

# GRAPH (BFS)

# Problem – Maximum Level Sum of a Binary Tree

Medium

 [LeetCode https://leetcode.com/problems/maximum-level-sum-of-a-binary-tree](https://leetcode.com/problems/maximum-level-sum-of-a-binary-tree)

## Problem Statement

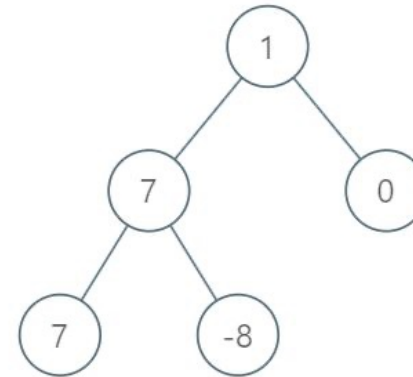
- Given the root of a binary tree, find the smallest level with the maximum sum
- For example, the tree below has the follow sums for each level:

level 1 (root) = 1

**level 2 = 7 + 0 = 7**

level 3 = 7 - 8 = -1

- Therefore, **level 2** has the maximum sum



# Solution – Maximum Level Sum of a Binary Tree

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## Solution

- Have a queue with the nodes for the current level
- Sum the values from that level by taking the nodes from the queue
- Example, we know that level 1 has one node. Hence, pop the first node from the queue  
If level 2 has 2 nodes, pop two nodes, sum the values
- In addition, add left and right to the end of the queue to process the next level

# Code – Maximum Level Sum of a Binary Tree

Medium

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```
int maxLevelSum(TreeNode* root) {
    std::queue<TreeNode*> nodes;
    int currentLevel = 0;
    int maxLevel = 1;
    int maxSum = INT_MIN;

    nodes.push(root);

    // traverse the graph
    while(!nodes.empty()) {
        int levelSum = 0;
        int levelSize = nodes.size();
        currentLevel++;

        // sum the values in current level
        for (int i = 0; i < levelSize; ++i) {
            TreeNode* node = nodes.front();
            levelSum += node->val;
            nodes.pop();

            if (node->left) nodes.push(node->left);
            if (node->right) nodes.push(node->right);
        }

        if (levelSum > maxSum) {
            maxLevel = currentLevel;
            maxSum = levelSum;
        }
    }

    return maxLevel;
}
```