

UNIT 2. FUNCTIONAL ELEMENTS OF A COMPUTER Activities-3



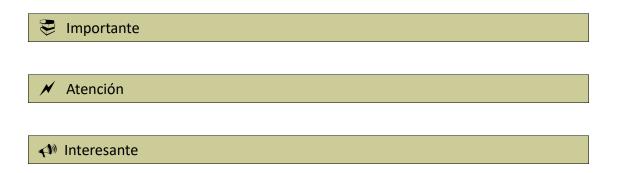
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Nomenclatura

A lo largo de este tema se utilizarán distintos símbolos para distinguir elementos importantes dentro del contenido. Estos símbolos son:



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(Exercise 1) We have a hypothetical computer with this instruction set. Each character in the instruction field corresponds to a bit.

Code	Instrucction	Description
LOAD RX, MMMM	00rxmmmm	Loads content of memory
		mmmm in Register rx
STORE MMMM,RX	01rxmmmm	Stores content of
		Register rx in memory mmmm
ADD RX,RY	1000rxry	Performs $rx+ry$ and sends the
		result to the register R3
SUB RX,RY	1100rxry	Performs $rx-ry$ and sends the
		result to the register R3
JNZ MMMM	1111mmmm	If the content of R3 is not zero
		the ${\it PC}$ jumps to memory ${\it mmmm}$

The memory has the following information (numbers are in binary representation):

<i>Address</i>	Content
0000	
0001	
0010	
0011	00001100
0100	00001001
0101	00001101
0110	00001000
0111	
1000	
1001	
1010	
1011	
1100	
1101	
1110	
1111	

And the following instructions of a program to be executed (numbers are in decimal representation)

- i1: LOAD R0, 3
- i2: LOAD R1, 4
- i3: ADD R0, R1
- i4: STORE 10, R3
- i5: LOAD RO, 5
- i6: LOAD R1, 6
- i7: SUB R0, R1

★ i8: JNZ 14 (i10) // memory address 14 stores instruction 10

i9: STORE 7, R3

i10: STORE 8, R3

a) Execute each instruction and update the values of registers and memory addresses and its content. For example, for the first instruction:

i1: $R0 \rightarrow 00001100 (8_{10})$

No memory addresses/content updated

- b) Convert each instruction to binary representation.
- c) Modify the content of address 0110 to store 00001101. Has this update any effect on the execution of the program?
- d) Create a new instruction that adds an integer to the content of a register. You must use 8 bits at maximum.