CS 445 Lab 10: Tree Traversals

Introduction

Assuming there are no duplicate data elements, the shape of a binary tree can be uniquely determined given the inorder traversal order alongside either the preorder or postorder traversal order. In this lab, you will implement a recursive procedure for reconstructing a binary tree (of characters) given the pre- and inorder traversal orders (as strings).

First, your TA will review trees, recursive procedures over trees, and the traversal orders.

Exercise

After the TA's lesson, complete the following steps:

1. Download the provided code and read it over. The `RebuildBinaryTree` class contains a stub for the `rebuildTree` method that you will implement.
2. First, determine the root node using the preorder traversal.
3. Next, use your knowledge of the root node to determine the portions of the traversals that represent the left subtree and right subtree. Consider the `substring` method and the `indexOf` method for the string manipulations.
4. Recurse on the left and right subtree traversals.
5. To complete the recursive case, recombine the returned rebuilt trees to reconstruct the tree overall.
6. Finally, determine an appropriate base case. Implement your base case to complete the `rebuildTree` method.
7. Test your code with the example from lecture, as well as a few other examples, to ensure your code works as expected.

Conclusion

In this lab, you implemented a method for reconstructing a binary tree given its preorder and inorder traversals. More importantly, you practiced writing complex recursive procedures over recursively-defined data structures.