General Assembly

BALANCING BINARY TREES

Key Terms

» **Rotating:** Moving the nodes around on a tree until we find balance.

» **AVL Tree:** A self-balancing binary search tree.

Cheat Sheet

How AVL trees work

An AVL tree balances itself by automatically calculating the difference in heights between the left and right sides:
- **Difference is 0 or 1:** The tree is *balanced*
- **Difference is more than 1:** The tree is *unbalanced*

Tree height

The height of a given node is the **longest possible path forward** in the tree before reaching a leaf node (the end of the tree).

Types of imbalance

There are four scenarios for AVL tree imbalance could look like:
Left-left imbalance
Left-right imbalance
Right-right imbalance
Right-left imbalance

Balancing act

In order to fix the imbalance, there are different steps for each:
1. Left-left imbalance
- Rotate everything to the right
2. Left-right imbalance
- Swap the outer two nodes.
- Rotate everything to the right.
3. Right-right imbalance
- Rotate everything to the left.
4. Right-left imbalance
- Swap the outer two nodes.
- Rotate everything to the left.