

# Binary Search Trees: Search Trees

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Data Structures  
Data Structures and Algorithms

# Learning Objectives

- Describe how a Binary Search Tree data structure is constructed.
- Determine whether a tree is properly sorted.

# Last Time

- Want data structure for local search.

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- None of the existing data structures work.

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- Want data structure for local search.
- None of the existing data structures work.
- Sorted arrays can search but not update.

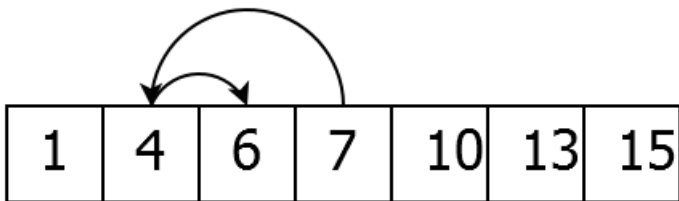
# Outline

① Array Search

② The Search Tree Structure

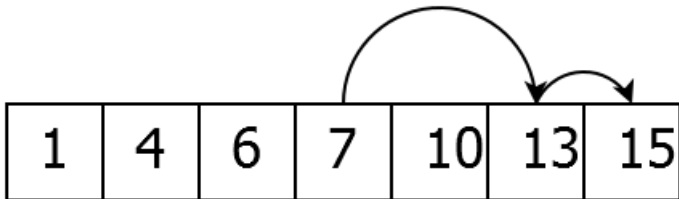
# Binary Search

Search an array:



# Binary Search

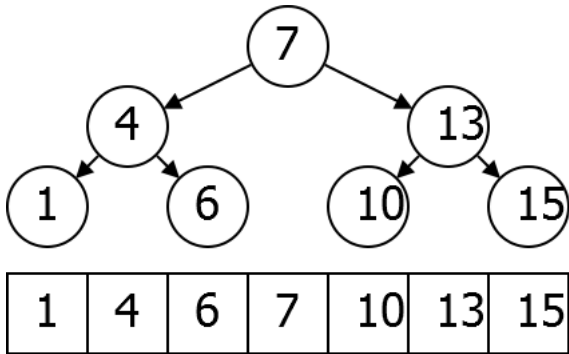
Search an array:





# Search Tree

Consider questions asked:



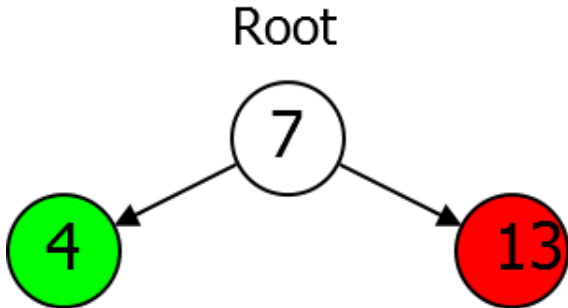
The search tree is much easier to insert into.

# Outline

- 1 Array Search
- 2 The Search Tree Structure

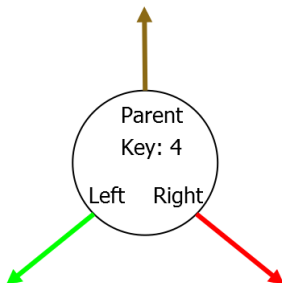
# Parts of a Tree

- Root node.
- Left subtree smaller keys.
- Right subtree bigger keys.



# Tree Node Data Type

- Key
- Parent
- Left Child
- Right Child

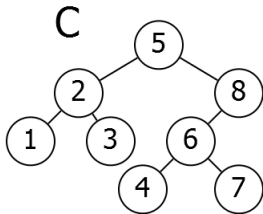
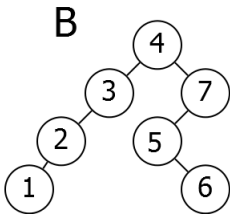
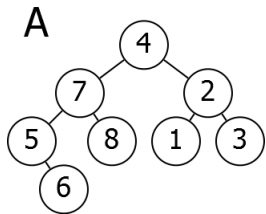


# Search Tree Property

$X$ 's key is larger than the key of any descendent of its left child, and smaller than the key of any descendant of its right child.

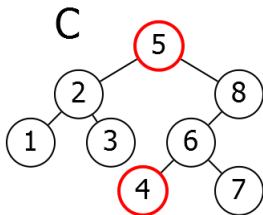
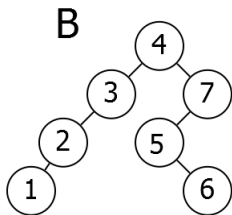
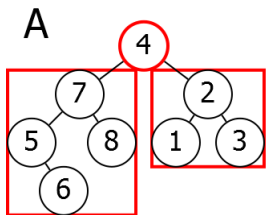
# Problem

Which of the following Trees satisfies the Search Tree Property?



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# Next Time

How to do basic operations on Binary Search Trees.