The tree in the slide is **not a valid (2,4) tree** for the following reasons:

1. **Child Limits in Nodes**: In a (2,4) tree, each internal node must have between 2 and 4 children. In the given tree, the node with keys {11, 24} has **3 children** ({2, 6, 8}, {15}, {27, 32}). This part is fine, but if any node has only 1 child or more than 4 children, it would violate the (2,4) tree properties. However, we also see leaf nodes like {30}, which effectively only has **1 child** in the broader context, leading to an imbalance.
2. **Key Limits in Nodes**: In a (2,4) tree, each internal node should have between **1 and 3 keys**. If a node has more than 3 keys, it violates the (2,4) tree structure. In the given tree, this condition is met, as no node has more than 3 keys. However, we need to ensure consistency across other structural requirements.
3. **Leaf Depth Requirement**: In a (2,4) tree, all leaves must be at the same depth to maintain balance. In the given tree, we see that:
    - Leaf nodes {2, 6, 8}, {15}, {27, 32}, and {30} are at different depths.
    - For example, {30} is a child of {27, 32}, which is at a deeper level than nodes like {2, 6, 8} and {15}.

This difference in depth for leaf nodes means the tree is **not balanced** according to (2,4) tree rules.

How to Make It a Valid (2,4) Tree

To convert this into a valid (2,4) tree, you could:

1. Adjust the tree structure to ensure that all leaves are at the same depth.
2. Ensure that each internal node has between 2 and 4 children by splitting or merging nodes as necessary.

By applying these steps, we would achieve a balanced (2,4) tree where:

- All internal nodes have between 2 and 4 children.
- Each internal node has 1 to 3 keys.
- All leaves are at the same depth, satisfying the balanced tree requirement.

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yongdanielliang.github.io/animation/web/24Tree.html

2-4 Tree Animation by Y. Daniel Liang

: an integer key and click the Search button to search the key in the tree. Click the Insert button to insert the key into the tree. Click the ove button to remove the key from the tree. For the best display, use integers between 0 and 99.