EED 1010 ALGORITHMS & PROGRAMMING

LAB#10

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<u>Task 1</u>: Write function binaryTreeSearch that attempts to locate a specified value in a binary search tree. The function should take as arguments a pointer to the root node of the binary tree and a search key to be located. If the node containing the search key is found, the function should return a pointer to that node; otherwise, the function should return.

NULL pointer.

https://github.com/EnesErten/chowtoprogram/blob/master/labtask12%201

click to see the code in github

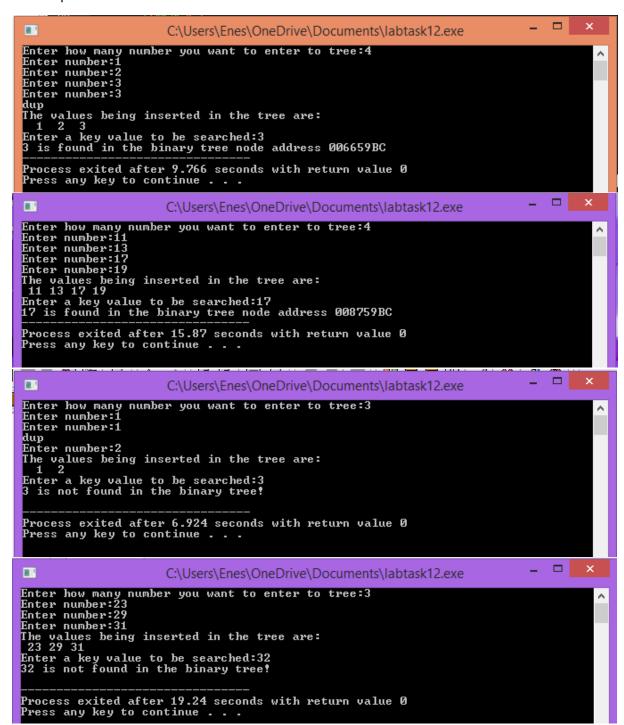
```
#include <stdio.h>
#include <time.h>
//include libraries

//defining new variable type
//left and right pointers make
//as a tree the variable type
struct treenode {
    struct treenode *left;
    int data;
    struct treenode *right;
};
//changinig names by typedef
typedef struct treenode treenode;
typedef treenode *treenodeptr;
//functions prototype
void insertnode(treenodeptr *a,int num);
```

```
treenodeptr binarysearchtree(treenodeptr a,int num);
void inorder(treenodeptr a);
void insertnode(treenodeptr *a,int num)
  if(*a==NULL)
     *a=(treenode *)malloc(sizeof(treenode));
    if(*a!=NULL)
       (*a)->data=num;
       (*a)->right=NULL;
       (*a)->left=NULL;
     }//assign num and NULLs
     if(num<(*a)->data)
       insertnode(\&((*a)->left),num);
       if(num>(*a)->data)
          insertnode(&((*a)->right),num);
         printf("dup\n");
treenodeptr binarysearchtree(treenodeptr a,int num)
void inorder(treenodeptr a)
  if(a!=NULL)
     inorder(a->left);//recursievly call
     printf("%3d",a->data);//display data
```

```
main()
  treenodeptr aptr=NULL,bptr;
  printf("Enter how many number you want to enter to tree:");
  for(i=0;i<n;i++)
  {//for loop
    printf("Enter number:");
    scanf("%d",&a);
    insertnode(&aptr,a);
  inorder(aptr);
  printf("\nEnter a key value to be searched:"); scanf("%d",&l);
  bptr=binarysearchtree(aptr,l);
  if(bptr==NULL)
    printf("%d is found in the binary tree node address %p",bptr->data,&(bptr->data));
```

The Outputs



<u>Task 2</u>: Write a program which calls the function in part (1) to search a key value in a binary search tree. Your program will first create a binary search tree with 15 nodes. The data values of the nodes are random integers from the range [1, 20]. (NOTE: if the same integer is created randomly, it will not be inserted, therefore nodes in the tree will be less than 15.) The data data values will be displayed on the screen. Then the user will enter the key value. Your program will call binaryTreeSearch() function. If the key is not found, it will display a message. If the key is found, it will display another message with key value and the address of the node. Sample program outputs are given below:

to see the code in the github.

https://github.com/EnesErten/chowtoprogram/blob/master/labtask2

```
#include <stdio.h>
#include <stdlib.h>
#include <time.h>
//include libraries
//defining new variable type
struct treenode{
  struct treenode *left;
  int data;
  struct treenode *right;
/changinig names by typedef
typedef struct treenode treenode;
typedef treenode *treenodeptr;
void insertnode(treenodeptr *a,int num);
treenodeptr binarysearchtree(treenodeptr a,int num);
void insertnode(treenodeptr *a,int num)
  if(*a==NULL)
     *a=(treenode *)malloc(sizeof(treenode));
    if(*a!=NULL)
       (*a)->data=num;
       (*a)->right=NULL;
       (*a)->left=NULL;
       printf("No memory available!\n");
```

```
insertnode(\&((*a)->left),num);
       if(num>(*a)->data)
//a num is exist in tree or not
treenodeptr binarysearchtree(treenodeptr a,int num)
 /if not exist return NULL
  else if(a->data==num)
     return a;
  else if(num<a->data)
  else if(num>a->data)
main()
  int n,i,a,l;
  treenodeptr aptr=NULL,bptr;
  srand(time(NULL));
     a=rand()\%20+1;
     printf("%d",a);
     insertnode(&aptr,a);
    printf(" ");
  bptr=binarysearchtree(aptr,l);
 send key and pointer
  if(bptr==NULL)
 if pointer is equal to NULL means key is not exist in tree
```

```
else
    printf("%d is found in the binary tree node address %p",bptr->data,&(bptr->data));
//if pointer different from NULL means key is exist in tree
}
```

The Outputs

