WEEK10: BINARY SEARCH TREES

PROGRAM

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
struct node
 {
  int info;
  struct node *rlink;
  struct node *llink;
 };
typedef struct node *NODE;
NODE getnode()
{
NODE x;
x=(NODE)malloc(sizeof(struct node));
if(x==NULL)
 {
  printf("mem full\n");
  exit(0);
 }
 return x;
}
void freenode(NODE x)
{
free(x);
}
NODE insert(NODE root,int item)
{
NODE temp,cur,prev;
```

```
temp=getnode();
temp->rlink=NULL;
temp->llink=NULL;
temp->info=item;
if(root==NULL)
 return temp;
prev=NULL;
cur=root;
while(cur!=NULL)
{
prev=cur;
cur=(item<cur->info)?cur->llink:cur->rlink;
}
if(item<prev->info)
 prev->llink=temp;
else
 prev->rlink=temp;
return root;
}
void display(NODE root,int i)
{
int j;
if(root!=NULL)
 {
  display(root->rlink,i+1);
  for(j=0;j<i;j++)
    printf("  ");
   printf("%d\n",root->info);
   display(root->llink,i+1);
 }
}
```

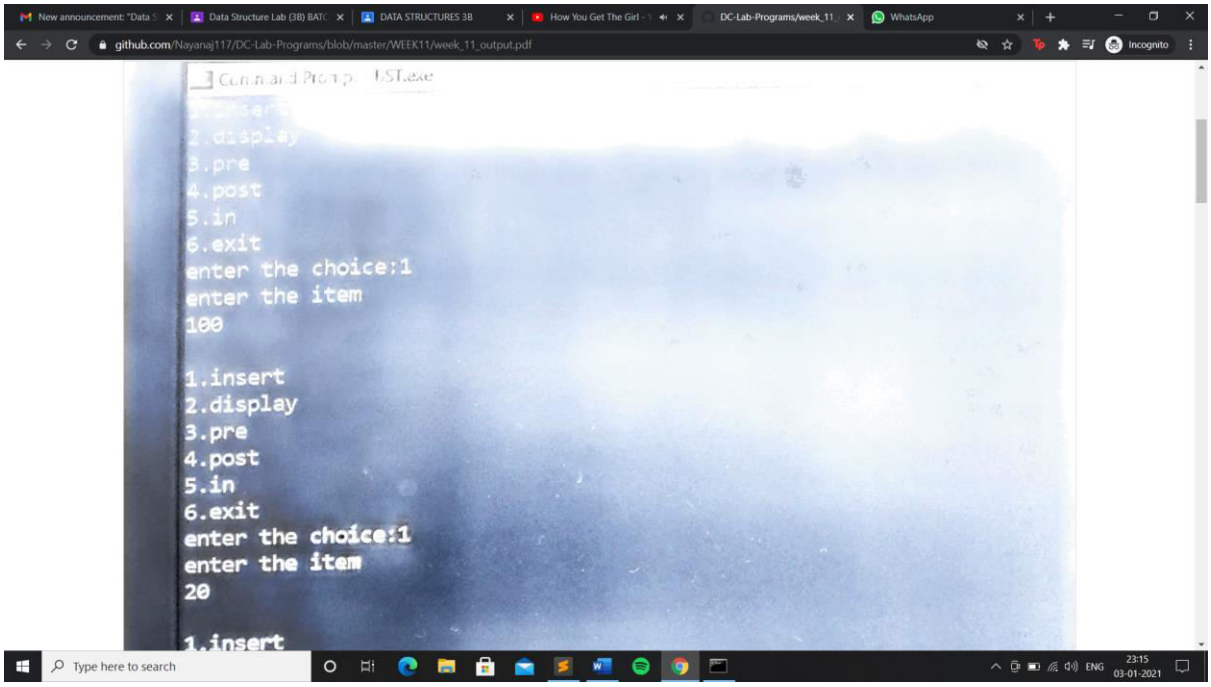
```
NODE delete(NODE root,int item)
{
NODE cur,parent,q,suc;
if(root==NULL)
{
printf("empty\n");
return root;
}
parent=NULL;
cur=root;
while(cur!=NULL&&item!=cur->info)
{
parent=cur;
cur=(item<cur->info)?cur->llink:cur->rlink;
}
if(cur==NULL)
{
 printf("not found\n");
 return root;
}
if(cur->llink==NULL)
 q=cur->rlink;
else if(cur->rlink==NULL)
 q=cur->llink;
else
 {
 suc=cur->rlink;
 while(suc->llink!=NULL)
  suc=suc->llink;
 suc->llink=cur->llink;
 q=cur->rlink;
```

```
 }
 if(parent==NULL)
  return q;
 if(cur==parent->llink)
  parent->llink=q;
 else
  parent->rlink=q;
 freenode(cur);
 return root;
 }

void preorder(NODE root)
{
if(root!=NULL)
 {
  printf("%d\n",root->info);
  preorder(root->llink);
  preorder(root->rlink);
  }
 }
void postorder(NODE root)
{
if(root!=NULL)
 {

  postorder(root->llink);
  postorder(root->rlink);
  printf("%d\n",root->info);
  }
 }
void inorder(NODE root)
```

```
{
if(root!=NULL)
 {

  inorder(root->llink);
  printf("%d\n",root->info);
  inorder(root->rlink);
  }
 }
void main()
{
int item,choice;
NODE root=NULL;
for(;;)
{
printf("\n1.insert\n2.display\n3.pre\n4.post\n5.in\n6.delete\n7.exit\n");
printf("enter the choice\n");
scanf("%d",&choice);
switch(choice)
 {
  case 1:printf("enter the item\n");
     scanf("%d",&item);
     root=insert(root,item);
     break;
  case 2:display(root,0);
     break;
  case 3:preorder(root);
     break;
  case 4:postorder(root);
     break;
  case 5:inorder(root);
```

```
    break;
  case 6:printf("enter the item\n");
    scanf("%d",&item);
    root=delete(root,item);
    break;
  default:exit(0);
     break;
   }
  }
 }
```

OUTPUT:



```
2.display
3.pre
4.post
5.in
6.exit
enter the choice:1
enter the item
200

1.insert
2.display
3.pre
4.post
5.in
6.exit
enter the choice:1
enter the item
10

1.insert
6.exit
```

```
1.insert
2.display
3.pre
4.post
5.in
6.exit
enter the choice:1
enter the item
30

1.insert
2.display
3.pre
4.post
5.in
6.exit
enter the choice:1
enter the item
```

```
150

1.insert
2.display
3.pre
4.post
5.in
6.exit
enter the choice:1
enter the item
300

1.insert
2.display
3.pre
4.post
5.in
6.exit
enter the choice:2
    300
```

```
enter the choice:4
    300
  200
    150
100
    30
  20
    10

1.insert
2.display
3.pre
4.post
5.in
6.exit
enter the choice:3
100     20      10      30      200     150     300
1.insert
2.display
3.pre
4.post
5.in
6.exit
enter the choice:4
10      30      20      150     300     200     100
```

```
6.exit
enter the choice:4
10      30      20      150     300     200     100
1.insert
2.display
3.pre
4.post
5.in
6.exit
enter the choice:5
10      20      30      100     150     200     300
1.insert
2.display
3.pre
4.post
5.in
6.exit
enter the choice:_
6.exit
```