

Unit #1.2

8) Create a class with static methods to calculate the sum, difference and product of two matrices (represented by 2D arrays). The methods must return the resulting matrices.

Program :

This program consisted of two java classes, ArrayOperation and ArrayOperationHandeler and their respective code are :

On file ArrayOperation :

```
/*
 * To change this license header, choose License Headers in Project
Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package arrayoperation;

import java.util.Scanner;

/**
 *
 * @author aashish
 */
public class ArrayOperation extends ArrayOperationHandeler {

    static int row1, column1, row2, column2;
    static String Choice;
    static int[][] ResultantArray, Array1, Array2;

    public static void ArrayValueSetterForAdditionAndSubtraction() {
        Array1 = new int[row1][column1];
        Array2 = new int[row2][column2];
        ResultantArray = new int[row1][column1];
        Scanner input = new Scanner(System.in);

        System.out.println("Enter the set of values for First matrix\n");
        for (int i = 0; i < row1; i++) {
            for (int j = 0; j < column1; j++) {
                Array1[i][j] = input.nextInt();
            }
        }

        System.out.println("Enter the set of values for Second matrix\n");
        for (int i = 0; i < row1; i++) {
            for (int j = 0; j < column1; j++) {
                Array2[i][j] = input.nextInt();
            }
        }
    }

    public static void ArrayValueSetterForProduct() {
        Array1 = new int[row1][column1];
        Array2 = new int[row2][column2];
        ResultantArray = new int[column1][row2];
        Scanner input = new Scanner(System.in);

        System.out.println("Enter the set of values for First matrix\n");
```

```
        for (int i = 0; i < row1; i++) {
            for (int j = 0; j < column1; j++) {
                Array1[i][j] = input.nextInt();
            }
        }

        System.out.println("Enter the set of values for Second matrix\
n");
        for (int i = 0; i < row2; i++) {
            for (int j = 0; j < column2; j++) {
                Array2[i][j] = input.nextInt();
            }
        }
    }

    public static void DisplayForAdditionAndSubtraction() {

        System.out.println("The set of values of First matrix is\n");
        for (int i = 0; i < row1; i++) {
            for (int j = 0; j < column1; j++) {
                System.out.print(Array1[i][j]);
                System.out.print("\t");
            }
            System.out.println("\n");
        }

        System.out.println("The set of values for Second matrix is\n");
        for (int i = 0; i < row2; i++) {
            for (int j = 0; j < column2; j++) {
                System.out.print(Array2[i][j]);
                System.out.print("\t");
            }
            System.out.println("\n");
        }

        System.out.println("The set of values for Resultant matrix is\
n");
        for (int i = 0; i < row2; i++) {
            for (int j = 0; j < column2; j++) {
                System.out.print(ResultantArray[i][j]);
                System.out.print("\t");
            }
            System.out.println("\n");
        }
    }

    public static void DisplayForProduct() {

        System.out.println("The set of values of First matrix is\n");
        for (int i = 0; i < row1; i++) {
            for (int j = 0; j < column1; j++) {
                System.out.print(Array1[i][j]);
                System.out.print("\t");
            }
            System.out.println("\n");
        }
    }
}
```

```
    }

    System.out.println("The set of values for Second matrix is\n");
    for (int i = 0; i < row2; i++) {
        for (int j = 0; j < column2; j++) {
            System.out.print(Array2[i][j]);
            System.out.print("\t");
        }
        System.out.println("\n");
    }

    System.out.println("The set of values for Resultant matrix is\n");
    for (int i = 0; i < row1; i++) {
        for (int j = 0; j < column2; j++) {
            System.out.print(ResultantArray[i][j]);
            System.out.print("\t");
        }
        System.out.println("\n");
    }
}

public static void main(String[] args) {

    Scanner input = new Scanner(System.in);

    ArrayOperationHandeler Matrix = new ArrayOperationHandeler();

    System.out.println("Enter the size of the first matrix");
    row1 = input.nextInt();
    column1 = input.nextInt();
    System.out.println("Enter the size of the second array");
    row2 = input.nextInt();
    column2 = input.nextInt();
    System.out.println("Enter the type of operation that you want to
perform\n 1) Addition\n 2) Difference\n"
        + " 3) Product2");
    Choice = input.next();
    switch (Choice.toLowerCase()) {
        case "addition": {

            if (row1 != row2 || column1 != column2) {
                System.out.println("For performing the Addition
operation the size must be same i.e row and column must be same");
            } else {
                ArrayValueSetterForAdditionAndSubtraction();
                ResultantArray = Matrix.AdditionArray(Array1, Array2,
row1, column1);
                DisplayForAdditionAndSubtraction();
            }
            break;
        }
        case "difference": {
```

Aashish Shrestha

```
        if (row1 != row2 || column1 != column2) {
            System.out.println("For performing the Difference
operation the size must be same i.e row and column must be same");
        } else {
            ArrayValueSetterForAdditionAndSubtraction();
            ResultantArray = Matrix.DifferenceArray(Array1,
Array2, row1, column1);
            DisplayForAdditionAndSubtraction();
        }
        break;
    }
    case "product": {
        if (column1 != row2) {
            System.out.println("Multiplication operation could
not be performed on these size of the matrices i.e the column of one
matrix must be equal to row of another matrix");
        } else {
            ArrayValueSetterForProduct();
            ResultantArray = Matrix.ProductArray(Array1, Array2,
row1, column1, row2, column2);
            DisplayForProduct();
        }
        break;
    }
    default: {
        System.out.println("Please Enter the appropriate type of
Choice");
    }
}

}
```

And another file ArrayOperationHandler consisted of the code :

```
/*
 * To change this license header, choose License Headers in Project
Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package arrayoperation;

/**
 *
 * @author aashish
 */
public class ArrayOperationHandler {

    static int sum = 0;
    static int[][] ResultArray;
```

Aashish Shrestha

```
    public static int[][] AdditionArray(int[][] Array1, int[][] Array2,
int row, int column) {
    ResultArray = new int[row][column];

    for (int i = 0; i < row; i++) {
        for (int j = 0; j < column; j++) {
            ResultArray[i][j] = Array1[i][j] + Array2[i][j];
        }
    }
    return ResultArray;
}

    public static int[][] DifferenceArray(int[][] Array1, int[][] Array2,
int row, int column) {
    ResultArray = new int[row][column];

    for (int i = 0; i < row; i++) {
        for (int j = 0; j < column; j++) {
            ResultArray[i][j] = Array1[i][j] - Array2[i][j];
        }
    }
    return ResultArray;
}

    public static int[][] ProductArray(int[][] Array1, int[][] Array2,
int row1, int column1, int row2, int column2) {
    ResultArray = new int[row1][column2];
    for (int i = 0; i < row1; i++) {
        for (int j = 0; j < column2; j++) {
            for (int k = 0; k < row2; k++) {
                sum = sum + Array1[i][k] * Array2[k][j];
            }
            ResultArray[i][j] = sum;
            sum = 0;
        }
    }
    return ResultArray;
}

}
```

Output :

While performing Addition operation :

```
run:
Enter the size of the first matrix
2
2
Enter the size of the second array
2
2
Enter the type of operation that you want to perform
1) Addition
2) Difference
3) Product2
addition
Enter the set of values for First matrix

1
1
1
1
Enter the set of values for Second matrix

1
1
1
1
The set of values of First matrix is

1      1
1      1

The set of values for Second matrix is

1      1
1      1

The set of values for Resultant matrix is

2      2
2      2
```

While performing Subtraction operation :

```
Run:
Enter the size of the first matrix
2
2
Enter the size of the second array
2
2
Enter the type of operation that you want to perform
1) Addition
2) Difference
3) Product2
difference
Enter the set of values for First matrix

2
2
2
2
Enter the set of values for Second matrix

1
1
1
1
The set of values of First matrix is

2      2
2      2

The set of values for Second matrix is

1      1
1      1

The set of values for Resultant matrix is

1      1
1      1
```

While performing product :

```
1) Addition
2) Difference
3) Product2
product
Enter the set of values for First matrix

1
2
3
4
Enter the set of values for Second matrix

5
6
7
8
9
10
The set of values of First matrix is

1      2
3      4

The set of values for Second matrix is

5      6      7
8      9      10

The set of values for Resultant matrix is

21      24      27
47      54      61
```