Microprocessors and Interfaces: 2021-22
Lecture 23 :
Memory Interface
Part 2 : 8088 Memory Interface

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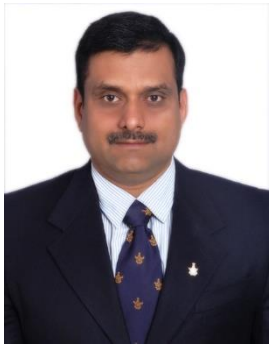
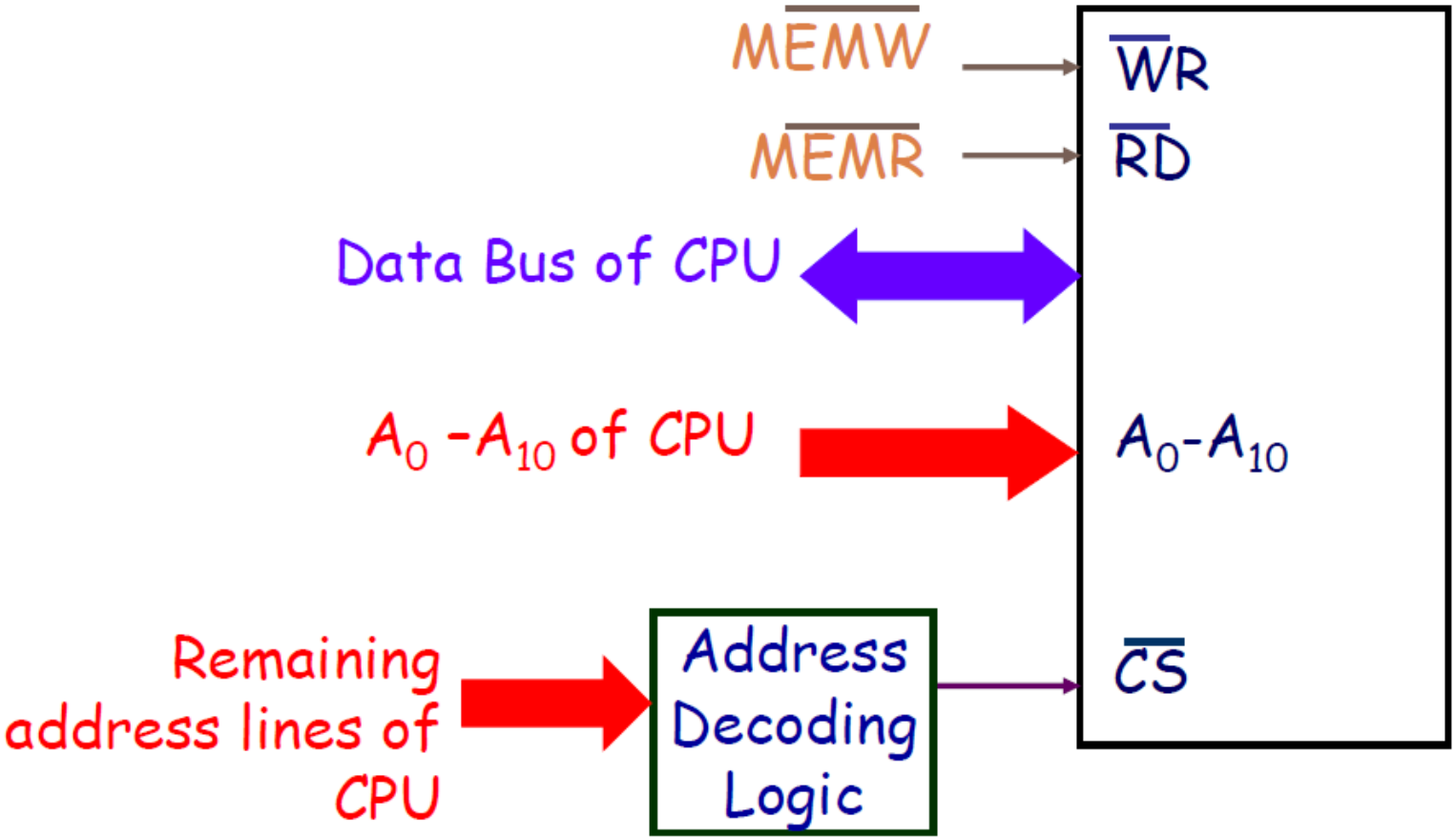


Memory Interfacing

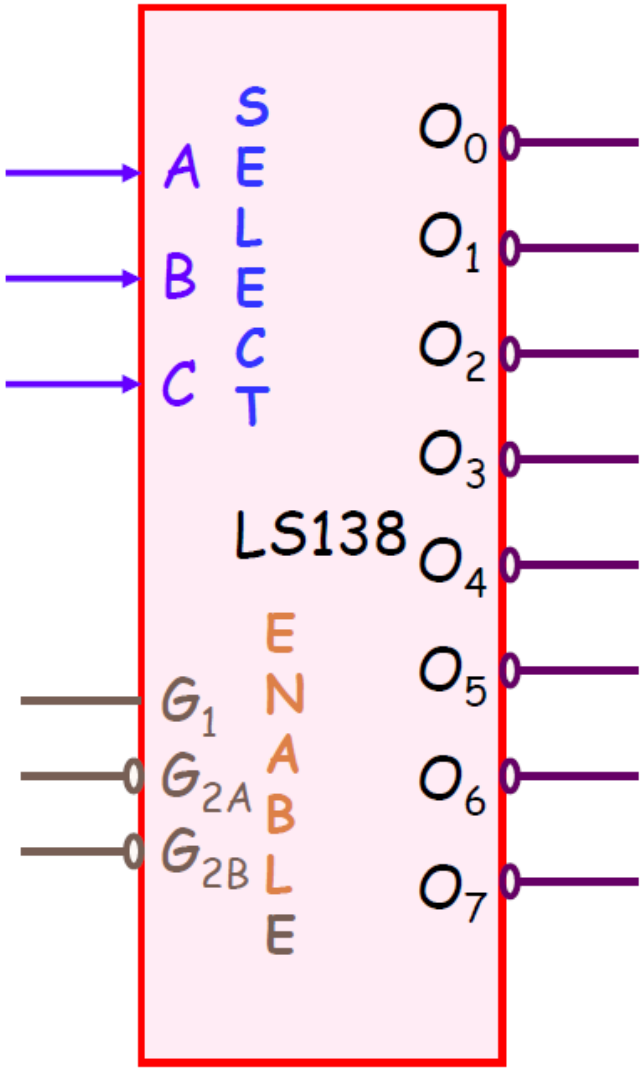
Example: Interfacing 8 K Bytes of memory to 8088 using 2K memory chips

- 8K Memory - 4 - 2K chips of memory
- Memory Mapping
- RAM1 00000_H - $007FF_H$
- RAM2 00800_H- $00FFF_H$
- RAM3 01000_H- $017FF_H$
- RAM4 01800_H-$01FFF_H$

Example: Interfacing 8Kbytes of memory to 8088 using 2K memory chips



Memory Address decoding



INPUT						OUTPUT							
ENABLE			SELECT										
G_1	G_{2A}	G_{2B}	A	B	C	O_0	O_1	O_2	O_3	O_4	O_5	O_6	O_7
0	X	X	X	X	X	1	1	1	1	1	1	1	1
X	1	X	X	X	X	1	1	1	1	1	1	1	1
X	X	1	X	X	X	1	1	1	1	1	1	1	1
1	0	0	0	0	0	0	1	1	1	1	1	1	1
1	0	0	0	0	1	1	0	1	1	1	1	1	1
1	0	0	0	1	0	1	1	0	1	1	1	1	1
1	0	0	0	1	1	1	1	1	0	1	1	1	1
1	0	0	1	0	0	1	1	1	1	0	1	1	1
1	0	0	1	0	1	1	1	1	1	1	0	1	1
1	0	0	1	1	0	1	1	1	1	1	1	0	1
1	0	0	1	1	1	1	1	1	1	1	1	1	0

RAM_1 00000_H - $007FF_H$

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	0	1	1	1	1	1	1	1	1	1	1	1

RAM_2 00800_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	1	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

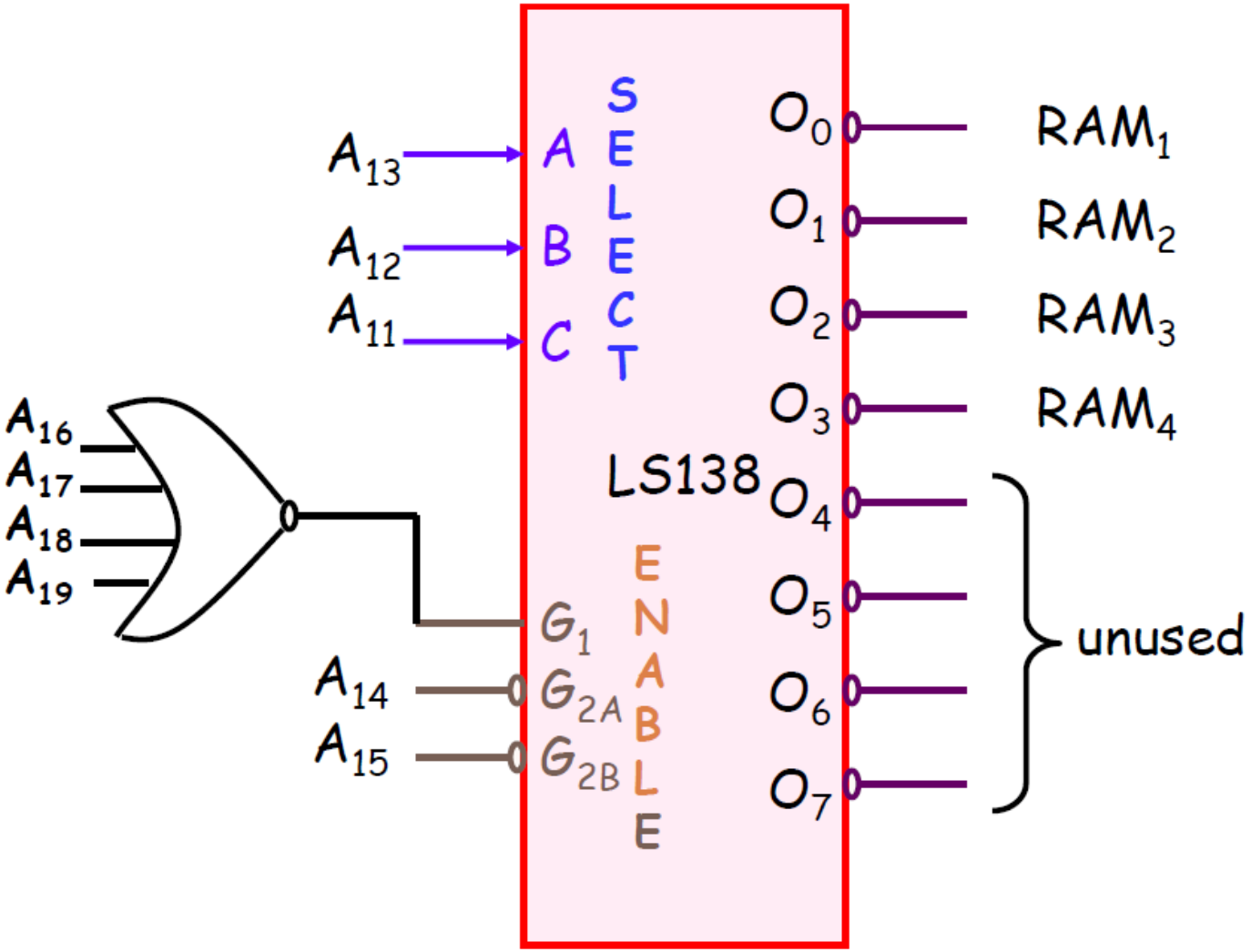
RAM_3 01000_H-$017FF_H$

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	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1

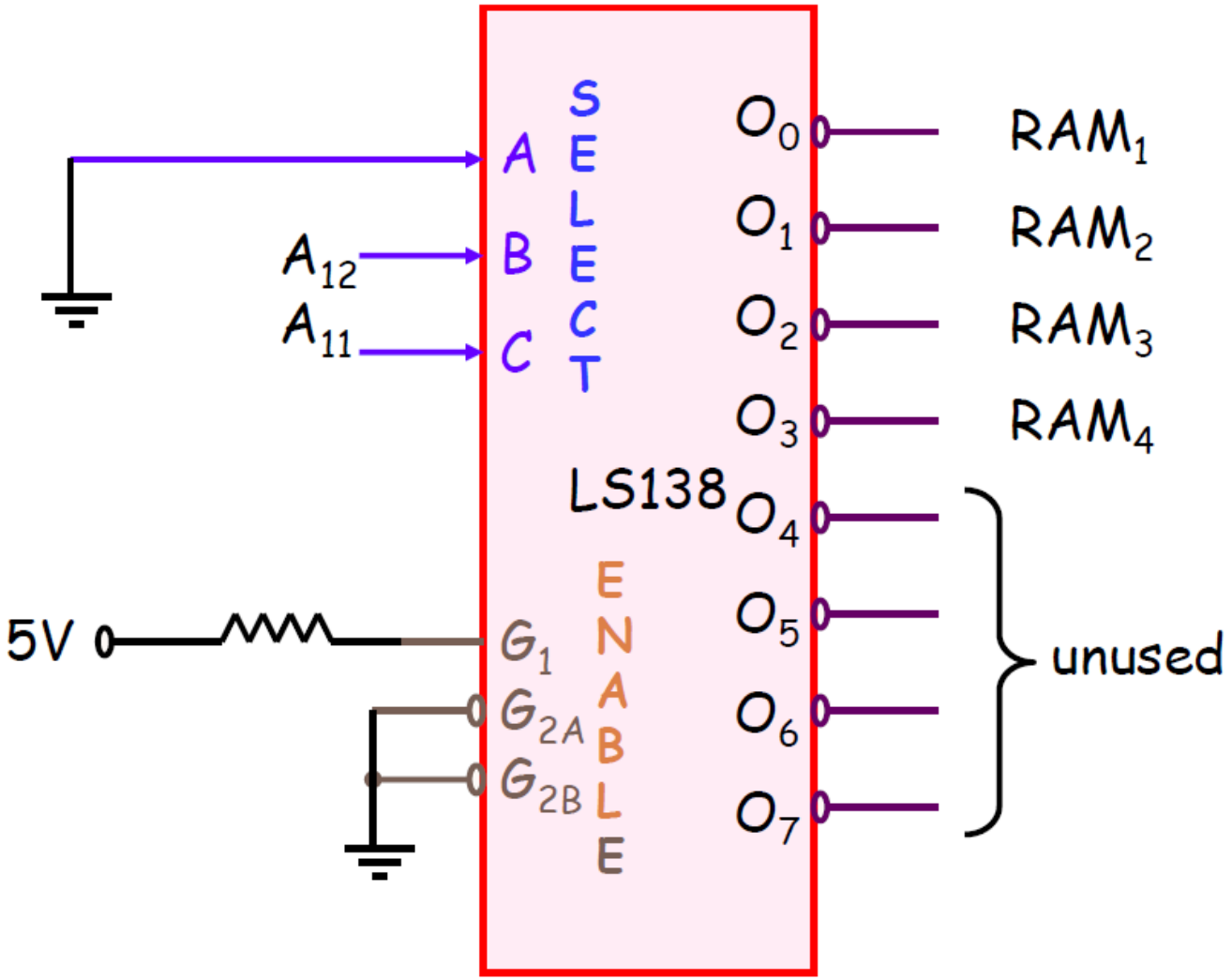
RAM_4 01800_H-$01FFF_H$

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	1	1	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

Absolute Addressing



Incremental Addressing



Example

Interface the memory to 8088 using the chips available

4K - 2716 (ROM) starting at 00000_H

8K - 6116 (SRAM) starting at 08000_H

Example

Memory Requirements

2716 - ROM - size 2K (16/8)

ROM - 4k

Number of 2716 required - 2

6116 - RAM size 2k (16/8)

RAM - 8k

Number of 6116 required - 4

Example

Memory map:

ROM_1 -	00000_H - $007FF_H$
ROM_2 -	00800_H - $00FFF_H$
RAM_1 -	08000_H - $087FF_H$
RAM_2 -	08800_H - $08FFF_H$
RAM_3 -	09000_H - $097FF_H$
RAM_4 -	09800_H - $09FFF_H$

Example

ROM_1 00000_H - $007FF_H$

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	0	1	1	1	1	1	1	1	1	1	1	1

ROM_2 00800_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	1	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

RAM_1 08000_H-$087FF_H$

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	0	1	1	1	1	1	1	1	1	1	1	1

Example

RAM_2 08800_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	1	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

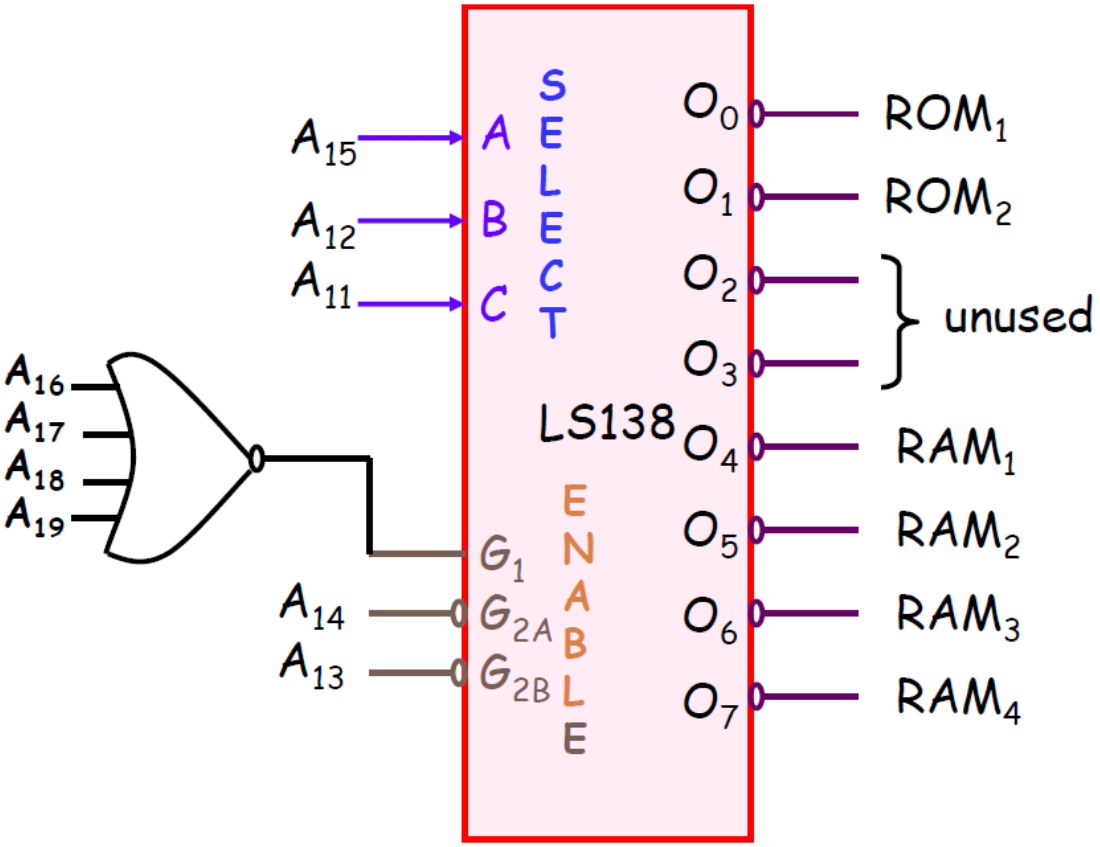
RAM_3 09000_H-$097FF_H$

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	0	1	1	1	1	1	1	1	1	1	1	1

RAM_4 09800_H-$09FFF_H$

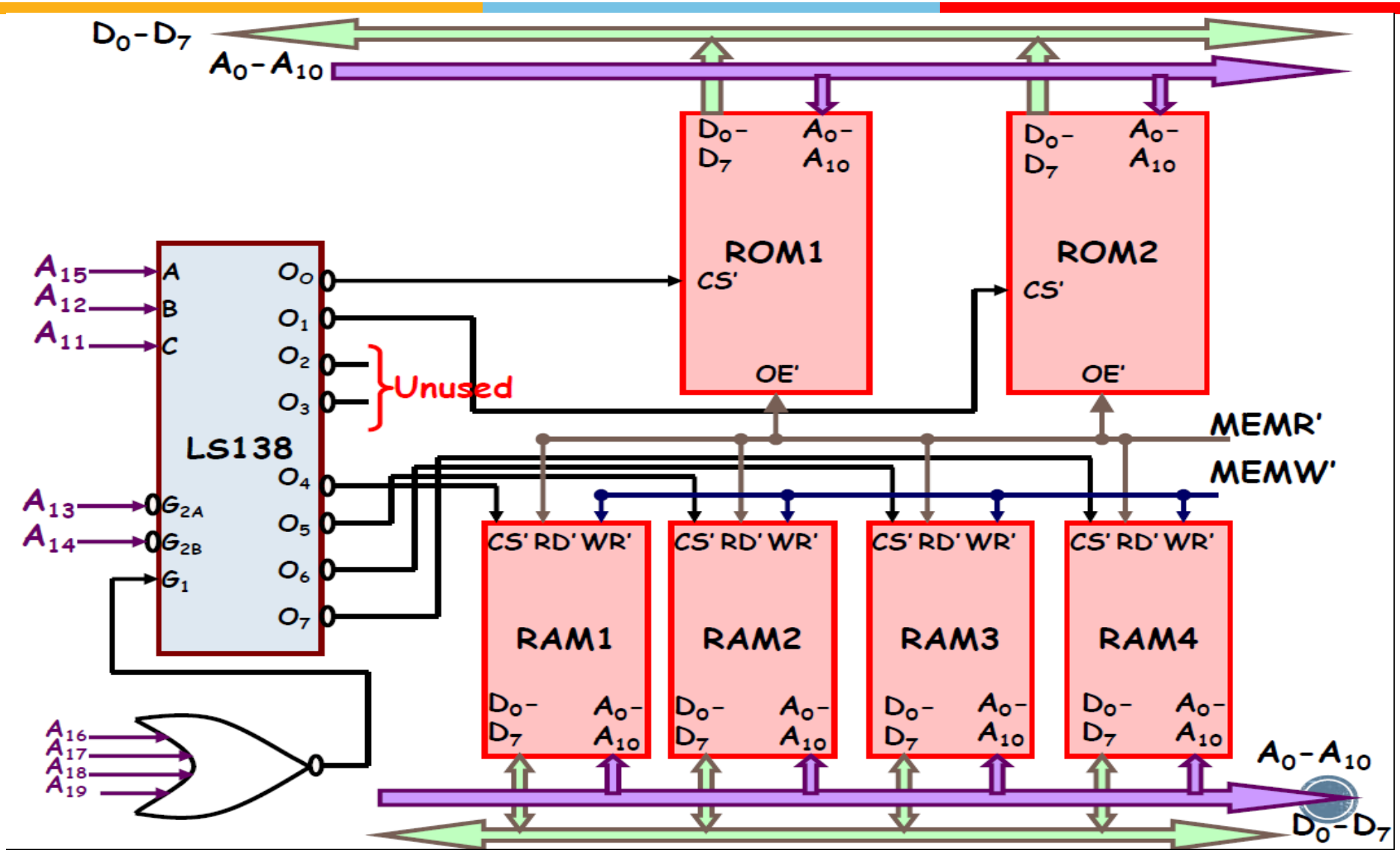
A_{15}	A_{14}	A_{13}	A_{12}	A_{11}	A_{10}	A_9	A_8	A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0
1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1

Example



Absolute Addressing

Example


D0-D7
A0-A10
D0-D7
A0-A10
ROM1
CS'
OE'
ROM2
CS'
OE'
A15
A12
A11
A
B
C
O0
O1
O2
O3
Unused
LS138
O4
O5
O6
O7
A13
A14
G2A
G2B
G1
MEMR'
MEMW'
CS' RD' WR'
RAM1
RAM2
RAM3
RAM4
A16
A17
A18
A19
A0-A10
D0-D7

Thank You