Creating a Basic Calculator in C

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Question

How to create a basic calculator in C that performs addition, subtraction, multiplication, and division operations? The calculator should prompt the user to enter two numbers and choose an operation. Based on the user's choice, it should display the result of the operation. Could you provide a sample code or outline the steps needed to implement this calculator?

Introduction

A calculator is a simple and effective program that allows users to perform basic arithmetic operations such as addition, subtraction, multiplication, and division. In this task, we will create a basic calculator in C, which will prompt the user to input two numbers and choose an arithmetic operation. The calculator will then perform the operation and display the result.

Steps to Implement the Calculator in C

The following steps outline how to create a basic calculator in C:

1. **Include necessary headers:** Start by including the standard input-output header file.
2. **Declare variables:** Declare variables to store the two numbers, the operator, and the result.
3. **Prompt the user for input:** Ask the user to enter two numbers and an operator (e.g., +, -, *, /).
4. **Use a switch-case statement:** Based on the operator entered, perform the corresponding arithmetic operation.
5. **Display the result:** Print the result of the operation.
6. **Handle division by zero:** Ensure the program checks for division by zero and handles it appropriately.

C Code Implementation

Below is the C code implementing the basic calculator:

```c
#include <stdio.h>

int main() {
    char operator;
    double num1, num2, result;

    // Prompt user to enter the first number
    printf("Enter first number: ");
    scanf("%lf", &num1);

    // Prompt user to enter an operator
    printf("Enter an operator (+, -, *, /): ");
    scanf(" %c", &operator);

    // Prompt user to enter the second number
    printf("Enter second number: ");
    scanf("%lf", &num2);

    // Perform the calculation based on the operator
    switch(operator) {
        case '+':
            result = num1 + num2;
            break;
        case '-':
            result = num1 - num2;
            break;
        case '*':
            result = num1 * num2;
            break;
        case '/':
            // Check for division by zero
            if(num2 != 0) {
                result = num1 / num2;
            } else {
                printf("Error! Division by zero.\n");
                return 1;
            }
            break;
        default:
            printf("Error! Operator is not correct.\n");
            return 1;
    }

    // Display the result
    printf("Result: %.2lf %c %.2lf = %.2lf\n", num1,
        operator, num2, result);
```

```
46
47      return 0;
48  }
```

Listing 1: Basic Calculator in C

Explanation

The code begins by including the ‘stdio.h‘ header for input and output functions. Variables ‘num1‘, ‘num2‘, and ‘result‘ are declared as ‘double‘ to allow decimal input. The operator is stored as a ‘char‘.

The user is prompted to enter two numbers and an operator. The ‘switch‘ statement is then used to perform the arithmetic operation based on the operator provided. For division, an additional check ensures that the denominator is not zero to avoid division by zero errors. The result of the operation is then displayed in the output.