

Assignment No. 2

Aim: Implement all the functions of a dictionary (ADT) using hashing and handle collisions using chaining with/ without replacement. Data: Set of (key, value) pairs, Keys are mapped to values, keys must be comparable, Keys must be unique Standard Operations: Insert (key, value), Find (key), Delete (key).

Program:

```
#include<iostream>

#include<string.h>

using namespace std;

class HashFunction
{
    typedef struct hash
    {
        long key;
        char name[10];
    }hash;
    hash h[10];
    public:
    HashFunction();
    void insert();
    void display();
    int find(long);
    void Delete(long);
};

HashFunction::HashFunction()
{
    int i;
    for(i=0;i<10;i++)
```

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```
{
    h[i].key=-1;
    strcpy(h[i].name,"NULL");
}
}

void HashFunction::Delete(long k)
{
    int index=find(k);
    if(index== -1)
    {
        cout<<"\n\tKey Not Found";
    }
    else
    {
        h[index].key=-1;
        strcpy(h[index].name,"NULL");
        cout<<"\n\tKey is Deleted";
    }
}

int HashFunction::find(long k)
{
    int i;
    for(i=0;i<10;i++)
    {
        if(h[i].key==k)
        {
```

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```
        cout<<"\n\t"<<h[i].key<<" is Found at "<<i<<" Location With Name "<<h[i].name;
            return i;
        }
    }
    if(i==10)
    {
        return -1;
    }
}

void HashFunction::display()
{
    int i;
    cout<<"\n\t\tKey\t\tName";
    for(i=0;i<10;i++)
    {
        cout<<"\n\t\t["<<i<<"]\t"<<h[i].key<<"\t\t"<<h[i].name;
    }
}

void HashFunction::insert()
{
    char ans,n[10],ntemp[10];
    long k,temp;
    int v,hi,cnt=0,flag=0,i;
    do
    {
        if(cnt>=10)
```

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```
{  
    cout<<"\n\tHash Table is FULL";  
    break;  
}  
cout<<"\n\tEnter a Telephone No: ";  
cin>>k;  
cout<<"\n\tEnter a Client Name: ";  
cin>>n;  
hi=k%10;  
if(h[hi].key==-1)  
{  
    h[hi].key=k;  
    strcpy(h[hi].name,n);  
}  
else  
{  
    if(h[hi].key%10!=hi)  
    {  
        temp=h[hi].key;  
        strcpy(ntemp,h[hi].name);  
        h[hi].key=k;  
        strcpy(h[hi].name,n);  
        for(i=hi+1;i<10;i++)  
        {  
            if(h[i].key==-1)  
            {
```

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```
        h[i].key=temp;
        strcpy(h[i].name,ntemp);
        flag=1;
        break;
    }
}
for(i=0;i<hi && flag==0;i++)
{
    if(h[i].key==-1)
    {
        h[i].key=temp;
        strcpy(h[i].name,ntemp);
        break;
    }
}

else
{
    for(i=hi+1;i<10;i++)
    {
        if(h[i].key==-1)
        {
            h[i].key=k;
            strcpy(h[i].name,n);
            flag=1;
            break;
        }
    }
}
```

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```
        }
    }

    for(i=0;i<hi && flag==0;i++)
    {
        if(h[i].key==-1)
        {
            h[i].key=k;
            strcpy(h[i].name,n);
            break;
        }
    }
}

flag=0;
cnt++;

cout<<"\n\t..... Do You Want to Insert More Key: y/n";
cin>>ans;
}while(ans=='y' || ans=='Y');
}

int main()
{
    long k;
    int ch,index;
    char ans;
    HashFunction obj;
    do
```

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```
{  
    cout<<"\n\t***** Telephone (ADT) *****";  
    cout<<"\n\t1. Insert\n\t2. Display\n\t3. Find\n\t4. Delete\n\t5. Exit";  
    cout<<"\n\t..... Enter Your Choice: ";  
    cin>>ch;  
    switch(ch)  
    {  
        case 1:  
            obj.insert();  
            break;  
        case 2:  
            obj.display();  
            break;  
        case 3:  
            cout<<"\n\tEnter a Key Which You Want to Search: ";  
            cin>>k;  
            index=obj.find(k);  
            if(index==-1)  
            {  
                cout<<"\n\tKey Not Found";  
            }  
            break;  
        case 4:  
            cout<<"\n\tEnter a Key Which You Want to Delete: ";  
            cin>>k;  
            obj.Delete(k);  
    }
```

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```
                break;

            case 5:

                break;

        }

        cout<<"\n\t..... Do You Want to Continue in Main Menu:y/n ";

        cin>>ans;

        }while(ans=='y' || ans=='Y');

    }
```

Output:

[administrators@fedora Documents]\$./a.out

***** Telephone (ADT) *****

1. Insert

2. Display

3. Find

4. Delete

5. Exit

..... Enter Your Choice: 1

Enter a Telephone No: 123

Enter a Client Name: A

..... Do You Want to Insert More Key: y/ny

Enter a Telephone No: 456

Enter a Client Name: B

..... Do You Want to Insert More Key: y/nn

..... Do You Want to Continue in Main Menu:y/n y

***** Telephone (ADT) *****

1. Insert

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2. Display

3. Find

4. Delete

5. Exit

..... Enter Your Choice: 2

| | Key | Name |
|------|-----|------|
| h[0] | -1 | NULL |
| h[1] | -1 | NULL |
| h[2] | -1 | NULL |
| h[3] | 123 | A |
| h[4] | -1 | NULL |
| h[5] | -1 | NULL |
| h[6] | 456 | B |
| h[7] | -1 | NULL |
| h[8] | -1 | NULL |
| h[9] | -1 | NULL |

..... Do You Want to Continue in Main Menu:y/n y

***** Telephone (ADT) *****

1. Insert

2. Display

3. Find

4. Delete

5. Exit

..... Enter Your Choice: 1

Enter a Telephone No: 126

Enter a Client Name: C

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..... Do You Want to Insert More Key: y/nn

..... Do You Want to Continue in Main Menu:y/n y

***** Telephone (ADT) *****

1. Insert

2. Display

3. Find

4. Delete

5. Exit

..... Enter Your Choice: 2

| | Key | Name |
|------|-----|------|
| h[0] | -1 | NULL |
| h[1] | -1 | NULL |
| h[2] | -1 | NULL |
| h[3] | 123 | A |
| h[4] | -1 | NULL |
| h[5] | -1 | NULL |
| h[6] | 456 | B |
| h[7] | 126 | C |
| h[8] | -1 | NULL |
| h[9] | -1 | NULL |

..... Do You Want to Continue in Main Menu:y/n y

***** Telephone (ADT) *****

1. Insert

2. Display

3. Find

4. Delete

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5. Exit

..... Enter Your Choice: 3

Enter a Key Which You Want to Search: 123

123 is Found at 3 Location With Name A

..... Do You Want to Continue in Main Menu:y/n y

***** Telephone (ADT) *****

1. Insert

2. Display

3. Find

4. Delete

5. Exit

..... Enter Your Choice: 4

Enter a Key Which You Want to Delete: 123

123 is Found at 3 Location With Name A

Key is Deleted

..... Do You Want to Continue in Main Menu:y/n y

***** Telephone (ADT) *****

1. Insert

2. Display

3. Find

4. Delete

5. Exit

..... Enter Your Choice: 2

| | Key | Name |
|------|-----|------|
| h[0] | -1 | NULL |
| h[1] | -1 | NULL |

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| | | |
|------|-----|------|
| h[2] | -1 | NULL |
| h[3] | -1 | NULL |
| h[4] | -1 | NULL |
| h[5] | -1 | NULL |
| h[6] | 456 | B |
| h[7] | 126 | C |
| h[8] | -1 | NULL |
| h[9] | -1 | NULL |

..... Do You Want to Continue in Main Menu:y/n n

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