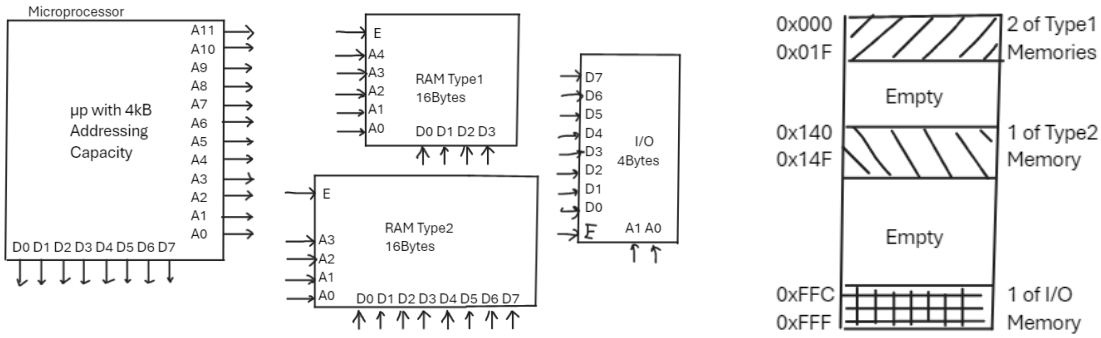
Full Name:
Student No:
Signature: 21.10.2024

BLG 212E Microprocessor Systems – Quiz 1

Question 1: Memory Layout Design

Using given microprocessor and memory units (2 of Type1s, 1 of Type2, 1 of Input/Output), design a connection diagram. You should also provide an address resolution unit to control address pins of the microprocessor correctly. (Using decoder as an address resolution unit is strictly recommended). Also use necessary decoders if needed.



a) Firstly, define the memory address ranges for the memory units given. Also describe what address pins of the microprocessor should connect to Address Resolution Unit. See the memory layout given.
b) Secondly, draw the connection diagram using the 5 components. Connect the address bits bit-by-bit and you could construct data bus line for data pins for simplicity.

Solutions:

a)

A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0	Address Region	Description
0	0	0	0	0	0	0	0	0	0	0	0	0x000	2 of Type1
0	0	0	0	0	0	0	1	1	1	1	1	0x01F	Memories
.	.	.	.	.	0	0	x	x	x	x	x	0x010 - 0x01F	(32Bytes)
0	0	0	1	0	1	0	0	0	0	0	0	0x140	1 of Type2
0	0	0	1	0	1	0	0	1	1	1	1	0x14F	Memory
.	.	.	.	.	1	0	.	x	x	x	x	0x140-0x14F	(16Bytes)
1	1	1	1	1	1	1	1	1	1	0	0	0xFFC	1 of I/O
1	1	1	1	1	1	1	1	1	1	1	1	0xFFF	Memory
.	.	.	.	1	1	1	.	.	.	x	x	0xFFC - 0xFFF	(4Bytes)

Bits for Address Resolution Unit

In this design, the dots ('.') represent the disconnected pins of the memory elements in relation to the microprocessor's address pins, while the 'x's indicate bits that are "don't care" or essentially "any" bits, representing a range from 00...000 to 11...111 for a given bit pattern.

b)

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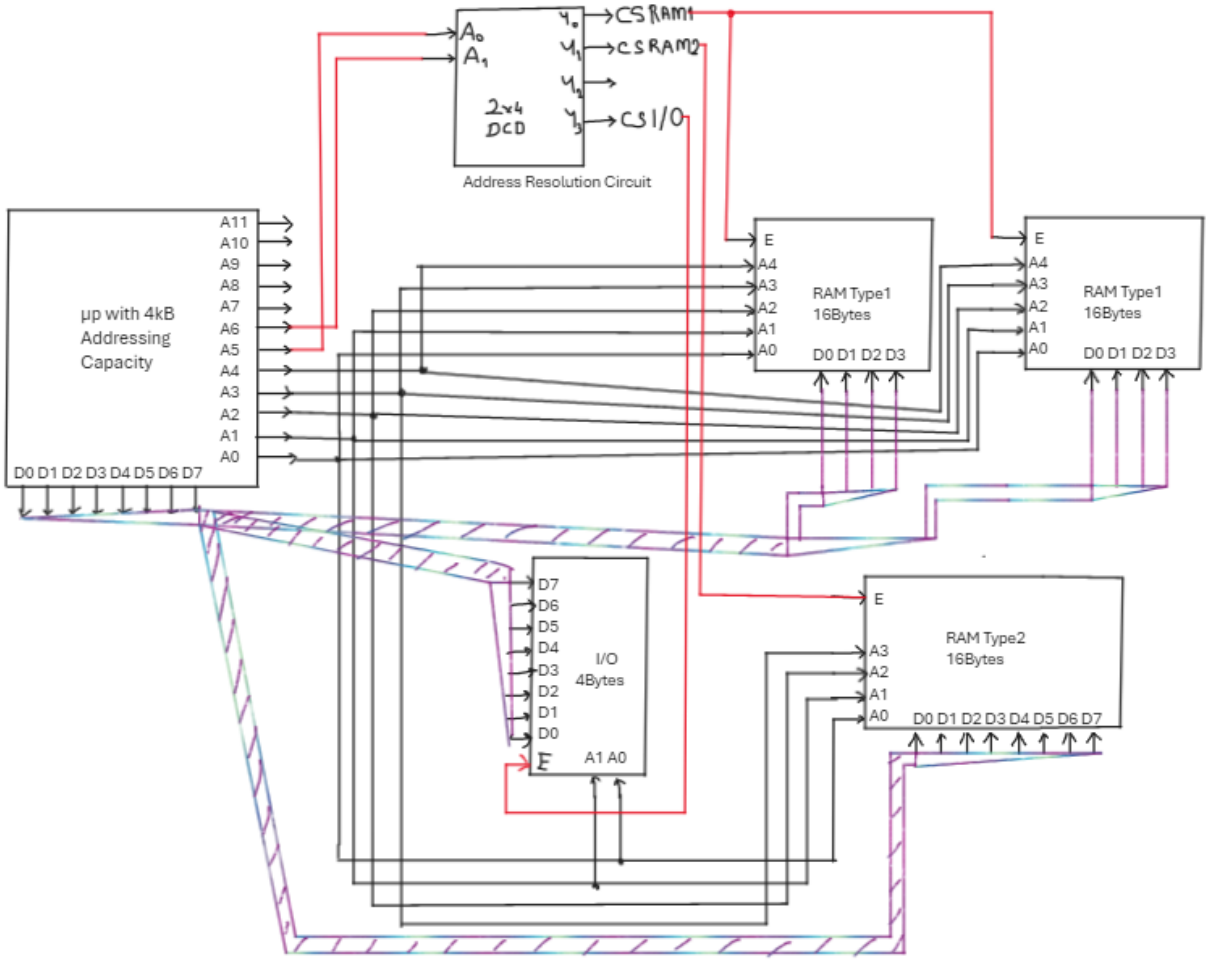

As seen in the design I provided, I use the A5 and A6 address bits of the microprocessor pins in the address resolution circuit, and the other pins directly in the memory elements.