STL Containers Overview And STL Algorithms

Write less, do more?

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SPECIALIST EDUCATORS IN GAMES, ANIMATION & FILM VFX

What we will cover

- What is this STL thing?
- STL Algorithms
  - An introduction

STL Collection

- What is STL? - Standard Template Library
- STL is a collection of composable class & function templates for handling various kinds of container objects. It has…
  - Helper class & function templates: operators, pair
  - Container and iterator class templates
  - Generic algorithms that operate over iterators
  - Function objects
  - Adaptors

STL Collection

- Although considered a part of C++, it is a separate component, where the implementation can differ across platforms and compilers.
- Containers and algorithms within STL are template based, therefore they will work with almost any object type.
- All parts of STL are contained within the namespace std
- You have already used parts of it:
  - std::cout, std::cin

Parts of the STL

- Each component of the STL is contained within its own include file, for example:
  - Vector containers - #include <vector>
  - Linked list containers - #include <list>
  - Useful algorithms - #include <algorithm>
- STL has been written and maintained over the years to be error-free and optimised for each specific purpose

STL Containers

- STL implements a large number of templated containers.
  - List
  - Vector
  - Hash Map
  - Unordered Map
  - Queue,Stack, Dequeue …

- You will be learning how to use these different containers over the coming weeks.

STL Containers - Iterators

- One of the most confusing parts of STL for those new to it is their use of iterators.

- Iterators are a data structure that STL uses to allow programmers to access and iterate through different types of STL containers in exactly the same ways.

- Iterators allow you to move backwards and forwards between different elements in the container.

STL Containers - Iterators

- You will be exploring iterators in more detail as you start using the different types of STL containers.
  - Common STL functions that return iterators:
    - Begin()
    - End()
    - Find()

STL Algorithms

- An algorithm is a well-defined set of instructions for a specific purpose and solve a certain task
- The STL algorithm library contains a huge variety of algorithms defined in the header <algorithm> and <numeric>
- Some STL algorithms act on simple data types – others require using STL container classes.
  - We will go through these more in later lessons.

STL Algorithms – A few useful functions

- std::min/std::max
  - Returns the largest / smallest of two values
- std::accumulate
  - Will sum the values in an array (or STL container)

Conclusion

- STL contains a huge number of functions and classes to handle many common operations in C++

References

- Data structures and algorithms for Game Developers, page 397
- C++ primer plus, 6th edition, chapter 16
- List of all STL header files http://en.cppreference.com/w/cpp/header