

Q. 1. Write a Java program that demonstrates various operations on a 3D array:

a. Initializing the 3D array with random values.

b. Finding the maximum value in the array.

c. Calculating the average of all elements.

d. Displaying the array.

```
package Packgetype;
import java.util.*;

/*Q.1. Write a Java program that demonstrates various operations on a 3D array:
a. Initializing the 3D array with random values.
b. Finding the maximum value in the array.
c. Calculating the average of all elements.
d. Displaying the array. */

public class DimensionalArray {

    public static void main(String[]args) {

        Random ran= new Random(); //Created a object for random values using Random method
        double[][][] array=new double[3][3][3]; //assign variable for 3D array
        double max = array[0][0][0]; //initialize max value 0 to find maximum value of random
array
        double sum=0; // initialize sum value 0 to find sum of all random array
        double length = array.length; // assign length of array is equals to length

        System.out.println("Displaying the array using Random method: "); //d. Displaying the
array.
        System.out.println(" ");

        for(int i=0; i<array.length; i++) //for loop initialization for i
        {
            for(int j=0; j<array.length; j++) //for loop initialization for j
            {
                for(int k=0; k<array.length; k++) //for loop initialization for k
                {
                    array[i][j][k]=ran.nextInt(50); // a. Initializing the 3D array with random
values.
                    System.out.print("arr["+i+"]["+j+"]["+k+"] = " +array[i][j][k]+"\\t");

                    if(array[i][j][k] > max)
                        max = array[i][j][k]; //b. Finding the maximum value in the array.

                    sum += array[i][j][k];
                }

                System.out.print("\\n");
            }
        }

        double average = sum / length; //c. Calculating the average of all elements.

        System.out.println("\\nLargest element present in given array: " + max); //print max value
of array

        System.out.println("\\nAverage of array[i][j][k] : "+average); //print average of array

    }

}
```

OUTPUT:

```
Console x
<terminated> DimensionalArray [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe (14-Sep-2023, 6:37:09 pm - 6:37:09 pm) [pid: 3320]
Displaying the array using Random method:

arr[0][0][0] = 47.0    arr[0][0][1] = 5.0    arr[0][0][2] = 17.0
arr[0][1][0] = 19.0    arr[0][1][1] = 30.0    arr[0][1][2] = 10.0
arr[0][2][0] = 4.0     arr[0][2][1] = 47.0    arr[0][2][2] = 10.0
arr[1][0][0] = 16.0    arr[1][0][1] = 10.0    arr[1][0][2] = 9.0
arr[1][1][0] = 39.0    arr[1][1][1] = 1.0     arr[1][1][2] = 21.0
arr[1][2][0] = 5.0     arr[1][2][1] = 3.0     arr[1][2][2] = 19.0
arr[2][0][0] = 31.0    arr[2][0][1] = 9.0     arr[2][0][2] = 38.0
arr[2][1][0] = 31.0    arr[2][1][1] = 7.0     arr[2][1][2] = 18.0
arr[2][2][0] = 32.0    arr[2][2][1] = 22.0    arr[2][2][2] = 17.0

Largest element present in given array: 47.0

Average of array[i][j][k] : 172.33333333333334
```

Q.2. Write a Java program that performs addition of two matrices. The program should use a 2D array of wrapper class objects (e.g., Integer) for the matrix elements. Take two matrices as input, perform the addition operation, and display the resulting matrix.

```
package Packgetype;
import java.util.Scanner;

public class MatricesAddition {

    /*Q.2. Write a Java program that performs addition of two matrices.
    The program should use a 2D array of wrapper class objects (e.g., Integer)
    for the matrix elements. Take two matrices as input, perform the addition operation,
    and display the resulting matrix.*/

    public static void main(String[] args) {
        int p,q,r,s;

        Scanner sc = new Scanner(System.in);

        //taking user input for no of rows in matrix 1
        System.out.print("Enter number of rows(p) in first matrix:");
        p = sc.nextInt();

        //taking user input for no of column in matrix 1
        System.out.print("Enter number of column(q) in first matrix:");
        q = sc.nextInt();

        //taking user input for no of rows in matrix 2
        System.out.print("Enter number of rows(r) in Second matrix:");
        r = sc.nextInt();

        //taking user input for no of column in matrix 2
        System.out.print("Enter number of column(s) in Second matrix:");
        s = sc.nextInt();

        /* if statement for no of rows of first matrix=no of rows of second matrix
        and no of columns of first matrix=no of columns of second matrix*/

        if (p == r && q == s)
        {
            Integer matrix1[][] = new Integer[p][q]; //Integer wrapper class for matrix 1
            elements
            Integer matrix2[][] = new Integer[r][s]; //Integer wrapper class for matrix 2
            elements
            Integer AddOfmatrices[][] = new Integer[r][s]; //Integer wrapper class for
            matrix After addition of matrices

            //taking user input as elements for matrix 1
```

```

System.out.println("Enter all the elements of first matrix:");

for (int i = 0; i < p; i++)
{
    for (int j = 0; j < q; j++)
    {
        matrix1[i][j] = sc.nextInt();
    }
}

//taking user input as elements for matrix 1

System.out.println("Enter all the elements of second matrix:");

for (int i = 0; i < r; i++)
{
    for (int j = 0; j < s; j++)
    {
        matrix2[i][j] = sc.nextInt();
    }
}
//displaying first 2D matrix
System.out.println("First Matrix :");

for (int i = 0; i < p; i++)
{
    for (int j = 0; j < q; j++)
    {
        if(matrix1[i][j]<10)
            System.out.print("0");
        System.out.print(matrix1[i][j]+" ");
    }
    System.out.println("");
}

//for displaying Second 2D matrix
System.out.println("Second Matrix :");

for (int i = 0; i < r; i++)
{
    for (int j = 0; j < s; j++)
    {
        if(matrix2[i][j]<10)
            System.out.print("0");
        System.out.print(matrix2[i][j]+" ");
    }
    System.out.println("");
}

// for loop for addition of both matrices elements
for (int i = 0; i < p; i++)
{
    for (int j = 0; j < s; j++)
    {
        for (int k = 0; k < q; k++)
        {
            AddOfmatrices[i][j] = matrix1[i][j] + matrix2[i][j];
        }
    }
}

//print matrix after addition of both matrices
System.out.println("Matrix after addition of matrix1 and matrix2 :");

for (int i = 0; i < p; i++)
{
    for (int j = 0; j < s; j++)
    {
        if(AddOfmatrices[i][j]<10)
            System.out.print("0");
    }
}

```

```

        System.out.print(AddOfmatrices[i][j]+" ");
    }
    System.out.println("");
}

// else condition if condition statement does not satisfied

else
{
    System.out.println("Addition would not be possible because if condition(p ==
r && q == s)is not satisfied ");
}
}
}

```

OUTPUT:

```

<terminated> MatricesAddition [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe (14-Sep-2023, 8:31:40 pm - 8:32:19 pm) [pid: 8528]
Enter number of column(q) in first matrix:3
Enter number of rows(r) in Second matrix:3
Enter number of column(s) in Second matrix:3
Enter all the elements of first matrix:
02
21
20
01
2
3
6

25
23
Enter all the elements of second matrix:
21
02
20
23
32
14
24
25
26

First Matrix :
02 21 20
01 02 03
06 25 23
Second Matrix :
21 02 20
23 32 14
24 25 26
Matrix after addition of matrix1 and matrix2 :
23 23 40
24 34 17
30 50 49

```

Q. 3. Write a program to receive array element , sort them by using your choice of sorting algorithm and display the elements.

```

package Packgetype;

import java.util.Scanner;

public class SortingArray {

    public static void main(String[] args) {
        /*Q.3. Write a program to receive array element , sort them by
        using your choice of sorting algorithm and display the elements. */

        Scanner sc = new Scanner(System.in);

        int temp=0;

        //taking user input
        System.out.print("Enter length of Array: ");
        int len = sc.nextInt();

        int array[]=new int[len];
    }
}

```

```

//user input for array elements
System.out.print("Enter Elements of array: ");
for (int i = 0; i < len; i++) {
    array[i]=sc.nextInt();
}

//display elements
System.out.println("Elements of array before Sorting: ");
for (int i = 0; i < len; i++) {
    System.out.println(array[i] + " ");
}

// function for sorting elements in ascending order
for (int i = 0; i < len; i++) {
    for (int j = i+1; j < len; j++) {
        if(array[i] > array[j]) {
            temp = array[i];
            array[i] = array[j];
            array[j] = temp;
        }
    }
}

//display output after sorting
System.out.println("Elements of array after sorting in ascending order: ");
for (int i = 0; i < len; i++) {
    System.out.print(array[i] + " ");
}

}

}

```

Output:

```

<terminated> SortingArray [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe (14-Sep-2023, 9:22:23 pm - 9:22:36 pm) [pid: 6860]
Enter length of Array: 8
Enter Elements of array: 23
32
14
98
75
65
45
35
Elements of array before Sorting:
23
32
14
98
75
65
45
35
Elements of array after sorting in ascending order:
14 23 32 35 45 65 75 98

```