



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
1  %macro read_or_print 4
2      mov rax,%1
3      mov rdi,%2
4      mov rsi,%3
5      mov rdx,%4
6      syscall
7  %endmacro
8
9  %macro exit 0
10     mov rax,60
11     mov rdi,0
12     syscall
13 %endmacro
14
15 ;-----
16
17 section .data
18     m1      db 10d,13d,"Enter Input number : ",10d,13d
19     l1      equ $-m1
20     m2      db 10d,13d,"Factorial of Number(in hexadecimal) : ",10d,13d
21
```

```
</> Code  Input  Output  Run  Save
21     12      equ $-m2
22     m3      db 10d,13d,"Assignment No. : 13 To Calculate Factorial of Number.",10d,13d
23     l3      equ $-m3
24     m4      db 10d,13d,"===== ",10d,13d
25     l4      equ $-m4
26     nline   db 10
27     nline_len equ $-nline
28
29 ;-----
30
31 section .bss
32     numascii resb 16
33     factorial resq 1
34     answer resb 16
35
36 section .text
37 global _start
38 _start:
39     read_or_print 1,1,m4,l4
40     read_or_print 1,1,m3,l3
41
```

</> Code ≡ Input >_ Output

▶ Run

📄 Save

```
41 read_or_print 1,1,m4,14
42 read_or_print 1,1,m1,11 ; Display message
43 read_or_print 0,0,numascii,17
44 read_or_print 1,1,numascii,17
45 call asciihextohex
46 mov [factorial],rbx
47 mov rcx,[factorial]
48 call facto
49 mov rax,00
50 read_or_print 1,1,m2,12 ;Display Message
51 mov rax,qword[factorial]
52 call display ; displays a 8 digit hex number in rax
53 read_or_print 1,1,nline,nline_len
54 exit
55
56 ;-----
57
58 facto:
59 push rcx
60 cmp rcx,01
61
```

</> Code ≡ Input >_ Output

▶ Run

📄 Save

```
61 jne ahead
62 jmp exit2
63 ahead: dec rcx
64 mov rax,rcx
65 mul qword[factorial]
66 mov qword[factorial],rax
67 call facto
68 exit2: pop rcx
69
70 ret
71
72 ;-----
73
74 asciihextohex:
75
76 mov rsi,numascii
77 mov rcx,16
78 mov rbx,0
79 mov rax,0
80
81
```

</> Code ≡ Input >_ Output

▶ Run

📄 Save

```
81 loop1:
82 rol rbx,04
83 mov al,[rsi]
84 cmp al,39h
85 jbe skip1
86 sub al,07h
87 skip1:
88 sub al,30h
89 add rbx,rax
90 inc rsi
91 dec rcx
92 jnz loop1
93
94 ret
95 ;-----
96
97 display:
98 mov rsi,answer+15
99 mov rcx,16
100
101
```

</> Code

☰ Input

>_ Output

▶ Run

📄 Save

```
96
97 ▾ display:
98     mov rsi,answer+15
99     mov rcx,16
100
101 ▾ loop2:
102     mov rdx,0
103     mov rbx,16
104     div rbx
105     cmp dl,09h
106     jbe skip2
107     add dl,07h
108 ▾ skip2:
109     add dl,30h
110     mov [rsi],dl
111     dec rsi
112     dec rcx
113     jnz loop2
114     read_or_print 1,1,answer,16
115     ret
```

Input :

</> Code

☰ Input



>_ Output

▶ Run

📄 Save

```
1 0000000000000006
```


Output :

 Code  Input  Output

 Run

 Save

```
=====

Assignment No. : 13 To Calculate Factorial of Number.

=====

Enter Input number :
0000000000000006
Factorial of Number (in hexadecimal) :
0000000000002D0

[Program exited with exit code 0]
```