

**CS 2123**  
**Data Structures**  
**Assignment 4**  
**Due Friday March 25**

1. (100 pts) Write a program to find the kth smallest element in a binary search tree. Since we don't know how many elements are in each subtree, we can add a new field *count* to each node that stores the total number of elements that are in the left subtree and the current node. You need to update *count* field of the nodes when you insert and delete from the tree. To find the kth smallest node, you need to use the *count* field of the current node and decide whether kth smallest node is in the left subtree or the right subtree and follow that subtree. Node structure with count field is as follows

```
struct node {  
    int key;  
    int count;  
    struct node *left, *right;  
};  
typedef struct node node;
```

Consider the binary search tree given below. Count field for a node is shown on top left of the node.

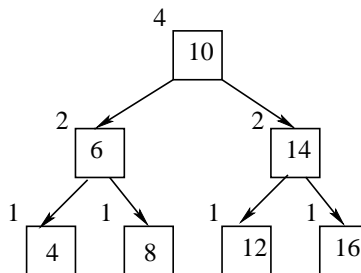


Figure 1: Binary Search Tree

Sample execution for above tree is given below

```
fox01>assign4  
Enter the set of numbers for the tree  
10 6 14 4 8 12 16  
Enter k  
5  
Result = 12
```

*Submit your program electronically using the blackboard system*

*The program you submit should be your own work. Cheating will be reported to office of academic integrity. Both the copier and copiece will be held responsible.*