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Write an assembly language program to implement a case conversion program that will read a string (a line of characters of letters, digits, punctuation symbols, and others) as input and then convert the letters into its opposite case as output. Here, the characters which are not belonged to letters will remain be unchanged. Your program must contain necessary messages for formatted input and output.

```asm
MODEL SMALL
.STACK 100H
.DATA
    MSG  DB  0DH,0AH, ' Enter a String:  $'
    MSG2 DB  0DH,0AH, ' Converted string is:  $'
    STR1 DB  255 DUP(?)

.CODE

    MAIN PROC
            MOV AX,@DATA
            MOV DS,AX

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

            LEA SI,STR1
            MOV AH,01H

      READ:
            INT 21H

            CMP AL,0DH
            JE  DISPLAY

            CMP AL,65
            JGE CHECK

            CMP AL,97
            JGE CHECK2

            JMP NC
      NC:
            MOV [SI],AL

            INC SI
            JMP READ

      CHECK:
            CMP AL,90
            JLE CHANGE

      CHECK2:
            CMP AL,122
            JLE CHANGE

      CHANGE:
            XOR AL,20H
            MOV [SI],AL
            INC SI

            JMP READ

      DISPLAY:

            MOV AL,'$'
            MOV [SI],AL

            LEA DX,MSG2
            MOV AH,09H
            INT 21H

            LEA DX,STR1
            MOV AH,09H
            INT 21H

            MOV AH,4CH
            INT 21H
            MAIN ENDP
    END MAIN
```

Write an assembly language program to implement a string reversal program that will read a string (a line of characters of letters, digits, punctuation symbols, and others) as input and then make the reverse form of the string as output. You have to solve this problem in two ways such as (i) using array (ii) using stack. Your program must contain necessary messages for formatted input and output.

```
.MODEL SMALL
.STACK 100H
.DATA
    MSG1 DB 0DH,0AH, 'INPUT STRING: $'
    MSG2 DB 0DH,0AH, 'REVERSE STRING: $'
.CODE
    MAIN PROC
            MOV CX,0
            MOV AX,@DATA
            MOV DS,AX

            LEA DX,MSG1
            MOV AH,9
            INT 21H

        INPUT:
            MOV AH,1
            INT 21H

            CMP AL,0DH
            JE LINE

            AND DX,0
            MOV DL,AL
            PUSH DX
            INC CX
            JMP INPUT

        LINE:
            MOV DX,0DH
            MOV AH,2
            INT 21H
            MOV DX,0AH
            MOV AH,2
            INT 21H

            LEA DX,MSG2
            MOV AH,9
            INT 21H

        PRINT:
            AND DX,0
            POP DX
            MOV AH,2
            INT 21H
            LOOP PRINT

            MOV AH,4CH
            INT 21H

            MAIN ENDP
    END MAIN
```

Write an assembly language program to implement a counting program that will read a string (a line of characters of letters, digits, punctuation symbols, and others) as input and then count the number of Vowels, Consonants, Digits, and Spaces in the string as output. Your program must contain necessary messages for formatted input and output.

```
.MODEL SMALL
.STACK 100H
.DATA
    MSG1 DB 'INPUT: $'
    MSG2 DB 0DH,0AH,'Vowel:$'
    MSG3 DB 0DH,0AH,'Consonants:$'
    MSG4 DB 0DH,0AH,'Digits:$'
    MSG5 DB 0DH,0AH,'Spaces:$'
.CODE
    MAIN PROC
        AND CH,0
        AND BH,0
        AND BL,0
        AND CL,0

        MOV AX,@DATA
        MOV DS,AX

        LEA DX,MSG1
        MOV AH,9
        INT 21H

        MOV AH,1
    READ:
        INT 21H
        CMP AL,0DH
        JE PRINT

        CMP AL,32
        JE COUNTSPACES

        CMP AL,0
        JE COUNTDIGITS
        CMP AL,1
        JE COUNTDIGITS
        CMP AL,2
        JE COUNTDIGITS
        CMP AL,3
        JE COUNTDIGITS
        CMP AL,4
        JE COUNTDIGITS
        CMP AL,5
        JE COUNTDIGITS
        CMP AL,6
        JE COUNTDIGITS
        CMP AL,7
        JE COUNTDIGITS
        CMP AL,8
        JE COUNTDIGITS
        CMP AL,9
        JE COUNTDIGITS

        CMP AL,'a'
        JE COUNTVOWELS
        CMP AL,'A'
        JE COUNTVOWELS
        CMP AL,'E'
        JE COUNTVOWELS
        CMP AL,'e'
        JE COUNTVOWELS
        CMP AL,'I'
        JE COUNTVOWELS
        CMP AL,'i'
        JE COUNTVOWELS
        CMP AL,'O'
        JE COUNTVOWELS
        CMP AL,'o'
        JE COUNTVOWELS
        CMP AL,'U'
        JE COUNTVOWELS
        CMP AL,'u'
        JE COUNTVOWELS

        CMP AL,'B'
        JE COUNTCONSONENTS
        CMP AL,'b'
        JE COUNTCONSONENTS
        CMP AL,'C'
        JE COUNTCONSONENTS
        CMP AL,'c'
        JE COUNTCONSONENTS
        CMP AL,'D'
        JE COUNTCONSONENTS
        CMP AL,'d'
        JE COUNTCONSONENTS
        CMP AL,'F'
        JE COUNTCONSONENTS
        CMP AL,'f'
        JE COUNTCONSONENTS
        CMP AL,'G'
        JE COUNTCONSONENTS
        CMP AL,'g'
        JE COUNTCONSONENTS
        CMP AL,'H'
        JE COUNTCONSONENTS
        CMP AL,'h'
        JE COUNTCONSONENTS
        CMP AL,'J'
        JE COUNTCONSONENTS
        CMP AL,'j'
        JE COUNTCONSONENTS
        CMP AL,'K'
        JE COUNTCONSONENTS
        CMP AL,'k'
        JE COUNTCONSONENTS
        CMP AL,'L'
        JE COUNTCONSONENTS
        CMP AL,'l'
        JE COUNTCONSONENTS
        CMP AL,'M'
        JE COUNTCONSONENTS
        CMP AL,'m'
        JE COUNTCONSONENTS
        CMP AL,'N'
        JE COUNTCONSONENTS
        CMP AL,'n'
        JE COUNTCONSONENTS
        CMP AL,'P'
        JE COUNTCONSONENTS
        CMP AL,'p'
        JE COUNTCONSONENTS
        CMP AL,'Q'
```

```asm
        JE COUNTCONSONENTS
        CMP AL,'q'
        JE COUNTCONSONENTS
        CMP AL,'R'
        JE COUNTCONSONENTS
        CMP AL,'r'
        JE COUNTCONSONENTS
        CMP AL,'S'
        JE COUNTCONSONENTS
        CMP AL,'s'
        JE COUNTCONSONENTS
        CMP AL,'T'
        JE COUNTCONSONENTS
        CMP AL,'t'
        JE COUNTCONSONENTS
        CMP AL,'V'
        JE COUNTCONSONENTS
        CMP AL,'v'
        JE COUNTCONSONENTS
        CMP AL,'W'
        JE COUNTCONSONENTS
        CMP AL,'w'
        JE COUNTCONSONENTS
        CMP AL,'X'
        JE COUNTCONSONENTS
        CMP AL,'x'
        JE COUNTCONSONENTS
        CMP AL,'Y'
        JE COUNTCONSONENTS
        CMP AL,'y'
        JE COUNTCONSONENTS
        CMP AL,'Z'
        JE COUNTCONSONENTS
        CMP AL,'z'
        JMP READ

    COUNTSPACES:
        MOV DL,BH
        INC DL
        MOV BH,DL
        JMP READ
COUNTDIGITS:
        MOV DL,CH
        INC DL
        MOV CH,DL
        JMP READ

COUNTVOWELS:
        MOV DL,BL
        INC DL
        MOV BL,DL
        JMP READ

COUNTCONSONENTS:
        MOV DL,CL
        INC DL
        MOV CL,DL
        JMP READ

PRINT:
        LEA DX,MSG5
        MOV AH,9
        INT 21H
        MOV DL,BH
        MOV AH,2
        INT 21H

        LEA DX,MSG4
        MOV AH,9
        INT 21H
        MOV DL,CH
        MOV AH,2
        INT 21H

        LEA DX,MSG2
        MOV AH,9
        INT 21H
        MOV DL,BL
        MOV AH,2
        INT 21H

        LEA DX,MSG3
        MOV AH,9
        INT 21H
        MOV DL,CL
        MOV AH,2
        INT 21H

        MOV AH,4CH
        INT 21H

        MAIN ENDP
END MAIN
```