BLG 212E - MICROPROCESSOR SYSTEMS

Homework-1

Assignment Date : 14.03.2017 Due Date : 04.04.2017 at 17:00

Submit your homework program file to Ninova. Include the following info at the beginning of program file. * Student Number : 123456789 * Student Name : Aaa Bbb

Using the Educational CPU Simulator software (Mikbil), write an assembly program to perform the following tasks.

DATA STORAGE PART

Define a symbolic variable for an Array of items.
The starting memory address of array will be determined by the Assembler.
Each array element should have two parts : **Item name** (1 byte), followed by **Item amount** (1 byte.)

Initialize the elements of array so that it will contain the data values given below, exactly in the given mixed order.
There can be different array elements whose item names are same.

When initializing, hexadecimal notation should be used for item names.
For item amounts, either decimal or hexadecimal notation can be used.

Item name		Item amount	
ASCII	Hexadecimal (with $ prefix)	Decimal	Hexadecimal (with $ prefix)
C	43	90	5A
A	41	20	14
D	44	120	78
A	41	30	1E
C	43	70	46
B	42	50	32
A	41	10	0A
D	44	130	82
B	42	60	3C
C	43	100	64
D	44	110	6E
B	42	40	28
C	43	80	50
X	58	0	00

Notice:

- The last element in the array has a special usage.
- Its item name should be X ($58) , to indicate the end of array.
- While program is scanning the array, it should stop scanning when X is encountered.
- X is not a real item.

PROGRAM INSTRUCTIONS PART

Write assembly instructions to sort the given array, by the item amounts, in decreasing order (from biggest amount to smallest amount).

- Item amounts should be considered as unsigned numbers.
- After sorting, the original order of items will be changed.
- Bubble Sort method is recommended.
- In the program, other neccessary symbolic variables such as Number of Items, Pass Counter, Loop Counter, etc. can be defined.
- Subroutines should NOT be used in this homework.
- After sorting by item amounts in decreasing order, the array should be as shown below.

Item name		Item amount	
ASCII	Hexadecimal	Decimal	Hexadecimal
D	44	130	82
D	44	120	78
D	44	110	6E
C	43	100	64
C	43	90	5A
C	43	80	50
C	43	70	46
B	42	60	3C
B	42	50	32
B	42	40	28
A	41	30	1E
A	41	20	14
A	41	10	0A
X	58	0	00

A partial list of array elements before and after the sorting is shown below.

Name of first item.
C ($43)

Amount of first item.
90 ($5A)

Before Sorting

Memory:

Adress	Conten	ASCII
0000	43	C
0001	5A	Z
0002	41	A
0003	14	▯
0004	44	D
0005	78	x
0006	41	A
0007	1E	
0008	43	C
0009	46	F
000A	42	B
000B	32	2
000C	41	A
000D	0A	
000E	44	D
000F	82	‚

After Sorting

Memory:

Adress	Conten	ASCII
0000	44	D
0001	82	‚
0002	44	D
0003	78	x
0004	44	D
0005	6E	n
0006	43	C
0007	64	d
0008	43	C
0009	5A	Z
000A	43	C
000B	50	P
000C	43	C
000D	46	F
000E	42	B
000F	3C	<