Lab: 8
Familiarization with DOS Service INT 21H in Assembly Language Programming

DOS Service

In assembly language DOS functions and interrupts are used for input/output services. An interrupt occurs when any currently executing program is disturbed (interrupted). Interrupts are generated for a variety of reasons, usually related to peripheral devices such as keyboard, disk drive or printer. The Intel 8086 microprocessor recognizes two types of interrupts; hardware and software. Hardware interrupt is generated when a peripheral device needs attention form microprocessor. A software interrupt is a call to subroutine located in the operating system, usually an input-output routine i.e., a software interrupt calls a built-in subroutine form the operating system usually DOS for input and output operations.

`INT 21H` is a DOS service for different purpose. This service has many functions but few of them are given below. The function no of the service is to be loaded in register AH and the other registers are loaded with the data as required before the interrupt call.

DOS Service `INT 21H`

Func No.	Description
`00H`.	Terminate the current program: `INT 21H`, function `4CH` is used instead
`01H`.	Console input with echo: wait for a character from the standard input device. The character is returned in `AL` and echoed. Respond to `CTRL+BREAK`.
`02H`.	Character output: Send the character in `DL` to the standard output device.
`05H`.	Printer output: Send the character in `DL` to the parallel printer port.
`06H`.	Direct console input-output: Reads the character in `AL` if `DL=0FFH` else displays character at `DL` to the standard output device. Control characters are not filtered.
`07H`.	Console input: Wait for a character from the standard input device. The character is returned in AL, but not echoed. It does not respond to `CTRL+BREAK`.
`08H`.	Console input without echo: Wait for a character from the standard input device. Ther character is returned in `AL`, but not echoed. Respond to `CTRL+BREAK`.
`09H`.	String output: Send a string of characters to the standard output device until $ character is reached. `DX` contains the offset address of the string.
`0AH`	Read string: Read characters from the standard input device. `DX` points a location whose first byte gives the max characters allowed to enter, the next byte reserved to store the actual no of characters entered and the rest space to store the entered characters.
`0BH`	Check keyboard Status: Returns `FFH` in `AL` if an input character is available in the keyboard buffer else returns `00H` in `AL`.
`0CH`	Clear key board buffer and invoke input functions: The input functions are stored in `AL` and other registers should hold the values as required.

Assignments:

1. Write a program to display a string "Programming is Fun" in the screen using string displaying function
2. Write a program to display the same string using character displaying function (use current address operator $ to count the no of characters e.g.
```
STR DB "String to be displayed"
LEN DW   $-STR    ;Gives the length of the string STR
```
3. Write a program to read string from the user (use function that reads string) and display the string in another line. (To display the character in new line display characters `0DH` and `0AH`)
4. Write a program to read the string using the character reading function and display the string using character displaying function.
5. Write a program to read the string and convert it into upper case if it is in lower case and display the resulting string. Process the string in the memory before displaying
6. Write a program to read a string and display each word in separate lines.