Microprocessor Laboratory

Assignment No. 13

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Assignment No. 13

Program :

```
%macro read_or_print 4
	mov rax,%1
	mov rdi,%2
	mov rsi,%3
	mov rdx,%4
	syscall
%endmacro

%macro exit 0
	mov rax,60
	mov rdi,0
	syscall
%endmacro

;-----------------------------------------------------------------------------------------------------------

section .data
	m1		db 10d,13d,"Enter Input number : ",10d,13d
	l1		equ $-m1
	m2		db 10d,13d,"Factorial of Number (in hexadecimal) : ",10d,13d
	l2		equ $-m2
	m3		db 10d,13d,"Assignment No. : 13 To Calculate Factorial of Number.",10d,13d
	l3		equ $-m3
```

```
        m4              db
10d,13d,"==========================================================
==========",10d,13d
        l4              equ $-m4
        nline           db 10
        nline_len       equ $-nline

;-------------------------------------------------------------------------------------------------------------

section .bss
        numascii resb 16
        factorial resq 1
        answer resb 16

section .text
global _start
_start:
        read_or_print 1,1,m4,l4
        read_or_print 1,1,m3,l3
        read_or_print 1,1,m4,l4
        read_or_print 1,1,m1,l1    ; Display message
        read_or_print 0,0,numascii,17
        read_or_print 1,1,numascii,17
        call asciihextohex
        mov [factorial],rbx
        mov rcx,[factorial]
        call facto
        mov rax,00
        read_or_print 1,1,m2,l2     ;Display Message
```

```
        mov rax,qword[factorial]
        call display       ; displays a 8 digit hex number  in rax
        read_or_print 1,1,nline,nline_len
        exit

;-------------------------------------------------------------------------------------------------------

facto:
        push rcx
        cmp rcx,01
        jne ahead
        jmp exit2
ahead:  dec rcx
        mov rax,rcx
        mul qword[factorial]
        mov qword[factorial],rax
        call facto
exit2:  pop rcx

        ret

;-------------------------------------------------------------------------------------------------------

asciihextohex:

        mov rsi,numascii
        mov rcx,16
        mov rbx,0
```

```
        mov rax,0

loop1:
        rol rbx,04
        mov al,[rsi]
        cmp al,39h
        jbe skip1
        sub al,07h
skip1:
        sub al,30h
        add rbx,rax
        inc rsi
        dec rcx
        jnz loop1

        ret
;------------------------------------------------------------------------------------------------------------

display:
        mov rsi,answer+15
        mov rcx,16

loop2:
        mov rdx,0
        mov rbx,16
        div rbx
        cmp dl,09h
        jbe skip2
```

```
        add dl,07h
skip2:
        add dl,30h
        mov [rsi],dl
        dec rsi
        dec rcx
        jnz loop2
        read_or_print 1,1,answer,16
        ret
```

Code Input Output Run Save

```
%macro read_or_print 4
        mov rax,%1
        mov rdi,%2
        mov rsi,%3
        mov rdx,%4
        syscall
%endmacro

%macro exit 0
        mov rax,60
        mov rdi,0
        syscall
%endmacro

;-----------------------------------------------------------------------------------------------------------

section .data
    m1      db 10d,13d,"Enter Input number : ",10d,13d
    l1      equ $-m1
    m2      db 10d,13d,"Factorial of Number(in hexadecimal) : ",10d,13d
```

Code Input Output Run Save

```
    l2      equ $-m2
    m3      db 10d,13d,"Assignment No. : 13 To Calculate Factorial of Number.",10d,13d
    l3      equ $-m3
    m4      db 10d,13d,"================================================================================",10d,13d
    l4      equ $-m4
    nline       db 10
    nline_len   equ $-nline

;-----------------------------------------------------------------------------------------------------------

section .bss
    numascii resb 16
    factorial resq 1
    answer resb 16

section .text
global _start
_start:
    read_or_print 1,1,m4,l4
    read_or_print 1,1,m3,l3
```

Code Input Output Run Save

```
    read_or_print 1,1,m4,l4
    read_or_print 1,1,m1,l1    ; Display message
    read_or_print 0,0,numascii,17
    read_or_print 1,1,numascii,17
    call asciihextohex
    mov [factorial],rbx
    mov rcx,[factorial]
    call facto
    mov rax,00
    read_or_print 1,1,m2,l2      ;Display Message
    mov rax,qword[factorial]
    call display          ; displays a 8 digit hex number  in rax
    read_or_print 1,1,nline,nline_len
    exit

;-----------------------------------------------------------------------------------------------------------

facto:
    push rcx
    cmp rcx,01
```

Code Input Output Run Save

```
    jne ahead
    jmp exit2
ahead:  dec rcx
    mov rax,rcx
    mul qword[factorial]
    mov qword[factorial],rax
    call facto
exit2:  pop rcx

    ret

;-----------------------------------------------------------------------------------------------------------

asciihextohex:

    mov rsi,numascii
    mov rcx,16
    mov rbx,0
    mov rax,0
```

Code Input Output Run Save

```
loop1:
    rol rbx,04
    mov al,[rsi]
    cmp al,39h
    jbe skip1
    sub al,07h
skip1:
    sub al,30h
    add rbx,rax
    inc rsi
    dec rcx
    jnz loop1

    ret
;-----------------------------------------------------------------------------------------------------------

display:
    mov rsi,answer+15
    mov rcx,16
```

Code Input Output Run Save

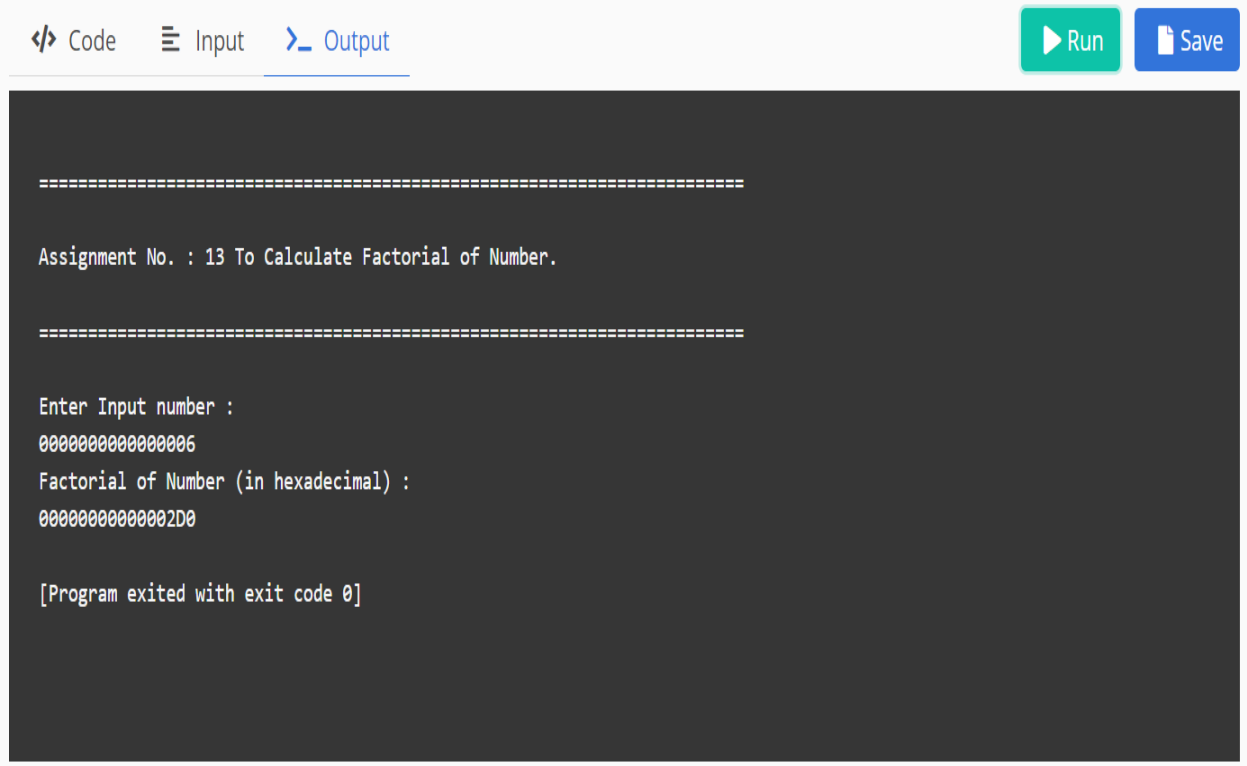
```
display:
    mov rsi,answer+15
    mov rcx,16

loop2:
    mov rdx,0
    mov rbx,16
    div rbx
    cmp dl,09h
    jbe skip2
    add dl,07h
skip2:
    add dl,30h
    mov [rsi],dl
    dec rsi
    dec rcx
    jnz loop2
    read_or_print 1,1,answer,16
    ret
```

Input :

Code Input Output Run Save

```
0000000000000006
```

Output :


Code
Input
Output
Run
Save
==========
Assignment No. : 13 To Calculate Factorial of Number.
==========
Enter Input number :
0000000000000006
Factorial of Number (in hexadecimal) :
00000000000002D0
[Program exited with exit code 0]