**SSN COLLEGE OF ENGINEERING (Autonomous)**

**Affiliated to Anna University**

**DEPARTMENT OF CSE**

**UCS 1312 Data Structures Lab Laboratory**

**Exercise 9: AVL Tree**

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**function.h:**

typedef struct avltree

{

char eng[50];

char tamil[50];

char hindi[50];

struct avltree \*left, \*right;

int height;

}tree;

static int height(tree \*p)

{

if(p==NULL)

return -1;

else

return p->height;

}

int max(int a, int b)

{

if(a>b)

return a;

else

return b;

}

static tree \*singlerotleft(tree \*k2)

{

printf("Single rotating with left\n");

tree \*k1;

k1=k2->left;

k2->left=k1->right;

k1->right=k2;

k2->height=max(height(k2->left),height(k2->right))+1;

k1->height=max(height(k1->left),height(k2))+1;

return k1;

}

static tree \*singlerotright(tree \*k2)

{

printf("Single rotating with right\n");

tree \*k1;

k1=k2->right;

k2->right=k1->left;

k1->left=k2;

k2->height=max(height(k2->left),height(k2->right))+1;

k1->height=max(height(k1->right),height(k2))+1;

return k1;

}

static tree \*doublerotleft(tree \*k3)

{

printf("Double rotating with left\n");

k3->left=singlerotright(k3->left);

return singlerotleft(k3);

}

static tree \*doublerotright(tree \*k3)

{

printf("Double rotating with right\n");

k3->right=singlerotleft(k3->right);

return singlerotright(k3);

}

tree \*insert(char eng[50], char tamil[50], char hindi[50],tree \*t)

{

if(t==NULL)

{

t=(tree\*)malloc(sizeof(tree));

if(t==NULL)

printf("Out of space\n");

else

{

strcpy(t->eng,eng);

strcpy(t->tamil,tamil);

strcpy(t->hindi,hindi);

t->height=0;

t->left=t->right=NULL;

}

}

else if(strcmp(eng,t->eng)<0)

{

t->left=insert(eng, tamil, hindi, t->left);

if(height(t->left)-height(t->right)==2)

{

if(strcmp(eng,t->left->eng)<0)

{

t=singlerotleft(t);

}

else

{

t=doublerotleft(t);

}

}

}

else if(strcmp(eng,t->eng)>0)

{

t->right=insert(eng, tamil, hindi, t->right);

if(height(t->right)-height(t->left)==2)

{

if(strcmp(eng,t->right->eng)>0)

{

t=singlerotright(t);

}

else

{

t=doublerotright(t);

}

}

}

t->height=max(height(t->left),height(t->right))+1;

return t;

}

void inorder(tree \*t)

{

if(t==NULL)

return;

inorder(t->left);

printf("%s ",t->eng);

inorder(t->right);

}

tree \*find(char x[50], tree \*t)

{

if(strcmp(x,t->eng)<0)

return find(x,t->left);

else if(strcmp(x,t->eng)>0)

return find(x,t->right);

return t;

}

**main.c:**

#include<stdio.h>

#include<stdlib.h>

#include<string.h>

#include"function.h"

int main()

{

char eng[50],tamil[50],hindi[50],x[50],ch;

int n;

tree \*t;

printf("Enter no. of words: ");

scanf("%d",&n);

for(int i=0;i<n;i++)

{

printf("\nEnglish: ");

scanf(" %[^\n]",eng);

printf("Tamil: ");

scanf(" %[^\n]",tamil);

printf("Hindi: ");

scanf(" %[^\n]",hindi);

t=insert(eng,tamil,hindi,t);

printf("\nTree: ");

inorder(t);

printf("\n");

}

do

{

printf("\nEnter english word to find meanings: ");

scanf("%s",x);

tree \*p=find(x,t);

printf("Tamil: %s\nHindi: %s\n",p->tamil,p->hindi);

printf("Want to continue?(y/n): ");

scanf(" %c",&ch);

}while(ch=='y');

return 0;

}

**OUTPUT:**

gml10:Desktop cseb10$ gcc avl.c -o avl

gml10:Desktop cseb10$ ./avl

Enter no. of words: 6

English: Algorithm

Tamil: நெறிமுறை

Hindi: कलन विधि

Tree: Algorithm

English: Animation

Tamil: அசைவூட்டம்

Hindi:  एनीमेशन

Tree: Algorithm Animation

English: Bit

Tamil: நுண்மி

Hindi: बिट

Single rotating with right

Tree: Algorithm Animation Bit

English: Browser

Tamil: உலாவி

Hindi: ब्राउज़र

Tree: Algorithm Animation Bit Browser

English: Clipboard

Tamil: மறைப்பலகை

Hindi: कर्तन पट्ट

Single rotating with right

Tree: Algorithm Animation Bit Browser Clipboard

English: Compiler

Tamil: தொகுப்பி

Hindi: संकलक

Single rotating with right

Tree: Algorithm Animation Bit Browser Clipboard Compiler

Enter english word to find meanings: Bit

Tamil: நுண்மி

Hindi: बिट

Want to continue?(y/n): y

Enter english word to find meanings: Compiler

Tamil: தொகுப்பி

Hindi: संकलक

Want to continue?(y/n): y

Enter english word to find meanings: Animation

Tamil: அசைவூட்டம்

Hindi:  एनीमेशन

Want to continue?(y/n): n