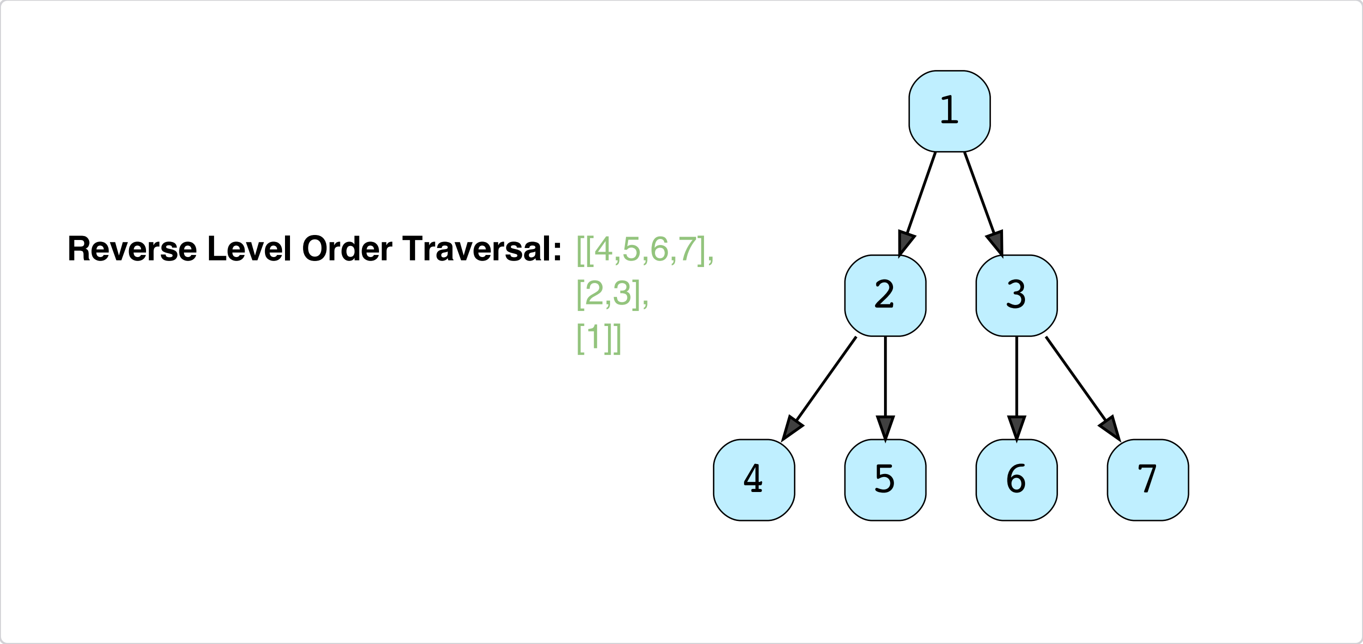
Reverse Level Order Traversal (easy)

We'll cover the following

Problem Statement#

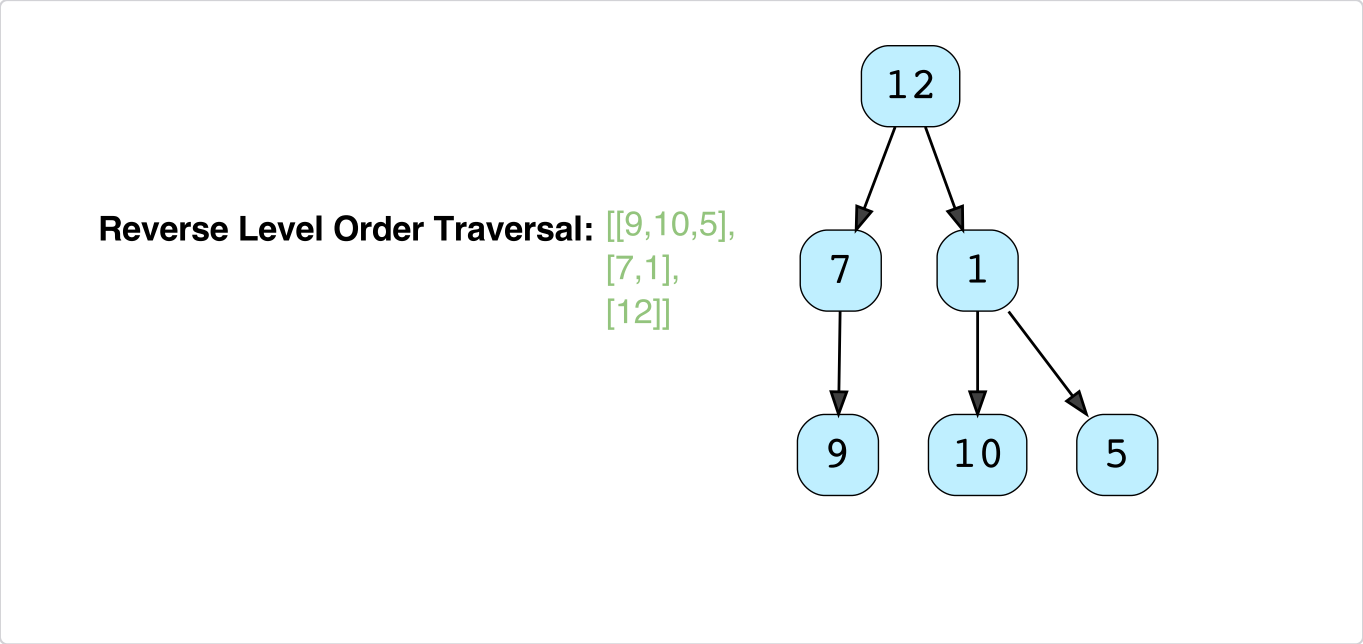
Given a binary tree, populate an array to represent its level-by-level traversal in reverse order, i.e., the **lowest level comes first**. You should populate the values of all nodes in each level from left to right in separate sub-arrays.

Example 1:



Reverse Level Order Traversal: [[4,5,6,7],
[2,3],
[1]]

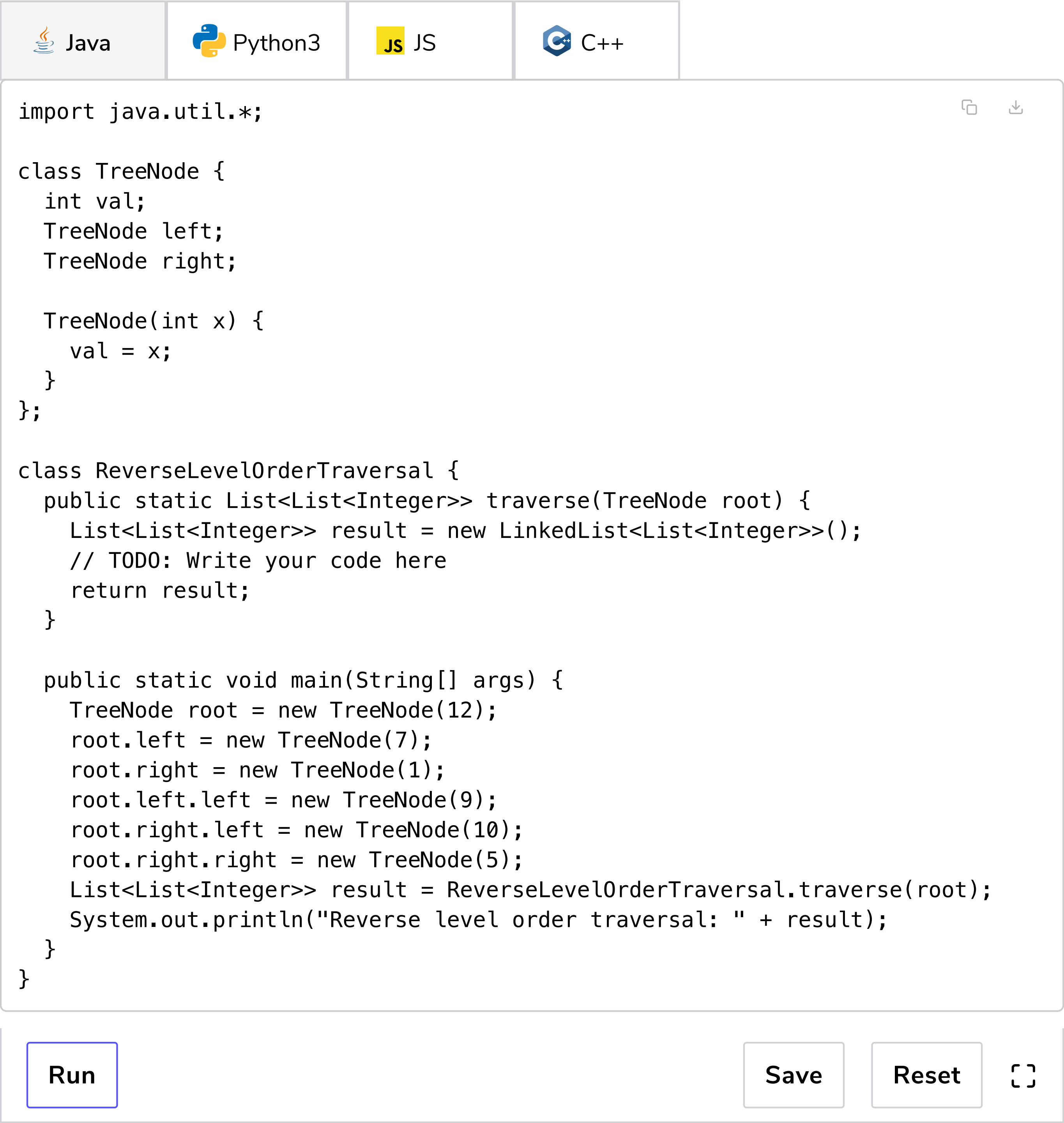
Example 2:



Reverse Level Order Traversal: [[9,10,5],
[7,1],
[12]]

Try it yourself#

Try solving this question here:



```
import java.util.*;

class TreeNode {
  int val;
  TreeNode left;
  TreeNode right;

  TreeNode(int x) {
    val = x;
  }
};

class ReverseLevelOrderTraversal {
  public static List<List<Integer>> traverse(TreeNode root) {
    List<List<Integer>> result = new LinkedList<List<Integer>>();
    // TODO: Write your code here
    return result;
  }

  public static void main(String[] args) {
    TreeNode root = new TreeNode(12);
    root.left = new TreeNode(7);
    root.right = new TreeNode(1);
    root.left.left = new TreeNode(9);
    root.right.left = new TreeNode(10);
    root.right.right = new TreeNode(5);
    List<List<Integer>> result = ReverseLevelOrderTraversal.traverse(root);
    System.out.println("Reverse level order traversal: " + result);
  }
}
```

Solution#

This problem follows the Binary Tree Level Order Traversal (https://www.educative.io/collection/page/5668639101419520/5671464854355968/5726607939469312/) pattern. We can follow the same **BFS** approach. The only difference will be that instead of appending the current level at the end, we will append the current level at the beginning of the result list.

Code#

Here is what our algorithm will look like; only the highlighted lines have changed. Please note that, for **Java**, we will use a `LinkedList` instead of an `ArrayList` for our result list. As in the case of `ArrayList`, appending an element at the beginning means shifting all the existing elements. Since we need to append the level array at the beginning of the result list, a `LinkedList` will be better, as this shifting of elements is not required in a `LinkedList`. Similarly, we will use a double-ended queue (deque) for **Python**, C++, and **JavaScript**.

Java Python3 C++ JS

```java
import java.util.*;

class TreeNode {
  int val;
  TreeNode left;
  TreeNode right;

  TreeNode(int x) {
    val = x;
  }
};

class ReverseLevelOrderTraversal {
  public static List<List<Integer>> traverse(TreeNode root) {
    List<List<Integer>> result = new LinkedList<List<Integer>>();
    if (root == null)
      return result;

    Queue<TreeNode> queue = new LinkedList<>();
    queue.offer(root);
    while (!queue.isEmpty()) {
      int levelSize = queue.size();
      List<Integer> currentLevel = new ArrayList<>(levelSize);
      for (int i = 0; i < levelSize; i++) {
        TreeNode currentNode = queue.poll();
        // add the node to the current level
        currentLevel.add(currentNode.val);
        // insert the children of current node to the queue
        if (currentNode.left != null)
          queue.offer(currentNode.left);
        if (currentNode.right != null)
          queue.offer(currentNode.right);
      }
      // append the current level at the beginning
      result.add(0, currentLevel);
    }

    return result;
  }

  public static void main(String[] args) {
    TreeNode root = new TreeNode(12);
    root.left = new TreeNode(7);
    root.right = new TreeNode(1);
    root.left.left = new TreeNode(9);
    root.right.left = new TreeNode(10);
    root.right.right = new TreeNode(5);
    List<List<Integer>> result = ReverseLevelOrderTraversal.traverse(root);
    System.out.println("Reverse level order traversal: " + result);
  }
}
```

Run

Save

Reset

Time complexity#

The time complexity of the above algorithm is $O(N)$, where 'N' is the total number of nodes in the tree. This is due to the fact that we traverse each node once.

Space complexity#

The space complexity of the above algorithm will be $O(N)$ as we need to return a list containing the level order traversal. We will also need $O(N)$ space for the queue. Since we can have a maximum of $N/2$ nodes at any level (this could happen only at the lowest level), therefore we will need $O(N)$ space to store them in the queue.

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Binary Tree Level Order Traversal (easy)

Next →

Zigzag Traversal (medium)

☑ Mark as Completed

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