

CSE108 – Computer Programming Lab.

Lab 5

Date: 22.03.2024

Part 1 [50 pts]

Write a C program that performs basic arithmetic operations. The program should prompt the user to input an arithmetic expression in the format "operand1 operator operand2" (e.g., 5 * 2) and then output the result of the operation. The supported operators are addition (+), subtraction (-), multiplication (*), and division (/). If the user attempts to divide by zero, the program should display an error message. Use the enum type for corresponding operands (+, -, *, /).

```
typedef enum Operation {
    ADDITION,
    SUBTRACTION,
    MULTIPLICATION,
    DIVISION
} optype;

void get_parameters(double *a, optype *op, double *b) {
    switch (operator_char) {
        ...
    }
}

void print_result(double a, optype op, double b) {
    switch (op) {
        ...
    }
}
```

Picture 1.1: Format

```
Type an arithmetic question (e.g., 1 + 2): 1+2
Result: 3.00
```

Picture 1.2: Output Format

Part 2 [50 pts]

Write a C program that allows users to convert temperatures between Celsius, Fahrenheit and Kelvin. The program should repeatedly prompt the user to choose an option until they choose to exit. For options 1, 2 and 3, the program should ask the user to enter the temperature value and then display the converted temperatures. Use a switch-case when the user enters an input. Your program should have a header file named `degree.h` that includes the function prototypes for the conversion functions. Implement the conversion functions in a source file named `main.c`.

Use formulas for the conversion.

```
#degree.h
// Function to convert Celsius to Fahrenheit and Kelvin
void celsius_to_fah_kel(double celsius, double *fahrenheit, double *kelvin) {
    ...
}

// Function to convert Fahrenheit to Celsius and Kelvin
void fahrenheit_to_cel_kel(double fahrenheit, double *celsius, double *kelvin) {
    ...
}

// Function to convert Kelvin to Celsius and Fahrenheit
void kelvin_to_cel_fah(double kelvin, double *celsius, double *fahrenheit) {
    ...
}

// Function to print converted temperatures
void print_temperatures(double celsius, double fahrenheit, double kelvin) {
    ...
}
```

Picture 3.1: Header File Format

```
1. Convert to Fahrenheit (Enter Celsius degree)
2. Convert to Celsius (Enter Fahrenheit degree)
3. Convert to Kelvin (Enter Celsius degree)
0. Choose if you want to exit
Choose an option (1, 2, 3, or 0 to exit): 1
Enter Celsius degree: 20
The degree in Celsius: 20.00
The degree in Fahrenheit: 68.00
The degree in Kelvin: 293.15
Choose an option (1, 2, 3, or 0 to exit): 2
Enter Fahrenheit degree: 68
The degree in Celsius: 20.00
The degree in Fahrenheit: 68.00
The degree in Kelvin: 293.15
Choose an option (1, 2, 3, or 0 to exit): 3
Enter Kelvin degree: 293.15
The degree in Celsius: 20.00 ✓
The degree in Fahrenheit: 68.00 ✓
The degree in Kelvin: 293.15 ✓
Choose an option (1, 2, 3, or 0 to exit): 0

Exiting program.
```

Picture 3.2: Output Format

$$\text{Fahrenheit} = \left(\frac{\text{Celsius} \times 9}{5} \right) + 32$$

$$\text{Celsius} = (\text{Fahrenheit} - 32) \times \frac{5}{9}$$

$$\text{Kelvin} = \left((\text{Fahrenheit} - 32) \times \frac{5}{9} \right) + 273.15$$

~~$$\text{Kelvin} = \text{Celsius} - 273.15$$~~

$$\text{Celsius} = \text{Kelvin}$$