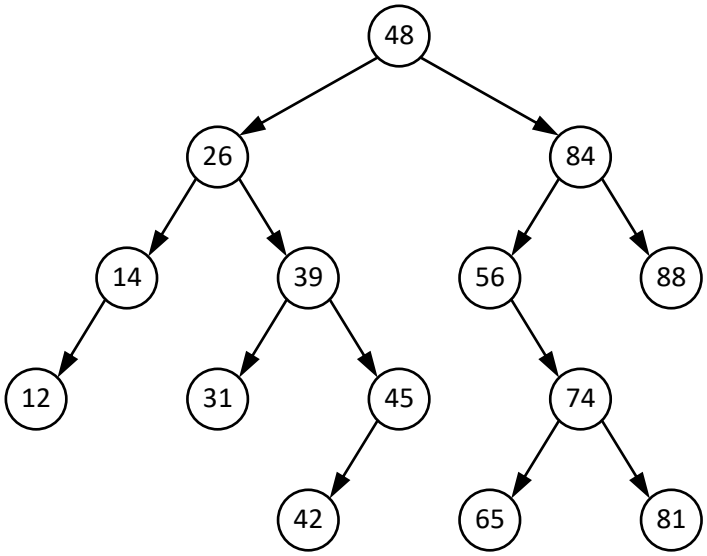
Degree in Software Engineering – Data Structures

Seminars 3 and 4: BSTs, AVL Trees and B-Trees Academic year 2019/20

Exercise 1 (1 pt): Create an empty BST and add the following set of nodes in the order given. Show the resulting tree after adding all the nodes, i.e. it is not necessary to show the process of adding each individual node into the tree.

38, 23, 56, 86, 75, 82, 47, 91, 51, 48, 15, 21

Exercise 2 (1 pt): Given the following BST, remove the nodes shown in the list below in order. Show the resulting tree after the removal of each node from the tree.

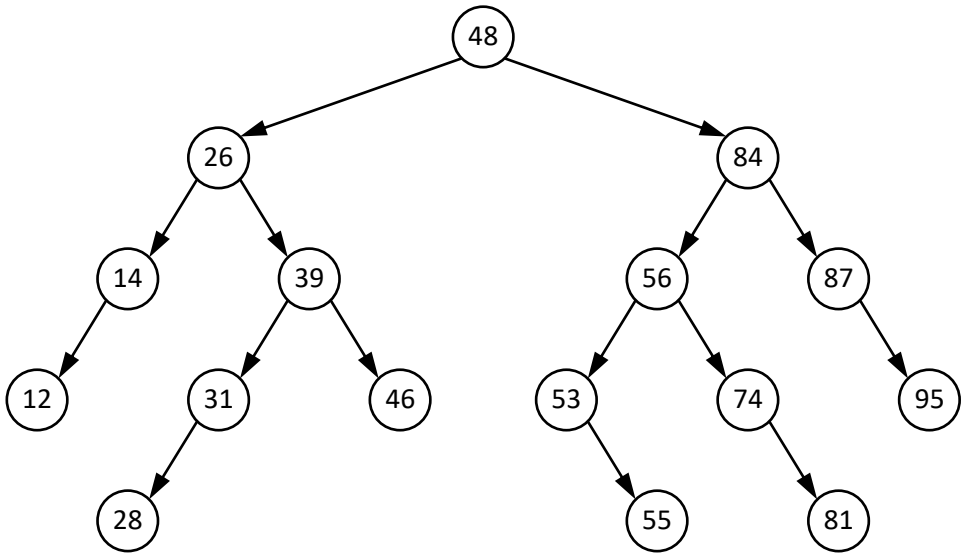


31, 56, 84, 26, 39

Exercise 3 (2 pts): Create an empty AVL tree and add the following set of nodes in the order given. Show the resulting tree after the addition of each series of nodes. Remember that you may need to perform rotations to keep the tree balanced. Indicate the height and balance factor of every node in each tree representation.

10, 20, 60	30, 65, 40	15, 14, 12, 11

Exercise 4 (2 pts): Given the following AVL tree, remove the nodes shown in the list below in order. Show the resulting tree after the removal of each node from the tree. Remember that you may need to perform rotations to keep the tree balanced. Indicate the height and balance factor of every node in each step.

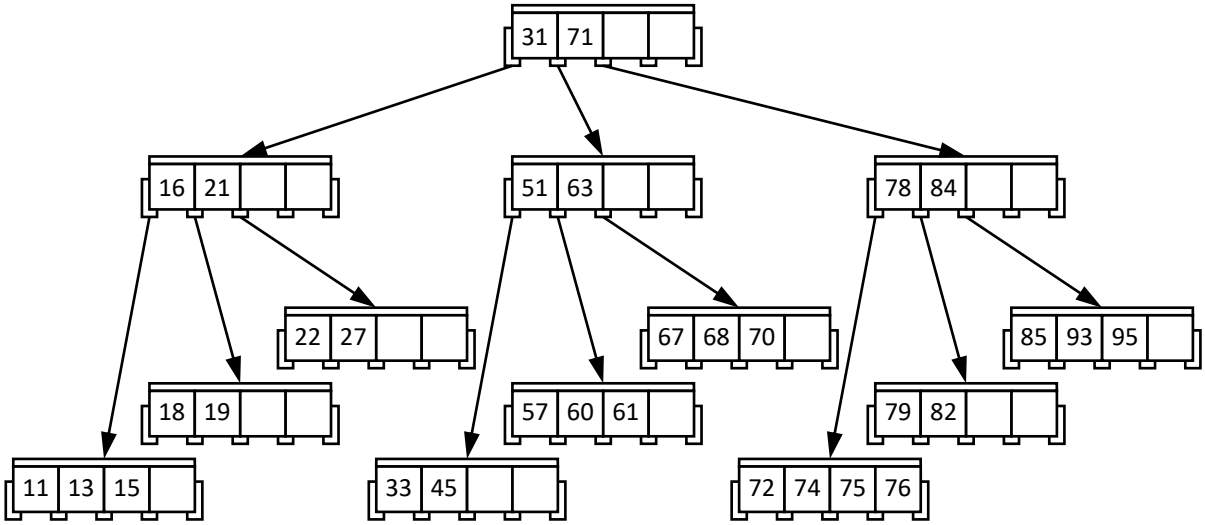


46, 56, 87, 74, 55

Exercise 5 (2 pts): Create an empty B-tree of order 3 and add the following set of keys in order. Show the resulting tree every time a page is split, and after adding all the keys, i.e. it is not necessary to show the tree if its structure remains the same after adding a key.

13, 27, 56, 44, 22, 89, 18, 11, 35, 74, 60, 32, 52

Exercise 6 (2 pts): Given the following B-tree of order 2, remove the keys shown in the list below in order. Show the resulting tree after the removal of each key from the tree.



78, 79, 82, 60, 45, 74