CSE 12 – Basic Data Structures and Object-Oriented Design
Lecture 19

Greg Miranda, Fall 2020

This lecture is being recorded

Announcements

- Quiz 19 due Friday @ 9am
- Survey 7 due Friday @ 11:59pm
- PA6 due tonight @ 11:59pm

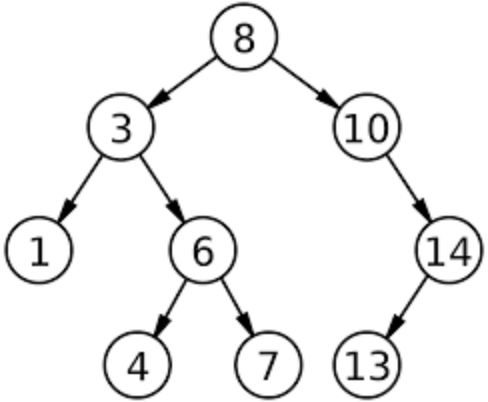
Topics

- Binary Search Trees
- Questions on Lecture 19?

Binary Search Tree

What order does PAE() traverse the tree?

```
void printAllElements(Node<K, N> n) {
  if (n == null ) return;
  System.out.println(n.key);
  printAllElements(n.left);
  printAllElements(n.right);
}
void printAllElement() {
  printAllElements(this.root);
}
```



What's the post, pre, in-order traversal of this tree?

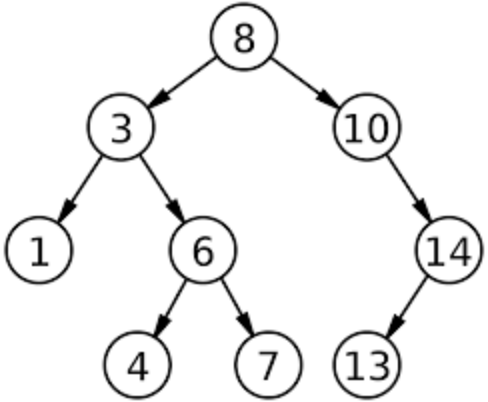
```
class Node<K,V> {
  K key;
  V value;
  Node<K,V> left;
  Node<K,V> right;
  public Node(K key, V value,
                  Node<K,V> left,
                  Node<K,V> right) {
    this.key = key;
    this.value = value;
    this.left = left;
    this.right = right;
  }
}
```

```
class BSTMap<K,V> implements OrderedDefaultMap<K,V>{
  Node<K, V> root;
  int size;
  Comparator<K> comparator;
  ...
  Node<K, V> set(Node<K, V> node, K key, V value) {
    if (node == null) {
      this.size += 1;
      return new Node<K, V>(key, value, null, null);
    }
    int comp = this.comparator.compare(node.key, key);
    if (comp < 0) {
      node.right = this.set(node.right, key, value);
      return node;
    } else if (comp > 0) {
      node.left = this.set(node.left, key, value);
      return node;
    } else {
      node.value = value;
      return node;
    }
  }

  @Override
  public void set(K key, V value) {
    if (key == null) {
      throw new IllegalArgumentException();
    }
    this.root = this.set(this.root, key, value);
  }
}
```

Binary Search Tree

- Assume the key and value are identical for this example
- set(“5”, 5);
- set(“11”, 11);
- set(“15”, 15);
- set(“12”, 12);
- What’s the picture after calling the above set() methods?



Questions on Lecture 19?