Understanding Full and Complete Binary Trees

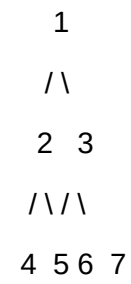
1. Definitions

A Full Binary Tree is a tree where every node has either 0 or 2 children.

A Complete Binary Tree is a tree where all levels are fully filled except possibly the last, and all nodes are as far left as possible in the last level.

2. Full Binary Tree - Example

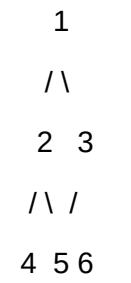
Example:



All nodes have either 0 or 2 children - this is a Full Tree.

3. Complete Binary Tree - Example

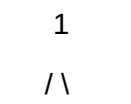
Example:



All levels are filled except the last, which is filled from left to right - this is a Complete Tree.

4. Not a Full Tree

Example:



Understanding Full and Complete Binary Trees

```
  2   3
 /
4
```

Node 2 has only one child - not a Full Tree.

Also not Complete because the last level is not filled from left to right.

5. Not a Complete Tree

Example:

```
    1
   / \
  2   3
     / \
    4   5
```

Even though all nodes have 0 or 2 children (so it's Full),

Node 2 has no children while Node 3 has two - this creates a left-to-right gap.

This breaks the rule of a Complete Tree.

6. Not Full and Not Complete Tree

Example:

```
    1
   / \
  2   3
   \
    4
```

Node 2 has only a right child - not Full.

Also violates left-to-right fill - not Complete.