Implementing matrix using 2D Arrays in Java

Two - dimensional array is the simplest form of a multidimensional array. A two - dimensional array can be seen as an array of one - dimensional array for easier understanding.

Indirect Method of Declaration:

- Declaration - Syntax:

```
data_type[][] array_name = new data_type[x][y];
        For example: int[][] arr = new int[10][20];
```

- Initialization - Syntax:

```
array_name[row_index][column_index] = value;
        For example: arr[0][0] = 1;
```

Example:

```
1
2
3  class GFG {
4      public static void main(String[] args)
5      {
6
7          int[][] arr = new int[10][20];
8          arr[0][0] = 1;
9
10         System.out.println("arr[0][0] = " + arr[0][0]);
11     }
12 }
13
```

Output:

```
arr[0][0] = 1
```

Direct Method of Declaration:

Syntax:

```
data_type[][] array_name = {
                            {valueR1C1, valueR1C2, ....},
                            {valueR2C1, valueR2C2, ....}
                           };

For example: int[][] arr = {{1, 2}, {3, 4}};
```

Example:

```
1
2
3  class GFG {
4      public static void main(String[] args)
5      {
6
7          int[][] arr = { { 1, 2 }, { 3, 4 } };
8
9          for (int i = 0; i < 2; i++)
10             for (int j = 0; j < 2; j++)
11                 System.out.println("arr[" + i + "][" + j + "] = "
12                                    + arr[i][j]);
13     }
14 }
15
```

Output:

```
arr[0][0] = 1
arr[0][1] = 2
arr[1][0] = 3
arr[1][1] = 4
```

Accessing Elements of Two-Dimensional Arrays

Elements in two-dimensional arrays are commonly referred by **x[i][j]** where 'i' is the row number and 'j' is the column number.

Syntax:

```
x[row_index][column_index]
```

For example:

```
int[][] arr = new int[10][20];

arr[0][0] = 1;
```

The above example represents the element present in first row and first column.

Note: In arrays if size of array is N. Its index will be from 0 to N-1. Therefore, for row_index 2, actual row number is 2+1 = 3.

Example:

```
1
2
3  class GFG {
4      public static void main(String[] args)
5      {
6
7          int[][] arr = { { 1, 2 }, { 3, 4 } };
8
9          System.out.println("arr[0][0] = " + arr[0][0]);
10     }
11 }
12
```

Output:

```
arr[0][0] = 1
```

Representation of 2D array in Tabular Format: A two - dimensional array can be seen as a table with 'x' rows and 'y' columns where the row number ranges from 0 to (x-1) and column number ranges from 0 to (y-1). A two - dimensional array 'x' with 3 rows and 3 columns is shown below:

	Column 0	Column 1	Column 2
Row 0	x[0][0]	x[0][1]	x[0][2]
Row 1	x[1][0]	x[1][1]	x[1][2]
Row 2	x[2][0]	x[2][1]	x[2][2]

Print 2D array in tabular format:

To output all the elements of a Two-Dimensional array, use nested for loops. For this two for loops are required, One to traverse the rows and another to traverse columns.

Output:

```
1 2
3 4
```