5118006-03 Data Structures

Binary Search Tree

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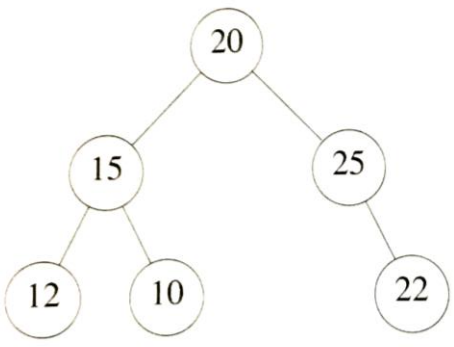
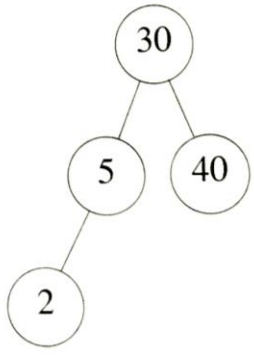
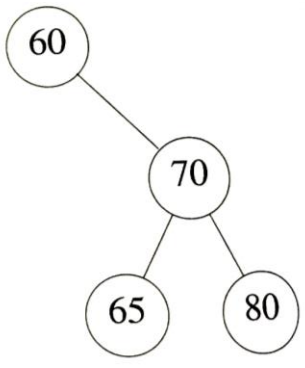
Shin Hong

Binary Search Tree

- A binary search tree is a binary tree with the following properties
  (1) each node has a unique key
  (2) keys in the left subtree are smaller than the key in the root
  (3) keys in the right subtree are greater than the key in the root
- A binary search tree can be used for constructing a dictionary as a collection of key-value pairs
- Examples







Operations

- search(T, K)
  - from the root node, compare the key with K
  - if K is equal to the key, return the node
  - if K is less than the key, recursively search the left-subtree if exists
  - if K is greater than the key, recursively search the r ight subtree if exists
- insert(T, K, V)
  - find the last node at the search
  - add a new node as the left or right child
- delete(T, K)

Operations

- search(T, K)
- insert(T, K, V)
- delete(T, K)
  - locate node X whose key is K
  - if it is a leaf, delete X
  - if it has a single child, replace X with its child
  - if it has two children:
    - find node Y immediately next to X
    - replace the element of X with that of Y
    - delete Y