Assignment-4

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Semester: 6th **Subject Code: 22CSH-359**

Subject Name: Project Based Learning in Java

Easy:

QUES: String Analysis

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

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

Solution:

```
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, specialChars = 0;

      for (char ch : input.toCharArray()) {
         if (Character.isLetter(ch)) {
            if (isVowel(ch)) {
               vowels++;
            } else {
               consonants++;
            }
         } else if (Character.isDigit(ch)) {
            digits++;
         } else if (!Character.isWhitespace(ch)) {
            specialChars++;
         }
      }

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

```
System.out.println("Special Characters: " + specialChars);

        scanner.close();
    }

    private static boolean isVowel(char ch) {
        return "AEIOUaeiou".indexOf(ch) != -1;
    }
}
```

```
Enter a string: Arya23
Vowels: 2
Consonants: 2
Digits: 2
Special Characters: 0


...Program finished with exit code 0
Press ENTER to exit console.
```

Medium:

QUES: Matrix Operations

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.

Solution:

```
import java.util.Scanner;

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

        System.out.println("Enter dimensions of matrices (rows and columns): ");
        int rows = scanner.nextInt();
        int cols = scanner.nextInt();

        int[][] matrix1 = new int[rows][cols];
        int[][] matrix2 = 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();
        }
    }

    System.out.println("Addition:");
    printMatrix(addMatrices(matrix1, matrix2, rows, cols));

    System.out.println("Subtraction:");
    printMatrix(subtractMatrices(matrix1, matrix2, rows, cols));

    System.out.println("Multiplication:");
    printMatrix(multiplyMatrices(matrix1, matrix2, rows, cols));

    scanner.close();
}

private static int[][] addMatrices(int[][] matrix1, int[][] matrix2, int rows, int cols) {
    int[][] result = new int[rows][cols];
    for (int i = 0; i < rows; i++) {
        for (int j = 0; j < cols; j++) {
            result[i][j] = matrix1[i][j] + matrix2[i][j];
        }
    }
    return result;
}

private static int[][] subtractMatrices(int[][] matrix1, int[][] matrix2, int rows, int cols) {
    int[][] result = new int[rows][cols];
    for (int i = 0; i < rows; i++) {
        for (int j = 0; j < cols; j++) {
            result[i][j] = matrix1[i][j] - matrix2[i][j];
        }
    }
    return result;
}

private static int[][] multiplyMatrices(int[][] matrix1, int[][] matrix2, int rows, int cols) {
    int[][] result = new int[rows][cols];
    for (int i = 0; i < rows; i++) {
        for (int j = 0; j < cols; j++) {
            result[i][j] = 0;
```

```
    for (int k = 0; k < cols; k++) {
    result[i][j] += matrix1[i][k] * matrix2[k][j];
                }
            }
        }
        return result;
    }
    private static void printMatrix(int[][] matrix) {
        for (int[] row : matrix) {
            for (int val : row) {
                System.out.print(val + " ");
            }
            System.out.println();
        }
    }
}
```

```
Enter dimensions of matrices (rows and columns):
2
2
Enter elements of Matrix 1:
2
3
3
4
Enter elements of Matrix 2:
1
2
3
4
Addition:
3 5
6 8
Subtraction:
1 1
0 0
Multiplication:
11 16
15 22
```

Hard:

QUES: Basic Banking System

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)

Solution:

```
import java.util.Scanner;
class BankAccount {
    private String name;
```

```
private String accountNumber;
    private double balance;


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

    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 > balance) {
            System.out.println("Error: Insufficient funds. Current Balance: " + balance);
        } else if (amount > 0) {
            balance -= amount;
            System.out.println("Withdrawal successful! Current Balance: " + balance);
        } else {
            System.out.println("Error: Withdrawal amount must be positive.");
        }
    }
}

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();

            if (choice == 1) {
                System.out.print("Enter deposit amount: ");
                double amount = scanner.nextDouble();
                account.deposit(amount);
            } else if (choice == 2) {
                System.out.print("Enter withdrawal amount: ");
                double amount = scanner.nextDouble();
                account.withdraw(amount);
            } else if (choice == 3) {
                System.out.println("Exiting... Thank you!");
                break;
            } else {
                System.out.println("Invalid choice. Please try again.");
            }
        }
        scanner.close();
    }
}
```

```
Enter Name: Arya
Enter Account Number: 22BCS10915
Enter Initial Balance: 1000

Choose an operation: 1-Deposit 2-Withdraw 3-Exit
2
Enter withdrawal amount: 363
Withdrawal successful! Current Balance: 637.0

Choose an operation: 1-Deposit 2-Withdraw 3-Exit
3
Exiting... Thank you!


...Program finished with exit code 0
Press ENTER to exit console.
```