Computer Organization and Architecture (EET2211)

LAB VIII: Calculate average of N 16-bit numbers

Siksha 'O' Anusandhan Deemed to be University, Bhubaneswar

| Branch | • | Section: | |
|--------|----------------|------------------|----------------|
| S. No. | Name | Registration No. | Signature |
| 52 | Saswat Mohanty | 1941012407 | Sasuat Mohanty |

| Marks: | /10 |
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| IVIGINS. | , 10 |

Remarks:

Teacher's Signature

I. OBJECTIVE:

1. Write a program to calculate average of N 16-bit numbers

II. PRE-LAB

For Obj. 1:

a. Calculate average of N 16-bit numbers.

```
[1500h] = 03h

[1501h] = 10h

[1502h] = 10h

[1503h] = 10h

Output: 10h
```

b. Write the assembly code.

```
org 100h
mov ax,0000h
mov ds,ax
mov si,1500h
mov di,1510h
mov ax,0000h
mov cl,[si]
mov bl,cl
inc si
loop: add al,[si]
     adc ah,00
     inc si
     dec cl
     jnz loop
div bl
mov [di],ax
```

hlt ret

III. LAB:

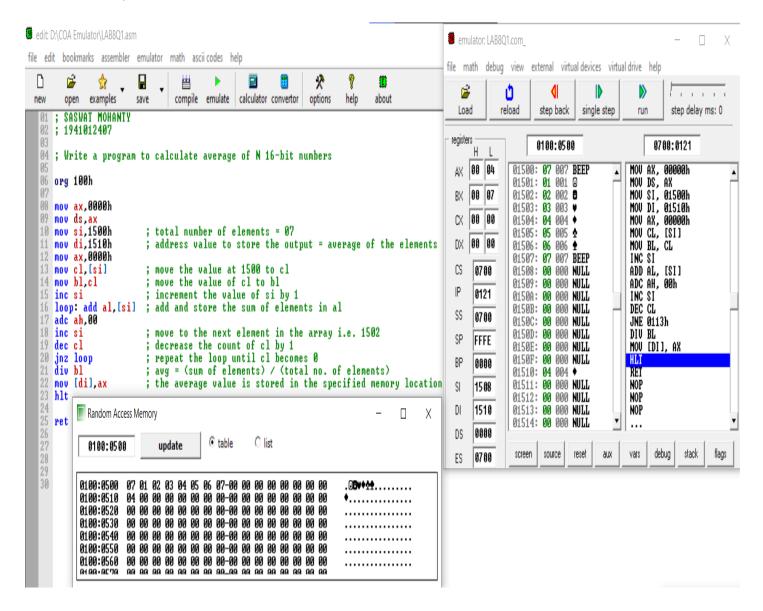
Assembly Program:

For Obj. 1:

```
; SASWAT MOHANTY
; 1941012407
; Write a program to calculate average of N 16-bit numbers
org 100h
mov ax,0000h
mov ds,ax
mov si,1500h
                  : total number of elements = 07
                  ; address value to store the output = average of the elements
mov di,1510h
mov ax,0000h
mov cl,[si]
                  ; move the value at 1500 to cl
mov bl.cl
                  : move the value of cl to bl
inc si
                  ; increment the value of si by 1
                  ; add and store the sum of elements in al
loop: add al,[si]
adc ah,00
inc si
                  ; move to the next element in the array i.e. 1502
dec cl
                  ; decrease the count of cl by 1
                  ; repeat the loop until cl becomes 0
jnz loop
                  ; avg = (sum of elements) / (total no. of elements)
div bl
                  ; the average value is stored in the specified memory location
mov [di],ax
hlt
ret
```

Observations (with screen shots):

For Obj. 1:



Conclusion:

It can be concluded to determine the largest number in an array when dry run and executed in system found to be same. Thus, the program to determine the largest number in an array was executed.

IV. POST LAB:

1. What is the maximum internal clock frequency of 8086?

The maximum internal clock frequency of 8086 is 5MHz.

2. List few applications of microprocessor-based system.

The use of microprocessor in toys, entertainment equipment and home applications is making them more entertaining and full of features. The use of microprocessors is more widespread and popular. Now the Microprocessors are used in:

- Calculators
- Accounting system
- Games machine
- Complex Industrial Controllers
- Traffic light Control
- Data acquisition systems

3. Briefly explain the following instructions of 8086:

- a) JMP
- b) JZ
- c) JNZ
- d) JC
- e) JNC
- a. <u>JMP: -</u> Used to jump to the provided address to proceed to the next instruction.
- **b.** \underline{JZ} : Used to jump if equal/zero flag ZF = 1
- c. JNZ: Used to jump if not equal/zero flag ZF = 0
- **d.** <u>JC:</u> Used to jump if carry flag CF = 1
- e. JNC: Used to jump if no carry flag (CF = 0)