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| **Name** |  |
| **CMS ID** |  |
| **Marks** |  |
| **Date** |  |

**Objective:** To become familiar with arrays

C++ provides a data structure, the **array**, which stores a fixed-size sequential collection of elements of the same type. An array is used to store a collection of data, but it is often more useful to think of an array as a collection of variables 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.

**Declaring Arrays**

To declare an array in C++, the programmer specifies the type of the elements and the number of elements required by an array as follows −

type arrayName [ arraySize ];

This is called a single-dimension array. The **arraySize** must be an integer constant greater than zero and **type** can be any valid C++ data type. For example, to declare a 10-element array called balance of type double, use this statement −

double balance[10];

You can initialize C++ array elements either one by one or using a single statement as follows −

double balance[5] = {1000.0, 2.0, 3.4, 17.0, 50.0};

The number of values between braces { } can not be larger than the number of elements that we declare for the array between square brackets [ ]. Following is an example to assign a single element of the array −

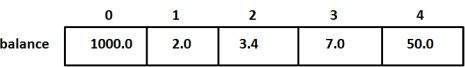
If you omit the size of the array, an array just big enough to hold the initialization is created. Therefore, if you write −

double balance[] = {1000.0, 2.0, 3.4, 17.0, 50.0};

You will create exactly the same array as you did in the previous example.

balance[4] = 50.0;

The above statement assigns element number 5th in the array a value of 50.0. Array with 4th index will be 5th, i.e., last element because all arrays have 0 as the index of their first element which is also called base index. Following is the pictorial representaion of the same array we discussed above –



**Accessing Array Elements**

An element is accessed by indexing the array name. This is done by placing the index of the element within square brackets after the name of the array. For example −

double salary = balance[9];

The above statement will take 10th element from the array and assign the value to salary variable. Following is an example, which will use all the above-mentioned three concepts viz. declaration, assignment and accessing arrays −

#include <iostream>

using namespace std;

#include <iomanip>

using std::setw;

int main () {

int n[ 10 ]; // n is an array of 10 integers

// initialize elements of array n to 0

for ( int i = 0; i < 10; i++ ) {

n[ i ] = i + 100; // set element at location i to i + 100

}

cout << "Element" << setw( 13 ) << "Value" << endl;

// output each array element's value

for ( int j = 0; j < 10; j++ ) {

cout << setw( 7 )<< j << setw( 13 ) << n[ j ] << endl;

}

return 0;

}

This program makes use of **setw()** function to format the output. When the above code is compiled and executed, it produces the following result −

Element Value

0 100

1 101

2 102

3 103

4 104

5 105

6 106

7 107

8 108

9 109

**Task # 1**

Write a program that takes ten numbers from user, store them in array named array\_numbers, take their average and store them in variable named average, and create another array that have the following  
array\_new[index] = array\_numbers[index]-average;

**Task # 2**

Write a program that creates an array named array\_numbers, takes 10 char and store them in array and show the vowels letters from char array.

**Task # 3**

Write a program that creates an array named array\_numbers, takes 10 numbers and store them in array and show the sum of even number in an array.

**Task # 4**

Write a program that creates an array of 10 indexes named array\_numbers, takes 10 numbers and store them in array and find maximum and minimum numbers from array.

**Task # 5**

Write a program that stores and display the following characters in a char array of length 15 and display the stars from array in following way.

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**Task # 6**

Write a C++ program to find the smallest and second smallest elements in a given array of integers.

**Task # 7**

Write a program that creates an array of size 26 and store all the capital letters alphabets in it using their ASCII values.

**Task # 8**

Write a program that input a 6 digit number from user, store it in a variable named num, split it and store in an array of size 6. For example, if user enters 672297, the array must have following values in it