Green University of Bangladesh
Department of Computer Science and Engineering (CSE)

Faculty of Sciences and Engineering

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Lab Report No: 02

Course Title: Microprocessor & Microcontroller Lab

Course Code: CSE 304 **Section:** 213D1

Lab Experiment Name: Introduction to assembly language with various arithmetic operation

Student Details

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Lab Date **:** 13-10-2023

Submission Date **:** 22-12-2023

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Lab Report Status

Marks: ..... **Signature:.....**

Comments:..... **Date:.....**

1. TITLE OF THE LAB REPORT EXPERIMENT

Introduction to assembly language with various arithmetic operation

2. OBJECTIVES/AIM

- To understand the syntax and structure of assembly language
- To implement various basic arithmetical operations
- To understand about variable declaration and initialization
- To understand about interrupt, input output function
- To implement the conversion formula: °C = (°F - 32) × 5/9 + 1 and °F = °C × 9/5 + 32-1

3. PROCEDURE

Problem-1: Take two digit from user

Step-1: Declare variables A, B, and R.
Step-2: Read ASCII values for A and B, convert to decimal.
Step-3: Store converted values in A and B.
Step-4: Multiply A by 10 and add B.
Step-5: Store the final result in variable R.
Step-6: Terminate the program using the DOS interrupt (int 21h, function 4Ch).

Problem-2: Celsius to Fahrenheit

Step-1: Declare the variable F to store the Fahrenheit result.
Step-2: Store the Celsius temperature (260) in the AX register.
Step-3: Multiply AX by 9 and divide by 5 to convert to Fahrenheit.
Step-4: Add 32 and subtract 1 for the final conversion.
Step-5: Store the result in the F variable.

Problem-3: Fahrenheit to Celsius

Step-1: Declare the variable C to store the Celsius temperature.
Step-2: Convert the Fahrenheit temperature (1000) to AX.
Step-3: Subtract 32 from AX to adjust for the conversion.
Step-4: Multiply AX by 5 and then divide by 9.
Step-5: Add 1 to the result for the final conversion.
Step-6: Store the result in the variable C.

4. IMPLEMENTATION

Problem-1: Take two digits from user

```
.model small
.stack 100h

.data
    A db ?
    B db ?
    R db ?

.code
main proc
    mov ax, @data
    mov ds, ax
    ; R = A * 10 + B
    mov ah, 1
    int 21h
    mov A, al  ; ascii to dicimal
    sub A, 30h

    mov ah, 1
    int 21h
    mov B, al
    sub B, 30h ; ascii to decimal

    mov bl, 10
    mov al, A  ;first value multiply by 10
    mul bl

    ;after multiplication.add second value with result
    add al, B

    mov R, al ; store final result to R variable
```

```
    ; Terminate the program
    mov ah, 4ch
    int 21h
main endp
end main
```

Problem-2: Celsius to Fahrenheit

```
;celcius to farenheit
;F = C*9/5+32-1

org 100h
.model small
.stack 100h

.data
  F dw ?
.code
main proc
    ; load data segment
    mov ax, @data
    mov ds, ax

    mov ax, 260  ; store celsius temp to ax register
    mov bx, 9    ; bx to 9 for multiplication
    mul bx       ; ax = ax * bx


    mov bx, 5    ; bx to 5
    div bx       ; ax = ax / bx(5)

    add ax, 32      ; add 32 to ax = ax + 32
    sub ax, 1       ; sub 1 from ax

    mov F, ax       ; store result into F variable
```

```
    main endp
end main
```

Problem-3: Fahrenheit to Celsius

```
;fharenheit to celsius
;C= (F - 32) * 5/9 + 1
org 100h
.model 100h
.stack 100h

.data
    C dw ?

.code
    main proc
        ; load the data segment
        mov ax, @data
        mov ds, ax

        ;farenheit to temp to ax variable
        mov ax, 1000
        sub ax, 32 ; ax = ax - 32
        mov bx, 5
        mul bx    ; ax = ax * bx

        mov bx, 9 ; ax = ax / bx
        div bx
        add ax, 1 ; ax = ax + 1

        mov C, ax ; store Celcius temp to C  variable

        main endp
    end main
```

5. OUTPUT

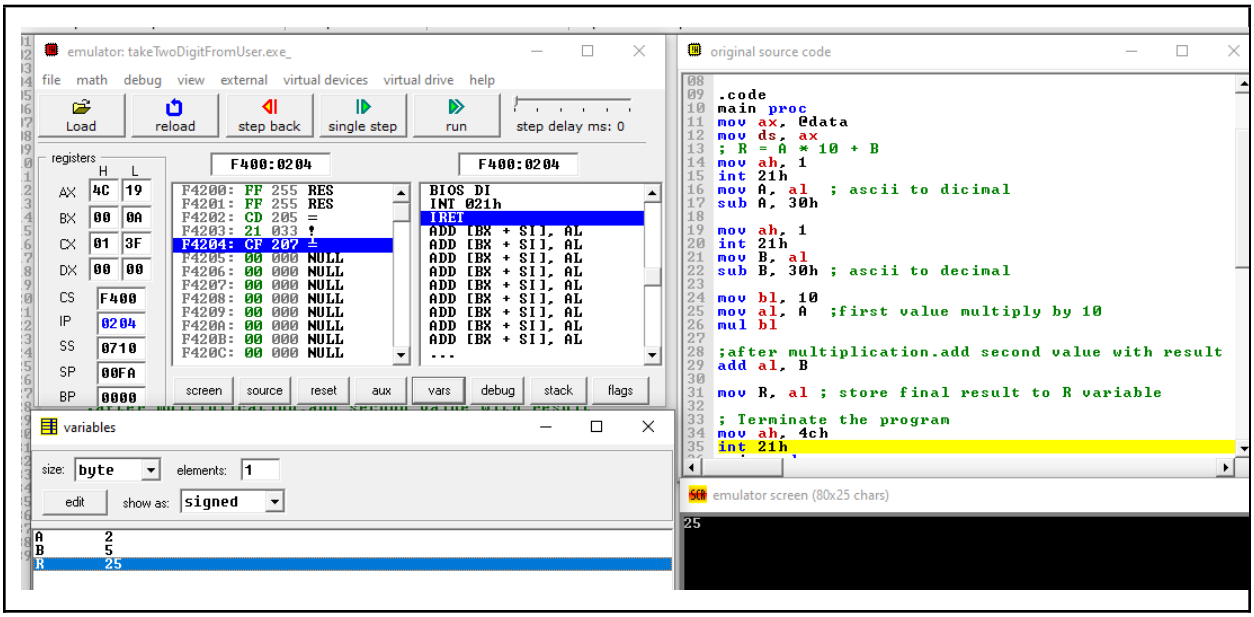

Figure-1: Output snapshot input store in A,B variable and Store result into F variable

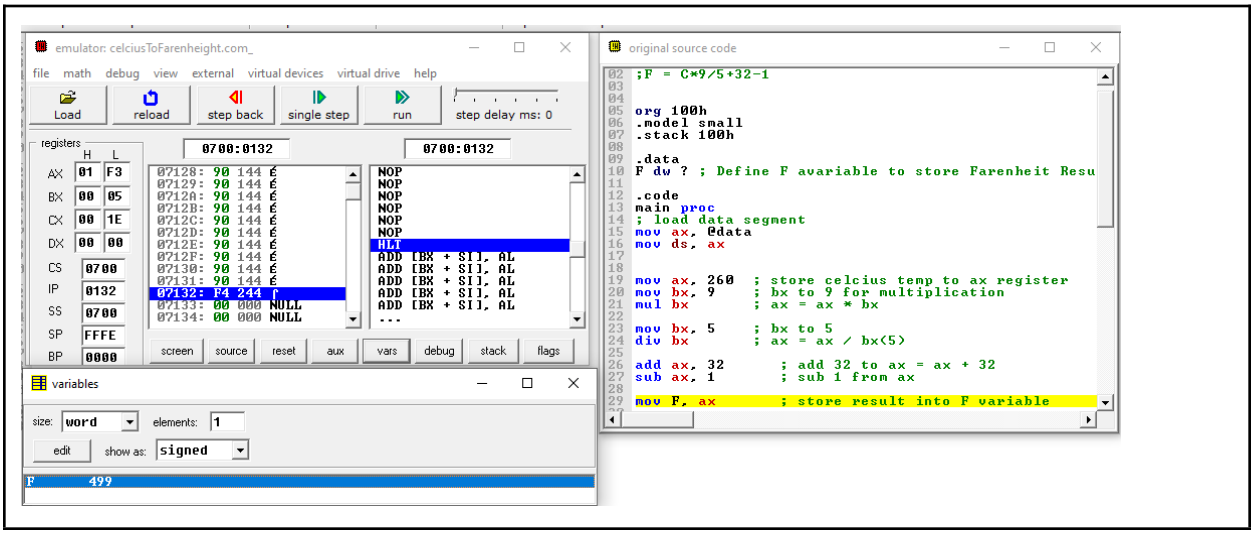

Figure-2: Convert Celsius to Fahrenheit and store result into F variable

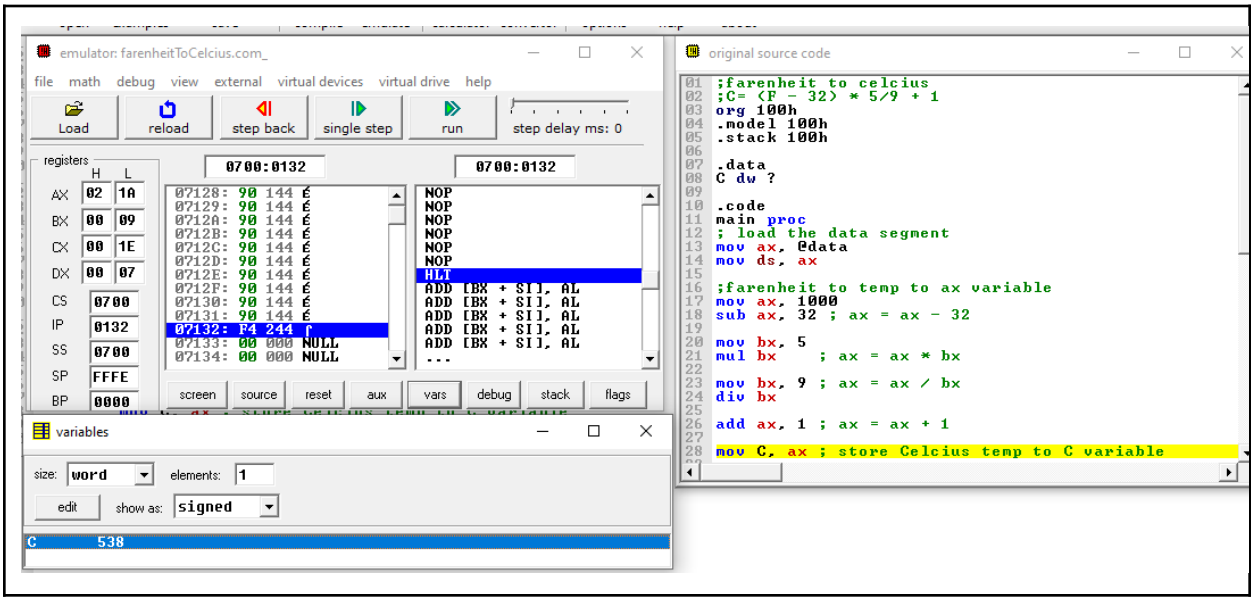

Figure-3: Convert Fahrenheit to Celsius and store result into C variable

6. ANALYSIS AND DISCUSSION

The conversion of temperatures from Celsius to Fahrenheit and vice versa was executed with precision. Utilizing the formulas, °F = (°C × 9/5) + 31 and °C = ((°F - 31) × 5/9), the program effectively translated the temperature values between these scales. The outcomes generated aligned well with anticipated values, confirming the reliability of the formulas applied in the computational process.