

2D Arrays



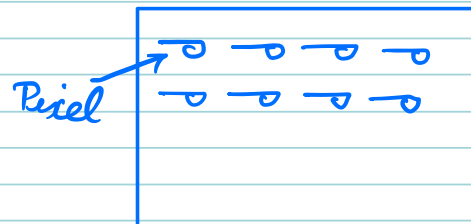
Sequential collection of similar data

⇒ Real life Examples:-

TIC TAC TOE

O		O
	X	

LED Screen



other Examples:- Theatre, Bus & chess etc.

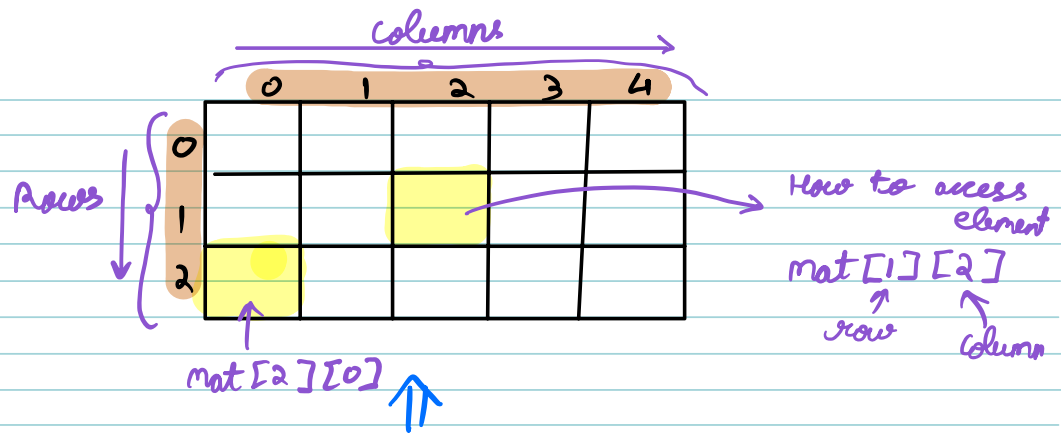
⇒ SYNTAX OF 2D ARRAY:-

```
int[][] arr = new int[rows][columns];
```

Ex:- `int[][] arr = new int[3][5];`

↑ `3` is labeled 'rows' and `5` is labeled 'columns'.

→ How many Total elements = row × col;



`int[][] mat = new int[3][5];`

- ★ If we have N rows then Max valid index of Rows $\rightarrow N-1$
- ★ If we have M Columns then Max valid index of columns $\rightarrow M-1$

★ Let Say we have Created a Mat of $N \times M$.

`int[][] mat = new int[N][M];`



\Rightarrow diag 2 \rightarrow Top Left = $\text{mat}[0][0]$;

\Rightarrow Top Right = $\text{mat}[0][M-1]$;

\Rightarrow Bottom Left = $\text{mat}[N-1][0]$;

\Rightarrow Bottom Right = $\text{mat}[N-1][M-1]$;

Q1 Given a Matrix of Size $N \times M$, Print its Top row.

	col \rightarrow				
	0	1	2	...	M-1
row \downarrow	0				
	1				
	2				
	...				
	N-1				

OBSERVATION :- ① We want to travel in first Row

\rightarrow Indexes :- $\text{mat}[0][0]$, $\text{mat}[0][1]$,
 $\text{mat}[0][2]$ $\text{mat}[0][M-1]$

② Row Same & Col changing.

PSEUDO CODE

Void printRow (int [][] mat) {

int noOfRows = mat.length;

int noOfColumns = mat[0].length;

int Row = 0;

for (int col = 0; col < noOfColumns; col++)

| SOP (mat[Row][col]);

}

Q2 Given a $N \times M$ matrix, Print it leftmost column.

	col \rightarrow	0	1	2	...	M-1
row \downarrow	0					
	1					
	2					
	...					
	N-1					

OBSERVATION :- ① We need to travel over first column. So
Indices $\rightarrow (0,0) (1,0) (2,0) \dots (N-1,0)$

③ Row changing column same.

PSEUDO CODE :-

```
Void Print Column ( int[][ ] arr ) {  
    int col = 0;  
    int Row = arr.length;  
    for ( i = 0 ; i < Row ; i++ ) {  
        SOPC arr[i][col];  
    }  
}
```

Q3 Given a Matrix of $N \times M$, Print it row by row.

Ex:-

	0	1	2	3	4
0	10	20	30	40	50
1	1	2	3	4	5
2	6	7	8	9	10

$\Rightarrow \text{mat}[3][5]$

O/P :-

10	20	30	40	50
1	2	3	4	5
6	7	8	9	10

OBSERVATION :- (1) We are travelling in a row & col is changing.
(2) once Row is travelled change the Row No. along with changing leno

PSEUDO CODE

Void PrintRowByRow (int[][] mat) {

int Row = mat.length;

int Col = mat[0].length;

for (i = 0; i < Row; i++) {

for (j = 0; j < Col; j++) {
| Print (mat[i][j] + " ");
}

```

    }
    println();

```

Q4 Given a Matrix of $N \times M$, Print it Col by Col.

Ex:-

	0	1	2	3	4
0	10	20	30	40	50
1	1	2	3	4	5
2	6	7	8	9	10

O/p:-

10	1	6
20	2	7
30	3	8
40	4	9
50	5	10

OBSERVATION :- ① Col is getting Fixed & Row is changing for each Column.

PSEUDO CODE

```

void PrintColByCol ( int [][ ] arr ) {

```

```

    int rows = arr.length;

```

```

    int columns = arr[0].length;

```

```

    for ( j = 0; j < col; j++ ) {

```

```

        for ( i = 0; i < Row; i++ ) {

```

```

            Print ( arr [ i ][ j ] + " ");

```

```

        }

```

```

        println();
    }
}

```

PSEUDO CODE

```
void PrintColByCol ( int [][] arr ) {
```

```
    int rows = arr.length;
```

```
    int columns = arr[0].length;
```

```
    for ( j=0; j < col; j++ ) {
```

```
        for ( i=0; i < Row; i++ ) {
```

```
            Print ( arr [i][j] + " ");
```

```
        }
```

```
        Println();
```

```
    }
```

ONLINE IDE

https://www.scaler.com/topics/java/online-java-compiler/?snippet_slug=bc03d63866038b90bb21