

Programming and Problem Solving through C Language O Level / A Level

Chapter -5 : Arrays

Array

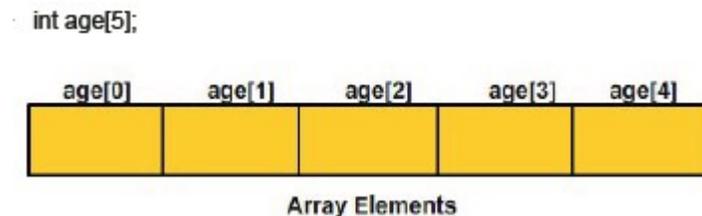
- An array is a collection of data storage locations, each having the same data type and the same name.
- An array can be visualized as a row in a table, whose each successive block can be thought of as memory bytes containing one element.
- Each storage location in an array is called an array element.

Arrays are of two types:

- Single or One dimensional arrays.
- Multidimensional eg. two dimensional arrays.

Single Dimensional Arrays

- A single dimensional array has only a single subscript.
- A subscript is a number in brackets that follows an array name.
- This number can identify the number of individual elements in the array.
- Individual array elements are stored in sequential memory locations.



1. In this example “**age**” is the array of type “**int**” having 5 elements.
2. Each element of the array is identified by the subscript number starting from 0 to 4.
3. If the address of the `age[0]` is 2120d and the size of **int** be 2 bytes,
then the address of next elements shall be
`age[1]` is 2122d
`age[2]` is 2124d
`age[3]` is 2126d
`age[4]` is 2128d

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.

```
#include <stdio.h>
int main ()
{
    int n[ 10 ]; /* n is an array of 10 integers */
    int i,j;
    /* initialize elements of array n to 0 */
    for(i = 0; i < 10; i++)
    {
        n[ i ] = i + 100; /* set element at location i to i + 100 */
    }
    /* output each array element's value */
    for(j = 0; j < 10; j++)
    {
        printf("Element[%d] = %d\n", j, n[j]);
    }
    return 0;
}
```

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

```
Element[0] = 100.
Element[1] = 101.
Element[2] = 102.
Element[3] = 103.
Element[4] = 104.
Element[5] = 105.
Element[6] = 106.
Element[7] = 107.
Element[8] = 108.
Element[9] = 109.
```

Example : Calculate Average

```
// Program to find the average of n numbers using arrays

#include <stdio.h>
int main()
{
    int marks[10], i, n, sum = 0, average;

    printf("Enter number of elements: ");
    scanf("%d", &n);

    for(i=0; i<n; ++i)
    {
        printf("Enter number%d: ",i+1);
        scanf("%d", &marks[i]);

        // adding integers entered by the user to the sum variable
        sum += marks[i];
    }

    average = sum/n;
    printf("Average = %d", average);

    return 0;
}
```

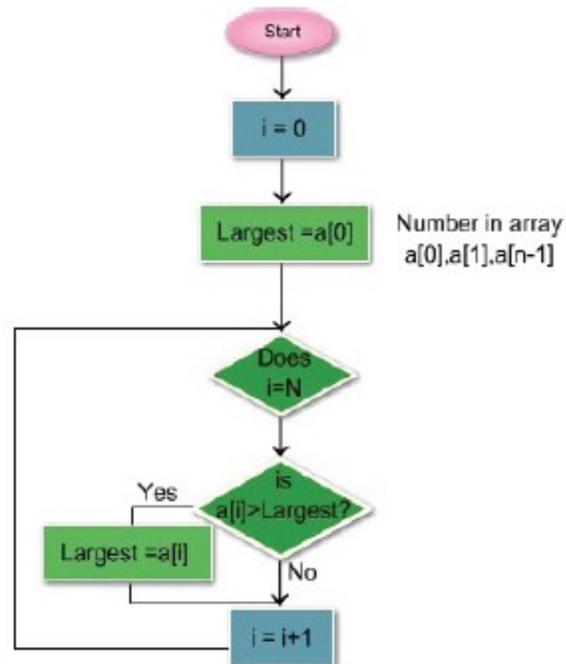
Output

```
Enter n: 5
Enter number1: 45
Enter number2: 35
Enter number3: 38
Enter number4: 31
Enter number5: 49
Average = 39
```

Find the Largest/Smallest of the Elements of an Array

- We set largest to the value of the first element of the array.
- Then we compare this value to each of the other elements in the array.
- If one is larger, we replace the value in largest with the value and continue to check the rest of the array.

Flow chart to find the largest of the array



```
#include <stdio.h>

int main()
{
    int array[100], maximum, size, c, location = 1;

    printf("Enter the number of elements in array\n");
    scanf("%d", &size);

    printf("Enter %d integers\n", size);

    for (c = 0; c < size; c++)
        scanf("%d", &array[c]);

    maximum = array[0];

    for (c = 1; c < size; c++)
    {
        if (array[c] > maximum)
        {
            maximum = array[c];
            location = c+1;
        }
    }

    printf("Maximum element is present at location %d\n and it's value is %d.\n", location, maximum);
    return 0;
}
```

Assignment

1. Write a program to find the smallest from the integer array.
2. Write a program to find the average of the 10 integer number stored in the array.
3. Write a program to read 10 integer numbers in an array and print only the even numbers.
4. Write a program to read 2 integer array of size 5 and calculate and print the sum of the elements of the arrays.

$$C [I] = A [I] + B [I]$$