

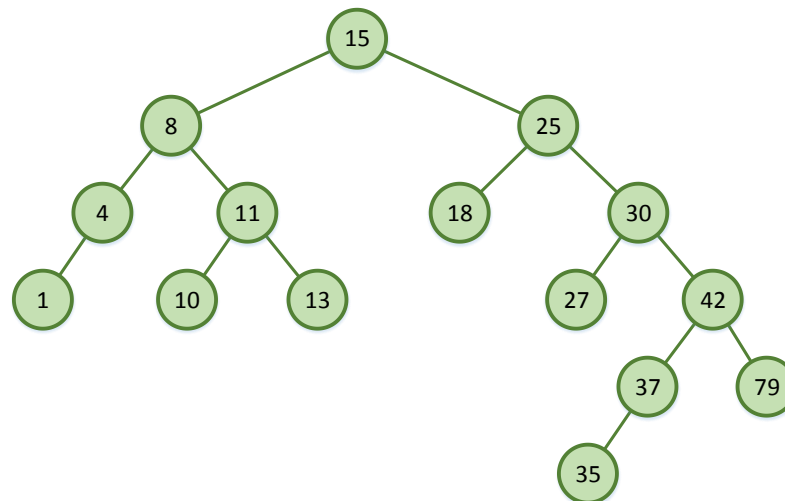


## Exercise Sheet 3: Trees & Advanced Indexes (until Tuesday 23.05.2014)

Exercises will be discussed on **Friday** on week after the respective lecture was given. The handouts are optional and do not have to be handed in. They only serve as optional preparation for the oral exams at the end of the semester.

### Exercise 1 - Binary Search Trees

- a. Given is the following binary search tree. Delete the nodes 10, 4, 30 and 15. If a node has two children, replace the node with its In-Order successor. Show the tree after each deletion step.



- b. In the original tree: access all nodes of the tree in Pre-Order, In-Order and Post-Order  
c. Why are simple binary search trees unsuitable for indexing database records?

### Exercise 2 - B-Trees

- a. What are the main differences between a simple binary search tree and a B-Tree? Why are these changes more efficient regarding disk accesses?  
b. Build a B-Tree by inserting the keys 1 to 20 in ascending order. The lower bound L is 2 and the upper bound U is  $2L=4$ . What do you recognize?  
c. What is the difference between a B-Tree a B\*Tree and a B+Tree?