Project 3

Due 11:59 PM Monday October 9

This project **must** be submitted on time.

Project 3

- Implement the methods insert, remove, findName and print in the BoundedBST class

- The tree is stored in parallel arrays. The use of parallel arrays is un-java like but you must do it this way.

- The methods must call private recursive methods that do most of the work. You have to figure out the signatures of the private methods.

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Example Tree (root == 3 and free ==12)

Index	left	key	name	right
0	10			
1	-1	70	Boyle	-1
2	-1			
3	9	50	Pasteur	4
4	11	75	Curie	14
5	7			
6	-1	10	Hodgkin	-1
7	13			
8	-1	40	Mendeleev	-1
9	6	25	Pauling	8
10	5			
11	-1	60	Avogadro	1
12	0			
13	2			
14	-1	80	Rutherford	-1

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```
import java.util.*;
import java.io.*;

public class BoundedBST {
//Implements an BST tree of (int, name) pairs stored in parallel arrays
//There are no duplicates in the tree

    private int root; //the index of the root node
    private int free; //the first node in the free list
     private int left[];
     private int key[];
     private String name[];
     private int right[];
     private int maxIndexUsed;
```

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```
public BoundedBST(int size) {
  root = -1;
  free = -1;
  left = new int[size];
  key = new int[size];
  name = new String[size];
  right = new int[size];
  maxIndexUsed = -1;
}
```

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```
public boolean full() {
     return maxIndexUsed == key.length-1 && free == -1;
 }

 public void insert(int k, String s) {
 //PRE: the tree is not full
 //if k is not in the tree insert (k,s) otherwise the tree does not change
 //if space is available in the free list then the first item on the free list
 //must be used to store the new node otherwise use the space at maxIndexUsed+1

 }

 public void print() {
 //print a comma delimited list of pairs, (key, name),of values in the tree in
//ascending order of the key on one line. a newline should be printed at the end of the
//line for example (10,Hodgkin), (25,Pauling), (40,Mendeleev),(50,Pasteur), (60,Avogadro),
//70,Boyle), (75,Curie), (80,Rutherford)

}
```

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```
    public void remove(int k) {
    //if k is in the tree remove the node with key k and add the node containing k to the free list
    //if k is not in the tree do nothing

    }

    public String findName(int k) {
    //if k is in the tree return the name associated with k otherwise return null

    }
}
```

Project 3

- Add instance variables and methods as needed
- For each instance variable and method add a comment describing the purpose or use of the variable or method
- Include a comment with your name at the top of the file

Project 3 Submission

- Upload one zip file to Canvas. The zip file must contain **only one file called BoundedBST.java**. Do not upload your whole Eclipse project!
- You have to write code to test your program but I will write my own test driver. Do not up load your test driver code.
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