# SSN College of Engineering, Kalavakkam

# Department of Computer Science and Engineering

# III Semester - CSE 'A ',’B’ & ‘C’

# UCS 1312 Data Structures Lab

# Academic Year: 2019-2020 Batch: 2018-2022

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**Exercise 9**

**Dictionary using AVL Tree**

* **Create AVL tree for maintaining English to multi-lingual dictionary for the following entries where the Key element is the English term.**

|  |  |  |
| --- | --- | --- |
| Algorithm | நெறிமுறை | कलन विधि |
| Animation | அசைவூட்டம் | एनीमेशन |
| Bit | நுண்மி | बिट |
| Browser | உலாவி | ब्राउज़र |
| Clipboard | மறைப்பலகை | कर्तन पट्ट |
| Compiler | தொகுப்பி | संकलक |
| Digital | எண்மின் | डिजिटल |
| Printer | அச்சுப்பொறி | छापनेवाला यंत्र |
| Encoding | குறியாக்கம் | संकेतीकरण |
| Gateway | நுழைவாயில் | प्रवेशद्वार |
| Hardware | வன்பொருள் | हार्डवेयर |
| Internet | இணையம் | अंतराजाल |
| Memory | நினைவகம் | याददाश्त |
| Monitor | கணித்திரை | मॉनिटर |
| Password | கடவுச்சொல் | संकेत-शब्द |

* Display the tree after inserting each element
* Display the type of rotation if applicable for each insertion.
* Find the Tamil and Hindi meanings of the given English term.

**/avl.h**

typedef struct mytree

{

char eng[25],tam[25],hindi[25];

struct mytree \*left,\*right;

int height;

}avl;

static int findheight(avl \*tree);

avl\* insert(char eng[],char tam[],char hindi[], avl \*t);

int max(int a,int b);

static avl\* singlerotatewithleft(avl \*k2);

static avl\* singlerotatewithright(avl \*k2);

static avl\* doublerotatewithleft(avl \*k3);

static avl\* doublerotatewithright(avl \*k3);

void searchnprint(char eng[],avl \*t);

void inorderdisplay(avl \*t);

static int findheight(avl \*tree)

{

if(tree==NULL)

return -1;

else

return tree->height;

}

avl\* insert(char eng[],char tam[],char hindi[], avl \*t)

{

if(t==NULL)

{

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

if(t==NULL)

{

printf("Out of Space\n");

}

else

{

strcpy(t->eng,eng);

strcpy(t->tam,tam);

strcpy(t->hindi,hindi);

t->height=0;

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

}

}

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

{

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

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

{

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

{

printf("Rotations:Single rotation with left!\n");

t=singlerotatewithleft(t);

}

else

{

printf("Rotations:Double rotation with left!\n");

t=doublerotatewithleft(t);

}

}

}

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

{

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

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

{

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

{

printf("Rotations:Single rotation with right!\n");

t=singlerotatewithright(t);

}

else

{

printf("Rotations:Double rotation with right!\n");

t=doublerotatewithright(t);

}

}

}

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

return t;

}

int max(int a,int b)

{

return (a>b)?a:b;

}

static avl\* singlerotatewithleft(avl \*k2)

{

avl \*k1;

k1=k2->left;

k2->left=k1->right;

k1->right=k2;

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

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

return k1;

}

static avl\* singlerotatewithright(avl \*k2)

{

avl \*k1;

k1=k2->right;

k2->right=k1->left;

k1->left=k2;

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

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

return k1;

}

static avl\* doublerotatewithleft(avl \*k3)

{

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

return singlerotatewithleft(k3);

}

static avl\* doublerotatewithright(avl \*k3)

{

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

return singlerotatewithright(k3);

}

void inorderdisplay(avl \*t)

{

if(t!=NULL)

{

inorderdisplay(t->left);

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

printf("Tamil:%s\t\t",t->tam);

printf("Hindi:%s\n",t->hindi);

inorderdisplay(t->right);

}

}

void searchnprint(char eng[],avl \*t)

{

int check=0;

if(t!=NULL)

{

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

{

check=1;

printf("Word Found!!!\n");

printf("Eqivalent Tamil Word:%s\n",t->tam);

printf("Eqivalent Hindi Word:%s\n",t->hindi);

}

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

{

searchnprint(eng,t->right);

}

else

{

searchnprint(eng,t->left);

}

}

if(check==0 && t==NULL)

{

printf("Word not found in the dictionary!\n");

}

}

**/main()**

#include<stdio.h>

#include<stdlib.h>

#include<string.h>

#include"avl.h"

int main()

{

int ch,ch1=1;

char eng[25],tam[25],hindi[25];

avl \*tree=NULL;

printf("Menu\n1.Enter the words.\n2.Search a word.\n3.Exit.\nEnter your choice:");

scanf("%d",&ch);

while(ch!=3)

{

switch(ch)

{

case 1:

{

ch1=1;

while(ch1==1)

{

printf("Enter the english word:");

scanf("%s",eng);

printf("Enter its tamil word:");

scanf("%s",tam);

printf("Enter its hindi word:");

scanf("%s",hindi);

tree=insert(eng,tam,hindi,tree);

printf("Inserted Successfully!\n");

printf("\n");

printf("Displaying elemens in the dictionary in alphabetical order!\n");

inorderdisplay(tree);

printf("\n");

printf("Continue(1.Yes/2.No):");

scanf("%d",&ch1);

}

break;

}

case 2:

{

printf("Enter the english word:");

scanf("%s",eng);

searchnprint(eng,tree);

break;

}

default:printf("Invalid Input!\n");

}

printf("\n");

printf("Menu\n1.Enter the words.\n2.Search a word.\n3.Exit.\nEnter your choice:");

scanf("%d",&ch);

printf("\n");

}

return 0;

}

**Sample I/O:**

Menu

1.Enter the words.

2.Search a word.

3.Exit.

Enter your choice:1

Enter the english word:Algorithm

Enter its tamil word:நெறிமுறை

Enter its hindi word:कलनविधि

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

Continue(1.Yes/2.No):1

Enter the english word:Animation

Enter its tamil word:அசைவூட்டம்

Enter its hindi word:एनीमेशन

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

Continue(1.Yes/2.No):1

Enter the english word:Bit

Enter its tamil word:நுண்மி

Enter its hindi word:बिट

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

Continue(1.Yes/2.No):1

Enter the english word:Browser

Enter its tamil word:உலாவி

Enter its hindi word:ब्राउज़र

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

Continue(1.Yes/2.No):1

Enter the english word:Clipboard

Enter its tamil word:தொகுப்பி

Enter its hindi word:संकलक

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

Continue(1.Yes/2.No):1

Enter the english word:Digital

Enter its tamil word:எண்மின

Enter its hindi word:डिजिटल

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

English:Digital Tamil:?????? Hindi:??????

Continue(1.Yes/2.No):1

Enter the english word:Printer

Enter its tamil word:அச்சுப்பொறி

Enter its hindi word:छापनेवाला

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

English:Digital Tamil:?????? Hindi:??????

English:Printer Tamil:??????????? Hindi:?????????

Continue(1.Yes/2.No):1

Enter the english word:Encoding

Enter its tamil word:குறியாக்கம்

Enter its hindi word:संकेतीकरण

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

English:Digital Tamil:?????? Hindi:??????

English:Encoding Tamil:??????????? Hindi:?????????

English:Printer Tamil:??????????? Hindi:?????????

Continue(1.Yes/2.No):1

Enter the english word:Gateway

Enter its tamil word:நுழைவாயில்

Enter its hindi word:प्रवेशद्वार

Rotations:Double rotation with left!

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

English:Digital Tamil:?????? Hindi:??????

English:Encoding Tamil:??????????? Hindi:?????????

English:Gateway Tamil:?????????? Hindi:???????????

English:Printer Tamil:??????????? Hindi:?????????

Continue(1.Yes/2.No):1

Enter the english word:Hardware

Enter its tamil word:வன்பொருள்

Enter its hindi word:हार्डवेयर

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

English:Digital Tamil:?????? Hindi:??????

English:Encoding Tamil:??????????? Hindi:?????????

English:Gateway Tamil:?????????? Hindi:???????????

English:Hardware Tamil:????????? Hindi:?????????

English:Printer Tamil:??????????? Hindi:?????????

Continue(1.Yes/2.No):1

Enter the english word:Internet

Enter its tamil word:இணையம்

Enter its hindi word:अंतराजाल

Rotations:Double rotation with left!

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

English:Digital Tamil:?????? Hindi:??????

English:Encoding Tamil:??????????? Hindi:?????????

English:Gateway Tamil:?????????? Hindi:???????????

English:Hardware Tamil:????????? Hindi:?????????

English:Internet Tamil:?????? Hindi:????????

English:Printer Tamil:??????????? Hindi:?????????

Continue(1.Yes/2.No):1

Enter the english word:Memory

Enter its tamil word:நினைவகம்

Enter its hindi word:याददाश्त

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

English:Digital Tamil:?????? Hindi:??????

English:Encoding Tamil:??????????? Hindi:?????????

English:Gateway Tamil:?????????? Hindi:???????????

English:Hardware Tamil:????????? Hindi:?????????

English:Internet Tamil:?????? Hindi:????????

English:Memory Tamil:???????? Hindi:????????

English:Printer Tamil:??????????? Hindi:?????????

Continue(1.Yes/2.No):1

Enter the english word:Monitor

Enter its tamil word:கணித்திரை

Enter its hindi word:मॉनिटर

Rotations:Double rotation with left!

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

English:Digital Tamil:?????? Hindi:??????

English:Encoding Tamil:??????????? Hindi:?????????

English:Gateway Tamil:?????????? Hindi:???????????

English:Hardware Tamil:????????? Hindi:?????????

English:Internet Tamil:?????? Hindi:????????

English:Memory Tamil:???????? Hindi:????????

English:Monitor Tamil:????????? Hindi:??????

English:Printer Tamil:??????????? Hindi:?????????

Continue(1.Yes/2.No):1

Enter the english word:Password

Enter its tamil word:கடவுச்சொல்

Enter its hindi word:संकेतशब्द

Inserted Successfully!

Displaying elemens in the dictionary in alphabetical order!

English:Algorithm Tamil:???????? Hindi:???????

English:Animation Tamil:?????????? Hindi:???????

English:Bit Tamil:?????? Hindi:???

English:Browser Tamil:????? Hindi:????????

English:Clipboard Tamil:???????? Hindi:?????

English:Digital Tamil:?????? Hindi:??????

English:Encoding Tamil:??????????? Hindi:?????????

English:Gateway Tamil:?????????? Hindi:???????????

English:Hardware Tamil:????????? Hindi:?????????

English:Internet Tamil:?????? Hindi:????????

English:Memory Tamil:???????? Hindi:????????

English:Monitor Tamil:????????? Hindi:??????

English:Password Tamil:?????????? Hindi:?????????

English:Printer Tamil:??????????? Hindi:?????????

Continue(1.Yes/2.No):2

Menu

1.Enter the words.

2.Search a word.

3.Exit.

Enter your choice:2

Enter the english word:Bit

Word Found!!!

Eqivalent Tamil Word:??????

Eqivalent Hindi Word:???

Menu

1.Enter the words.

2.Search a word.

3.Exit.

Enter your choice:2

Enter the english word:rahul

Word not found in the dictionary!

Menu

1.Enter the words.

2.Search a word.

3.Exit.

Enter your choice:3