STL

C++'s Standard Containers Library

Matthew Barulic

RoboJackets
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Today's Plan

1. Introduction to the STL
2. How to read cppreference.com
3. Common Containers
4. Common Algorithms
5. Code Examples

Introduction to the STL

Brief History

- 1979 - C++ Invented
- 1992 - STL Created
- 1998 - First Standardization

The STL

Standard **T**emplate **L**ibrary

- Containers
- Iterators
- Algorithms
- Function Objects

The STL

Algorithms $\rightarrow$ Iterators $\rightarrow$ Containers

Containers

- Store data (objects / primitives)
- The *Data Structures* of
  Data Structures and Algorithms (CS 1332)
- Minimal member methods for managing contents

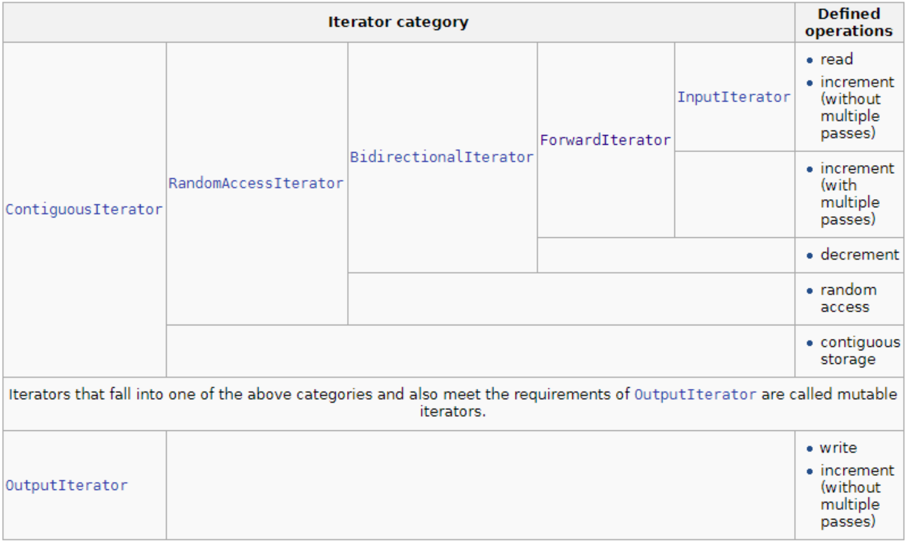
`http://en.cppreference.com/w/cpp/container`

Iterators

- Interface for useful container operations
- Exposed through begin() / end()
  (and their variants)

`http://en.cppreference.com/w/cpp/iterator`

Iterators



Iterator category					Defined operations
ContiguousIterator	RandomAccessIterator	BidirectionalIterator	ForwardIterator	InputIterator	• read • increment (without multiple passes)
					• increment (with multiple passes)
					• decrement
					• random access
					• contiguous storage
Iterators that fall into one of the above categories and also meet the requirements of OutputIterator are called mutable iterators.					
OutputIterator					• write • increment (without multiple passes)

Algorithms

- Utility functions for ranges of elements
- Decoupled from specific containers

`http://en.cppreference.com/w/cpp/algorithm`

Algorithms

Categories of Algorithms

- Non-Modifying
- Modifying
- Sorting / Partitioning
- Numeric

How to read cppreference.com

cppreference.com

`http://en.cppreference.com`

cppreference.com

http://en.cppreference.com

- Guided tour through std::vector's cppreference page.
- Constructors
- Member Functions
- Example

Common Containers

array

- Fixed size container
- Preferred over "c-style" arrays
- Two template arguments: *type* and *size*

Example

```
std::array<int,5> my_array = {0,1,2,3,4};
```

vector

set

map

Common Algorithms

any_of / all_of / none_of

copy

fill

generate

accumulate

transform

Code Examples

- TODO a handful of simple, but not trivial examples