Intro to Array

- **What is an Array?**

An array in C++ is a collection of variables that are of the same type and stored in contiguous memory locations. Instead of declaring separate variables for each value, you can use an array to group them together.

- **Why Use Arrays?**

➢ **Organized Storage**: Arrays help keep your data organized.
➢ **Easy Access**: You can quickly access and modify any value in the array.
➢ **Efficient**: Using arrays can make your code more efficient and easier to manage.

- **How to Declare an Array?**

To declare an array in C++, you need to specify the type of elements it will hold and the number of elements it will contain.

Syntax:
type arrayName[size];

Example:
```
int myArray[5];
```

This creates an array named `myArray` that can hold 5 integers.

➢ Initializing an Array

You can also initialize an array with values when you declare it.

Syntax:
type arrayName[size] = {value1, value2, value3, ...};

Example:
```
int myArray[5] = {1, 2, 3, 4, 5};
```

If you provide fewer initial values than the array size, the remaining elements are initialized to zero.

Example:
```
int myArray[5] = {1, 2};
```
 // myArray[2] to myArray[4] will be initialized to 0

- **Accessing Array Elements**

Each element in an array has an index, starting from 0. You can access elements using these indices.

Syntax:
arrayName[index];

Example:
```
int firstElement = myArray[0]; // Accesses the first element (1)
int thirdElement = myArray[2]; // Accesses the third element (3)
```

- **Modifying Array Elements**

You can change the value of an array element by assigning a new value to a specific index.

Syntax:
arrayName[index] = newValue;

Example:
```
myArray[0] = 10; // Changes the first element to 10
```

- **Looping Through an Array**

You can use loops to iterate over each element in the array.

Example (using a for loop):

```
for(int i = 0; i < 5; i++) {
    std::cout << myArray[i] << std::endl;
}
```

This loop will print all elements in the array.

- **Key Points**

  - Arrays are zero-indexed: The first element is at index 0.
  - Arrays have a fixed size: Once you create an array, you cannot change its size.
  - Arrays can store any type of data: integers, doubles, strings, objects, etc.

  ● **Summary**

Arrays are a fundamental part of C++ programming that allow you to store and manage collections of data efficiently. Understanding how to declare, initialize, access, modify, and loop through arrays is essential for any beginner programmer.

Here's a complete example putting all these concepts together:

```cpp
#include <iostream>

int main() {
  // Declare and initialize an array
    int myArray[5] = {1, 2, 3, 4, 5};

  // Access and modify array elements
    myArray[0] = 10;

  // Loop through the array and print elements
    for(int i = 0; i < 5; i++) {
        cout << myArray[i] << std::endl;
    }

    return 0;
}
```

This program will output:10
2
3
4
5

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