## Java - Introduction to Programming Lecture 11

## **2D Arrays In Java**

It is similar to 2D matrices that we studied in 11th and 12th class.

a. Creating a 2D Array - with new keyword
int[][] marks = new int[3][3];

b. Taking a matrix as an input and printing its elements.

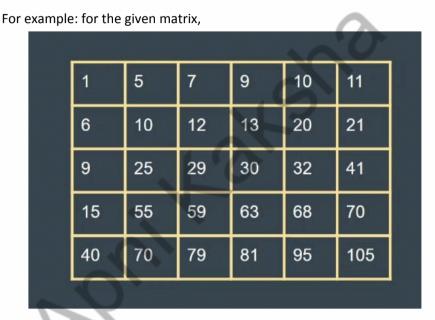
```
import java.util.*;
public class TwoDArrays {
  public static void main(String args[]) {
```

c. Searching for an element x in a matrix.

```
import java.util.*;
public class TwoDArrays {
  public static void main(String args[]) {
       Scanner sc = new Scanner(System.in);
       int rows = sc.nextInt();
       int cols = sc.nextInt();
       int[][] numbers = new int[rows][cols];
       //input
       for(int i=0; i<rows; i++) {</pre>
           //columns
           for(int j=0; j<cols; j++) {</pre>
               numbers[i][j] = sc.nextInt();
       int x = sc.nextInt();
       for(int i=0; i<rows; i++) {</pre>
           for(int j=0; j<cols; j++) {</pre>
               //compare with x
               if(numbers[i][j] == x) {
                    System.out.println("x found at location (" + i + ", " + j +
```

## **Homework Problems**

Print the spiral order matrix as output for a given matrix of numbers.
 [Difficult for Beginners]



Spiral order is given by:

1 5 7 9 10 11 21 41 70 105 95 81 79 70 40 15 9 6 10 12 13 20 32 68 63 59 55 25 29 30 29.

## **APPROACH:**

Algorithm: (We are given a 2D matrix of n X m).

- 1. We will need 4 variables:
  - a. row\_start initialized with O.
  - b. row\_end initialized with n-1.
  - c. column\_start initialized with 0.
  - d. column\_end initialized with m-1.
- 2. First of all, we will traverse in the row row\_start from column\_start

- to column\_end and we will increase the row\_start with 1 as we have traversed the starting row.
- 3. Then we will traverse in the column column\_end from row\_start to row\_end and decrease the column\_end by 1.
- 4. Then we will traverse in the row row\_end from column\_end to column\_start and decrease the row\_end by 1.
- 5. Then we will traverse in the column column\_start from row\_end to row\_start and increase the column\_start by 1.
- 6. We will do the above steps from 2 to 5 until row\_start <= row\_end and column\_start <= column\_end.

```
import java.util.*;
  public static void main(String args[]) {
     Scanner sc = new Scanner(System.in);
     int n = sc.nextInt();
     int m = sc.nextInt();
     for(int i=0; i<n; i++) {
```

```
int rowEnd = n-1;
       System.out.print(matrix[rowStart][col] + " ");
       System.out.print(matrix[row][colEnd] +" ");
```

```
System.out.print(matrix[row][colStart] + " ");

colStart++;

System.out.println();
}

}
```

2. For a given matrix of N x M, print its transpose.

```
public class Arrays {
  public static void main(String args[]) {
    Scanner sc = new Scanner(System.in);
    int n = sc.nextInt();
    int m = sc.nextInt();

    int matrix[][] = new int[n][m];
    for(int i=0; i<n; i++) {
        for(int j=0; j<m; j++) {
            matrix[i][j] = sc.nextInt();
        }
    }
}</pre>
```

```
System.out.println("The transpose is : ");

//To print transpose

for(int j=0; j<m ;j++) {
    for(int i=0; i<n; i++) {
        System.out.print(matrix[i][j]+" ");
    }

    System.out.println();
}</pre>
```