**ARRAYS**

**Definition:**

Arrays a kind of data structure that can store a fixed-size sequential collection of elements of the same type. Instead of declaring individual variables, such as number0, number1, ..., and number99, you declare one array variable such as numbers and use numbers[0], numbers[1], and ..., numbers[99] to represent individual variables. A specific element in an array is accessed by an index.

All arrays consist of contiguous memory locations. The lowest address corresponds to the first element and the highest address to the last element.



**Types of Arrays:**

**->1D arrays.**

**->Multi-Dimensional Arrays.**

**Single-Dimensional Arrays.**

**Declaration:**

**typeName ArrayName[size];**

**int A[10]; // An array of ten integers; A[0], A[1], …, A[9]**

**char name[20]; // An array of 20 characters**

**float nums[50]; // An array of fifty floating numbers; nums[0], nums[1], …,nums[49]**

**int C[]; // An array of an unknown number of integers; C[0], C[1], …, C[size-1]**

**int table[5][10]; // A two dimensional array of integers**

**Array Initialization:**

**int num[6] = {1, 3, 5, 7, 9, 11};  
char letters[5] = {'a', 'b', 'c', 'd', 'e'};  
float numbers[3] = {13.25, 12.09, 8.1};**

**Array elements using expressions:**

Example: int A[5];

A[i]=2 4 6 8 9

I=0 1 2 3 4

x = A[1] \* 2;     /\* sets x to 8\*/

A[4] = 88;    /\* replaces 9 with 88 \*/

m = 3;

y = A[m];   /\* sets y to 3 \*/

z = A[A[1]]; /\* sets z to 9 \*/

**Mullti\_Dimensional Arrays:**

Multi Dimensional arrays means array has more than one dimension. Ie 2-D,3-D…etc.

**2-D array:**

A two-dimensional array can be used to represent a matrix, a table or board games (Tic Tac Toe, Sudoku etc). The row and column positions are given as successive indices. When you declare a variable of such an array, use a pair of square brackets for each dimension.

Declare a two-dimensional array with 3 rows and 2 columns

int table[3][2]:

create and initialize an array

int table[3][2] = { {10, 22}, {33, 44}, {45, 78} };

**Accessing elements from 2-D array:**

|  |  |  |
| --- | --- | --- |
| **Ex:** | **0** | **1** |
| **0** | **10** | **22** |
| **1** | **33** | **44** |
| **2** | **45** | **78** |

**table[1][1] //contains 22**

**table[2][0] //contains 45**

**table[2][2] //It is "array out of bounds".**

Displaying 2-D array:

#include <stdio.h>

main()

{

int row,col;

int table[3][2] = { {10, 22}, {33, 44}, {45, 78} };

for (row = 0; row < 3; row++)

{

for (col = 0; col < 2; col++)

{

printf("%d\t",table[row][col]);

}

printf("\n");

}

}