

AVL Trees

Properties of AVL Tree

There's basically just one rule for AVL trees:

1. For every sub-tree, the height difference of the left and right sub-trees must be no greater than an absolute value of 1.

Cases of AVL Trees

There are four cases for insertion:

1. Insertion into left subtree of left child
2. Insertion into right subtree of left child
3. Insertion into left subtree of right child
4. Insertion into right subtree of right child

These can then be subdivided into just two basic categories, *insertion on the “outside” of the subtree or the “inside” of the subtree.*

Red-Black Trees

Five Properties of RB Trees:

1. Root node must be black
2. All paths from the root to any leaf (null node) must encounter the same number of black nodes.
3. No red node can have red children.
4. All nodes are either red or black
5. All null leaves are black

Two basic operations:

1. Push blackness down from grandparent.
2. If no blackness above, rotate (and THEN recolor)

What is Object Inheritance

When an object inherits the methods and values of a “parent object.”

What is a Virtual Table

A table of pointers to methods that don't yet exist. Once a derived class is declared and instantiated, the pointers are set to point to the newly defined method.

What is a Virtual Method?

A virtual method is a method with the word virtual in front of it :)
. Virtual methods can be overridden.

What is a Purely Virtual Method?

A purely virtual method is a virtual method without any implementation, depending on it being implemented in a derived class.

Why can't an abstract class be directly instantiated?

An abstract class has at least one purely virtual function, so you can't instantiate it with nothing.

What is Big O Notation

A notation for denoting the "worst" case performance of an algorithm.

Which Big O Notation is bigger (quiz question)

To determine the largest Big O notation, consider only the most significant N. For example:

$O(\ln(N^2 + N^5))$ is bigger than $O(\ln(N^3 + 5000))$

Know bubble sort

Travers a tree depth first and breadth first using a queue

< gonna write later, probably in class >

What is a template class?

A template class is a class written using the `template <class T>` syntax to define a pattern for generating the necessary code for a class that can handle any specified type (in theory).

What are the max number of black nodes you can have in any Left subtree if Right subtree has K nodes?

Taking C as the total number of black nodes in the Left subtree, $C \leq K$. This is because no matter how big the Left subtree is, it still can't have any path that goes through more black nodes than the right node.