CS 360 100P
Red-Black Trees

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Topics to learn

Please read up on the following subjects:

- binary search trees
- red-black trees
- tree rotations
- tree iterators

Tasks to perform

Implement a red-black tree class the provides methods for inserting, deleting, and searching.

Feel free to use the mailing list to ask questions if you are unsure of how to proceed in certain areas.

Testing your implementations

Your *main* function should implement an mini-interpreter for testing your data structures. While the following list of interpreter commands may not always apply to the particular problem, implement those that do:

i XXX

       - insert value XXX into the data structure

d XXX

       - delete value XXX from the data structure

f XXX

       - find value XXX in the data structure

v

       - visualize the data structure using graphviz

V

       - verify the correctness of the data structure

r XXX

       - read a set of interpreter commands from file XXX

s

       - print statistics concerning the current state of the data structure

l XXX

       - list the elements in the data structure; XXX should specify the kind of traversal

b XXX

       - inject a fault of type XXX into the data structure

You may need to implement additional interpreter commands or modify those listed above to fit this particular problem.

You must program this assignment in the C programming language. You must provide a makefile.

Other concepts

Be prepared to show examples that illustrate the kinds of rotations needed to maintain balance in a red-black tree.

Be able to describe to your mentor the complexity of each operation in the public interface of your classes using order notation.