

Title: Basic Calculator Using Switch-Case in Java

Objective:

To implement a simple calculator program in Java using the switch-case control statement that performs basic arithmetic operations (addition, subtraction, multiplication, and division) based on user input.

Theory:

Switch-Case Statement:

The switch statement in Java allows the execution of different blocks of code based on the value of an expression. The case labels define the possible values, and the break statement ensures that only one case is executed.

Calculator Operations:

A calculator takes two operands and an operator to perform a computation. Common operations include:

1. Addition (+)
2. Subtraction (-)
3. Multiplication (*)
4. Division (/)

Error Handling:

- Division by zero is checked to prevent runtime errors.
- Invalid operators are handled using the default case.

Algorithm:

1. Start the program.
2. Input two numbers and an operator.
3. Use a switch statement to handle operations based on the operator:
 - +: Perform addition.
 - -: Perform subtraction.
 - *: Perform multiplication.
 - /: Check if the second number is not zero, then perform division.
 - default: Print an error message for invalid operators.

4. Output the result of the operation.
5. End the program.

Program:

```
import java.util.Scanner;

public class Calculator {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        // Input numbers and operator
        System.out.print("Enter the first number: ");
        double num1 = scanner.nextDouble();

        System.out.print("Enter the operator (+, -, *, /): ");
        char op = scanner.next().charAt(0);

        System.out.print("Enter the second number: ");
        double num2 = scanner.nextDouble();

        double result;

        // Switch-case for calculator operations
        switch (op) {
            case '+':
                result = num1 + num2;
                System.out.println("Result: " + result);
                break;

            case '-':
                result = num1 - num2;
                System.out.println("Result: " + result);
                break;

            case '*':
                result = num1 * num2;
                System.out.println("Result: " + result);
                break;

            case '/':
                if (num2 != 0) {
                    result = num1 / num2;
                    System.out.println("Result: " + result);
                } else {
                    System.out.println("Error: Division by zero is not allowed.");
                }
                break;
        }
    }
}
```

```
        default:
            System.out.println("Error: Invalid operator.");
        }

        scanner.close();
    }
}
```

Sample Output:

Case 1: Addition

Enter the first number: 25.5
Enter the operator (+, -, *, /): +
Enter the second number: 14.5
Result: 40.0

Case 2: Division by Zero

Enter the first number: 50
Enter the operator (+, -, *, /): /
Enter the second number: 0
Error: Division by zero is not allowed.

Case 3: Invalid Operator

Enter the first number: 30
Enter the operator (+, -, *, /): %
Enter the second number: 10
Error: Invalid operator.

Conclusion:

The program demonstrates the use of the switch-case statement in Java to implement a basic calculator. It efficiently handles different arithmetic operations and includes error checking for invalid inputs, such as unsupported operators or division by zero. This approach highlights the importance of control flow structures in Java programming.