Activity No. 3

DISPLAYING SINGLE CHARACTER USING FUNCTION 02H, 06H AND 09H

1. Objective:

Identify the use of the function 02H,06H and 09h in assembly Language

2. Intended Learning Outcomes (ILOs):

The students should be able to:

2.1 Use the function 02H,06h and 09H in creating program in assembly language

2.2 Create programs using TASM

2.3 Run the program in the command promt

3. Discussion :

In this activity you will be introduced to the basic Output (I/O) operation using assembly language. You will use the DOS interrupt (INT 21H) function calls I/O function are mainly used to read a character or string from the keyboard, which could be an input data to a program and display character or string.

4. Resources:

PC
TASM

5. Procedure:

DOS Display Function 02H and 06H:

1. Open Notepad or any text editor, and write the following:

```
.model small
.stack
.code
        begin
        mov ah,02h
        mov dl,' H '
        int 21h
        mov dl, ' E ‘
        int 21h
```

```
mov dl, ' L '
int 21h
   mov dl, ' L '
int 21h
   mov dl, ' O '
int 21h
mov ah,4ch
int 21h
end begin
```

2. Save the program as Prog3_1.asm.
3. Open TASM at the command prompt, type the following prompt in your computer:
   C:\>cd Tasm[Enter]
4. Assemble the file using TASM. At the c:\Tasm>, type
   C:\Tasm>**Tasm Prog3_1.asm**[**Enter]**
5. If the file assembled successfully, link the file by typing,
   C:\Tasm>**Tlink/t Prog3_1.obj**[**Enter]**
6. Run the program,
   C:\Tasm>**Prog3_1**[**Enter]**
7. Record your output in the Data and Results provided.

8. Open again your text editor and type the following

```
; DOS Display Function 09H
.model small
.stack
.data
msg1 db “WELCOME$”
msg2 db”TO THE WORLD OF ASSEMBLE LANGUAGE $”
.code
begin:
mov ax, @data
```

```
mov ds,ax

mov ah,09h

mov dx,offset msg1

int 21h

mov ah,09h

mov dx,offset msg2

int 21h

mov ah,4ch

int 21h

end begin
```

9. Save the program as Prog3_2.asm.
10. Open TASM at the command prompt, type the following prompt in your computer:

    C:\>cd Tasm[Enter]
11. Assemble the file using TASM. At the c:\Tasm>, type
    C:\Tasm>**Tasm Prog3_2.asm**[**Enter]**
12. If the file assembled successfully, link the file by typing,
    C:\Tasm>**Tlink/t Prog3_2.obj**[**Enter]**
13. Run the program,
    C:\Tasm>**Prog3_2**[**Enter]**
14. Record your output in the Data and Results provided.

Course: BET-CPET	**Activity No.: 3**
Group No.:	**Section: 2A**
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6. DATA AND RESULTS:

Procedure:

1. The following source code presented on Procedure number 1 prints the word "HELLO".
2. 2. The following source code presented on Procedure number 8 prints the sentence string "WELCOMETO THE WORLD OF ASSEMBLE LANGUAGE." (Period not included). Due to the fact that MSG1 does not have a space in between WELCOME and the "$" symbol, when the program executes, there is not space in between the words "WELCOME" and "TO."

Problems:

1. The function 02h and 02 are the same function and is interpreted as such by TASM and MASM when executed. This is due to the fact that even though 02 is a decimal, when converted to hexadecimal, it is still of same value when converted.
2. Considering procedure number 1, the output is still the same. The function "06H" is a function that when paired with a string or ASCII output and "INT 21H," waits for an input. If there is not input, it prints the string or ASCII symbol applied by the programmer. This is done incrementally when there are no inputs. In the case of procedure number 1, there are no inputs so that program iterates each ASCII equivalent therefore printing hello.
3. "INT 21H" is an interrupt command in assembly that executes whatever command is stored in a register.
4. The function of "09H" is to simply print a string stored in the .DATA segment of a program.
5. The purpose of MOV DS, AX is to move the contents of information stored in the .DATA section of the program into the the data segment register of the memory. Following the source code in procedure number 8, the data section of the code is stored in ax, afterwards, ax (which contains the data section of the program) is sent to the data segment register for the system unit to read the data section of the program when executed.
6. The use of MOV AH, 4CH stores the value 4ch on the Accumulator high register. This command essentially terminates the program. When executed without, the program results to an error.

Problem 7 Solution:

```
DOSSEG
.MODEL SMALL
.STACK 200H

.DATA
ADDRESS DB "          San Marcelino St, Ayala Blvd, Ermita, Manila, 1000          $"
COURSE DB "                    BET-CPET 2A                    $"
TUPSPACE DB "                    $"
NAMESPACE DB "                   $"
TUPSPACE2 DB "                      $"
NAMESPACE2 DB "                  $"

.CODE
START:
   MOV AX, @DATA
   MOV DS, AX

   MOV AH, 0EH
   MOV AL, 201
   INT 10H

MOV CX, 78
LOOP_UPPERHORIZONTAL:
   MOV AL, 205
   MOV AH, 0EH
   INT 10H
   LOOP LOOP_UPPERHORIZONTAL

UPPER_LEFT:
   MOV AH, 0EH
   MOV AL, 187
   INT 10H

   JMP PRINT_TIME

PRINT_TIME:
   MOV AH, 0EH
   MOV AL, 186
   INT 10H

   MOV AH, 09H
   LEA DX, TUPSPACE
   INT 21H

   MOV AH, 02H
```

```
MOV DL, 'T'
INT 21H

MOV DL, 'U'
INT 21H

MOV DL, 'P'
INT 21H

MOV AH, 09H
LEA DX, TUPSPACE2
INT 21H

MOV AH, 0EH
MOV AL, 186
INT 10H

MOV DL, 0DH
INT 21H

MOV DL, 0AH
INT 21H

MOV AH, 0EH
MOV AL, 186
INT 10H

MOV AH, 09H
LEA DX, ADDRESS
INT 21H

MOV AH, 0EH
MOV AL, 186
INT 10H

MOV AH, 0EH
MOV AL, 186
INT 10H

MOV AH, 09H
LEA DX, NAMESPACE
INT 21H

MOV AH, 06H
MOV DL, 4AH
INT 21H
```

```
MOV DL, 6FH
INT 21H

MOV DL, 73H
INT 21H

MOV DL, 65H
INT 21H

MOV DL, 70H
INT 21H

MOV DL, 68H
INT 21H

MOV DL, ' '
INT 21H

MOV DL, 41H
INT 21H

MOV DL, 72H
INT 21H

MOV DL, 65H
INT 21H

MOV DL, 6EH
INT 21H

MOV DL, 61H
INT 21H

MOV DL, 73H
INT 21H

MOV AH, 09H
LEA DX, NAMESPACE2
INT 21H

MOV AH, 0EH
MOV AL, 186
INT 10H

MOV DL, 0DH
```

```
    INT 21H

    MOV DL, 0AH
    INT 21H

    MOV AH, 0EH
    MOV AL, 186
    INT 10H

    MOV AH, 09H
    LEA DX, COURSE
    INT 21H

    MOV AH, 0EH
    MOV AL, 186
    INT 10H

LOWER_LEFT:
    MOV AH, 0EH
    MOV AL, 200
    INT 10H

MOV CX, 78
LOOP_LOWERHORIZONTAL:
    MOV AL, 205
    MOV AH, 0EH
    INT 10H
    LOOP LOOP_LOWERHORIZONTAL

LOWER_RIGHT:
    MOV AH, 0EH
    MOV AL, 188
    INT 10H

    MOV AH, 4CH
    INT 21H

END START
```

PROBLEMS:

1. What is the function of 02h and what is the difference if you use function 02 instead?

2. If the function 02h will be change to 06h what will happen, explain you answer?

1. What is the used of “int 21h”?

2. What is the function of 09h and the program?

3. What is the purpose of “ mov ds, ax”?

4. What is the used of “mov ah,4ch” and when you removed it what will happen?

5. Create programs that will this play the name of your school it should be in abbreviation, address and a square box on the center. Followed by your full name and below your course /year/section, used function 02 on the name of your school and 06 on your full name, and used 09 on course/year/section and square box.

7. Conclusion:

In conclusion, there are different functions utilized when printing in assembly. Function 02h prints a character in ASCII format. Function 09h prints a string. Lastly, function 06h prints a character when there is no input. Through these functions, essential aspects of assembly programming are realized, further cementing its ease-of-use as compared to machine language.