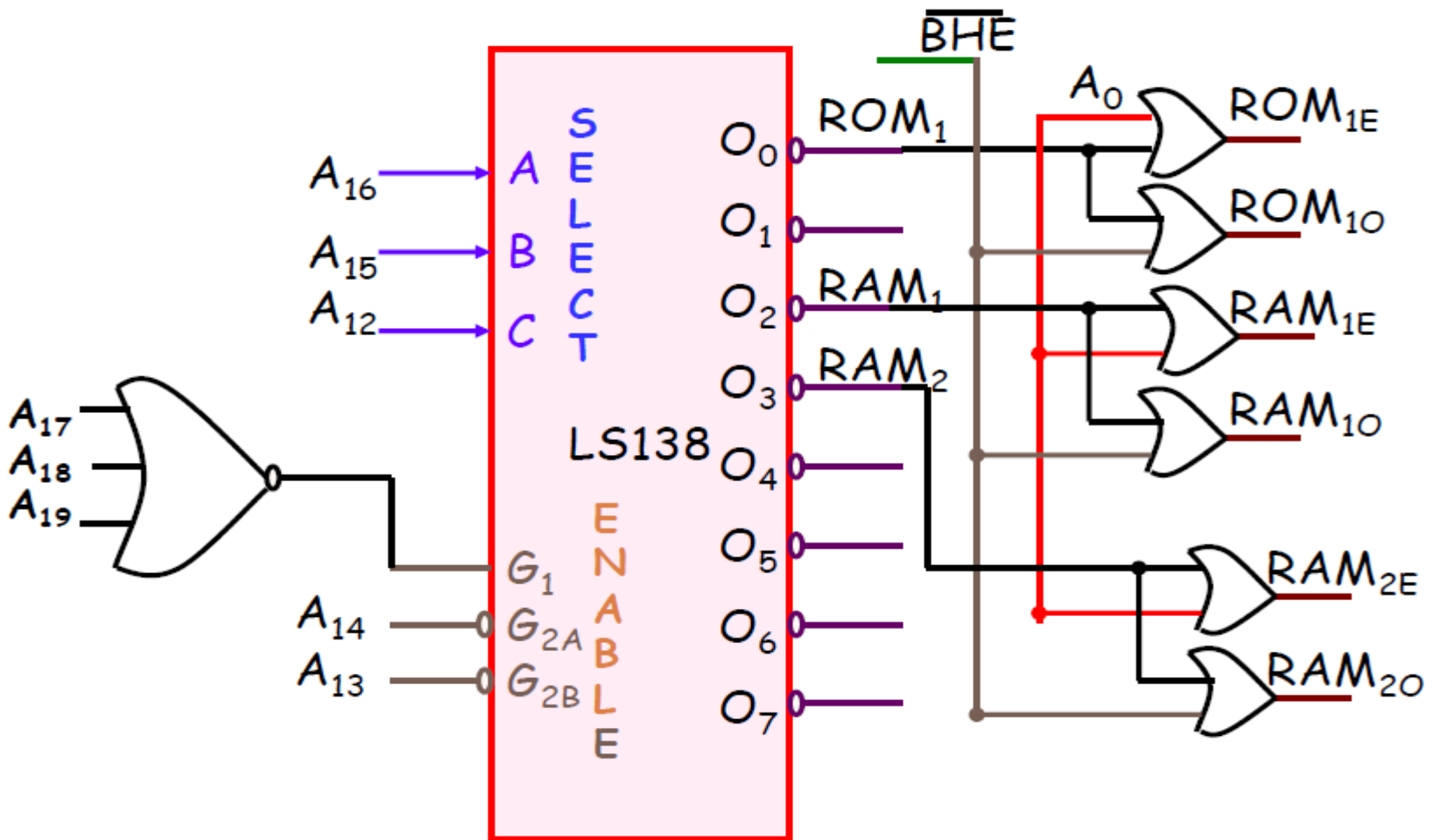
A ₁₅	A ₁₄	A ₁₃	A ₁₂	A ₁₁	A ₁₀	A ₉	A ₈	A ₇	A ₆	A ₅	A ₄	A ₃	A ₂	A ₁	A ₀
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1

RAM₂

09000_H - 09FFF_H

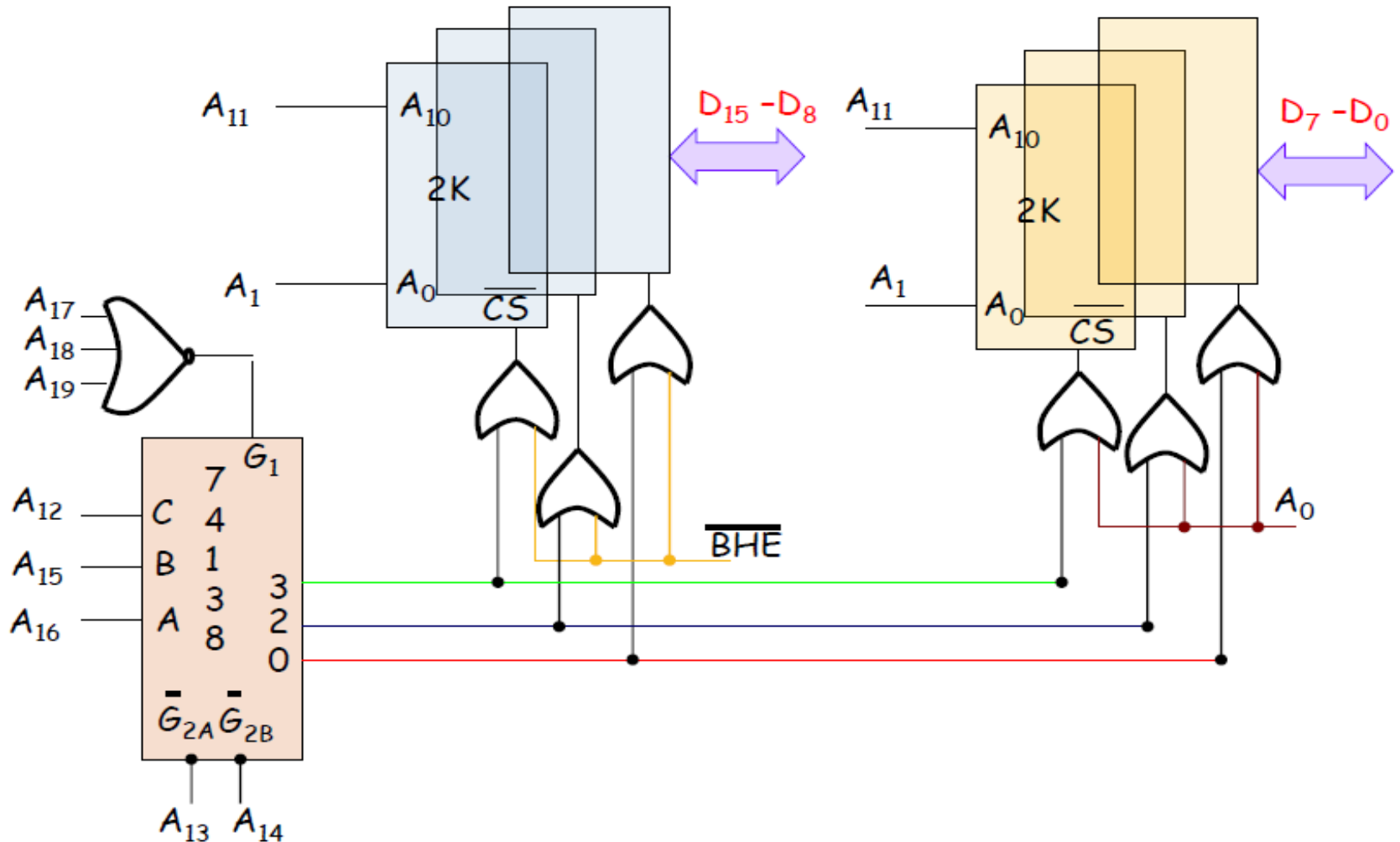
A ₁₅	A ₁₄	A ₁₃	A ₁₂	A ₁₁	A ₁₀	A ₉	A ₈	A ₇	A ₆	A ₅	A ₄	A ₃	A ₂	A ₁	A ₀
1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1

Memory Interfacing: 8086



Absolute Addressing

Memory Interfacing: 8086



Memory Interfacing: 8086

If memory chips available are only 256KB

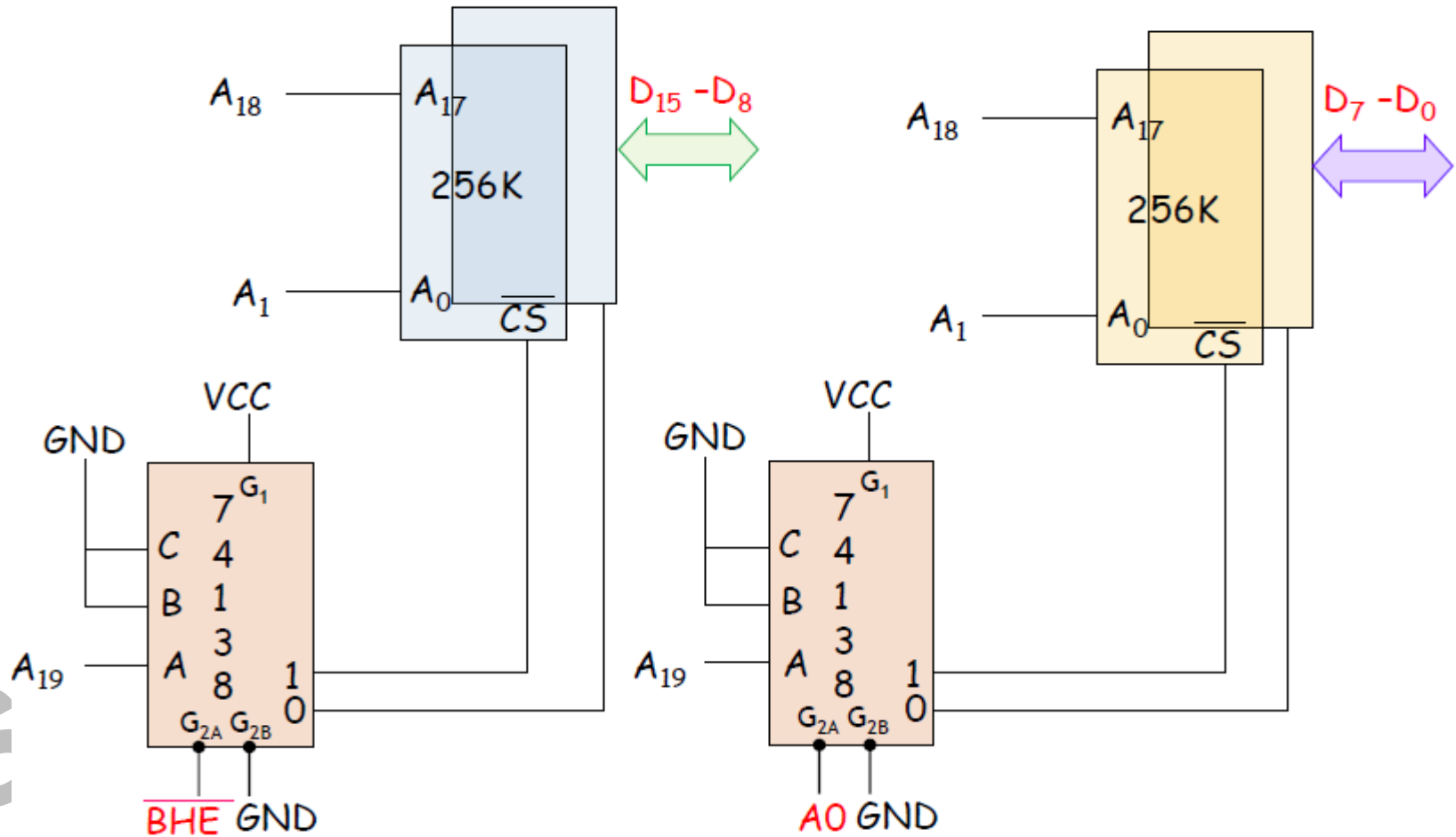
Ex: Interface

1MB (SRAM) to 8086

Memory Interfacing: 8086

A_{19}	A_{18}	A_{17}	A_{16}	A_{15}	A_{14}	A_{13}	A_{12}	A_{11}	A_{10}	A_9	A_8	A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	} 512KB
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	} 512KB
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Memory Interfacing: 8086



Memory Interfacing: 8086

If memory chips available are 2KB (4 chips) and 4KB (2 Chips)

Ex: Interface

16KB of RAM to 8086 starting at 00000H

Memory Interfacing: 8086

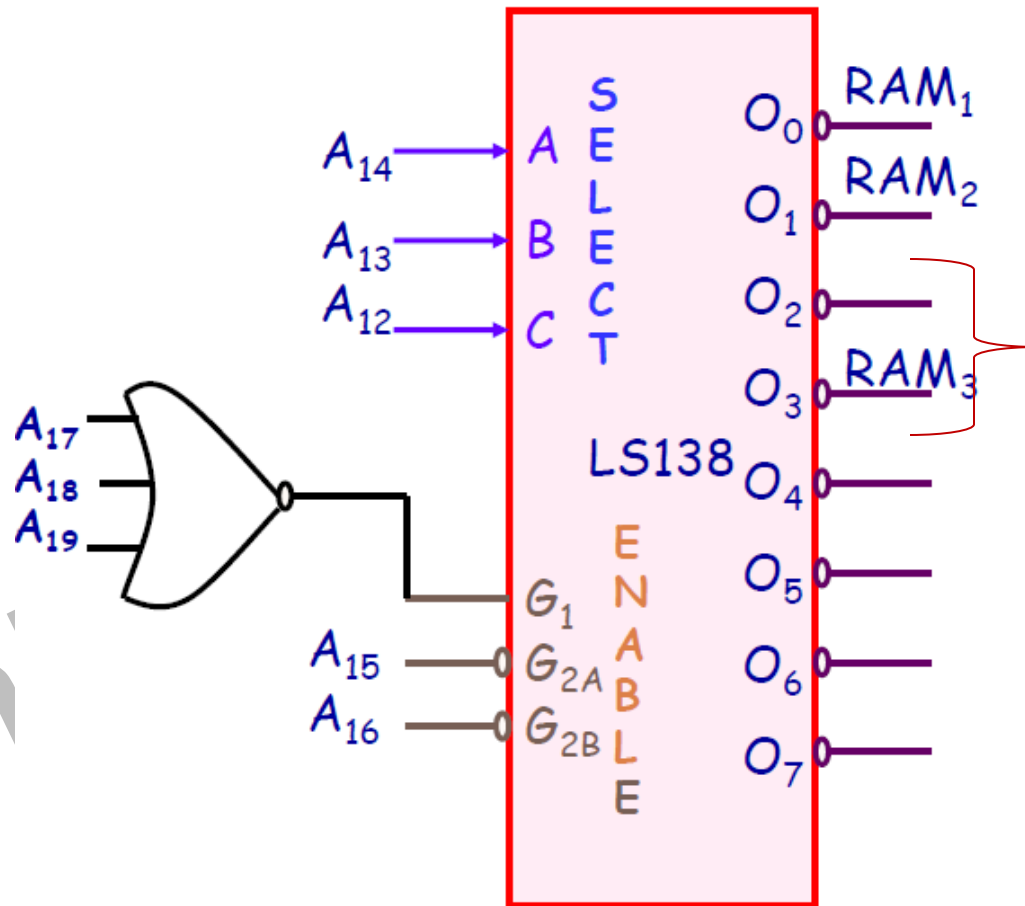
RAM _{1even}	00000 _H , 00002 _H , 00004 _H ,00FFE _H
RAM _{1odd}	00001 _H , 00003 _H , 00005 _H ,00FFF _H
RAM _{2even}	01000 _H , 01002 _H , 01004 _H ,01FFE _H
RAM _{2odd}	01001 _H , 01003 _H , 01005 _H ,01FFF _H
RAM _{3even}	02000 _H , 02002 _H , 02004 _H ,03FFE _H
RAM _{3odd}	02001 _H , 02003 _H , 02005 _H ,03FFF _H

Sanjay

Memory Interfacing: 8086

19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Memory Interfacing: 8086



Memory Interfacing: 80286

Memory Interfacing: 80286

- 80286 has 24 bit address bus and 16 bit data bus.
- 16 MB each address represent a byte

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Memory Interfacing: 80286

Interface 4K of ROM to 80286 starting at 080000H

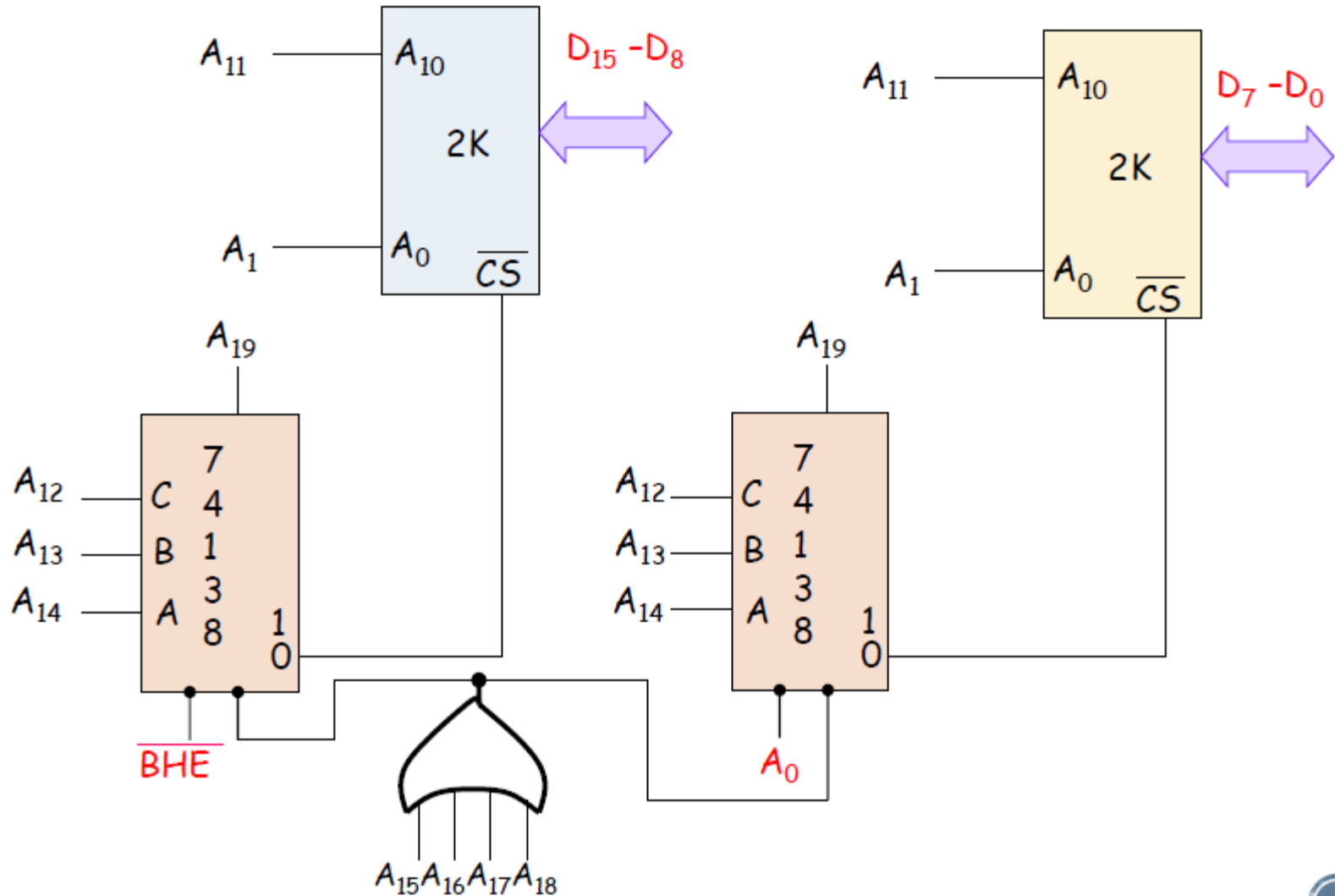
Available memory chips are only 2716

Memory Interfacing: 80286

ROM_{even} $080000_H, 080002_H, 080004_H, \dots, 080FFE_H$
 ROM_{odd} $080001_H, 080003_H, 080005_H, \dots, 080FFF_H$

A_{19}	A_{18}	A_{17}	A_{16}	A_{15}	A_{14}	A_{13}	A_{12}	A_{11}	A_{10}	A_9	A_8	A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1

Memory Interfacing: 80286



Memory Interfacing: 80286

Interface 8K of ROM to 80286 starting at 080000H

Available memory chips are only 2716

ROM_{1even} 080000_H, 080002_H, 080004_H,080FFE_H

ROM_{1odd} 080001_H, 080003_H, 080005_H,080FFF_H

ROM_{2even} 081000_H, 081002_H, 081004_H, 081FFE_H

ROM_{1odd} 081001_H, 081003_H, 081005_H, 081FFF_H

Memory Interfacing: 80286

in

19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1

Sanja



Thank You