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**Green University of Bangladesh**

**Department of Computer Science and Engineering (CSE)**

**Faculty of Sciences and Engineering**

**Semester: (Fall: Year 2023), B.Sc. in CSE (Day)**

**Lab Report No:** 01

**Course Title:** Microprocessor & Microcontroller Lab

**Course Code:** CSE 304 **Section:** 213D2

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

**Student Details**

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**Submission Date :** 19-10-2023

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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**

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| --- | --- |
| .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 |

**Output:**

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

**Problem-2: Celsius to Fahrenheit**

|  |  |
| --- | --- |
| ;celcius to farenheit  ;F = C\*9/5+32-1  org 100h  .model small  .stack 100h  .data  F dw ? ; Define F avariable to store Farenheit Result  .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 |

**Output:**

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

**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 |

**Output:**

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

**5. TEST RESULT / OUTPUT**

For the given problem, the input was taken from the user and store in variable A and B then final result store in F variable, and the following conversions were performed:

260°C was converted to Fahrenheit, resulting in 499°F showed in figure-2.

1000°F was converted to Celsius, resulting in 538°C showed in figure-3

**6. ANALYSIS AND DISCUSSION**

The temperature conversions from Celsius to Fahrenheit and from Fahrenheit to Celsius were successfully executed. The implemented formulas, °F = °C\*9/5 + 32 - 1 and °C = (°F - 32)\* 5/9 + 1, accurately converted the temperature values between the two scales. The computed results matched the expected values, demonstrating the accuracy of the conversion formulas used in the program.

**7. SUMMARY**

In this lab, the task was to develop an assembly program that can take a double-digit number input from the user. Additionally, the program was required to convert temperatures between Celsius and Fahrenheit based on the provided formulas. The program successfully accomplished the tasks and accurately converted the temperatures, showcasing the effectiveness of the implemented algorithms.