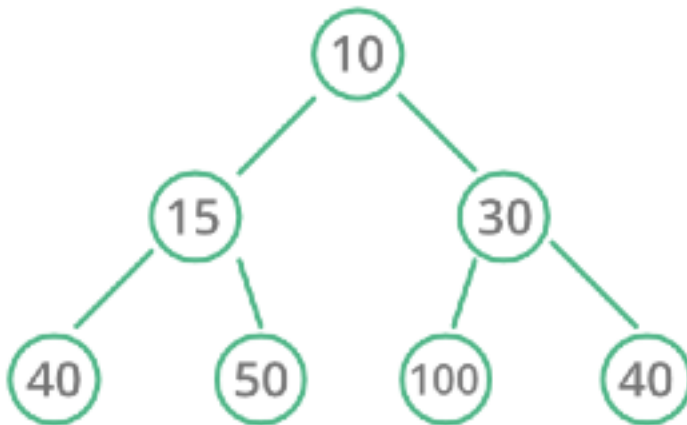


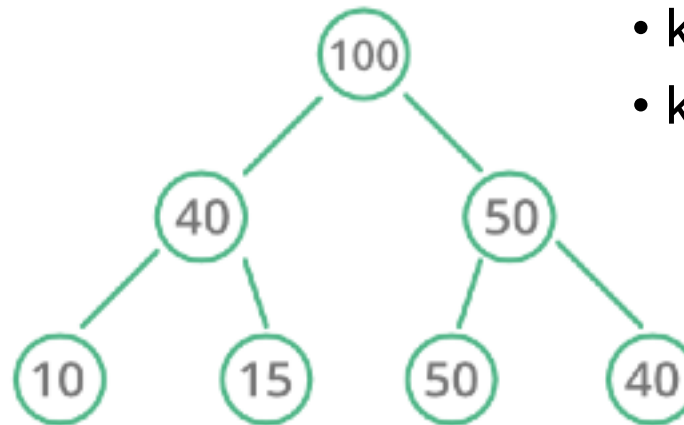
# Heap Data Structure

- useful data structure for the heap sort algorithm that can sort elements in an unsorted array with at most  $O(n \log n)$  time complexity
- tree data structure where the root-node key is compared with its children and arranged accordingly. If  $\alpha$  has child node  $\beta$  then:

- $\text{key}(\alpha) \leq \text{key}(\beta)$
- $\text{key}(\alpha) \geq \text{key}(\beta)$



Min Heap



Max Heap

# Application of trees

- Storing naturally hierarchical data eg:- file system, HDF5
- Organise data for quick search, insertion, deletion eg:- binary search tree
- TRIE (prefix trees) are used in auto-completions and makes use of dictionary words
- Network routing algorithm

