STL, Sorting Large Amounts of Data

Chapter 7

CS380 Algorithm Design and Analysis

Problem of the Day

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- The *nuts and bolts problem* is defined as follows. You are given a collection of *n* bolts of different widths, and n corresponding nuts.
- You can test whether a given nut and bolt go together, from which you learn whether the nut is too large, too small, or an exact match for the bolt.
- The differences in size between pairs of nuts or bolts can be too small to see by eye, so you cannot rely on comparing the sizes of two nuts or two bolts directly.

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• You are to match each bolt to each nut.

Problem of the Day

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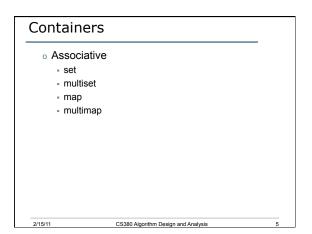
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- 1. Give an O(n²) algorithm to solve the nuts and bolts problem.
- 2. Suppose that instead of matching all of the nuts and bolts, you wish to find the smallest bolt and its corresponding nut. Show that this can be done in only 2n 2 comparisons.
- 3. Match the nuts and bolts in expected O(n lg n) time.

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Standard Template Library • Two important parts • Containers • Iterators • Containers • Sequential • vector • dequeue • list

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Iterators

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- Iterators are objects that behave like pointers
- · Used to access items stored in containers

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- Each STL container object provides two member functions:
 - .begin()
 - o .end()

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Using Iterators

- Because an iterator is an object of an inner class called iterator that is defined inside of a container class, we need to use the scope resolution operator to obtain an interator of a container
- To define an iterator object for vecors:
 - o vector<int>::iterator iter;
- What about this?
 - o vector<int> vect;
- o
 vector<int>::iterator
 iter
 =
 vect.begin();

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Example

#include <iostream>
#include <vector> // needed to use vectors
using namespace std;

int main()

{

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vector<int> vect; // Create a vector of int

for (int x = 0; x < 10; x++)
 vect.push_back(x*x);</pre>

//print everything using iterators. vector<int>::iterator iter = vect.begin(); while (iter != vect.end())

(cout << *iter << " ";

iter ++;

return 0;

Algorithms in STL	
 Many algorithms including: 	
 binary_search 	
o count	
₀ for_each	
o find	
o max_element	
o min_element	
o random_shuffle	
o sort	

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Example

See code

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