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C++ STL



Standard Template Library (STL) in C++

The Standard Template Library (STL) is a powerful library in C++ that provides generic classes and functions. It includes useful components such as containers, iterators, algorithms, and function objects.

Introduction to STL

STL is a collection of template classes and functions that provide many common data structures and algorithms. Its main components are containers, iterators, algorithms, and function objects (functors).

Containers

Containers are data structures that store objects. STL provides several types of containers, each optimized for different kinds of operations.

- **Vector:** A dynamic array.
- **List:** A doubly linked list.
- **Deque:** A double-ended queue.
- **Set:** A collection of unique elements.
- **Map:** A collection of key-value pairs.

Iterators

Iterators are objects that point to elements within containers. They are used to traverse containers.

Example of Iterators

```
#include <iostream>
#include <vector>

int main() {
    std::vector<int> v = {1, 2, 3, 4, 5};
    for (auto it = v.begin(); it != v.end(); ++it) {
        std::cout << *it << " "; // Output: 1 2 3 4 5
    }
    return 0;
}
```

Algorithms

Algorithms are a set of procedures that operate on containers through iterators. They perform tasks such as searching, sorting, counting, and manipulating elements.

Example of Algorithms:

```
#include <iostream>
#include <vector>
#include <algorithm>

int main() {
    std::vector<int> v = {5, 1, 4, 2, 3};
    std::sort(v.begin(), v.end()); // Sort the vector
    for (int i : v) {
        std::cout << i << " "; // Output: 1 2 3 4 5
    }
    return 0;
}
```