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**CHENNAI**

## **MICROPROCESSOR AND INTERFACING**

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## Aim:

To find average of 10 numbers stored in an array using 8086 processor by MASM611 assembler.

## Tool Used:

Assembler - MASM 611

## Algorithm:

In data Segment Define myarray with 10 array elements, SUM and QUO variables

- 1.Start
2. Move in CX the number of element(10)
3. Move into BX CX's value as a temporary variable to calculate average
- 4.Clear AX register and set to 0
5. Move into SI the base address of myarr
6. Start Loop
  - 6.1 Add myarr[SI] into AX register and store into AX
  - 6.2 Since 16-bit numbers increment SI by 02H
  - 6.3 Call Loop Again till CX == 0
- 7.Store the sum of array in SUM variable
8. Divide AX by BX to find average
- 9.Store result in QUO
- 10.HALT

## Program:

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: QBASIC
File Edit Search Options Help
ARRADD.ASM
;*****
;AVERAGE OF AN ARRAY OF 10 NUMBERS
;*****

ASSUME CS:CODE, DS:DATA
DATA SEGMENT
MYARRAY dw 005AH,005BH,005CH,005DH,005EH,005FH,0060H,0061H,0062H,0063H
SUM dw ?
QUO dw ?
DATA ENDS

CODE SEGMENT
START:
MOV CX,000AH ;LOOP always dec CX register, no need explicit DEC
MOV BX,CX ;FOR LOOPS always store n in CX register
MOV AX,DATA
MOV DS,AX
XOR AX,AX
LEA SI,MYARRAY

RPT:
MS-DOS Editor <F1=Help> Press ALT to activate menus 00001:001
```

```
RPT:
ADD AX,MYARRAY[SI]
ADD SI,02H ;or INC twice
LOOP RPT

MOV SUM,AX
DIV BX
MOV QUO,AX
HLT
CODE ENDS
END START
MS-DOS Editor <F1=Help> Press ALT to activate menus 00032:001
```

## Sample Input:

Input Array :-

[005AH,005BH,005CH,005DH,005EH,005FH,0060H,0061H,0062H,0063H]

## Sample Output:

The sum of the array is : 03B1 H

The Quotient of Average : 005E H

## Snapshot of the Output:

```

C:\BIN>debug arradd.exe
-u
0766:0000 B90A00      MOV     CX,000A
0766:0003 8BD9        MOV     BX,CX
0766:0005 B86407      MOV     AX,0764
0766:0008 8ED8        MOV     DS,AX
0766:000A 33C0        XOR     AX,AX
0766:000C 8D360000     LEA     SI,[0000]
0766:0010 03840000     ADD     AX,[SI+0000]
0766:0014 83C602      ADD     SI,+02
0766:0017 E2F7        LOOP   0010
0766:0019 A31400      MOV     [0014],AX
0766:001C F7F3        DIV     BX
0766:001E A31600      MOV     [0016],AX
-u
0766:0021 F4          HLT
0766:0022 741C        JZ      0040
0766:0024 04CE        ADD     AL,CE

```

## Register/Memory Contents for I/O

```

-g 0021
AX=005E BX=000A CX=0000 DX=0005 SP=0000 BP=0000 SI=0014 DI=0000
DS=0764 ES=0754 SS=0763 CS=0766 IP=0021  NU UP EI PL NZ NA PE NC
0766:0021 F4          HLT
-d 0764:0000 0017
0764:0000 5A 00 5B 00 5C 00 5D 00-5E 00 5F 00 60 00 61 00  Z.[.\.].^._.`.a.
0764:0010 62 00 63 00 B1 03 5E 00  b.c...^..

```

## Manual Verification:

### Convert Hexadecimal Value to Decimal Value

Result

Decimal value: **945**

Hexadecimal Value:  = ?

Calculate

Clear

### Hexadecimal Calculation—Add, Subtract, Multiply, or Divide

Result

Hex value:

03b1 ÷ 000a = **5E Remainder : 5**

Decimal value:

945 ÷ 10 = **94 Remainder : 5**

## Result:

Hence the average of 10 numbers stored in an array has been performed and verified using the MASM611 application in DOSBOX.