CS2302 - Data Structures

Spring 2020

Lab 3

Due Wednesday, July 8, 2020

For this lab you will practice with binary search trees and b-trees. For lab 2 you implemented four sorting algorithms for objects of the *List* class. For this lab, you will implement two more sorting algorithms: bst_sort and btree_sort, as explained below.

1. *bst_sort(L)* - Insert the elements of *List L* to a binary search tree, then traverse the tree to extract its elements into a List object.
2. *btree_sort(L)* - Insert the elements of *List L* to a b-tree, then traverse the tree to extract its elements into a List object.

Note: using intermediate representations is not allowed; your functions must insert the List items directly into a tree and extract the results of a traversal directly into a List. Thus, for example, you are not allowed to use the *tree2List* function to extract the elements of a BST into a Python list, and then insert the elements from the Python list to a linked list.

For your report, compare all 6 sorting algorithms (including the ones from lab 2) using random lists and sorted lists as input. Discuss whether the observed results match the expected behavior of the algorithms. Use tables and/or plots to show the relative performance of the algorithms. As usual, write a report describing your work.