Multi-Dimensional Arrays

What is Multi-Dimensional Array?

- C language supports multidimensional arrays too. The simplest form of a multidimensional array is the two-dimensional array. Here, we have a row index and a column index. Both the row's and column's index begins from 0.

- Just like a single-dimensional array, we can do Compile time initialization of two dimensional arrays or runtime initialization of two dimensional arrays.

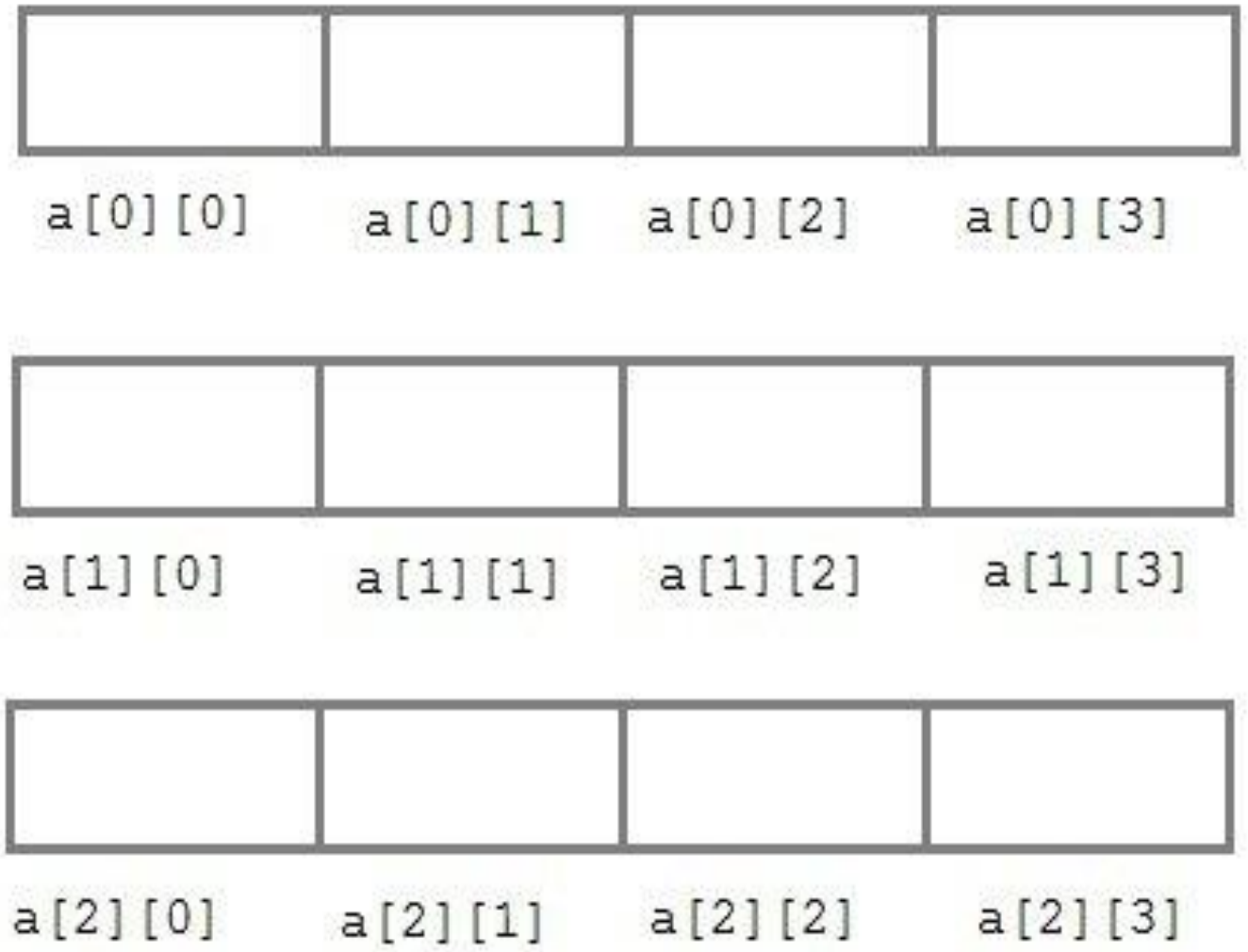
Declaration of Multi-Dimensional Array

- data-type array-name[row-size][column-size]
- Note and remember, the first [ ] holds row count and second [ ] holds column count.
  - Example:

```
double arr[5][5];

int a[3][4];
```

Indexing of Multi-Dimensional Array



Compile-time Initializing a multidimensional array

- Initialization of a 2d array

```
// Different ways to initialize two-dimensional array

int c[2][3] = {{1, 3, 0}, {-1, 5, 9}};

int c[][3] = {{1, 3, 0}, {-1, 5, 9}};

int c[2][3] = {1, 3, 0, -1, 5, 9};
```

Note: We have not assigned any row value to our arrays in the 2nd example. It means we can initialize any number of rows. But, we must always specify number of columns, else it will give a compile time error. Here, a 2*3 multi-dimensional matrix is created.

Input multidimensional array elements

```
for(i = 0; i < 3;i++)
{
    for(j = 0; j < 4; j++)
    {
        scanf("%d", &arr[i][j]);
    }
}
```

- Using the first for loop, we first access the row of the matrix(2D array) and in that particular row, we traverse each column using the inner for loop.

Accessing multidimensional array elements

```
for(i = 0; i < 3; i++)
    {
        for(j = 0; j < 4; j++)
        {
            printf("%d", arr[i][j]);
        }
    }
```

Using the first for loop, we first access the row of the matrix(2D array) and in that particular row, we traverse each column using the inner for loop.

Example

```
#include <stdio.h>
void main()
{
    int marks[2][3];
    int sum = 0;

    for(int i = 0; i < 2; i++) {
       for(int j = 0; j < 3; j++){
           scanf("%d", &marks[i][j]);
       }
    }
    for(int i = 0; i < 2; i++) {
       for(int j = 0; j < 3; j++){
           sum += marks[i][j];
       }
    }
    printf("%d",sum);
}
```