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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:

Java



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```
class GFG {  
    public static void main(String[] args)  
    {  
  
        int[][] arr = new int[10][20];  
        arr[0][0] = 1;  
  
        System.out.println("arr[0][0] = " + arr[0][0]);  
    }  
}
```

Output:

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

Direct Method of Declaration:**Syntax:**



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

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



Example:

Java

```
class GFG {  
    public static void main(String[] args)  
    {  
  
        int[][] arr = { { 1, 2 }, { 3, 4 } };  
  
        for (int i = 0; i < 2; i++)  
            for (int j = 0; j < 2; j++)  
                System.out.println("arr[" + i + "][" + j + "] = "  
                                    + arr[i][j]);  
    }  
}
```

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;
```



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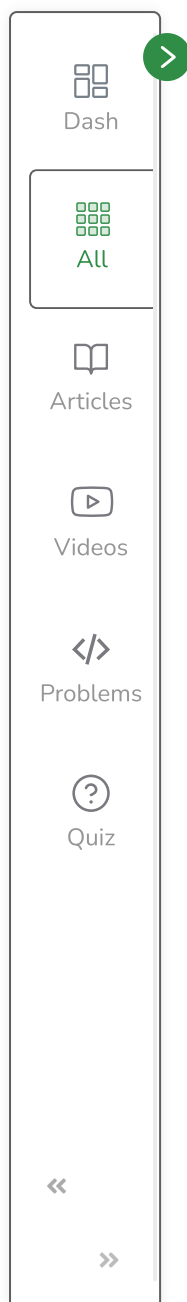


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The above example represents the element present in first row and first column.

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:

Java

```
class GFG {  
    public static void main(String[] args)  
    {  
  
        int[][] arr = { { 1, 2 }, { 3, 4 } };  
  
        System.out.println("arr[0][0] = " + arr[0][0]);  
    }  
}
```

Output:

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

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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	<code>x[0][0]</code>	<code>x[0][1]</code>	<code>x[0][2]</code>
Row 1	<code>x[1][0]</code>	<code>x[1][1]</code>	<code>x[1][2]</code>
Row 2	<code>x[2][0]</code>	<code>x[2][1]</code>	<code>x[2][2]</code>

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.

Example:

Java



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```
class GFG {  
    public static void main(String[] args)  
    {  
  
        int[][] arr = { { 1, 2 }, { 3, 4 } };  
  
        for (int i = 0; i < 2; i++) {  
            for (int j = 0; j < 2; j++) {  
                System.out.print(arr[i][j] + " ");  
            }  
  
            System.out.println();  
        }  
    }  
}
```

Output:

```
1 2  
3 4
```

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