Experiment-1

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Subject Name: Project Based Learning in Java **Subject Code: 22CSH-359**

1.Aim: Write a Java program to analyze a user-input string. The program should:

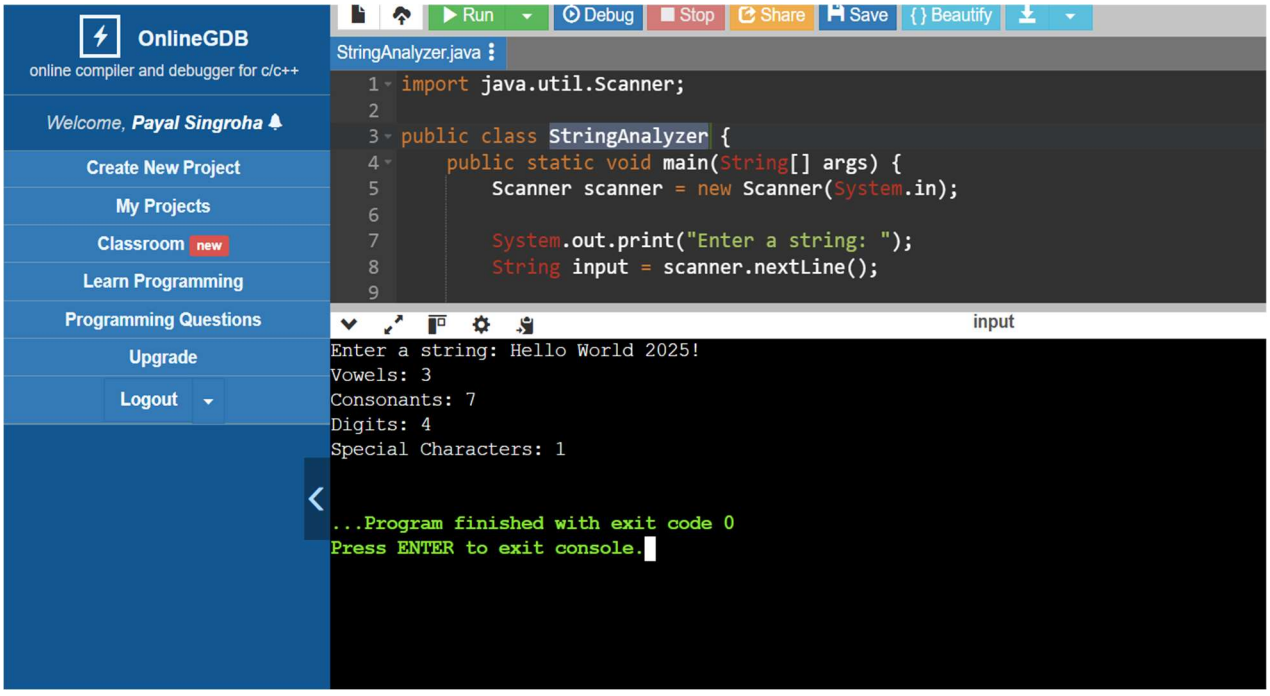
- **Count the number of vowels, consonants, digits, and special characters.**

2.Code:

```
import java.util.Scanner;


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


        System.out.print("Enter a string: ");
        String input = scanner.nextLine();


        int vowels = 0, consonants = 0, digits = 0, specialCharacters = 0;


        for (char ch : input.toCharArray()) {
            if (Character.isLetter(ch)) {
                if ("AEIOUaeiou".indexOf(ch) != -1) {
                    vowels++;
                } else {
                    consonants++;
                }
            } else if (Character.isDigit(ch)) {
                digits++;
```

```
            } else if (!Character.isWhitespace(ch)) {
                specialCharacters++;
            }
        }

        System.out.println("Vowels: " + vowels);
        System.out.println("Consonants: " + consonants);
        System.out.println("Digits: " + digits);
        System.out.println("Special Characters: " + specialCharacters);

        scanner.close();
    }
}
```

OUTPUT:



2.Aim: Write a Java program to perform addition, subtraction, and multiplication on two matrices. The program should:

Check the dimensions of the matrices to ensure valid operations.

Code:

```
import java.util.Scanner;

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

        System.out.print("Enter the number of rows and columns for the matrices: ");
        int rows = scanner.nextInt();
        int cols = scanner.nextInt();

        int[][] matrix1 = new int[rows][cols];
        int[][] matrix2 = new int[rows][cols];
        int[][] addition = new int[rows][cols];
        int[][] subtraction = new int[rows][cols];
        int[][] multiplication = new int[rows][cols];

        System.out.println("Enter elements of Matrix 1:");
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < cols; j++) {
                matrix1[i][j] = scanner.nextInt();
            }
        }

        System.out.println("Enter elements of Matrix 2:");
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < cols; j++) {
                matrix2[i][j] = scanner.nextInt();
```

```
    }
}

// Perform addition and subtraction
for (int i = 0; i < rows; i++) {
    for (int j = 0; j < cols; j++) {
        addition[i][j] = matrix1[i][j] + matrix2[i][j];
        subtraction[i][j] = matrix1[i][j] - matrix2[i][j];
    }
}

// Perform multiplication
for (int i = 0; i < rows; i++) {
    for (int j = 0; j < cols; j++) {
        multiplication[i][j] = 0;
        for (int k = 0; k < cols; k++) {
            multiplication[i][j] += matrix1[i][k] * matrix2[k][j];
        }
    }
}

System.out.println("Addition:");
printMatrix(addition);

System.out.println("Subtraction:");
printMatrix(subtraction);

System.out.println("Multiplication:");
printMatrix(multiplication);
```

```
        scanner.close();
    }

    private static void printMatrix(int[][] matrix) {
        for (int[] row : matrix) {
            for (int elem : row) {
                System.out.print(elem + " ");
            }
            System.out.println();
        }
    }
}
```

OUTPUT:

```
MatrixOperations.j...
 1 import java.util.Scanner;
 2
 3 public class MatrixOperations {
 4     public static void main(String[] args) {
 5         Scanner scanner = new Scanner(System.in);
 6
 7         System.out.print("Enter the number of rows and columns for the matrices: ");
 8         int rows = scanner.nextInt();
 9         int cols = scanner.nextInt();
10
```

input

```
Enter the number of rows and columns for the matrices: 2 2
Enter elements of Matrix 1:
1 2
3 4
Enter elements of Matrix 2:
5 6
7 8
Addition:
6 8
10 12
Subtraction:
-4 -4
-4 -4
Multiplication:
19 22
43 50
```

3) AIM-Create a Java program that implements a basic banking system with the following features:

Account creation (Name, Account Number, Balance)
Deposit and withdrawal operations
Prevent overdraft by checking the balance before withdrawal
Use encapsulation (private variables with public getters/setters)

Code:

```
import java.util.Scanner;

class BankAccount {
    private String name;
    private String accountNumber;
    private double balance;

    public BankAccount(String name, String accountNumber, double initialBalance) {
        this.name = name;
        this.accountNumber = accountNumber;
        this.balance = initialBalance;
    }

    public String getName() {
        return name;
    }

    public String getAccountNumber() {
        return accountNumber;
    }

    public double getBalance() {
        return balance;
    }

    public void deposit(double amount) {
        if (amount > 0) {
            balance += amount;
            System.out.println("Deposit successful! Current Balance: " + balance);
        } else {
            System.out.println("Error: Deposit amount must be positive.");
        }
    }

    public void withdraw(double amount) {
        if (amount > 0 && amount <= balance) {
            balance -= amount;
```

```
            System.out.println("Withdrawal successful! Current Balance: " + balance);
        } else {
            System.out.println("Error: Insufficient funds. Current Balance: " + balance);
        }
    }
}

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

        System.out.print("Enter Name: ");
        String name = scanner.nextLine();

        System.out.print("Enter Account Number: ");
        String accountNumber = scanner.nextLine();

        System.out.print("Enter Initial Balance: ");
        double initialBalance = scanner.nextDouble();

        BankAccount account = new BankAccount(name, accountNumber, initialBalance);

        while (true) {
            System.out.println("\nChoose an operation: 1. Deposit  2. Withdraw  3. Exit");
            int choice = scanner.nextInt();

            switch (choice) {
                case 1:
                    System.out.print("Enter deposit amount: ");
                    double depositAmount = scanner.nextDouble();
                    account.deposit(depositAmount);
                    break;
                case 2:
                    System.out.print("Enter withdrawal amount: ");
                    double withdrawAmount = scanner.nextDouble();
                    account.withdraw(withdrawAmount);
                    break;
                case 3:
                    System.out.println("Exiting the banking system. Thank you!");
                    scanner.close();
                    return;
                default:
                    System.out.println("Invalid choice. Please try again.");
            }
        }
```

```
    }
}
```

Output:

```
                case 3:
                    System.out.println("Exiting the banking system. Thank you!");
                    scanner.close();
                    return;
                default:
                    System.out.println("Invalid choice. Please try again.");
            }
        }
    }
}
```

input

```
Enter Name: Payal Singroha
Enter Account Number: 123456
Enter Initial Balance: 500000

Choose an operation: 1. Deposit  2. Withdraw  3. Exit
1
Enter deposit amount: 10000
Deposit successful! Current Balance: 510000.0

Choose an operation: 1. Deposit  2. Withdraw  3. Exit
```