

Create eclipse project 2190221_Q3_{yourID}_{FirstName}, for example, 2190221_Q3_6532782021_Adam

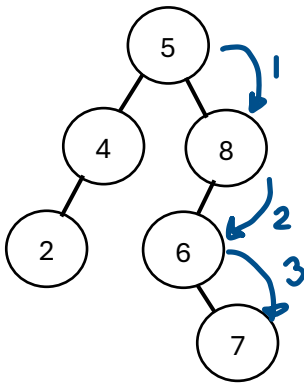
You are writing code for Binary Search Tree.

- Copy files from folder 04_BST to your project src folder. (you can add code from other given folders if needed.)
- Copy other .java files in folder Q3 into your project.

For the given class, BST, write the following methods:

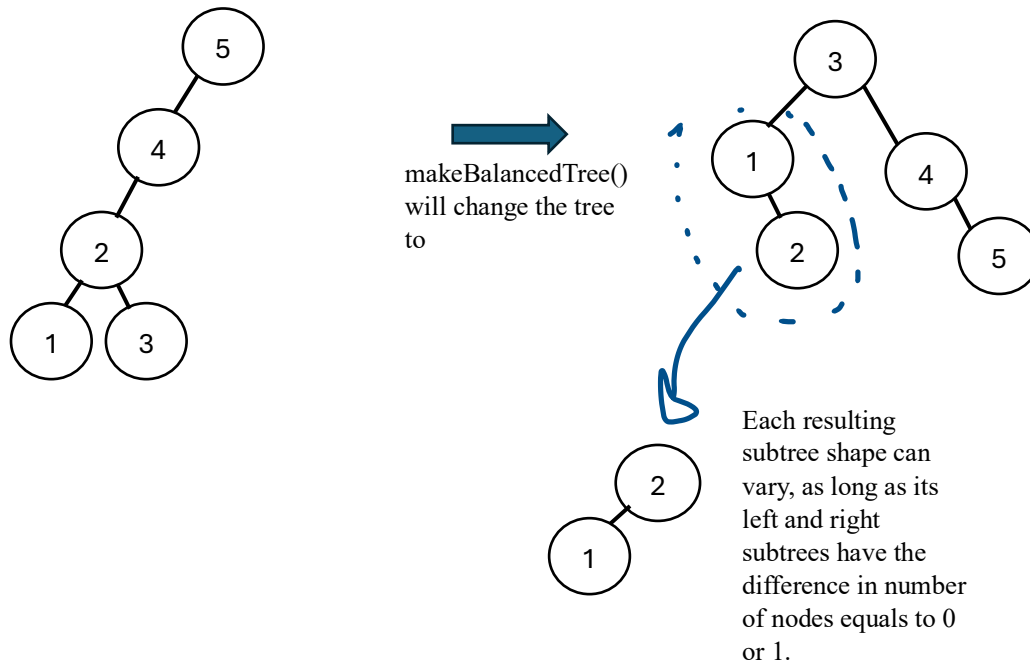
- public int height();
 - calculate the height of the tree. It is the number of branches **furthest** away from the root.

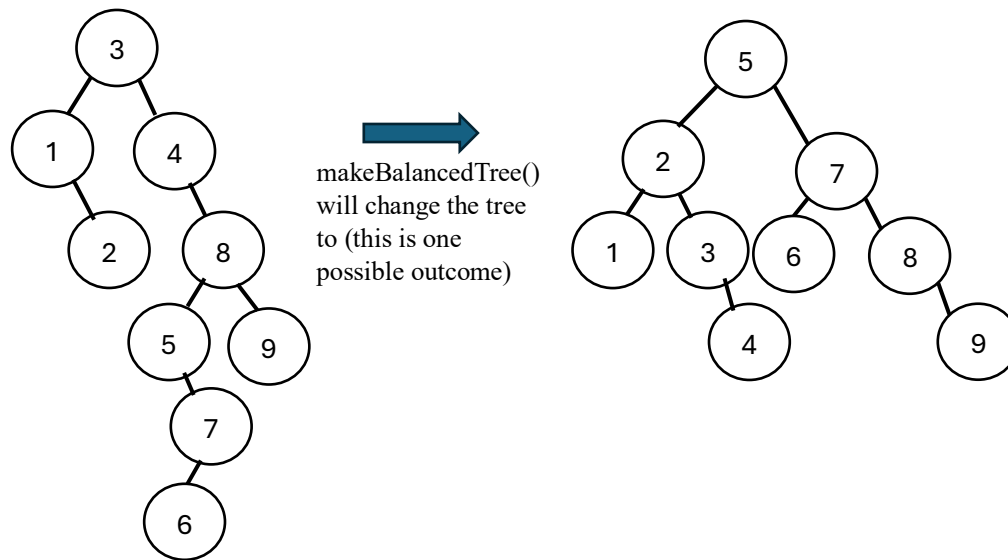
For example, the following tree has height =3.



- public void makeBalancedTree():
 - This method reads the content of this BST and creates a new BST (overwriting the original tree).
 - The changed tree **distributes nodes evenly** on its left and right subtrees (so as each subtree).

For example, if our original BST looks like:





Important Hints:

1. Trees that contain the same number sequence (but different tree shape) can change to the same shape after executing makeBalancedTree().
2. Writing a method that creates an array that stores sorted data from the tree may help. Don't forget to deal with the case where the root of the tree is null.
3. Some methods are already implemented (you don't need to use them, they are used by test cases):
 - `public boolean contains(int value)`: tests whether the tree stores the given value.
 - `public int numNodes(BSTNode n)`: number of nodes in subtree which has n as its root.
 - `public boolean isBalanced(BSTNode n)`: tests whether a subtree with n as its root is actually a balanced tree.
4. You can write your own methods.

Scoring Criteria:

The total score is 20 (will be scaled to 10).

Run the given JUnit file (given in folder Q3) (If you do not write your code, you will not get any marks):

- | | |
|-------------------------|---------|
| • testheight | 2 marks |
| • Testheight2 | 2 marks |
| • testmakeBalancedTree1 | 1 mark |
| • testmakeBalancedTree2 | 2 marks |
| • testmakeBalancedTree3 | 4 marks |
| • testmakeBalancedTree4 | 9 marks |

You can create new array or ArrayList in this question.