Assignment – Factorial

Code

; Problem statement: Write x86 ALP to find the factorial of a given integer number on a command line by using recursion. Explicit stack manipulation is expected in the code.

; BEGINNING OF CODE

```
%macro print 2

mov rax,1

mov rdi,1

mov rsi,%1

mov rdx,%2

syscall

%endmacro

%macro exitprog 0

mov rax,60

xor rdi,rdi

syscall

%endmacro

%macro gtch 1

mov rax,0

mov rdi,0

mov rsi,%1

mov rdx,1

syscall

%endmacro

section .data

nwline db 10

m0 db 10,13,"----- Program to calculate factorial of a given number -----",10,10

l0 equ $-m0

m2 db 10,"Enter a number (2 digit HEX no.): "

l2 equ $-m2

m4 db 10,"The factorial is: "

l4 equ $-m4

factorial dq 1

section .bss

no1 resq 1

input resb 1

output resb 1
```

```asm
section .text
global _start
_start:
print m0,l0
print m2,l2
call getnum
mov [no1],rax
gtch input
mov rcx,[no1]
call facto
mov rax,00
print m4,l4
mov rax,qword[factorial]
call disphx16
exitprog
facto:
push rcx
cmp rcx,01
jne ahead
jmp exit2
ahead: dec rcx
call facto
exit2:
pop rcx
mov rax,rcx
mul qword[factorial]
mov qword[factorial],rax
ret
getnum:
mov cx,0204h
mov rbx,0
ll2:
push rcx
gtch input
pop rcx
mov rax,0
mov al,byte[input]
sub rax,30h
cmp rax,09h
jbe skip1
```

```
sub rax,7
skip1:
shl rbx,cl
add rbx,rax
dec ch
jnz ll2
mov rax,rbx
ret
disphx16:
mov rbx,rax
mov cx,1004h
ll6:
rol rbx,cl
mov rdx,rbx
and rdx,0fh
add rdx,30h
cmp rdx,039h
jbe skip4
add rdx,7
skip4:
mov byte[output],dl
push rcx
print output,1
pop rcx
dec ch
jnz ll6
ret
; END OF CODE
```

Output

```
$ nasm -f elf64 Practical-11.asm && ld -o exec Practical-11.o && ./exec

----- Program to calculate factorial of a given number -----

Enter a number (2 digit HEX no.): 04

The factorial is: 0000000000000018
```