

Computer Science II — CSci 1200

Lab 10

Binary Search Trees and Recursion

We strongly recommend that you do this lab in advance and do it before starting HW 8. All checkpoints are included in the on-line posting.

Introduction

This lab explores binary search trees and their implementation in the `cs2set` class, along with the use of recursive functions to manipulate binary search trees. Once you have a basic understanding of trees, the actual code that you have to write for the lab is quite short. Review the notes from Lectures 16 and 17 prior to starting. Download the files:

```
http://www.cs.rpi.edu/academics/courses/spring08/cs2/lab10/cs2set.h  
http://www.cs.rpi.edu/academics/courses/spring08/cs2/lab10/test\_cs2set.cpp
```

Then, turn off all network connections.

Examine the code in `cs2set.h` and `testset.cpp`. The former contains the implementation discussed in Lectures 16 and 17, including the functions implemented in lecture as exercises. The latter contains code for testing the implementation. Some of this has been commented out because all the functions have not yet been implemented.

Checkpoints

1. The implementation of `find` provided in `cs2set.h` is recursive. Implement and test a non-recursive replacement for this function.
2. The implementation of the copy constructor and the assignment operator is not yet complete because each depends on a private member function called `copy_tree`, the body of which has not yet been written. Write `copy_tree` and then test to see if it works by “uncommenting” the appropriate code from the main function.
3. Add a member function called `accumulate` to the public interface to the `cs2set<T>` class, and provide its implementation. The function should take only one argument and it should return the accumulated

result. The argument is the initial value to start from. The function should only use `operator+=` on type `T`.

Test your code by showing that this works for both a set of ints, where the accumulate function should sum the values in the set, and a set of strings, where the accumulate function should concatenate the strings in the set.