

A two dimensional array or a matrix is essentially an array of one dimensional arrays. It is different from a one dimensional array in that a one dimensional array consists of a single row, one or many columns. A two dimensional array consists of one or more rows and one or more columns.

Two dimensional arrays store values in rows and columns where each element in the array has an index that is represented by a row and column subscript. All values stored in the array must be of the same data type.



	Column 0	Column 1	Column 2	Column 3
Row 0	56	78	99	90
Row 1	23	45	66	79
Row 2	31	88	98	49

EXAMPLE OF INPUT

```
for (int row = 0; row < 3; row++)
{
    for (int col = 0; col < 4; col++)
    {
        arr[row][col] =
        Integer.parseInt(JOptionPane.showInputDialog("Enter a number"));
    }
}
```

Populating a Two Dimensional array with specific values.

Example 1: Populate a 4 x 4 array called "numArr" with 0 values.

```
import java.util.*;
public class Fill2dArray
{
    public static void main (String [ ] args)
    {
        int [ ][ ] numArr = new int [4][4];
        for (int i=0; i< 4;i++)
        {
            Arrays.fill(numArr[i],0); //populate
        }
        for (int i=0;i<4;i++)
        {
            for (int j=0;j<4;j++)
            System.out.print(numArr[i][j]+" "); //display
            System.out.println( );
        }
    }
}
```

0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Example 2: Populate a 4 x 5 array called "charArr" with '*' characters.

*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*

```
Import java.util.*;
public class Fill2dArrayChar
{
    public static void main (String [ ] args)
    {
        Char[ ][ ] charArr = new char [4][5];
        For (int i=0; i< 4;i++)
        {
            Arrays.fill(charArr[i],'*'); //populate
        }
        for (int i=0;i<4;i++) // display
        {
            for (int j=0; j<5;j++)
            System.out.print(charArr[i][j]+" ");
            System.out.println( );
        }
    }
}
```

EXAMPLE OF OUTPUT / DISPLAY

```
For (int row = 0; row < 3; row++)
{
    for (int col =0; col < 4; col++)
    {
        System.out.print (arr[row][col]+ "\t"); // prints each row
```

Refers to the name of the array. The name is user defined.

Refers to a new reference.

Syntax

Refers to the data type of the array.

`int [][] arr = new int [3][4]`

Refers to a two dimensional array.

The maximum number of rows.

The maximum number of columns.

The index of the first value is arr[0][0]. That means that the element is at row 0 and column 0. The contents of this index is the value 56. The contents of arr[2][3] = 49. The contents of arr[1][2] is 66 etc.

The entry and display of elements of a two dimensional array generally requires the use of two loops, one to control the row value while the other is used to control the column value.

value on the same line

```
System.out.println( ); // leaves a line to print the next row.
```

Example 1:

Code a class called Twod that uses a parameterized constructor to receive a 4 x 5 array.

Code an accessor method to return the array. Code a void method to display the elements in the form of a matrix.

Use a typed method to return the average of the elements in the array.

Code a Test Class to read in values into an array. Create an object to send the array as a parameter. Display the elements in the array and display the average.

```
class TwoD
{
    private int [ ][ ] arr = new int [4][5];
```

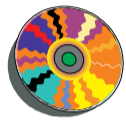
```
public TwoD(int [ ][ ] a)
{
    arr = a;
}
public int [ ][ ] getArray( )
{
    return arr;
}
```

```
public void display( )
{
    for (int i=0; i< 4; i++)
    {
        for (int j = 0; j<5;j++)
        {
            System.out.print(arr[i][j]+"\\t");
        }
        System.out.println( );
    }
}
```

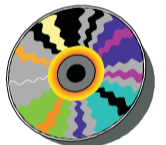
```
public double getAverage( )
{
    int sum =0;
```

The array declared above can be explained as follows:

There are 3 rows and 4 columns. The first row starts from position 0, therefore the last row will have the value 2. The first column starts from position 0 and ends at position 3 if there are 4 columns.



```
for (int i=0; i< 4;i++)
{
    for (int j =0; j< 5; j++)
    {
        sum +=arr[i][j];
    }
}
double ave = sum / 20;// 4 x 5 = 20 elements
return ave;
```



Driver Class / User Class

```
import java.util.*;
public class TestTwoD
{
    TestTwoD( )
    {
        int [ ][ ] arr = new int [4][5];
        Scanner kb =
        New Scanner (System.in);
        for (int i=0;i<4;i++)
        {
            for (int j=0;j<5; j++)
            {
                System.out.println("Please enter value for row
                "+(i+1)+" col "+(j+1));
                arr[i][j] = kb.nextInt( );
            }
        }
        TwoD obj= new TwoD(arr);
        System.out.println("The array elements
        are:");
        obj.display( );
        System.out.println("The average is:
        "+obj.getAverage( ));
    }
    public static void main (String [ ] args)
    {
        new TestTwoD( );
    }
}
```

