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

; 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.

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

section .data

nummsg db "\*\*\*Program to find Factorial of a number\*\*\* ",10

db "Enter the number : ",

nummsg\_len equ $-nummsg

resmsg db "Factorial is : "

resmsg\_len equ $-resmsg

thankmsg db 10,"Thank you ",10

thankmsg\_len equ $-thankmsg

zerofact db " 00000001 "

zerofactlen equ $-zerofact

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

section .bss

dispbuff resb 16

result resb 4

num resb 1

num1 resb 1

numascii resb 3

%macro display 2

mov rax,01

mov rdi,01

mov rsi,%1

mov rdx,%2

syscall

%endmacro

%macro accept 2

mov rax,0

mov rdi,0

mov rsi,%1

mov rdx,%2

syscall

%endmacro

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

section .text

global \_start

\_start:

display nummsg,nummsg\_len

accept numascii,3 ;accept number from user

call packnum8\_proc ;convert number from ascii to hex

mov [num],bl

display resmsg,resmsg\_len

mov al,[num] ;store number in accumulator

cmp al,01h

jbe endfact

mov bl,[num]

call proc\_fact

mov rbx,rax

call disp64\_proc

jmp exit

endfact:

display zerofact,zerofactlen

exit: display thankmsg,thankmsg\_len

mov rax,60

mov rdi,0

syscall

ret

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

disp64\_proc:

mov rdi,dispbuff ;point esi to buffer

mov rcx,16 ;load number of digits to display

dispup1:

rol rbx,4 ;rotate number left by four bits

mov dl,bl ;move lower byte in dl

and dl,0fh ;mask upper digit of byte in dl

add dl,30h ;add 30h to calculate ASCII code

cmp dl,39h ;compare with 39h

jbe dispskip1 ;if less than 39h akip adding 07 more

add dl,07h ;else add 07

dispskip1:

mov [rdi],dl ;store ASCII code in buffer

inc rdi ;point to next byte

loop dispup1 ;decrement the count of digits to display

;if not zero jump to repeat

display dispbuff,16 ;

ret

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

packnum8\_proc:

mov bx,0

mov ecx,02

mov esi,numascii

up1:

rol bl,04

mov al,[esi]

cmp al,39h

jbe skip1

sub al,07h

skip1: sub al,30h

add bl,al

inc esi

loop up1

ret

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Recursion\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

;There are two kinds of recursion: direct and indirect.

;In direct recursion, the procedure calls itself and

;in indirect recursion, the first procedure calls a second ;procedure,which in turn, calls the first procedure.

proc\_fact:

cmp bl, 1

jne do\_calculation

mov ax, 1

ret

do\_calculation:

push rbx

dec bl

call proc\_fact

pop rbx

mul bl

ret

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

manu@ubuntu:~/mpfinals$ nasm -felf64 8Facto.nasm

manu@ubuntu:~/mpfinals$ ld -o 8Facto 8Facto.o

manu@ubuntu:~/mpfinals$ ./8Facto

\*\*\*Program to find Factorial of a number\*\*\*

Enter the number : 05

Factorial is : 0000000000000078

Thank you

**OUTPUT :**

--------------------------------------------------------

manu@ubuntu:~/mpfinals$ nasm -felf64 ascdsc.nasm

manu@ubuntu:~/mpfinals$ ld -o ascdsc ascdsc.o

manu@ubuntu:~/mpfinals$ ./ascdsc

\*\*\*\*\*\*\*\*\*MENU\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

1.enter filename

2.ascending order

3.decending order

Enter choice

1

Enter filename

ascdsc.txt

Floating point exception (core dumped)

manu@ubuntu:~/mpfinals$ ./ascdsc

\*\*\*\*\*\*\*\*\*MENU\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

1.enter filename

2.ascending order

3.decending order

Enter choice

1

Enter filename

numbers.txt

687134

\*\*\*\*\*\*\*\*\*MENU\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

1.enter filename

2.ascending order

3.decending order

Enter choice

2

Acending:

134678

\*\*\*\*\*\*\*\*\*MENU\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

1.enter filename

2.ascending order

3.decending order

Enter choice

3

Decending:

876431

\*\*\*\*\*\*\*\*\*MENU\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

1.enter filename

2.ascending order

3.decending order

Enter choice

4