Section 4

Assembly language

Int 21, int 10, int 20

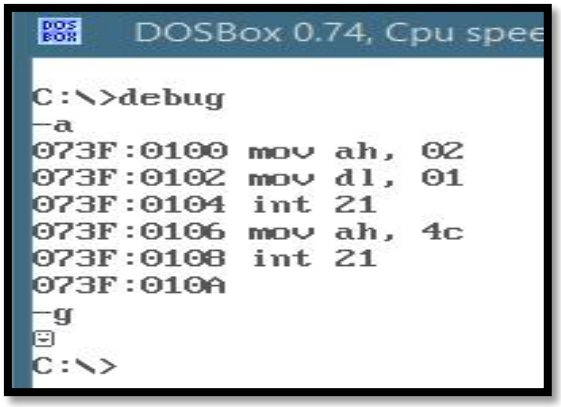
Describe INT instruction.

1) Has format INT xx
2) xx can be 00 – FFH
3) Has a total 256 interrupts.
4) Most widely used INT 10H, INT 21H.

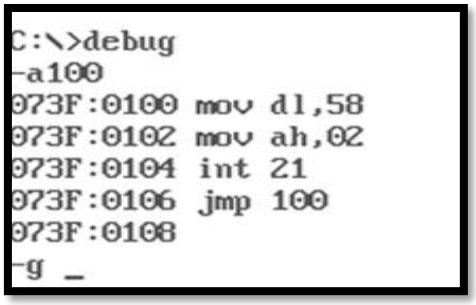
❖ **Int 21 h (depending on ah register)**

AH	Description
01	Input single character with echo.
07	Input single character without echo.
02	Output a single character to the monitor.
0A	Input a string of data from keyboard.
09	Output a string of data to monitor.
4c	Exit from debug.

Write assembly program to print smiley face ☺



Write assembly program which print "X" infinite number of times.



Write a program that accepts number from user then print it.

```
C:\>debug
-a
073F:0100 mov ah,01
073F:0102 int 21
073F:0104 mov dl,al
073F:0106 mov ah,02
073F:0108 int 21
073F:010A mov ah,4c
073F:010C int 21
073F:010E
-g
44
C:\>_
```

Quiz: Write a program that accept number from the user then print it infinite number of times.

Write assembly program, to print string "this my first program"

```
C:\>debug
-e200 "This my first program $"
-a
073F:0100 mov dx, 200
073F:0103 mov ah,9
073F:0105 int 21
073F:0107 int 20
073F:0109
-g
This my first program
```

Write assembly program (Instructions), to print string "ABC$EFG"

```
C:\>debug
-e 200 "ABC$"
-e 300 "EFG$"
-a100
073F:0100 mov dx, 200
073F:0103 mov ah,09
073F:0105 int 21
073F:0107 mov dl,24
073F:0109 mov ah,02
073F:010B int 21
073F:010D mov dx,300
073F:0110 mov ah,09
073F:0112 int 21
073F:0114 int 20
073F:0116
-g
ABC$EFG_
```

Write assembly program which printing all characters from A to Z

```
C:\>debug
-a
073F:0100 mov dl,41
073F:0102 mov cx,1a
073F:0105 mov ah,02
073F:0107 int 21
073F:0109 inc dl
073F:010B dec cx
073F:010C jnz 107
073F:010E mov ah,4c
073F:0110 int 21
073F:0112
-g
ABCDEFGHIJKLMNOPQRSTUVWXYZ
C:\>_
```

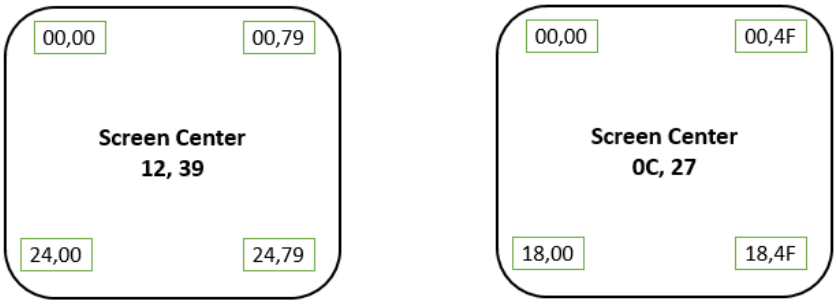
INT 10 (16 dicimal)(Funcion calls reside into ROM BIOS)

⇨ This option are chosen by puting a specifice value in register AH

(02 OR 06)

Position Clear

Decimal **Hexadecimal**



Write code to set the cursor position to row =15 = 0Fh and column =25 = 19h. in MASM

```
MOV AH, 02    ; set cursor option
MOV BH, 00    ; Page 0
MOV DL, 25    ; Column position
MOV DH, 15    ; Row position
INT 10 H      ; invoke interrupt 10H
```

Write code used to clear the screen in "DEBUG"

```
MOV AX, 0600          ; Scroll function
MOV BH, 07            ; Normal attribute
MOV CX, 0000          ; Start at 00, 00
MOV DX, 184F H        ; End at 24, 79(hex =18, 4f)
INT 10 H              ; Invoke the interrupt
```

Write code used to clear the screen in Microsoft Macro Assembler "MASM".

```
MOV AH, 06        ; AH=06 Scroll function (cause the screen to scroll upward)
MOV AL,  00       ; AL=00 entire page
MOV BH, 07        ; normal attribute
MOV CH, 00        ; Start row value
MOV CL,  00       ; start column value
MOV DH, 24        ; End row value
MOV DL,  79       ; End column value
INT 10 H          ; invoke interrupt 10H
```

Write a program that clear the screen, then set the cursor at the center of the screen.

```
; Clear the screen
MOV AX, 0600 H          ; Scroll function
MOV BH, 07              ; Normal attribute
MOV CX, 0000            ; Start at 00, 00
MOV DX, 184F H          ; End at 24, 79(hex =18, 4f)
INT 10  H               ; Invoke the interrupt
; Setting the cursor to the center of screen
MOV AH, 02              ; set cursor option
MOV BH, 00              ; Page 0
MOV DL, 39              ; Center column position
MOV DH, 12              ; Center row position
INT 10 H                ; invoke interrupt 10H
```

Exercise

1. **INT…… function calls reside into ROM BIOS, whereas INT …. Function calls are provided by DOS.**

2. **What is the difference between the following two programs?**

MOV AH, 09
MOV DX, 200
INT 21
	MOV AH, 0A
	MOV DX, 200
	INT 21

3. **INT 21 H function 09 will display a string of data beginning at the location specified in register DX. How does the system know where the end of the string is?**

4. **Fill in the blanks to display the following string using INT 21H.**

```
XXXX: …….. DB 'what is your last name?$'
XXXX: …….. MOV AH, ……
XXXX: …….. MOV DX, ……
XXXX: …….. INT 21
```

5. **The following string needs to be displayed what will happen if this string is output using INT 21H function 09?**

```
DB   'Enter (round to nearest$) your annual salary'
```

```
-t

AX=0000  BX=0000  CX=1423  DX=2C68  SP=18FE  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0105   NV UP EI PL NZ NA PO NC
073F:0105 5B            POP     BX
-t

AX=0000  BX=F991  CX=1423  DX=2C68  SP=1900  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0106   NV UP EI PL NZ NA PO NC
073F:0106 CC            INT     3
-
```