

Activity 8.2

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BinaryTreeNode.java

```
public class BinaryTreeNode {
    String label;
    BinaryTreeNode left;
    BinaryTreeNode right;

    BinaryTreeNode(String label, BinaryTreeNode left, BinaryTreeNode right) {
        this.label = label;
        this.left = left;
        this.right = right;
    }

    public String toString() {
        return "[" + label + ", " + left + ", " + right + "]";
    }
}
```

TraverseBinaryTree.java

```
public class TraverseBinaryTree {
    public static void traversePreorder(BinaryTreeNode t) {
        if(t == null) return;
        System.out.println("Visited node: " + t.label);
        traversePreorder(t.left);
        traversePreorder(t.right);
    }

    public static void traverseInorder(BinaryTreeNode t) {
        if (t == null) return;
        traverseInorder(t.left);
        System.out.println("Visited node: " + t.label);
        traverseInorder(t.right);
    }

    public static void traversePostorder(BinaryTreeNode t) {
        if (t == null) return;
        traversePostorder(t.left);
        traversePostorder(t.right);
        System.out.println("Visited node: " + t.label);
    }
}
```

```

public static String getSpaces(int n) {
    String s = "";
    for(int i = 0; i < n; i++)
        s += " ";
    return s;
}

public static String prettyPrint(BinaryTreeNode node) {
    return prettyPrint(0, node);
}

public static String prettyPrint(int n, BinaryTreeNode node) {
    if (node == null)
        return getSpaces(n) + "null\n";
    String s = "";
    s += prettyPrint(n+2, node.right);
    s += getSpaces(n) + node.label + "\n";
    s += prettyPrint(n+2, node.left);
    return s;
}

//Activity
public static void main(String[] args) {
    BinaryTreeNode tree, p, q, r;
    p = new BinaryTreeNode("h", null, null);
    q = new BinaryTreeNode("i", null, null);
    p = new BinaryTreeNode("d", p, q);
    q = new BinaryTreeNode("j", null, null);
    q = new BinaryTreeNode("e", null, q);
    r = new BinaryTreeNode("b", p, q);

    p = new BinaryTreeNode("f", null, null);
    q = new BinaryTreeNode("k", null, null);
    q = new BinaryTreeNode("g", q, null);
    p = new BinaryTreeNode("c", p, q);

    tree = new BinaryTreeNode("a", r, p);

    System.out.println("Tree Representation: \n" + prettyPrint(tree));
    System.out.print("Preorder Traversal [ROOT - LEFT - RIGHT]: ");
}

```

```

        traversePreorder(tree);
        System.out.print("Inorder Traversal [LEFT - ROOT - RIGHT]: ");
        traverseInorder(tree);
        System.out.print("Postorder Traversal [LEFR - RIGHT - ROOT]: ");
        traversePostorder(tree);
    }
}

```

Output and Evaluation

```

PS C:\Users\them1\Downloads\java-prak-asd\seventh-meet\activity> java -cp .\bin\
oads\java-prak-asd\seventh-meet\activity'; & 'C:\Program File
+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\them1\Do
t\activity\bin' 'TraverseBinaryTree'
Tree Representation:
    null
  g
    null
  k
    null
c
  null
f
  null
a
  null
  j
    null
  e
    null
b
  null
  i
    null
d
  null
  h
    null

```

```

Preorder Traversal [ROOT - LEFT - RIGHT]:
Visited node: a
Visited node: b
Visited node: d
Visited node: h
Visited node: i
Visited node: e
Visited node: j
Visited node: c
Visited node: f
Visited node: g
Visited node: k
Inorder Traversal [LEFT - ROOT - RIGHT]:
Visited node: h
Visited node: d
Visited node: i
Visited node: b
Visited node: e
Visited node: j
Visited node: a
Visited node: f
Visited node: c
Visited node: k
Visited node: g
Postorder Traversal [LEFR - RIGHT - ROOT]:
Visited node: h
Visited node: i
Visited node: d
Visited node: j
Visited node: e
Visited node: b
Visited node: f
Visited node: k
Visited node: g
Visited node: c
Visited node: a
PS C:\Users\them1\Downloads\java-prak-asd\seventh-meet\activity>

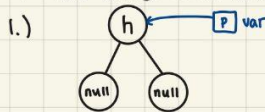
```

Answer:

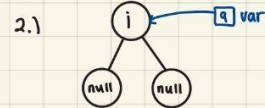
Notice both screenshots given above and below, that the result of tree representation drawn by the source code and also three different traversals method (pre-order, in-order, post-order) yield the same result, implying that both have the same tree structure.

Manual Drawn Tree (Activity 8.1)

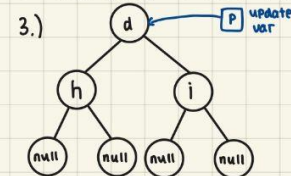
1.) $p = \text{new BinaryTreeNode}(h, \text{null}, \text{null})$



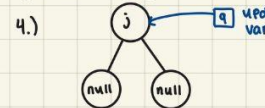
2.) $q = \text{new BinaryTreeNode}(i, \text{null}, \text{null})$



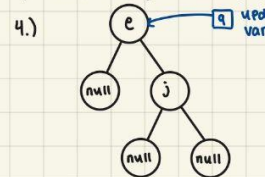
3.) $p = \text{new BinaryTreeNode}(d, p, q)$



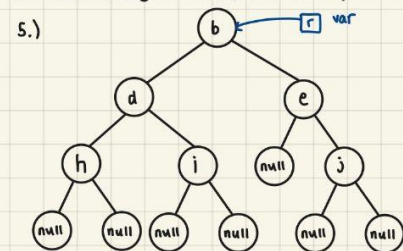
4.) $q = \text{new BinaryTreeNode}(j, \text{null}, \text{null})$



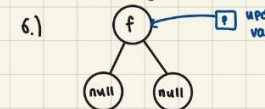
4.) $q = \text{new BinaryTreeNode}(e, \text{null}, q)$



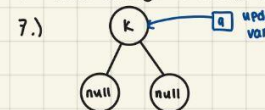
5.) $r = \text{new BinaryTreeNode}(b, p, q)$



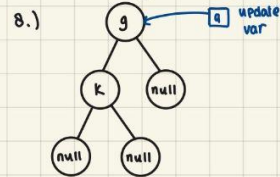
6.) $p = \text{new BinaryTreeNode}(f, \text{null}, \text{null})$



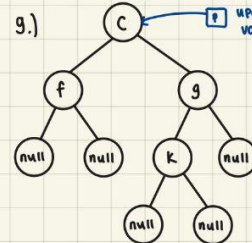
7.) $q = \text{new BinaryTreeNode}(k, \text{null}, \text{null})$



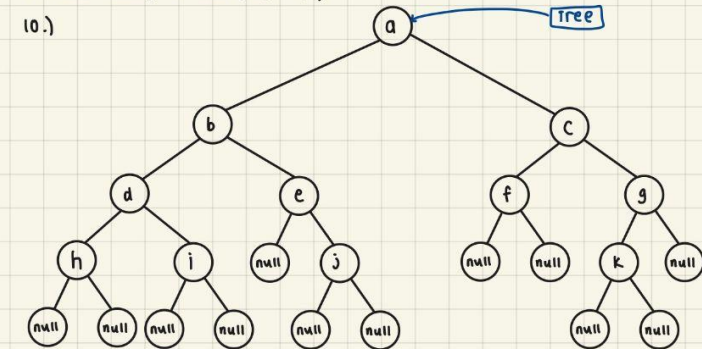
8.) $q = \text{new BinaryTreeNode}(g, q, \text{null})$



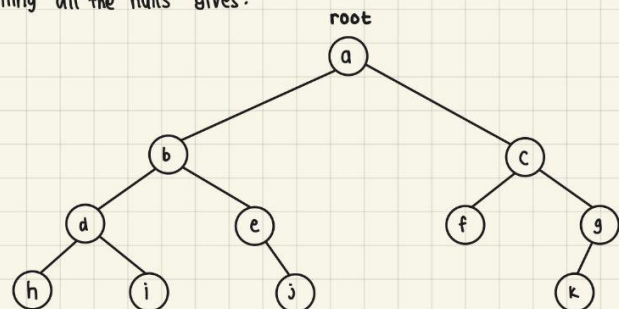
9.) $p = \text{new BinaryTreeNode}(c, p, q)$



10.) $\text{Tree} = \text{new BinaryTreeNode}(a, r, p)$



omitting all the nulls gives:



Preorder traversal: $a-b-d-h-i-e-j-c-f-g-k$

Inorder traversal: $h-d-i-b-e-j-a-f-c-k-g$

Postorder traversal: $h-i-d-j-e-b-f-k-g-c-a$

activity 8.1

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