662. Maximum Width of Binary Tree

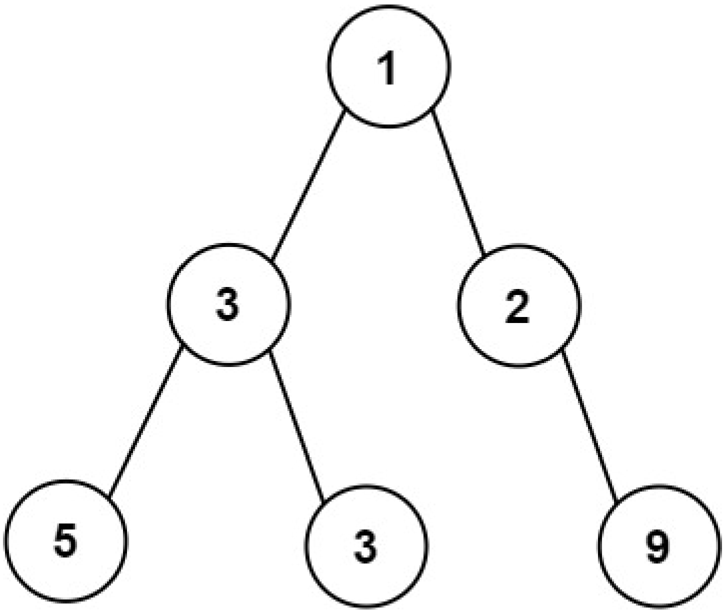
Given the `root` of a binary tree, return *the **maximum width** of the given tree*.

The **maximum width** of a tree is the maximum **width** among all levels.

The **width** of one level is defined as the length between the end-nodes (the leftmost and rightmost non-null nodes), where the null nodes between the end-nodes are also counted into the length calculation.

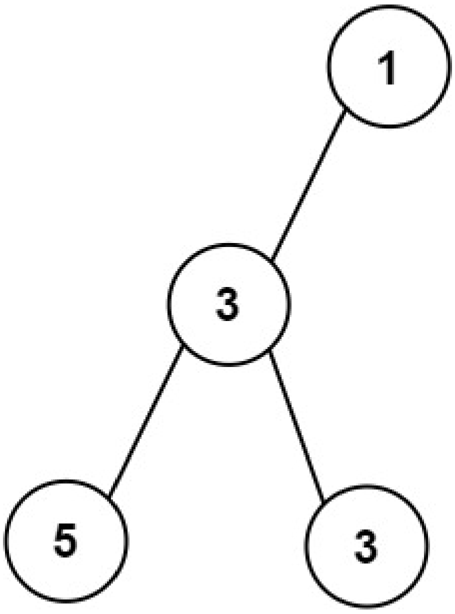
It is **guaranteed** that the answer will in the range of **32-bit** signed integer.

Example 1:



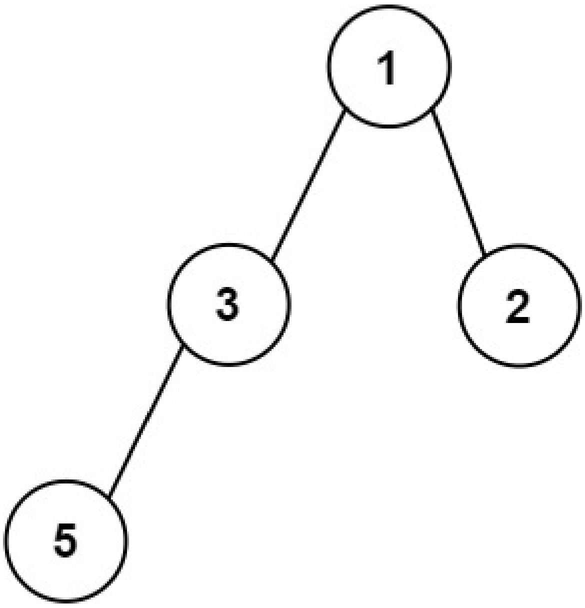
```
Input: root = [1,3,2,5,3,null,9]
Output: 4
Explanation: The maximum width existing in the third level with the length 4 (5,3,null,9).
```

Example 2:



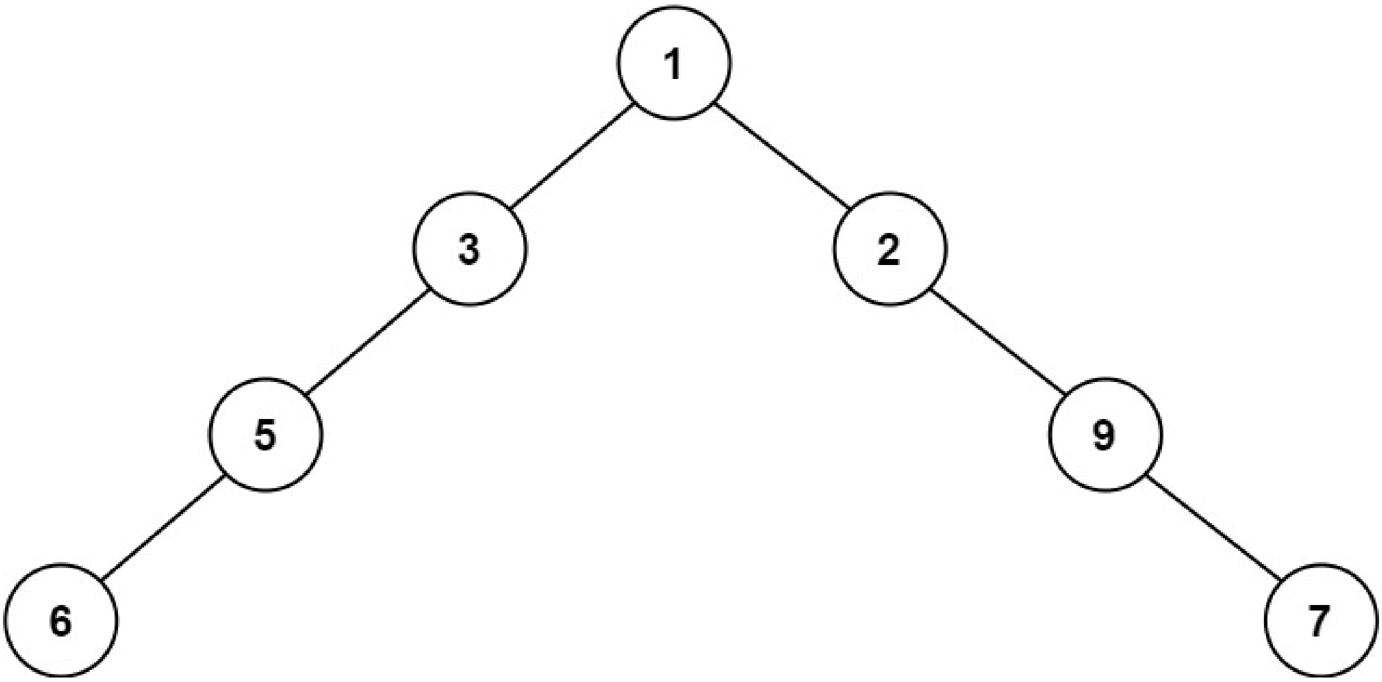
```
Input: root = [1,3,null,5,3]
Output: 2
Explanation: The maximum width existing in the third level with the length 2
(5,3).
```

Example 3:



```
Input: root = [1,3,2,5]
Output: 2
Explanation: The maximum width existing in the second level with the length
2 (3,2).
```

Example 4:



```
Input: root = [1,3,2,5,null,null,9,6,null,null,7]
Output: 8
Explanation: The maximum width existing in the fourth level with the length 8 (6,null,null,null,null,null,null,7).
```

Constraints:

- The number of nodes in the tree is in the range `[1, 3000]`.
- `-100 <= Node.val <= 100`

```
class Solution:
    def widthOfBinaryTree(self, root: Optional[TreeNode]) -> int:
        if root is None:
            return 0
        queue = [(root,0)]
        maxWidth = 0

        while len(queue)>0:
            size = len(queue)
            left = queue[0][1]
            right = queue[0][1]
            while size>0:
                node,idx = queue.pop(0)
                right = idx
                if node.left!=None:
                    data = (node.left,2*idx+1)
                    queue.append(data)
                if node.right!=None:
                    data = (node.right,2*idx+2)
                    queue.append(data)
                size-=1
            maxWidth = max(maxWidth,right-left+1)
        return maxWidth
```