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### Program: How to check the given Binary Tree is Binary Search Tree (BST) or not?

#### Description:

In a Binary Tree, each node can have at most two nodes. For a binary tree to be a binary search tree (BST), the data of all the nodes in the left sub-tree of the root node should be less than or equals to the data of the root. The data of all the nodes in the right subtree of the root node should be greater than the data of the root.

There are various ways to validate Binary Search Tree. One of the simple way is: The in-order traversal of a binary search tree results natural order. So, we can do in-order traversal and check for natural order. If the order sorted, then it is binary search tree. We will give this implementation in the coming pages.

In this page we follow different approach. We will set min and max value for each node and validate node data against min and max value. The same approach will continue for each left and right sub binary search tree in recursive way.

Here is the steps to validate binary search tree:

1. Start with root node. In this case root node data min & max values can be extreme integer ranges. Pass min value as Integer.MIN\_VALUE and max value as Integer.MAX\_VALUE.
2. Make sure node data is falling under min & max values.
3. Along with the above check, make sure the left and right sub trees are also go through similar checks.
4. Make a recursive call on left node with no change in min value and node data as max value.
5. Make a recursive call on right node with node data as min value and no change in max value.
6. Check the the code for better understanding.

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### IsBinarySearchTree

```

1 package com.java2novice.ds;
2
3 public class IsBinarySearchTree {
4
5     public boolean isBinarySearchTree(BstNode root) {
6
7         if(root == null) return Boolean.TRUE;
8         return isBstValid(root, Integer.MIN_VALUE, Integer.MAX_VALUE);
9     }
10
11     private boolean isBstValid(BstNode root, Integer minValue, Integer maxValue) {
12
13         if(root == null) return Boolean.TRUE;
14         if(root.getData() >= minValue && root.getData() < maxValue
15             && isBstValid(root.getLeft(), minValue, root.getData())
16             && isBstValid(root.getRight(), root.getData(), maxValue)) {
17             return Boolean.TRUE;
18         } else {
19             return Boolean.FALSE;
20         }
21     }
22 }

```

### BstNode

```

1 package com.java2novice.ds;
2
3 public class BstNode {
4
5     private BstNode left;

```

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### Knowledge Centre

#### What is java static import?

By using static imports, we can import the static members from a class rather than the classes from a given package. For example, Thread class has static sleep method, below example gives an idea:

```

import static java.lang.Thread;
public class MyStaticImportTest {
    public static void main(String[] a) {
        try{
            sleep(100);
        } catch(Exception ex){

```

```

}
}
}

```

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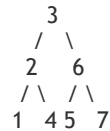
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```

14         return left;
15     }
16     public void setLeft(BstNode left) {
17         this.left = left;
18     }
19     public BstNode getRight() {
20         return right;
21     }
22     public void setRight(BstNode right) {
23         this.right = right;
24     }
25
26     public Integer getData() {
27         return data;
28     }
29 }

```

Input Tree:



Input Tree in main method:

```

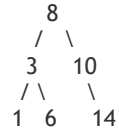
1  public static void main(String a[]) {
2
3      BstNode root = new BstNode(3);
4      // left sub tree
5      BstNode node_2 = new BstNode(2); root.setLeft(node_2);
6      BstNode node_1 = new BstNode(1); node_2.setLeft(node_1);
7      BstNode node_4 = new BstNode(4); node_2.setRight(node_4);
8      // right sub tree
9      BstNode node_6 = new BstNode(6); root.setRight(node_6);
10     BstNode node_5 = new BstNode(5); node_6.setLeft(node_5);
11     BstNode node_7 = new BstNode(7); node_6.setRight(node_7);
12
13     IsBinarySearchTree ibsTree = new IsBinarySearchTree();
14     System.out.println(ibsTree.isBinarySearchTree(root));
15 }

```

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Input Tree:



Input Tree in main method:

```
1 public static void main(String a[]) {
2
3     BstNode root = new BstNode(8);
4     // left sub tree
5     BstNode node_3 = new BstNode(3); root.setLeft(node_3);
6     BstNode node_1 = new BstNode(1); node_3.setLeft(node_1);
7     BstNode node_6 = new BstNode(6); node_3.setRight(node_6);
8     // right sub tree
9     BstNode node_10 = new BstNode(10); root.setRight(node_10);
10    BstNode node_14 = new BstNode(14); node_10.setRight(node_14);
11
12    IsBinarySearchTree ibsTree = new IsBinarySearchTree();
13    System.out.println(ibsTree.isBinarySearchTree(root));
14 }
```

Output:

true

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### LIST OF ALL INTERVIEW PROGRAMS:

Remove last node of the Linked List

Identify middle element of a Linked List

Identify given LinkedList is a palindrom or not using Stack.

Remove duplicates from sorted linked list

Find Nth node from the end of Linked List

Identify loop/cycle in a LinkedList.

Find length of a loop in a LinkedList.

Detect and remove loop in a LinkedList.

How to reverse Singly Linked List?

Check if given Linked List is a Circular Linked List or not.

Find out duplicate number between 1 to N numbers.

Find out middle index where sum of both ends are equal.

Write a singleton class.

Write a program to create deadlock between two threads.

Write a program to reverse a string using recursive algorithm.

Write a program to reverse a number.

Write a program to convert decimal number to binary format.



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Write a program to find top two maximum numbers in an array.

Write a program to sort a map by value.

Write a program to find common elements between two arrays.

How to swap two numbers without using temporary variable?

Write a program to print fibonacci series.

Write a program to find sum of each digit in the given number using recursion.

Write a program to check the given number is a prime number or not?

Write a program to find the given number is Armstrong number or not?

Write a program to convert binary to decimal number.

Write a program to check the given number is binary number or not?

Write a program for Bubble Sort in java.

Write a program for Insertion Sort in java.

Write a program to implement hashCode and equals.

How to get distinct elements from an array by avoiding duplicate elements?

Write a program to get distinct word list from the given file.

Write a program to get a line with max word count from the given file.

Write a program to convert string to number without using Integer.parseInt() method.

Write a program to find two lines with max characters in descending order.

Write a program to find the sum of the first 1000 prime numbers.

Find longest substring without repeating characters.

Write a program to remove duplicates from sorted array.

How to sort a Stack using a temporary Stack?

Write a program to print all permutations of a given string.

Implement Binary Search Tree (BST)

Find min and max value from Binary Search Tree (BST)



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Implement Binary Search Tree (BST) post-order traversal (depth first).

How to check the given Binary Tree is Binary Search Tree (BST) or not?

How to delete a node from Binary Search Tree (BST)?

Write a program to find common integers between two sorted arrays.

Write a program to find given two trees are mirror or not.

HackerRank stack problem - Find maximum element.

HackerRank stack problem - Balanced Brackets.

HackerRank stack problem - Equal Stacks.

HackerRank stack problem - Game Of Two Stacks.

### About Author

I'm Nataraja Gotooru, programmer by profession and passionate about technologies. All examples given here are as simple as possible to help beginners. The source code is compiled and tested in my dev environment.

If you come across any mistakes or bugs, please email me to [java2novice@gmail.com](mailto:java2novice@gmail.com).

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