# Minimum Depth of a Binary Tree (easy)

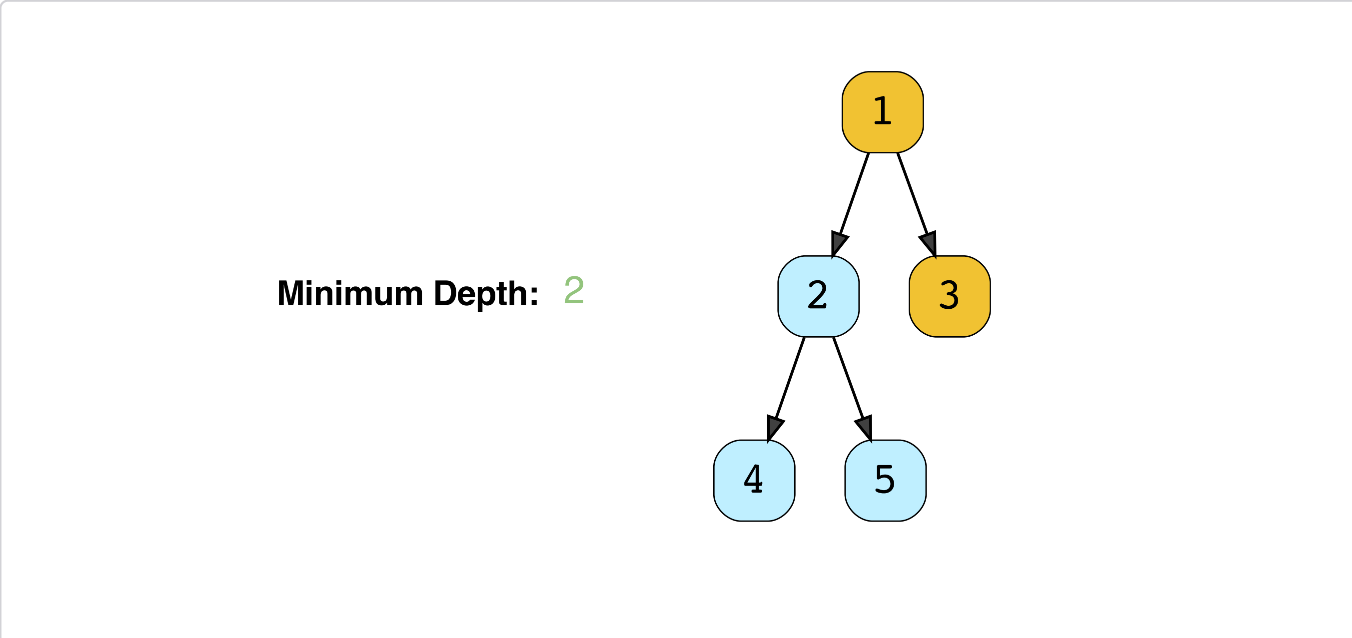
**We'll cover the following**



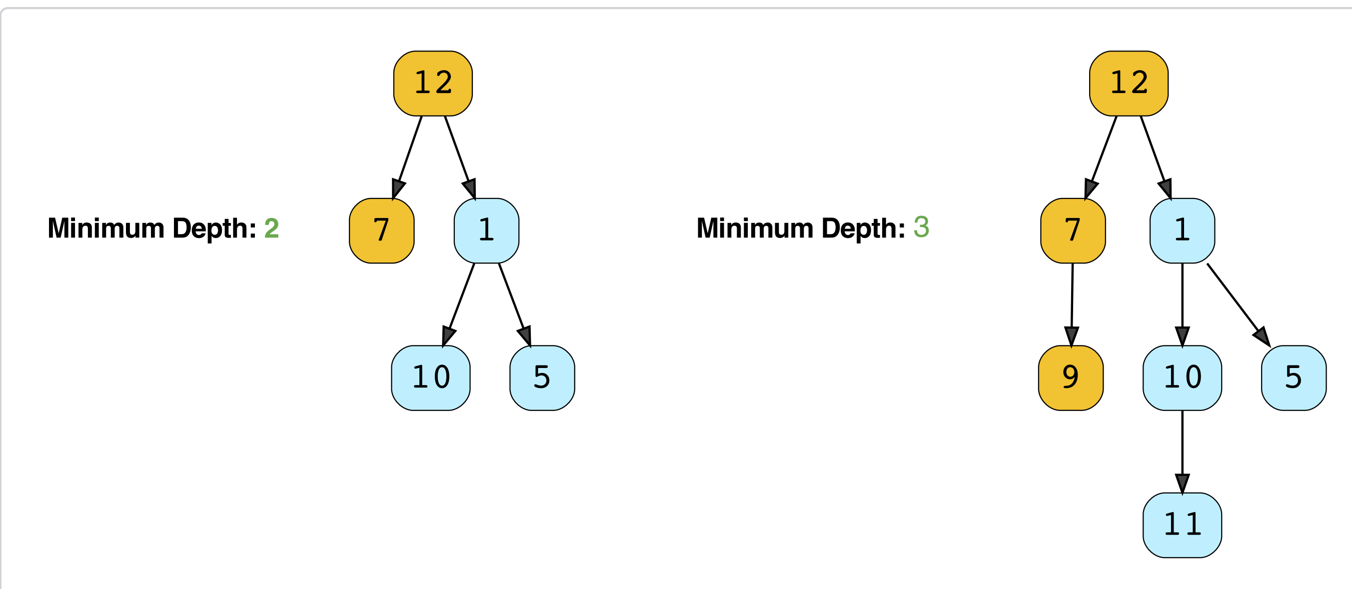
## Problem Statement#

Find the minimum depth of a binary tree. The minimum depth is the number of nodes along the **shortest path from the root node to the nearest leaf node**.

**Example 1:**




### Example 2:




# Try it yourself#

Try solving this question here:

Java | Python3 | JS | C++

```
class TreeNode {

  constructor(value) {
    this.value = value;
    this.left = null;
    this.right = null;
  }
};


const find_minimum_depth = function(root) {
  // TODO: Write your code here
  return -1;
};



var root = new TreeNode(12)
root.left = new TreeNode(7)
root.right = new TreeNode(1)
root.right.left = new TreeNode(10)
root.right.right = new TreeNode(5)
console.log(`Tree Minimum Depth: ${find_minimum_depth(root)}`)
root.left.left = new TreeNode(9)
root.right.left.left = new TreeNode(11)
console.log(`Tree Minimum Depth: ${find_minimum_depth(root)}`)
```

Run    Save    Reset

# 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, instead of keeping track of all the nodes in a level, we will only track the depth of the tree. As soon as we find our first leaf node, that level will represent the minimum depth of the tree.

# Code#

Here is what our algorithm will look like, only the highlighted lines have changed:

Java | Python3 | C++ | JS

```
const Deque = require('./collections/deque'); //http://www.collectionsjs.com


class TreeNode {
  constructor(val) {
    this.val = val;
    this.left = null;
    this.right = null;
  }
}

function find_minimum_depth(root) {
  if (root === null) {
    return 0;
  }

  const queue = new Deque();
  queue.push(root);
  let minimumTreeDepth = 0;
  while (queue.length > 0) {
    minimumTreeDepth += 1;
    levelSize = queue.length;
    for (i = 0; i < levelSize; i++) {
      currentNode = queue.shift();

      // check if this is a leaf node
      if (currentNode.left === null && currentNode.right === null) {
        return minimumTreeDepth;
```

```
      }
      // insert the children of current node in the queue
      if (currentNode.left !== null) {
        queue.push(currentNode.left);
      }
      if (currentNode.right !== null) {
        queue.push(currentNode.right);
      }
    }
  }
}


const root = new TreeNode(12);
root.left = new TreeNode(7);
root.right = new TreeNode(1);
root.right.left = new TreeNode(10);
root.right.right = new TreeNode(5);
console.log(`Tree Minimum Depth: ${find_minimum_depth(root)}`);
root.left.left = new TreeNode(9);
root.right.left.left = new TreeNode(11);
console.log(`Tree Minimum Depth: ${find_minimum_depth(root)}`);
```

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 $O(N)$ which is required 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.

# Similar Problems#

**Problem 1:** Given a binary tree, find its maximum depth (or height).

**Solution:** We will follow a similar approach. Instead of returning as soon as we find a leaf node, we will keep traversing for all the levels, incrementing `maximumDepth` each time we complete a level. Here is what the code will look like:

Java Python3 C++ JS

```
const Deque = require('./collections/deque'); //http://www.collectionsjs.com


class TreeNode {
  constructor(val) {
    this.val = val;
    this.left = null;
    this.right = null;
  }
}


function find_maximum_depth(root) {
  if (root === null) {
    return 0;
  }

  const queue = new Deque();
  queue.push(root);
  let maximumTreeDepth = 0;
  while (queue.length > 0) {
    maximumTreeDepth += 1;
    const levelSize = queue.length;
    for (i = 0; i < levelSize; i++) {
      currentNode = queue.shift();

      // insert the children of current node in the queue
```

```
      if (currentNode.left !== null) {
        queue.push(currentNode.left);
      }
      if (currentNode.right !== null) {
        queue.push(currentNode.right);
      }
    }
  }
  return maximumTreeDepth;
}


const root = new TreeNode(12);
root.left = new TreeNode(7);
root.right = new TreeNode(1);
root.right.left = new TreeNode(10);
root.right.right = new TreeNode(5);
console.log(`Tree Maximum Depth: ${find_maximum_depth(root)}`);
root.left.left = new TreeNode(9);
root.right.left.left = new TreeNode(11);
console.log(`Tree Maximum Depth: ${find_maximum_depth(root)}`);
```

Run Save Reset