2024/08/28 - Data Structures - Week 05 Ponble hashing fraction Cot calls offect of he and he gives you a random location m-nE # probes required to find an empty location = $\frac{1}{1-\alpha}$ [Unsuccessful search:= event of finding an empty location 1. Nohen searching for a key] Insertion $O\left(\frac{1}{1-\alpha}\right)$ required to insert a new key E # probes Expected no. of trials until success in geometric distribution













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Complete Binary Tree

A complete binary tree is a binary tree in which:

- 1. Every level, except possibly the last, is completely filled.
- 2. All nodes in the last level are as far left as possible.

In simpler terms, a complete binary tree fills levels from left to right, and if the last level isn't fully filled, the nodes are still aligned to the left.

Example:

For a tree of height 3, where the last level isn't fully filled:

markdown	🗗 Copy code
1	
2 3	
4 56	

In this example, the tree is complete because all levels before the last are fully filled, and the nodes at the last level (4, 5, 6) are left-aligned.

Perfect Binary Tree

A perfect binary tree is a more restrictive form of a binary tree. It has the following properties:

- 1. All internal nodes have exactly two children.
- 2. All leaf nodes (nodes without children) are at the same level.

This means that a perfect binary tree is both **completely filled** at all levels and **balanced** in terms of its depth.

Example:

For a tree of height 3:

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1	
2 3	
4 5 6 7	

Here, the tree is perfect because all levels are fully filled, and all leaf nodes (4, 5, 6, 7) are at the same depth.

Summary of Differences:

- Complete Binary Tree: All levels are filled except possibly the last, which is filled from left to right.
- Perfect Binary Tree: All levels are completely filled, and all leaf nodes are at the same level.

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