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Department of Computer Science and Engineering
Data Science

Department of Computer Science Engineering Data Science

Academic Year: 2022-23 **Semester: IV**
Class / Branch: S.E.D.S. **Subject: Microprocessor Lab**

Experiment No. 9

1. Aim: Write an Assembly program to find largest number from a given array.

2. Hardware used: DYNA-86L Kit ,SMPS,Keyboard

3. Theory :-

Microprocessor 8086 can compare two numbers by using CMP instruction. This instruction compares a byte / word in the specified source with a byte / word in the specified destination. The source can be an immediate number, a register, or a memory location. The destination can be a register or a memory location. The comparison is actually done by subtracting the source byte or word from the destination byte or word. The source and the destination are not changed, but the flags are set to indicate the results of the comparison. AF, OF, SF, ZF, PF, and CF are updated by the CMP instruction.
For the instruction CMP BX, CX, the values of CF, ZF, and SF will be as follows:
CMP BX, CX

	CF	ZF	SF
BX = CX	0	1	0
BX > CX	0	0	0
BX < CX	1	0	1

In assembly language programing set of instructions can be executed n number of times using "*LOOP label*" instruction.

LOOP *label*

This instruction is used to repeat a series of instructions some number of times. The number of times the instruction sequence is to be repeated is loaded into CX. Each time the LOOP instruction executes, CX is automatically decremented by 1. If CX is not 0, execution will jump to a destination specified by a label in the instruction. If CX = 0 after the auto decrement, execution will simply go on to the next instruction after LOOP. The destination address for the jump must be in the range of –128 bytes to +127 bytes from the address of the instruction after the LOOP instruction.

Suppose following set of instructions need to be execute 5 times using assembly instructions then *LOOP label* instruction is useful.

```
1) INC BX
2) CMP AL, [BX]
3) JC 400C
4) MOV AL, [BX]
```

```
        MOV CX, 0005
BACK:   INC BX
        CMP AL, [BX]
        JC 400C
        MOV AL, [BX]
        LOOP BACK
```

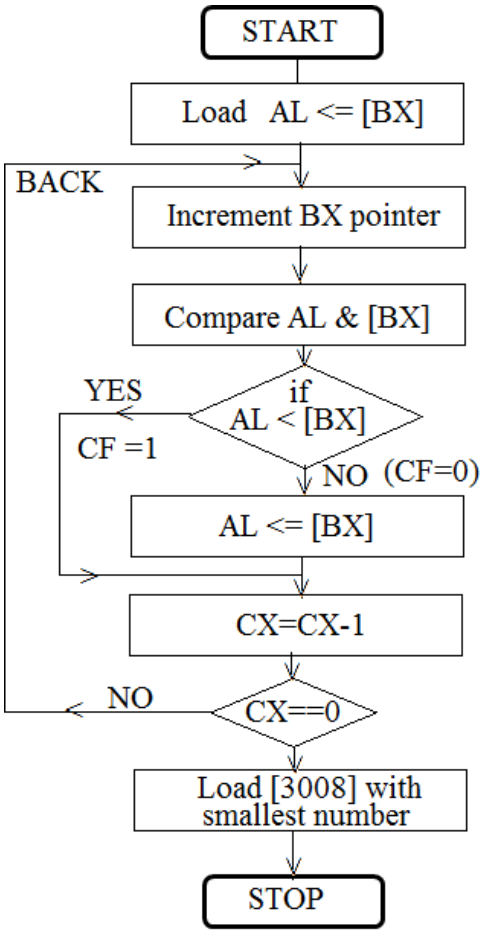
To execute set of instruction five times, load CX register with 0005, use LOOP instruction to decrease CX counter value by 1 and monitor its value. If CX value is not equal to zero then control will jump to *BACK* label/address. Once CX reaches to zero, control will execute very next instruction after *LOOP BACK*.

Conditional jump

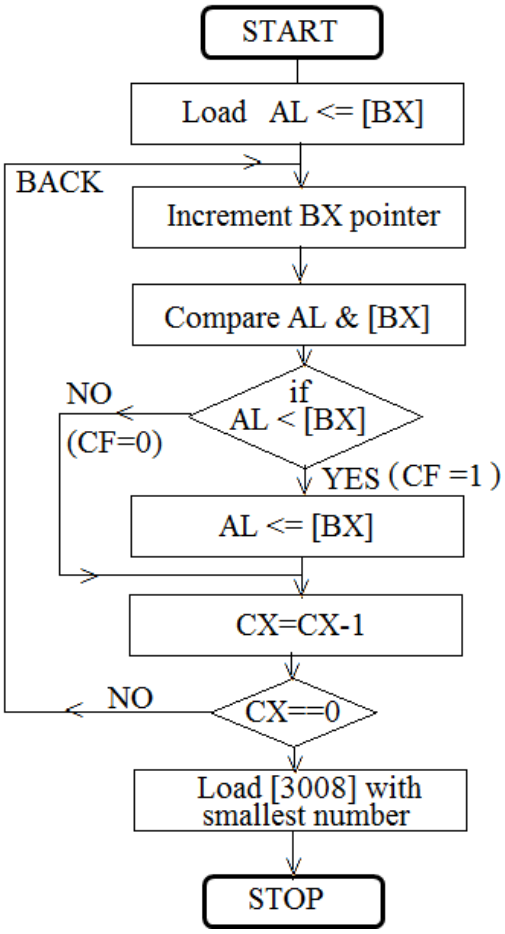
If some specified condition is satisfied in conditional jump, the control flow is transferred to a target instruction.

```
CMP AL, [BX]
JC LABEL
```

If, after a compare or some other instructions which affect flags, the carry flag is 1, this instruction will cause execution to jump to a label given in the instruction. If CF is 0, the instruction will have no effect on program execution.



Flow Chart for finding Smallest Number



Flow Chart for finding Largest Number

4.Program :

	MOV BX, 3000H	;Load BX with 3000H
	MOV AL, [BX]	;Transfer data from memory to AL register
	MOV CX, 0007H	;Load counter with 07.
BACK:	INC BX	;Increment BX register to point memory location
	CMP AL, [BX]	;Compare two data bytes
	JNC *NEXT*	;If AL is greater then jump to *NEXT*
	MOV AL, [BX]	;If AL is smaller then load AL with greater number
NEXT	LOOP *BACK*	;Repeat until CX is not zero
	MOV [3008], AL	;Store largest number in one of memory location
	INT 3	

Result:

Location	**Data bytes**							
3000H	65	24	46	86	64	02	45	75
3008H	**02**	00	00	00	00	00	00	00

5. Conclusion :