

Experiment 3

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.MODEL SMALL

.STACK 100H

.DATA

NUM DB 5 ; Number for factorial (change this value as needed)

FACT DW 1 ; Variable to store factorial result

MSG DB 'Factorial: \$' ; Message to display before result

.CODE

MAIN PROC

MOV AX, @DATA

MOV DS, AX

MOV AL, NUM ; Load number in AL

CBW ; Convert AL to AX (sign-extend)

CALL FACTORIAL ; Call factorial procedure

MOV DX, OFFSET MSG

MOV AH, 09H

INT 21H ; Print message

CALL PRINT_NUM ; Print the factorial result

MOV AH, 4CH

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    INT 21H      ; Exit program
MAIN ENDP

; Factorial Procedure
FACTORIAL PROC

    MOV CX, AX   ; Move number to CX for loop counter
    MOV AX, 1    ; Initialize AX = 1 (Factorial starts at 1)

FACTORIAL_LOOP:
    MUL CX       ; AX = AX * CX
    LOOP FACTORIAL_LOOP

    MOV FACT, AX ; Store the result in FACT
    RET

FACTORIAL ENDP

; Print Number Procedure
PRINT_NUM PROC

    MOV AX, FACT ; Load factorial result
    MOV CX, 0    ; Clear CX (digit counter)

NEXT_DIGIT:
    MOV DX, 0
    MOV BX, 10

    DIV BX       ; AX / 10 → Quotient in AX, Remainder in DX
    PUSH DX      ; Push remainder (digit) onto stack
    INC CX       ; Increment digit counter
    TEST AX, AX  ; Check if AX is zero

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JNZ NEXT_DIGIT ; If not, continue extracting digits

PRINT_LOOP:

POP DX ; Get digit from stack

ADD DL, '0' ; Convert to ASCII

MOV AH, 02H

INT 21H ; Print digit

LOOP PRINT_LOOP ; Repeat for remaining digits

RET

PRINT_NUM ENDP

END MAIN

OUTPUT:

The screenshot shows a debugger window with the following content:

Assembly Code:

```
#fact#main
cs:0000 B88108      * MOV AX, DGROUP
cs:0003 8ED8        * MOV DS, AX
cs:0005 A00000      * MOV AL, NUM ; Load num
cs:0008 98          * CBW ; Convert AL to AX
cs:0009 E80E00      * CALL FACTORIAL ; Call
cs:000C BA0300      * MOV DX, OFFSET MSG
cs:000F B409        * MOV AH, 09H
cs:0011 CD21        * INT 21H ; Print message
cs:0013 E81100      * CALL PRINT_NUM ; Print
cs:0016 B44C        * MOV AH, 4CH
cs:0018 CD21        * INT 21H ; Exit program

#fact#factorial
es:0000 CD 20 7D 9D 00 EA FF FF = }¥ ¢
es:0008 AD DE 32 0B C5 05 6B 07 i |2¢|*k•
es:0010 15 03 28 08 15 03 93 01 §•(§•6©
es:0018 01 01 01 00 02 04 FF FF 000 0•
```

Registers:

ax	0078	c	=0
bx	0000	z	=0
cx	0000	s	=0
dx	0000	o	=0
si	0000	p	=1
di	0000	a	=0
bp	0000	i	=1
sp	0100	d	=0
ds	0881		
es	086C		
ss	0882		
cs	087C		
ip	000C		

Stack:

ss:0102	0403
ss:0100	52FB