Microprocessor-Based Systems Labs

Lab Session 1: Addressing modes. Directives and operators.

The objective is to write three separated source programs in assembler that include the different addressing modes and some of the memory directives set of the 8086 family processors.

Program labs1a.asm

Write a simple asm program that includes the following operations: (template provided in annex is encouraged to be used)

- Load 13H in AX
- Load BAH in BX
- Load 3412H in CX
- Load the content of CX in DX
- Load in AL the content of the memory address 65246H and in AH the content of the memory address 65247H
- Load in the memory address 40004H the content of CH
- Load in AX the content of the memory address pointed by DI
- Load in AX the content of the memory address pointed by BP + 8 bytes.

Program labs1b.asm

Write a source asm to include the following data structures:

- Reserve memory for a variable named COUNTER of 1 byte.
- Reserve 2 bytes for a variable called GRAB, initialized with the value CAFEH.
- Reserve 100 bytes for a table called TABLE100
- Store in memory the text string ERROR1 previously initialized with “Incorrect data. Try again”.

With the data structure defined, please include the following instructions:

- Copy the 6th character of the string ERROR1 in the position 53H of TABLE100
- Copy the content of the variable GRAB just after the position 22H of TABLE100
- Copy the most significative byte of GRAB into the variable COUNTER.

Program labs1c.asm

Assuming DS=0511H, BX=0211H & DI=1010H, determine the REAL memory address where the following instructions will access:

a) MOV AL,DS:[1234H]
b) MOV AX,[BX]
c) MOV [DI],AL

Add and complete with the following instructions so as to address to the same values in the same memory positions than the precedent instructions.

a1) MOV AL,ES:[????H]
b1) MOV SI, ????H
MOV AX,ES:[SI]
c1) MOV ES:[????H],AL

Write a program to verify the expected results in the TD. The student is free to initialize the contents as necessary. It is recommended to previously store in memory known data to verify the correct content.

The final (real) address expected shall be included in the source file as part of the comments

DELIVERY: Date and contents.

Upload to Moodle a ZIP file containing **only the makefile and the source files** (.asm) of the exercises. Remember that only one member of the team can upload the file and the files shall contain the authors' name and the team number **in the header**.

Notice that the source files shall be correctly tabulated and commented. The lack of comments or poor quality ones will be qualified negatively.

The date limit to upload the files is March the 12th at 23:55h

The student may use the following program as a template:

```
;*************************************************************************
; ASSEMBLY CODE STRUCTURE EXAMPLE. MBS 2020
;*************************************************************************
; DATA SEGMENT DEFINITION
DATOS SEGMENT
        ;-- complete with the data requested
DATOS ENDS
;*************************************************************************
; STACK SEGMENT DEFINITION
PILA SEGMENT STACK "STACK"
        DB 40H DUP (0) ; initialization example, 64 bytes set to 0
PILA ENDS
;*************************************************************************
; EXTRA SEGMENT DEFINITION
EXTRA SEGMENT
        RESULT DW 0,0 ; initialization example. 2 WORDS (4 BYTES)
EXTRA ENDS
;*************************************************************************
; CODE SEGMENT DEFINITION
CODE SEGMENT
ASSUME CS: CODE, DS: DATOS, ES: EXTRA, SS: PILA
; BEGINNING OF THE MAIN PROCEDURE
INICIO PROC
        ; INITIALIZE THE SEGMENT REGISTERS
        MOV AX, DATOS
        MOV DS, AX
        MOV AX, PILA
        MOV SS, AX
        MOV AX, EXTRA
        MOV ES, AX
        MOV SP, 64 ; LOAD THE STACK POINTER WITH THE HIGHEST VALUE
        ;
        ; PROGRAM START
        ; -- to be completed with the instructions requested
        ; PROGRAM END
        MOV AX, 4C00H
        INT 21H
INICIO ENDP
; END OF CODE SEGMENT
CODE ENDS
; END OF PROGRAM. OBS: INCLUDES THE ENTRY OR THE FIRST PROCEDURE (i.e. “INICIO”)
END INICIO
```