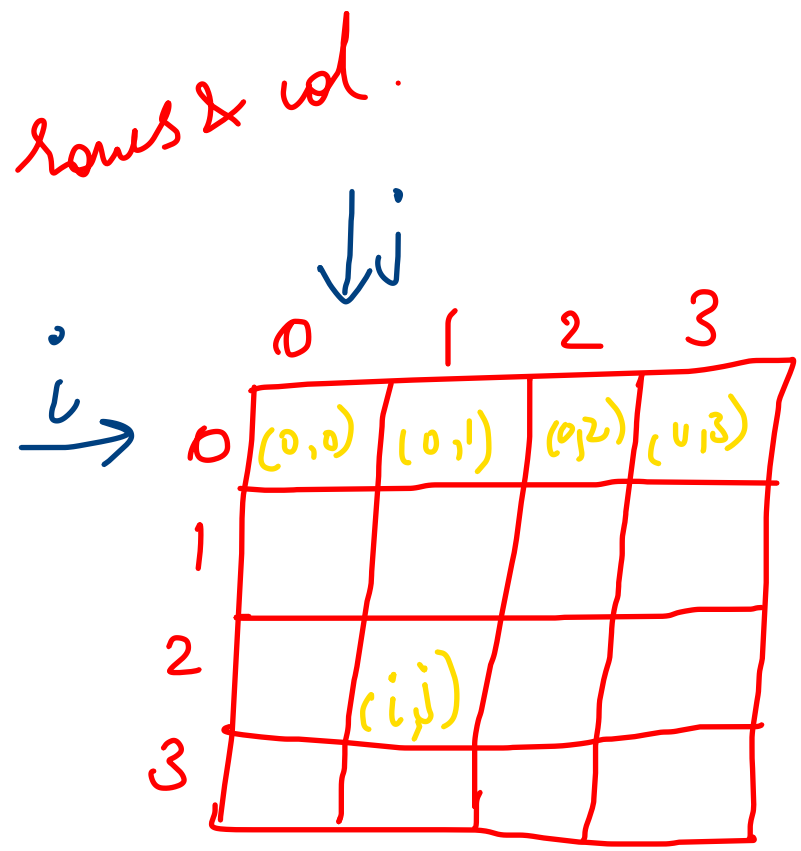
2D Arrays. - matrix, rows & cols.

Syntax of 2D array

int arr[][] = new int[r][c] (r: size of rows, c: size of col.)



arr[0][2] = 0

By default values will be zero

4x4

Take Input

```java
import java.util.Scanner;
class Main {
    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);

        System.out.println("Enter numbers of rows : ");
        int rows = s.nextInt();
        System.out.println("Enter numbers of cols : ");
        int cols = s.nextInt();

        int arr[][] = new int[rows][cols];
        // take input
        for(int i = 0; i < rows; i++){
            for(int j = 0; j < cols; j++){
                System.out.print("Enter element at " + i + " row " +
                    j + " col ");

                arr[i][j] = s.nextInt();
            }
        }
```

```java
        // print 2d array
        for(int i = 0; i < rows; i++){
            for(int j = 0; j < cols; j++){
                System.out.print(arr[i][j] + " ");
            }
            System.out.println();
        }
}
```

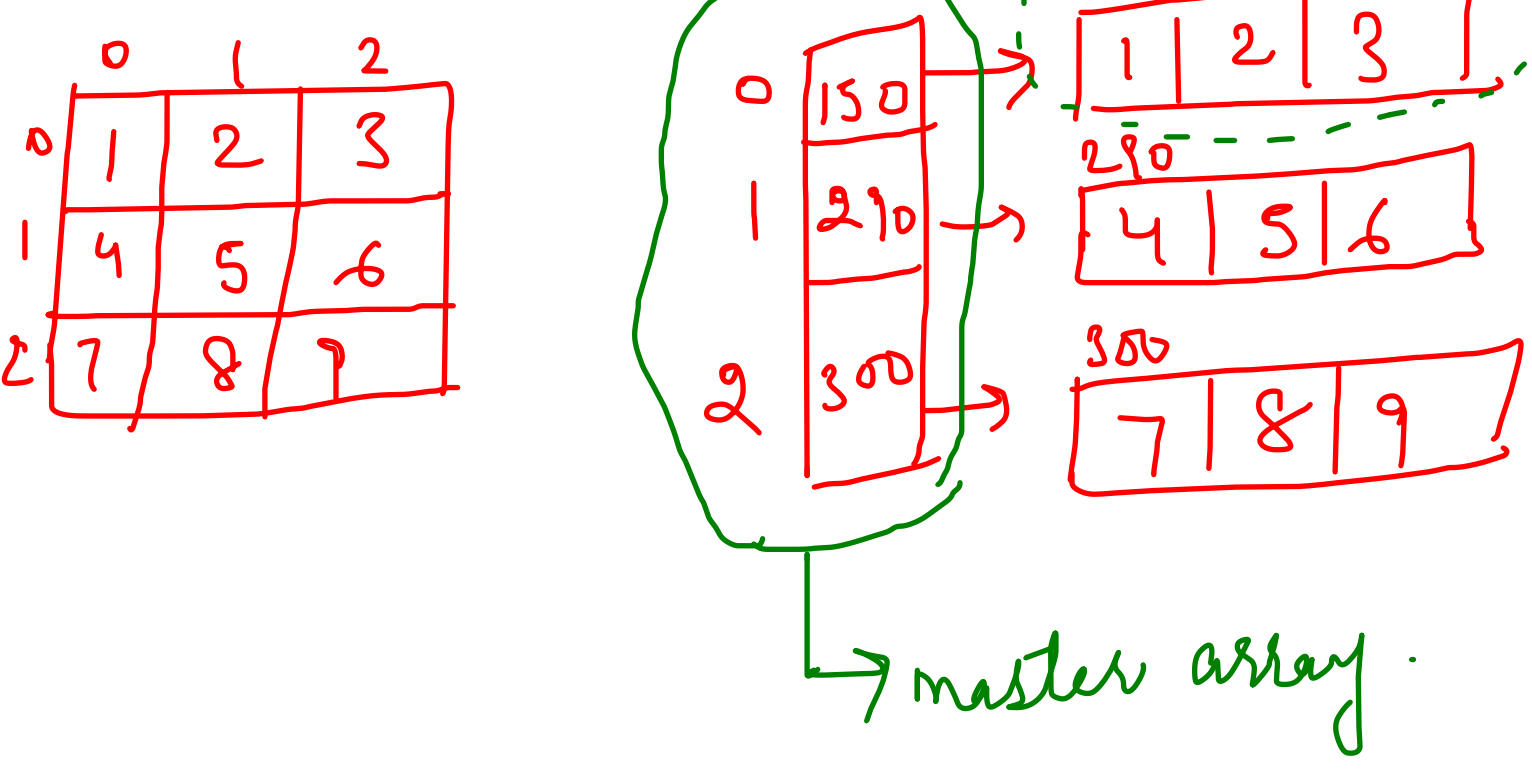
Output

```
Enter numbers of rows :
2
Enter numbers of cols :
2
Enter element at 0 row 0 col 1
Enter element at 0 row 1 col 2
Enter element at 1 row 0 col 3
Enter element at 1 row 1 col 4
1 2
3 4

=== Code Execution Successful ===
```

How 2D array are stored

Actually 2D arrays are stored in the form of 1D array.



Every row of 2D array has a reference of 1D array and reference of 1D array is stored in master array.

```java
int arr[][] = {{1,2,3},{4,5,6}};
System.out.println(arr);
System.out.println(arr[0]);
```

Output

```
[[I@659e0bfd
[I@2a139a55
```

arr will print address of master array.

arr[0] address of 0th row.

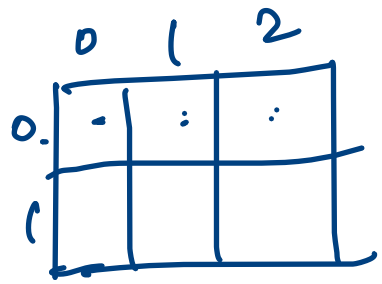
sysо (arr . length) ;

o/p → 2 (no. of rows).

sysо (arr[0]. length) ;

o/p → 3 (no. of cols)

(arr[2][3])




```java
int arr[][] = {{1,2,3},{4,5,6}};
int rows = arr.length;
int cols = arr[0].length;

System.out.println(rows);
System.out.println(cols);
```

Output

```
2
3
```

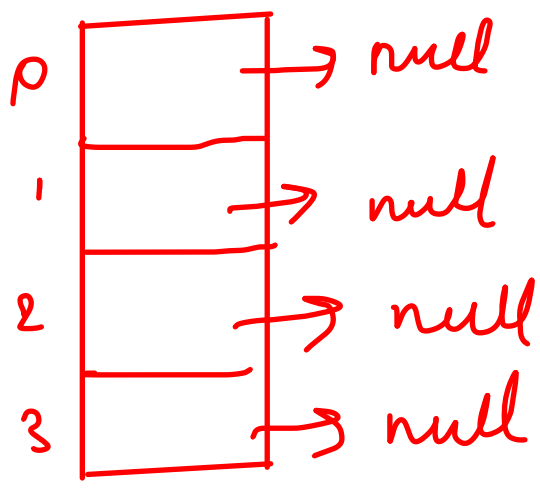
int arr[][] = new int[4][];

It will create master array

```
int arr[][] = new int[4][];
System.out.println(arr);
System.out.println(arr[0]);
```

```
Output
[[I@659e0bfd
null
```

Size of master array = no. of rows.



Jagged Array.

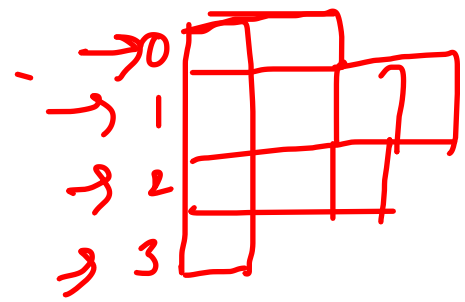
r c

0 → 2

1 → 4

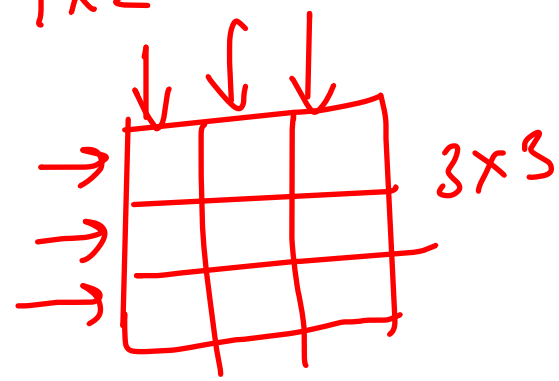
2 → 3

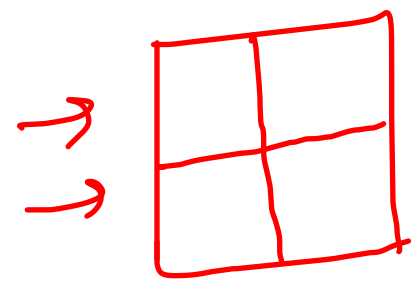
3 → 1



2x3

4x2





Each row will have different size in array.