**Daffodil International University**

**Department of Electrical and Electronic Engineering**

**EEE 324: Microprocessors and Interfacing Laboratory**

**Experiment No: 04**

**NAME OF THE EXPERIMENT: Using Loop and Conditional Jumps in Assembly Language**

## Theory:

**CMP instruction:**

CMP AX, BX subtracts BX from AX but result is not saved to any register. Just flags are affected

**JMP instruction:**

JMP loads IP with new address to run next instruction from new location

**Conditional Jump instructions:**

JE, JNE, JG, JL, JNG, JNL are examples of conditional jump.

## PROGRAM 1

1. Write a code that will print characters starting from A to Z. The code is given below. You can omit comments. Don’t write line number on editor window.

 .MODEL SMALL

 .STACK 100H

 .CODE

 MAIN PROC

 MOV AX,@DATA

 MOV DS,AX

 MOV DL,65 ;or you can write MOV DL,’A’

 MOV CX,26

 MOV AH,2

 MYLABEL:

loop starts here

loop ends here

“you can also write”

MYLABEL:

INT 21H

INC DL

LOOP MYLABEL

 INT 21H

 INC DL

 DEC CX

 JNZ MYLABEL

 MOV AH,4CH

 INT 21H

 MAIN ENDP

 END MAIN

1. Save the program as an asm file. i.e. filename should be like exp2.asm (select “all files” in “save as type”).
2. Save the program in a folder where MASM.EXE and LINK.EXE are present.
3. Write ‘cmd’ in RUN window and press OK/Enter
4. Run the file MASM.EXE with your asm file name after it

MASM.EXE EXP2.ASM↵ or

MASM EXP2↵

1. Run the file LINK.EXE with your created object file name after it

LINK.EXE EXP2.OBJ↵ or

LINK EXP2↵

1. Run the created exp2.exe file

Exp2.exe↵ or exp2↵

C:\mda>exp2 (↵)

ABCDEFGHIJKLMNOPQRSTUVWXYZ

C:\mda>

1. Modify the program so that there is a space after each character printed.

## PROGRAM 2

1. Write a code that will print highest of three numbers stored in A,B,C variables.

yes

no

yes

no

no

Take A,B,C

B > C?

A is Max

C is max

B is max

yes

A > B?

 A > C?

1. Identify the relation between the flowchart and operations below.
	1. Compare A and B
	2. if B greater go to (g.)
	3. Compare A and C
	4. if C greater go to (f.)
	5. Declare A be MAX go to (j)
	6. Declare C be MAX go to (j)
	7. Compare B and C
	8. if C greater go to (f)
	9. Declare B be MAX
	10. Print the Max Number
2. In a text editor (Notepad) write the following code. You can omit comments. Don’t write line number on editor window.

.MODEL SMALL

.STACK 100H

.DATA

A DW 12

B DW 52

C DW 42

.CODE

MAIN PROC

 MOV AX,@DATA

 MOV DS,AX

 MOV AX,A

 MOV BX,B

 CMP AX,BX

 JNG G\_LABEL

 MOV BX,C

 CMP AX,BX

 JNG F\_LABEL

 MOV DX,A

 JMP J\_LABEL

F\_LABEL:

 MOV DX,C

 JMP J\_LABEL

G\_LABEL:

MOV AX,B

MOV BX,C

CMP AX,BX

JNG F\_LABEL

MOV DX,B

J\_LABEL:

 MOV AX,DX

 MOV BL,10 ;you can also write MOV BL, 0AH

DIV BL

MOV DX,AX

MOV AH,2

ADD DL,48 ;you can also write ADD DL, 30H

INT21H

MOV DL,DH

ADD DL,48

INT 21H

MOV AH,4CH

INT 21H

MAIN ENDP

END MAIN

1. Save the program as an asm file. Assemble and link the program then run.
2. It will show the highest of the three numbers.

**Program analysis:**

1. The program follows the flowchart. Labels are named following the operation Labels.
2. To compare A and C, A is stored in AX and C in BX the CMP AX,BX
3. To declare a variable max, it is stored in DX.
4. At J\_LABEL value of DX is printed in decimal format.

## Questions:

1. How do conditional Jumps decide whether to Jump or not?
2. What is the limitation of conditional jump? How to overcome it?
3. Try to solve the Problem using any other method/flowchart.