

# An Exploration of RB Trees and Applications

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## Abstract

A red black tree is a self balancing binary tree. The nodes on a red black tree have an extra attribute which signifies their color. There are two colors which are used in Red Black trees. The color attribute per node is used as a tool for completing an approximate balancing of the tree. Some properties of RB trees are as follows:

- Every node is either red or black.
- The root is always black.
- All terminal leaves are black.
- The children of red nodes are black.
- Any path from a given node to a leaf contains the same number of black nodes.

Our research included the study of Red Black trees and their applications in specific systems. One system in which we used a red black tree was the ability to locate a phone number and caller in a database. During this project, we explored the implementation of RB trees and pondered some of the drawbacks of using them. We also used the data structure in a system modeling a school database. Our work with the RB trees allowed us to formulate opinions regarding additional applications in specific environments and systems. We also propose ways for improving the implementation of the RB tree and object oriented system that we utilized throughout the project.