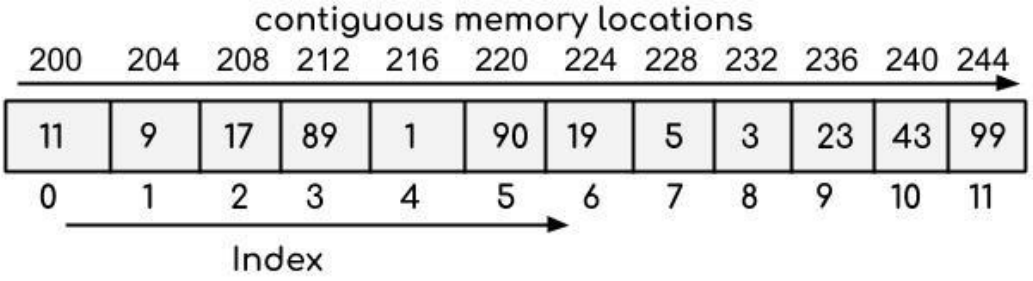
ESP_LEC_8

An array is a collection of homogeneous (same type) data items stored in contiguous memory locations. For example if an array is of type “int”, it can only store integer elements and cannot allow the elements of other types such as double, float, char etc.



Array is particularly useful when we are dealing with lot of variables of the same type. For example, lets say I need to store the marks in math subject of 100 students. To solve this particular problem, either I have to create the 100 variables of int type or create an array of int type with the size 100.

Multidimensional arrays are often known as array of the array. In multidimensional arrays the array is divided into rows and columns, mainly while considering multidimensional arrays

```
int arr[3][3];
```

where first index value shows the number of the rows and second index value shows the no. of the columns in the array.

Mainly multidimensional arrays are stored in the memory in the following two ways :

- **Row-Major order Implementation**
- **Column-Major order Implementation**

In Row-Major Implementation of the arrays, the arrays are stored in the memory in terms of the row design, i.e. first the first row of the array is stored in the memory then second and so on. Suppose we have an array named arr having

3 rows and 3 columns then it can be stored in the memory in the following manner :

arr[0][0]	arr[0][1]	arr[0][2]
arr[1][0]	arr[1][1]	arr[1][2]
arr[2][0]	arr[2][1]	arr[2][2]

Thus an array of 3*3 can be declared as follows :

arr[3][3] = { 1, 2, 3, 4, 5, 6, 7, 8, 9 };

and it will be represented in the memory with row major implementation as follows :

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

In Column-Major Implementation of the arrays, the arrays are stored in the memory in the term of the column design, i.e. the first column of the array is stored in the memory then the second and so on. By taking above eg. we can show it as follows :

arr[3][3] = { 1, 2, 3, 4, 5, 6, 7, 8, 9 };

and it will be represented in the memory with column major implementation as follows :

1	**4**	**7**	**2**	**5**	**8**	**3**	**6**	**9**