

Quiz

CSC301 Algorithms and Data Structures

2 April 2015

1. In a 2–3 tree, a 3-node with keys a and b has pointers to subtrees that contain...
 - elements whose keys are less than a
 - elements whose keys have values between those of a and b
 - elements whose keys are greater than b

In a red-black tree, two 2-nodes can serve the same purpose.

- The 2-node whose key is b has pointers to...
 - a right subtree whose elements have what relation to b ?
 - a left subtree whose root node contains a and that has pointers to...
 - * a left subtree whose elements have what relation to a ?
 - * a right subtree whose elements have what relation to a and b ?
2. There are three constraints that define a red-black tree.
 - (a) All red links lean in which direction?
 - (b) No node has two links of which color connected to it?
 - (c) The tree has perfect balance when balance is measured in which way?
 3. Because red-black trees are both binary search trees and 2–3 trees, they have properties of both kinds of trees.
 - (a) Which valuable trait do the red-black trees inherit from binary search trees?
 - (b) Which valuable trait to the red-black trees inherit from 2–3 trees?
 4. Compare the code on page 399 of our textbook with the code on page 439. What is the difference?
 5. What are the three characteristics of a good hash functions?

6. There are two ways of resolving collisions in a hash table. Linear probing is a form of open addressing. Separate chaining is the other method. Which one of these two approaches makes use of linked lists?
7. Some operations on symbol tables can be efficient if the table is built on a tree but not if it is build on a hash table. If an application requires these operations, then a symbol table built on a hash table is not a good choice. What are the operations that make a hash table a poor choice?
8. The textbook lists some important applications of symbol tables.
 - (a) What is a concordance?
 - (b) What is DNS (the Domain Name Service)?
 - (c) What is a .csv (comma separated value) file?
 - (d) What is a sparse vector?