CSC221 Data Structures & Algorithms I Fall 2016

Programming Assignment #3 – Binary Search Trees

This lab will create an interactive program that will read text into a binary search tree; a frequency will be tallied for all the strings. The text **must** be normalized by placing the letters into lower case, and removing punctuation. The program must process a number of interactive commands to perform different functions. You will need to implement basic *tree* and *treenode* data structures.

For a maximum grade of 75, your program must be able to handle the commands of ***add*** *filename*, ***stop***, ***inorder*** and ***postorder***.

- The command ***add*** *filename* will cause the contents of the file, *filename*, to be added to the binary search tree. Each new word (string) in the file should be added to the binary search tree. You may assume that no word is longer than 32 characters. No string will be duplicated in the binary search tree; instead, the frequency will reflect the number of times a string has been encountered.
- The commands ***inorder*** and ***postorder*** will print to the screen the contents of the tree in the specified order. For both traversals, you must also print the number of times each word has been encountered in parentheses, whenever that number is greater than one. For example, if the input file is:

  ```
  One fish, two fish
  red fish, blue fish
  ```

  The output of ***inorder*** should be:

  ```
  blue
  fish (4)
  one
  red
  two
  ```

- The command ***stop*** will cause your program to exit.
- If a command is entered that is not one of the ones specified, your program should print an error message and continue to process additional commands.

For a maximum grade of 88 you must add to the 75 point assignment a command ***breadthfirst***. This command will traverse the contents of the tree by levels, starting at the root and moving down to the leaves. As we discussed in class, you will want to use a queue.

For a maximum grade of 100 you must add to the 88 point assignment a command ***bottomup***. This command will traverse the contents of the tree by levels, starting at the bottom and moving up to the root.

This assignment will require some time to complete. **Do not** postpone starting. If you work on this project for one hour each day, concentrating on one class at a time, you will complete this assignment promptly.

Test input files named `test1` and `test2` may be downloaded from:

http://menehune.opt.wfu.edu/csc221

Among yourselves you may discuss syntax issues. Any other issues regarding your work must be discussed only with me, Charchil, or the TAs in the CS Center. Resources from the class handouts and from the textbook may be adapted to help you complete the assignment.