

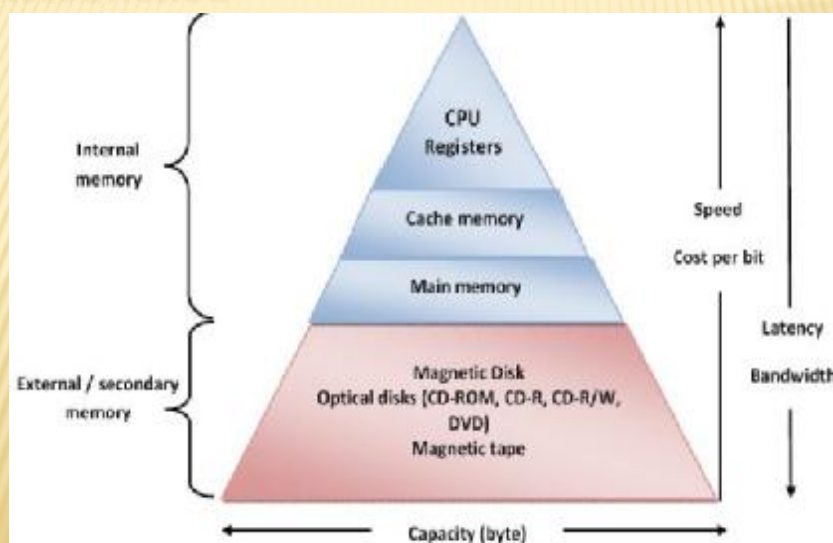
MAIN MEMORY الذاكرة الرئيسية

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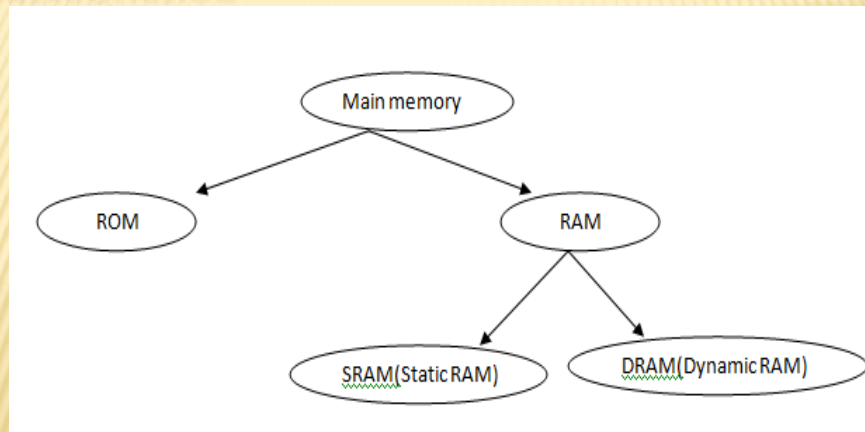
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Introduction



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STATIC RAM (SRAM)

- 1- it consists essentially of internal flip-flops that store the binary information.
- 2- the stored information remains valid as long as power is applied to the unit.
- 3-The static RAM is easier to use.
- 4- SRAM has shorter read and write cycles.

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DYNAMIC RAM (DRAM)

- 1- stores the binary information in the form of electric charges that are applied to capacitors.
- 2- it needs refreshing because The charge on the capacitors tend to discharge with time and the capacitors must be periodically recharge.
- 3-DRAM offers reduced power consumption.
- 4- DRAM offers larger storage capacity in a single memory chip.

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ROM (READ ONLY MEMORY)

ROM is used to refer to memories that offers the ability of reading information only without the right of updating these information.

ROM is needed for storing important information such as an initial program called :

bootstrap loader

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The Startup Of Computer & Bootstrap loader

The startup of computer consists of :

- ò Turning the power on and starting the initial program by setting the program counter (PC) to the first address of the bootstrap loader.
- ò The bootstrap program loads a portion of the operating system (OS) from disk to main memory and control is then transferred to OS which prepare the computer for general use.

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Comparison Between RAM & ROM

- ò Both are random access memory.
- ò RAM is used to store the programs and data that are subject to change. while ROM is used to store the programs that are permanently resident in the computer and for tables f constants that do not change in value once the production of computer is completed .
- ò RAM is volatile, its contents are destroyed power is turned off. The contents of ROM remain unchanged after power in turned off and n again.

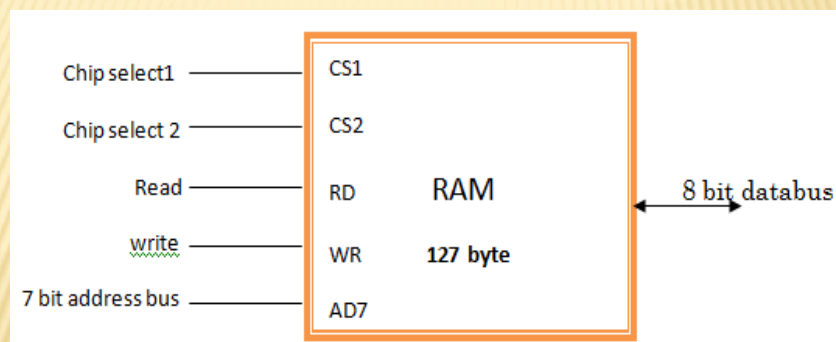
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RAM And ROM Chips



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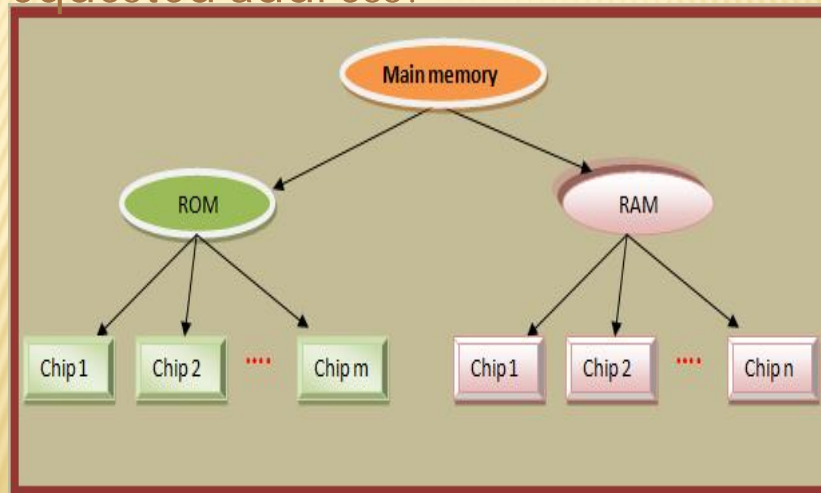
Example of RAM Chip....



128 = 2^7 → 7 bit address bus
 Byte → 8 bit data bus (bidirection)

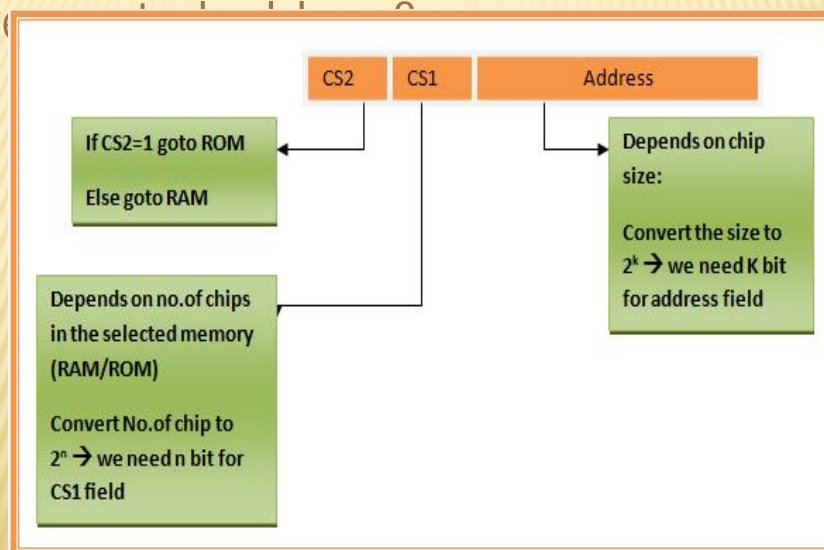
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Problem : how to access the requested address?



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Example: translate the following address:

0	01	0000011
CS2	CS1	Address

Sol:

- The selected chip located within RAM because $CS2=0$
- The selected chip is : 1 because $CS1=(01)_2=(1)_{10}$
- The selected address within chip is the address no.3 because the value of address field is $(0000011)_2=(3)_{10}$

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Example: Draw the address format for ROM consists of 1 chip of 512 B and the selected address is the third one.

Sol:

1-The selected chip located within ROM, So $\rightarrow CS2=1$

2- Calculating no. of bits for CS1:

The ROM consists of 1 chip (given) $\equiv 2^0$

\therefore no. of bits in CS1 is 0 , i. e. there is no CS1 field in the format

3-Calculating no. of bits for address within chip:

The chip size= 512 B (given) $\rightarrow 512=2^9$

\therefore no. of bits in address field is 9 ,

The value of this field is $(000000011)_2$ (also given).

The address format issued by CPU is:

1	000 000 011
CS2	Address

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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)],