1 Glossary

Here are some terms that are used when discussing red-black trees:

child same as for binary search trees
parent same as for binary search trees
leaf same as for binary binary search trees
grandparent parent of parent
uncle sibling of parent
niece closest child of sibling - if you are a right child, your niece is a right child - if you are a left child, your niece is a left child
nephew furthest child of sibling - if you are a right child, your nephew is a left child - if you are a left child, your nephew is a right child
black height the number of black nodes encountered on the way to a leaf - sometimes abbreviated BH
linear true if the parent and child are both left children or are both right children
rotation make a child a parent and the former parent a child - preserves binary search tree ordering

Note that terms like uncle, niece, and nephew are not found in other binary search tree descriptions. They are used here in order to remove leftness and rightness issues from the main red-black tree algorithms.

2 Red-black properties

A red-black tree has the following properties:

• The root is colored black
• The null child pointers of a leaf are considered black nodes
• No red node has a red parent
• All nodes have a consistent black height (all paths from a node to the reachable leaves have the same number of black nodes)

Next: Inserting into red-black trees