

## C# - Multidimensional Arrays

C# allows multidimensional arrays. Multi-dimensional arrays are also called rectangular array. You can declare a 2-dimensional array of strings as –

```
string [,] names;
```

or, a 3-dimensional array of int variables as –

```
int [ , , ] m;
```

### Two-Dimensional Arrays

The simplest form of the multidimensional array is the 2-dimensional array. A 2-dimensional array is a list of one-dimensional arrays.

A 2-dimensional array can be thought of as a table, which has x number of rows and y number of columns. Following is a 2-dimensional array, which contains 3 rows and 4 columns –

	Column 0	Column 1	Column 2	Column 3
Row 0	a[ 0 ][ 0 ]	a[ 0 ][ 1 ]	a[ 0 ][ 2 ]	a[ 0 ][ 3 ]
Row 1	a[ 1 ][ 0 ]	a[ 1 ][ 1 ]	a[ 1 ][ 2 ]	a[ 1 ][ 3 ]
Row 2	a[ 2 ][ 0 ]	a[ 2 ][ 1 ]	a[ 2 ][ 2 ]	a[ 2 ][ 3 ]

Thus, every element in the array a is identified by an element name of the form a[ i , j ], where a is the name of the array, and i and j are the subscripts that uniquely identify each element in array a.

### Initializing Two-Dimensional Arrays

Multidimensional arrays may be initialized by specifying bracketed values for each row. The Following array is with 3 rows and each row has 4 columns.

```
int [,] a = new int [3,4] {  
    {0, 1, 2, 3} ,    /* initializers for row indexed by 0 */  
    {4, 5, 6, 7} ,    /* initializers for row indexed by 1 */  
    {8, 9, 10, 11}    /* initializers for row indexed by 2 */  
};
```

### Accessing Two-Dimensional Array Elements

An element in 2-dimensional array is accessed by using the subscripts. That is, row index and column index of the array. For example,

```
int val = a[2,3];
```

The above statement takes 4th element from the 3rd row of the array. You can verify it in the above diagram. Let us check the program to handle a two dimensional array –

Live Demo

```
using System;

namespace ArrayApplication {
    class MyArray {
        static void Main(string[] args) {
            /* an array with 5 rows and 2 columns*/
            int[,] a = new int[5, 2] {{0,0}, {1,2}, {2,4}, {3,6}, {4,8} };
            int i, j;

            /* output each array element's value */
            for (i = 0; i < 5; i++) {

                for (j = 0; j < 2; j++) {
                    Console.WriteLine("a[{0},{1}] = {2}", i, j, a[i,j]);
                }
            }
            Console.ReadKey();
        }
    }
}
```

When the above code is compiled and executed, it produces the following result –

```
a[0,0]: 0
a[0,1]: 0
a[1,0]: 1
a[1,1]: 2
a[2,0]: 2
a[2,1]: 4
a[3,0]: 3
a[3,1]: 6
a[4,0]: 4
a[4,1]: 8
```