**CSE 331L / EEE 332L: Microprocessor Interfacing & Embedded System**

Section: 9, Spring 2020

Lab - 05 (Loop)

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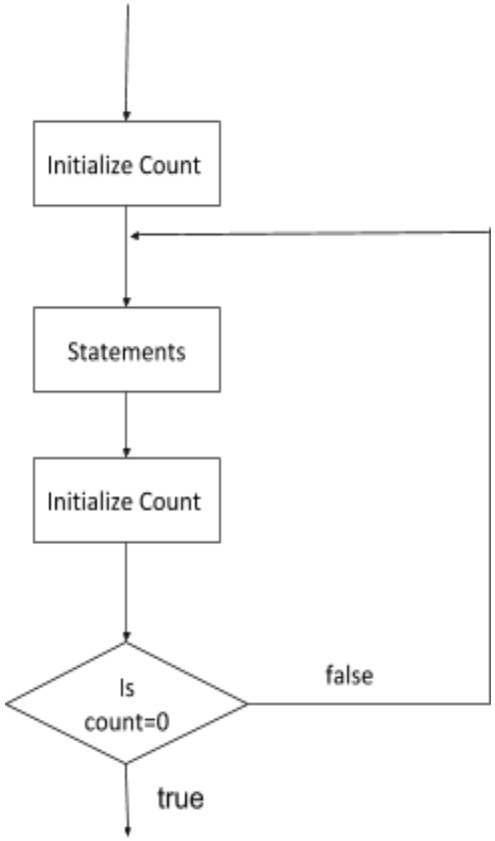
**1. print the first five characters of ascii table**

```
ORG 100H
.MODEL SMALL
.STACK 100H
.CODE
MAIN PROC
        MOV AH, 2
        MOV CX, 5
        MOV DL, 0

        PRINT_LOOP:
            INT 21H
            INC DL
            LOOP PRINT_LOOP

        EXIT:
        MOV AH, 4CH
        INT 21H

MAIN ENDP
END MAIN
```




**Logic Instructions**

| a | b | a AND b | a OR b | a XOR b | NOT a | Instructions |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 0 | 1 | Opcode destination, source |
| 0 | 1 | 0 | 1 | 1 | 1 | |
| 1 | 0 | 0 | 1 | 1 | 0 | |
| 1 | 1 | 1 | 0 | 0 | 0 | |

**Mask**

| a | b | a AND b | a OR b | a XOR b | | a | b | a AND b | a OR b | a XOR b |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 1 | 1 |
| 1 | 0 | 0 | 1 | 1 | | 1 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 | 1 | | 1 | 1 | 1 | 1 | 0 |

**Example: Check if input contains even number**

```
        MOV AH, 1
        INT 21H

        TEST AL, 1
        JZ PRINT

PRINT:
        MOV AH, 2
        MOV DL, 'E'
        INT 21H
        JMP EXIT

EXIT:
        MOV AH, 4CH
        INT 21H
```


**Array: Index mode**

- BX, SI, DI registers hold the offset addresses of memory locations. Their segment numbers are contained in DS.

**Example: find the summation of the numbers of an array**

```
arr db 90h, 23h, 21h, 43h, 33h
```

```
        XOR AX, AX              ;CLEAR AX
        XOR BX, BX              ;CLEAR BX
        MOV CX, 5

PRINT:
        MOV DL, ARR[BX]    ; mov dl, [si/di]
        INC BX                  ; inc si/di

        MOV AH, 2
        INT 21H

        LOOP PRINT
```

**Example: Declare an array of size 10 without any initial data. Prompt the user to enter a line of text and store it into the array. Terminate the program if the number of user input keys exceed the array size or user inputs a carriage return.**

```
ORG 100H
.MODEL SMALL
.DATA
        MY_STRING DB 10 DUP (?),'$'
        MSG1 DB “ENTER A TEXT:$”
        NEWL DB 0Ah, 0Dh, ‘$’
.CODE

        MAIN PROC
        MOV AX, @DATA
        MOV DS, AX

        MOV AH, 9
        LEA DX, MSG1
        INT 21H
```

```
        LEA DX, NEWL
        INT 21H

        XOR BX, BX      ;INITIALIZE STRING INDEX
        MOV CX, 10      ;SET COUNTER TO MAX COUNT
        MOV AH, 1       ;FUNCTION# 1


        INPUT:
          INT 21H           ;INPUT FOR EACH LOOP

          CMP AL, 0DH   ;COMPARE IF INPUT KEY IS CRET
          JE EXIT           ;JUMP TO EXIT IF AL HOLDS CRET

          MOV MY_STRING[BX],AL      ;LOAD INPUT CHAR INTO STRING
          INC BX                    ;UPDATE STRING INDEX

          LOOP INPUT                ;CX=CX-1 & REPEAT LOOP IF CX!=0


        OUTPUT:

          MOV AH, 9
          LEA DX, NEWL
          INT 21H
          LEA DX, MY_STRING
          INT 21H

        EXIT:
          MOV AH, 4CH
          INT 21H

        MAIN ENDP
END MAIN
```


**Task**

1. Write a program that will prompt the user to enter a hex digit character ("0"......"9" or "A"....."F"), display it on the next line in decimal.

   **Sample 1:**
   Enter a Hex digit: B
   The decimal value of B is 11

   **Sample 2:**
   Enter a Hex digit: 3
   The decimal value of 3 is 3

**Home Task**

1. Replace each uppercase letter in the following string by its lowercase equivalent. Use index addressing mode.

   MSG DB "THIS IS CSE 331 LAB CLASS 5$"

2. Write a count-loop that will print the following shape

   ```
   **********
   **********
   **********
   **********
   **********
   **********
   **********
   **********
   ```

3. Create a hollow diamond star pattern using '*'
   Example: