

# Experiment 6

Name:Pratik Chavan

Div/Batch:A/A1      Roll No.07

.MODEL SMALL

.STACK 100H

.DATA

MSG DB 'Flag Register: \$' ; *Message to display*

HEX\_CHARS DB '0123456789ABCDEF' ; *Lookup table for hex digits*

FLAGS DW ? ; *Variable to store flag register value*

.CODE

MAIN PROC

MOV AX, DGROUP

MOV DS, AX

PUSHF ; *Push flag register onto the stack*

POP FLAGS ; *Pop flag register into FLAGS variable*

MOV DX, OFFSET MSG

MOV AH, 09H

INT 21H ; *Print "Flag Register: "*

MOV AX, FLAGS ; *Load flag register value into AX*

CALL PRINT\_HEX ; *Print the flag register in hexadecimal format*

MOV AH, 4CH

```

    INT 21H    ; Exit program
MAIN ENDP

; -----
; Print 16-bit Hex Procedure
; -----

PRINT_HEX PROC
    MOV CX, 4    ; We have 4 hex digits (16-bit / 4-bit each)
    MOV BX, 12   ; Bit shift amount (12, 8, 4, 0)

HEX_LOOP:
    MOV DX, AX    ; Copy AX value
    MOV CL, BL    ; Move shift count into CL (Fix for SHR error)
    SHR DX, CL    ; Shift right to isolate one hex digit
    AND DX, 0FH   ; Mask the lower 4 bits
    MOV SI, DX    ; Move index to SI
    MOV DL, [HEX_CHARS + SI] ; Convert to ASCII hex character
    MOV AH, 02H
    INT 21H      ; Print the hex digit
    SUB BX, 4     ; Move to the next hex digit
    LOOP HEX_LOOP ; Repeat until all digits are printed

    RET
PRINT_HEX ENDP

END MAIN

```

OUTPUT:

GUI Turbo Assembler x64

File Edit View Run Breakpoints Data Options Window Help

READY

Module: flag File: flag.asm 16

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# Experiment 3

Name:Pratik Chavan

Div/Batch:A/A1      Roll No.07

.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

```

    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

```

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 DOS 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 |2d|*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 |

# Experiment 3

Name:Pratik Chavan

Div/Batch:A/A1      Roll No.07

.MODEL SMALL

.STACK 100H

.DATA

    ARRAY DB 10, 25, 15, 40, 5, 30, 50, 20

    LEN EQU \$ - ARRAY

    MIN DB 0

    MAX DB 0

.CODE

MAIN PROC

    MOV AX, @DATA

    MOV DS, AX

    MOV SI, 0

    MOV AL, ARRAY[SI]

    MOV MIN, AL

    MOV MAX, AL

FIND\_MIN\_MAX:

    MOV AL, ARRAY[SI]

    CMP AL, MAX

    JG UPDATE\_MAX

    CMP AL, MIN

JL UPDATE\_MIN

JMP NEXT\_ELEMENT

UPDATE\_MAX:

MOV MAX, AL

JMP NEXT\_ELEMENT

UPDATE\_MIN:

MOV MIN, AL

NEXT\_ELEMENT:

INC SI

CMP SI, LEN

JL FIND\_MIN\_MAX

MOV AX, 4C00H

INT 21H

MAIN ENDP

END MAIN

OUTPUT:

The screenshot shows a debugger window with the following content:

| Address         | Disassembly | Comment                  | Register/Value |
|-----------------|-------------|--------------------------|----------------|
| cs:000D         | 8A840000    | + mov al, [array + si]   | ax 0C07        |
| cs:0011         | 3AC4        | + cmp al, ah ; Compare c | bx 0000        |
| cs:0013         | 7F15        | + jg update_max ; If AL  | cx 0000        |
| cs:0015         | 3AC0        | + cmp al, al ; Compare c | dx 0000        |
| cs:0017         | 7C0D        | + jl update_min ; If AL  | si 0006        |
| cs:0019         | 46          | + inc si                 | di 0000        |
| cs:001A         | A00700      | + mov al, [n] ; Load arr | bp 0000        |
| cs:001D         | 3BF0        | + cmp si, ax ; Compare i | sp 0100        |
| cs:001F         | 7CEC        | + jl find_min_max ; If s | ds 0B7F        |
| cs:0021         | B8004C      | + mov ax, 4C00h          | es 0B6C        |
| cs:0024         | CD21        | + int 21h                | ss 0B80        |
| #max#update_min |             |                          | cs 0B7C        |
|                 |             |                          | ip 001F        |

Registers and values on the right:

|     |
|-----|
| c=1 |
| z=0 |
| s=1 |
| o=0 |
| p=1 |
| a=1 |
| i=1 |
| d=0 |

Stack (ss) values:

|              |
|--------------|
| ss:0102 0403 |
| ss:0100 52FB |