Experiment Name

Write a program to that takes a string as input and prints all the lowercase characters of that string in the output.

Theory

As assembly language instructions are so basic, Input/output is much harder in assembly language than high level languages. DOS functions are used to take I/O. In assembly language there are operation field, operand field, variables and they work with different registers. There are CMP, JG, JL, JE and JMP instructions available in assembly language for Comparing to operand, Jump to a specific line if first variable is greater than the second, Jump to a specific line if first variable is lesser than the second, Jump to a specific line if first variable is equal to the second and to jump to a line if none of the conditions become true respectively. Here, FOR: was used as for loop to handle the Array. For input and output, MOV AH,1 and MOV AH,2 are used respectively in assembly language.

Code:

```
.MODEL SMALL
.STACK 100H
.DATA
   PROMPT DB 'Type a string: ','$'
   ARR DB 10 DUB (?)
   A DB ?

.CODE
 MAIN PROC
   MOV AX, @DATA
   MOV DS, AX

   MOV AH,9
   LEA DX,PROMPT
   INT 21H

   XOR BX, BX
   MOV CX, 6

   FOR:
     MOV AH, 1
     INT 21H
     MOV ARR[BX], AL
     INC BX
   LOOP FOR

   MOV AH,2        ;for new line after ther input
   MOV DL,0DH
   INT 21H
   MOV DL,0AH
```

```
    INT 21H

    XOR BX, BX
    MOV CX, 6


    PRINT:
     MOV CL, ARR[BX] ;point to the  current index

     CMP CL,61h
     JL END_IF

     CMP CL,00H
     JE EXIT

     CMP CL,7ah
     JG END_IF

     MOV AH, 2       ;output
     MOV DL, CL
     INT 21H

     END_IF:
     INC BX
                      ;move pointer to the next element
    LOOP PRINT       ;loop until done

    EXIT:
    MOV AH,4CH    ;this is for DOS exiting
    INT 21H

    MAIN ENDP
END MAIN
```

Output:

Discussion:

In this above code, firstly DATA Segment was used to show a prompt message and to declare an array to store the string. Then in the main program that data segment was initialized. After that, a FOR LOOP was used to store the characters into the array. Then CMP was used to compare the character whether it is lowercase or not. Then finally PRINT LOOP was used to show the output.

Experiment Name

Write a program that takes a hexadecimal number and in the output, it will print whether that hexadecimal number is Even or Odd.

Theory

As assembly language instructions are so basic, Input/output is much harder in assembly language than high level languages. DOS functions are used to take I/O. In assembly language there are operation field, operand field, variables and they work with different registers. There are CMP, JG, JL, JE and JMP instructions available in assembly language for Comparing to operand, Jump to a specific line if first variable is greater than the second, Jump to a specific line if first variable is lesser than the second, Jump to a specific line if first variable is equal to the second and to jump to a line if none of the conditions become true respectively. For input and output, MOV AH,1 and MOV AH,2 are used respectively in assembly language.

Code:

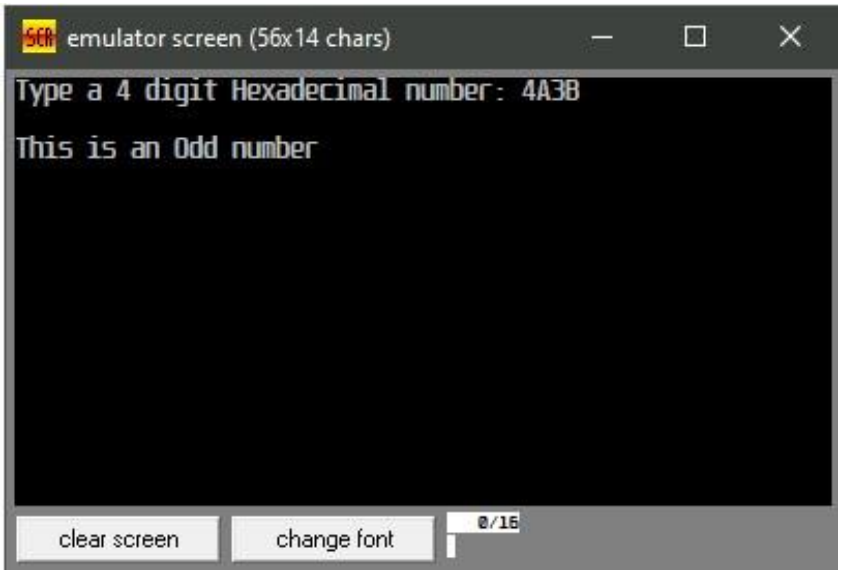
```
.MODEL SMALL
.STACK 100H
.DATA
   PROMPT1 DB 'Type a 4 digit Hexadecimal number: ','$'
   PROMPT2 DB 'This is an Even number $'
   PROMPT3 DB 'This is an Odd number $'
   A DB ?
   B DB ?
   C DB ?
   D DB ?
.CODE
MAIN PROC
   MOV AX, @DATA
   MOV DS, AX

   MOV AH,9
   LEA DX,PROMPT1
   INT 21H

   MOV AH,1
   INT 21H
   MOV A,AL

   MOV AH,1
   INT 21H
   MOV B,AL

   MOV AH,1
   INT 21H
   MOV C,AL

   MOV AH,1
   INT 21H
   MOV D,AL
```

```
MOV AH,2
MOV DL,0DH
INT 21H
MOV DL,0AH
INT 21H


EX6:
CMP D,30H
JE E

JMP EX7

EX7:
CMP D,31H
JE O

JMP EX8

EX8:
CMP D,32H
JE E

JMP EX9

EX9:
CMP D,33H
JE O

JMP EX10

EX10:
CMP D,34H
JE E

JMP EX11

EX11:
CMP D,35H
JE O

JMP EX12

EX12:
CMP D,36H
JE E

JMP EX13

EX13:
CMP D,37H
JE O

JMP EX14

EX14:
CMP D,38H
JE E

JMP EX15
```

```
EX15:
CMP D,39H
JE O

JMP EX16

EX16:
CMP D,41H
JE E

JMP EX17

EX17:
CMP D,42H
JE O

JMP EX18

EX18:
CMP D,43H
JE E

JMP EX19

EX19:
CMP D,44H
JE O

JMP EX20

EX20:
CMP D,45H
JE E

JMP EX21

EX21:
CMP D,46H
JE O

JMP EX6

E:
MOV AH,2
MOV DL,0DH
INT 21H
MOV DL,0AH
INT 21H
MOV AH,9
LEA DX,PROMPT2
INT 21H
JMP EXIT

O:
MOV AH,2
MOV DL,0DH
INT 21H
MOV DL,0AH
INT 21H
MOV AH,9
LEA DX,PROMPT3
INT 21H
```

```
    JMP EXIT

    EXIT:
    MOV AH,4CH    ;this is for DOS exiting
    INT 21H

    MAIN ENDP
END MAIN
```

Output:



Discussion:

In this above code, firstly DATA Segment was used to show a prompt message and to declare 4 variables to store the digits of the hexadecimal number. Then in the main program that data segment was initialized. After that, the digits of the hexadecimal number were taken as input from the used and then the last digit of the number was checked by using several CMP operation which means comparing the last digit with 0 to 9, it was possible to identify a number as an even or odd number. After figuring out the number, a prompt message was printed regarding the number was even or odd.