

Main memory/Part2

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Architecture For 3rd Stage

Computer Science

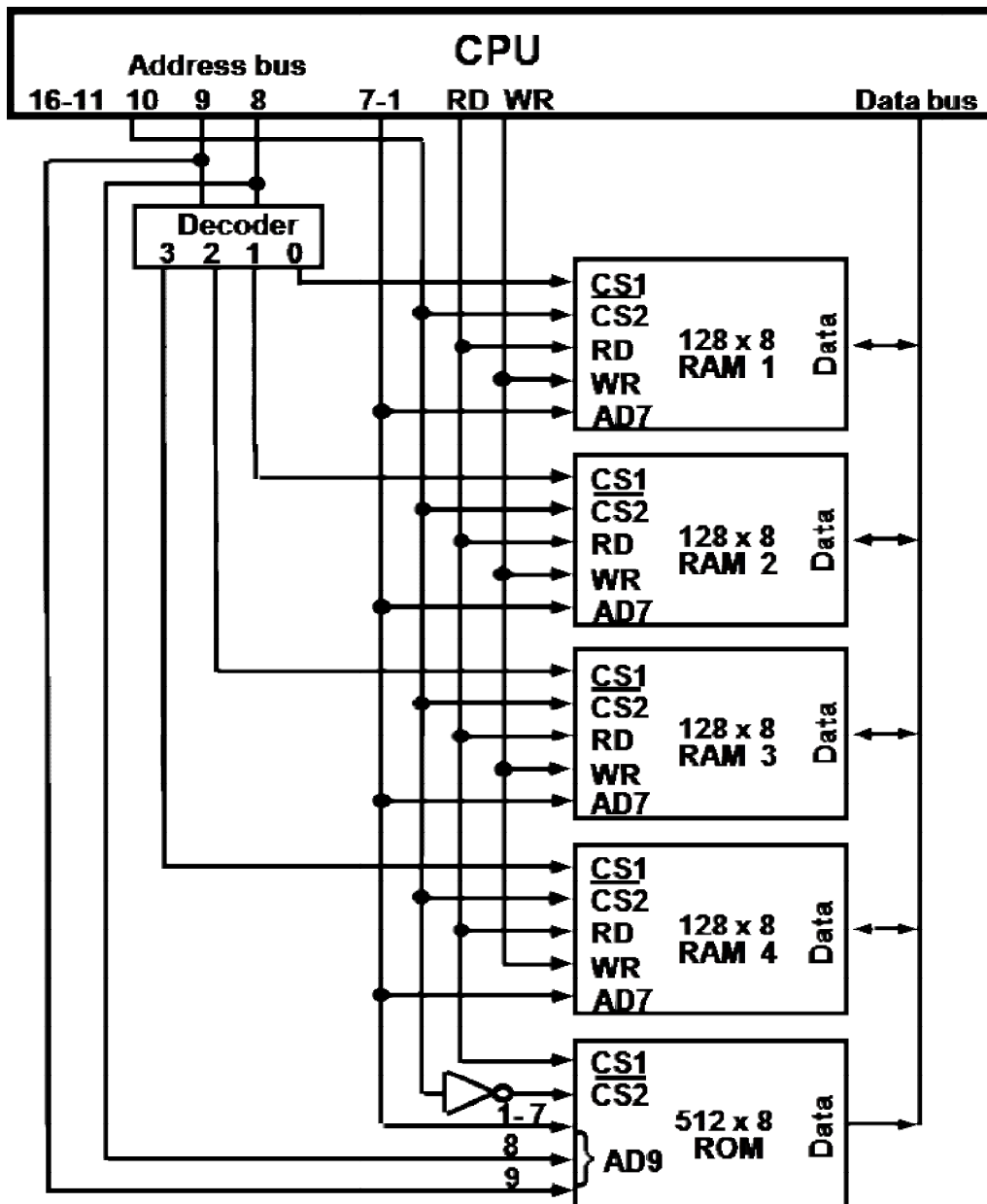
Decoders and multi chips

The connection of memory chip to the cpu is shown in the following figure. this configuration gives a memory capacity of 512 bytes of RAM and 512 bytes of ROM. The selection between RAM and ROM is achieved by CS2 bit. RAM has 4 chips. The question is: How the computer knows the required chip?

This is done by a 2×4 decoder whose outputs go to CS1 inputs in each RAM chip:

CS1	Selected chip
0 0	RAM1
0 1	RAM2
1 0	RAM3
1 1	RAM4

Note that RD and WR outputs from CPU are applied to the inputs of each RAM chip. ROM chip is connected with RD only.

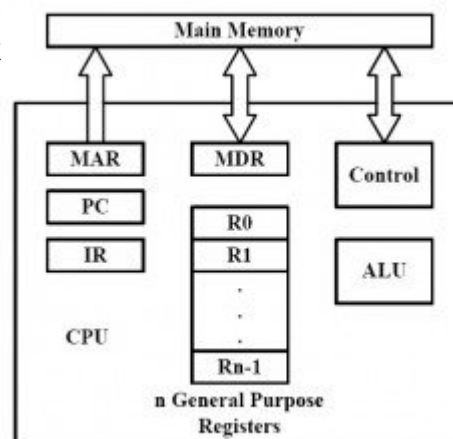


Memory connection to CPU

Remember that the RAM connects directly with two registers in the CPU :

- MDR via bidirectional data bus .
- MAR via address buses

Of course M.M needs to contact with CU by control buses



Exercise:

Draw the address format for ROM consists of 1 chip and the selected address is the third one.

Example: designing Main Memory:

Designate a M.M of 1KB consisting of chips of 128 byte (RAM) and single chip for ROM.

SOL:

- a- Devide M.M size into two halves equally between RAM and ROM.

$$1\text{KB} = 2^{10} \text{ B}$$

$$\text{Size of ROM} = \text{Size of RAM} = 2^{10}/2 = 2^9 = 512 \text{ byte}$$

- b- Compute the NO.of each chip :

$$\begin{aligned} \text{the no. of chip (RAM)} &= \text{size of RAM} / \text{size of CHIP} \\ &= 2^9 / 2^7 = 2^2 = 4 \text{ chips} \end{aligned}$$

$$\text{The no. of chip(ROM)} = 1 \text{ (given) .}$$

M.M consists 5 chips as a whole [4chips (RAM)+1chip (ROM)], and they are connected to the CPU in the same way explained previously.

Exercises

A-Suppose that :

- RAM consists of 8 chips with 128 byte for each.
- ROM consists of 2 chips, what is the size of each chip?

- Find the size of main memory based on your answers of the previous points.

B-The size of M.M=1MB. The size of RAM chip is equal to the size of ROM chip and equal to 1 KB. find the no. of bits in each field in the address.

Next Lecture

The next clamshell we will learn about another kind of memories , the cache. See you next week, God willing,