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Experiment 2

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Section/Group: MAM - 3(B)

Semester: II

Subject Name: Software Testing [24CAH-654]

Aim: Write a test script using unit testing framework for addition, subtraction, multiplication and division of two numbers.

The program uses a Scanner for user input and provides a menu to choose operations. Each operation is implemented as a method to ensure modularity and testability. The division method includes handling for division by zero, returning an error message instead of throwing an exception. Test cases validate the functionality of these methods to ensure correct outputs under various scenarios.

Steps:

- **Understand Requirements:**
  - The program allows the user to perform addition, subtraction, multiplication, and division.
  - It handles invalid inputs and division by zero.
- **Write the Core Logic:**
  - Create methods for each operation: add, subtract, multiply, and divide.
  - Include user prompts and input validation.
- **Implement Test Cases**
- **Execute Tests:**
  - Run the test cases and verify all outputs align with expected results

Source Code:

```
import java.util.*;

public class Exp_1 {

   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      while (true) {
         System.out.println("Choose an operation:");
         System.out.println("A: Addition");
         System.out.println("S: Subtraction");
         System.out.println("M: Multiplication");
```

```
        System.out.println("D: Division");
        System.out.println("Q: Quit");

        System.out.print("Enter your choice: ");
        char choice = sc.next().toUpperCase().charAt(0);

        if (choice == 'Q') {
            System.out.println("Exiting the program. Goodbye!");
            break;
        }

        double num1 = 0, num2 = 0;
        boolean validInput = true;

        try {
            System.out.print("Enter the first number: ");
            num1 = sc.nextDouble();

            System.out.print("Enter the second number: ");
            num2 = sc.nextDouble();
        } catch (Exception e) {
            System.out.println("Error: Please enter valid numeric values.");
            sc.nextLine();
            validInput = false;
        }

        if (validInput) {
            switch (choice) {
                case 'A':
                    System.out.println("Result: " + add(num1, num2));
                    break;
                case 'S':
                    System.out.println("Result: " + subtract(num1, num2));
                    break;
                case 'M':
                    System.out.println("Result: " + multiply(num1, num2));
                    break;
                case 'D':
                    System.out.println("Result: " + divide(num1, num2));
                    break;
                default:
                    System.out.println("Invalid choice. Please try again.");
            }
        }
        System.out.println();
    }
    sc.close();
}

public static double add(double a, double b) {
    return a + b;
}

public static double subtract(double a, double b) {
    return a - b;
}

static double multiply(double a, double b) {
    return a * b;
}

static String divide(double a, double b) {
    if (b == 0) {
        return "Error: Division by zero is not allowed.";
    }
    return String.valueOf(a / b);
}
}
```

Test Cases:

Test Case ID: TC001 **Status = Passed**

Module Name: Addition Module
Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Addition Test
Test Steps:
1. Select 'A' for addition.
2. Enter 520 and 345 as inputs.

Expected Result: Result: 856
Actual Result: Result: 856

Test Case ID: TC002 **Status = Passed**

Module Name: Subtraction Module
Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Subtraction Test
Test Steps:
1. Select 'S' for subtraction.
2. Enter 428412 and 7894125 as inputs.

Expected Result: Result: -7465713.0.
Actual Result: Result: - 7465713.0.

Test Case ID: TC003 **Status = Passed**

Module Name: Multiplication Module
Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Multiplication Test
Test Steps:
1. Select 'M' for multiplication.
2. Enter 7895 and 7412 as inputs.

Expected Result: Result: 5.851774E7
Actual Result: Result: 5.851774E7

Test Case ID: TC004 **Status = Passed**

Module Name: Division Module
Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Division Test
Test Steps:
1. Select 'D' for division.
2. Enter 10 and 2 as inputs.

Expected Result: Result: 5.0
Actual Result: Result: 5.0

Test Case ID: TC005 **Status = Passed**

Module Name: Division Module

Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Divide by Zero Test
Test Steps:

1. Select 'D' for division.
2. Enter 10 and 0 as inputs.

Expected Result: Error: Division by zero is not allowed.
Actual Result: Error: Division by zero is not allowed.

Test Case ID: TC006 **Status = Passed**

Module Name: Invalid Module
Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Invalid Input
Test Steps:

1. Select 'A' for addition.
2. Enter a non-numeric input for both numbers.

Expected Result: Error: Please enter valid numeric values.
Actual Result: Error: Please enter valid numeric values.

Test Case ID: TC007 **Status = Passed**

Module Name: Quit Module
Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Quit Test
Test Steps:

1. Select 'Q' for quit.

Expected Result: Exiting the program. Goodbye!
Actual Result: Exiting the program. Goodbye!

Test Case ID: TC008 **Status = Passed**

Module Name: Invalid Module
Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Invalid Choice Test
Test Steps:

1. Select 'X' as input for an invalid operation.

Expected Result: Invalid choice. Please try again.
Actual Result: Invalid choice. Please try again.

Test Case ID: TC009 **Status = Passed**

Module Name: Mixed Module
Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Mixed Operation Test
Test Steps:

1. Select 'A' for addition.
2. Enter 10 and 5.
3. Select 'M' for multiplication.
4. Enter 2 and 3.

Expected Result: Result: 15 (addition) and 6 (multiplication)
Actual Result: Result: 15 (addition) and 6 (multiplication)

Test Case ID: TC010 **Status = Passed**

Module Name: Multiple Module
Test Designed By: Rahul
Test Designed Date: 2025-01-20
Test Executed By: Rahul
Test Title/Name: Multiple Valid Input
Test Steps:

1. Select 'S' for subtraction.
2. Enter 10 and 3.
3. Select 'D' for division.
4. Enter 9 and 3.

Expected Result: Result: 7 (subtraction), 3.0 (division)
Actual Result: Result: 7 (subtraction), 3.0 (division)

Learning Outcome:

- Writing Modular Code: Learned how to write reusable and modular methods for basic arithmetic operations.
- User Input Validation: Gained experience in handling invalid inputs gracefully to enhance user experience.
- Test-Driven Development: Developed and ran test cases to ensure the correctness of individual components.
- Edge Case Handling: Understood the importance of handling special cases like division by zero.