CENG 112 – DATA STRUCTURES
Homework 6

May 14, 2015

Due Date: 28 May 2015

Prog. Assignment 1.1 Verifying Red-Black Trees

Modify the program in "balanced_trees/rb_tree.c" by adding code that varifies the structure and performance of the RB tree after construction as follows:

- Check that the number of black links from the root to every leaf node is the same. Print a message that reports an error or the number of black links from root to any leaf.
- Query each student in the `ceng112_students` array by name and measure the number of comparisons for each query. Print the minimum, maximum, and average number of comparisons.

Prog. Assignment 1.2 Sets with Hash Tables

Modify the code in "sets_with_trees/set_of_ints.c" so that the set is implemented with a hash table that uses linear probing instead of a red-black tree. Make sure that the program "rand-uniq" still works correctly.

Also add a new function to the set interface that let's you remove an integer from the set. Write a small test program to test the delete function. *Hint:* To hash integers you can use modular hashing with a prime number of elements in the hash table.

Prog. Assignment 1.3 Double Hashing

Read the description of double-hashing from the book or any other reference. Re-implement the set of integers in "sets_with_trees/set_of_ints.c" using hash-tables and double hashing.