**(HASHING )**

Name: Kunal Gupya

Batch: A1 Roll No.-231023

**CODE:**

#include<iostream>

#include<string.h>

**using namespace** std**;**

#define SIZE 20

**struct** data *//data contains name and Roll number*

**{**

**int** Roll\_no**;**

**char** name**[**20**];**

**};**

**struct** student

**{**

**struct** data d1**;***//variable d1 of type struct data*

**int** chain**;**

**int** flag**;**

**};**

**class** hash

**{**

**struct** student s**[**SIZE**];** *//array of structures*

**int** n**;** *//maintains number of records*

**int** hash\_fun**(int** key**)**

**{**

**return (**key**%**13**);**

**}**

**public:**

hash**()**

**{**

**for(int** i

**=**0**;**i**<**SIZE**;**i**++)**

*//initialization*

**{**

s**[**i**].**d1**.**Roll\_no**=-**1**;**

s**[**i**].**chain**=-**1**;** *//stores address of next element with same hash value*

s**[**i**].**flag**=**0**;** *//flag==0,unoccupied else flag==1*

s**[**i**].**d1**.**name**[**0**]=**'\0'**;**

**}**

**}**

**int** compute\_pos**(int** key**)** *//chaining with replacement*

**{**

**int** h1**,**h2**,**h3**,**i**,**pos**;**

h1**=**h2**=**h3**=**hash\_fun**(**key**);**

**if(**s**[**h2**].**flag**==**0**)**

**return** h2**;**

**while(**s**[**h3**].**flag**!=**0**)**

**{**

*//empty home location*

h3**=(**h3**+**1**)%**13**;**

*//holds the next free location*

**}**

**if(**hash\_fun**(**s**[**h2**].**d1**.**Roll\_no**)==**h1**)**

*//same hash value*

**{**

**while(**s**[**h2**].**chain**!=-**1**)**

h2**=**s**[**h2**].**chain**;**

s**[**h2**].**chain**=**h3**;**

**return** h3**;**

**}**

**else**

**{**

*//home location occupied by another*

**for(**i**=**0**;**i**<**13**;**i**++)** *//element pointing to h2*

**{**

**if(**s**[**i**].**chain**==**h2**)** *//i stores the index pointing to*

*h2*

**{**

pos**=**i**;**

**break;**

**}**

**else**

pos**=-**1**;**

**}**

s**[**h3**]=**s**[**h2**];**

**if(**pos**!=-**1**)**

s**[**i**].**chain**=**h3**;**

*//if some element points to it*

**return** h2**;**

**}**

**return** h3**;**

**}**

**void** search**(int** key**)**

**{**

**int** h1**=**hash\_fun**(**key**);**

**int** h2**=**h1**,**pos**,**flag1**=**0**;**

**while(**s**[**h2**].**flag**!=**0**)**

**{**

**if(**h2**==(**s**[**h2**].**d1**.**Roll\_no**%**13**))**

**{**

**break;**

**}**

h2**=(**h2**+**1**)%**13**;**

**}**

**while(**h2**!=-**1**)**

**{**

**if(**s**[**h2**].**d1**.**Roll\_no**==**key**)**

**{**

cout**<<"Record Found at position "<<**h2**<<**endl**;**

flag1**=**1**;**

**break;**

**}**

h2**=**s**[**h2**].**chain**;**

**}**

**if(**flag1**!=**1**)**

**{**

cout**<<"Record Not Found in the hash table"<<**endl**;**

**}**

**}**

**void** accept**()**

**{**

**int** number**,**UID**;**

**char** name1**[**20**];**

cout**<<"Enter the number of elements to be inserted:"<<**endl**;** cin**>>**number**;**

**for(int** i**=**0**;**i**<**number**;**i**++)**

**{**

cout**<<"Enter the data"<<**endl**;**

cin**>>**UID**;**

**int** pos**=**compute\_pos**(**UID**);**

s**[**pos**].**d1**.**Roll\_no**=**UID**;**

cout**<<"Enter the name"<<**endl**;**

cin**>>**name1**;**

strcpy**(**s**[**pos**].**d1**.**name**,**name1**);**

s**[**pos**].**chain**=-**1**;**

s**[**pos**].**flag**=**1**;**

**}**

**}**

**void** display**()**

**{**

**int** i**;**

cout**<<"INDEX"<<"\t"<<"ROLL**

**NO"<<"\t"<<"NAME"<<"\t"<<"CHAIN"<<**endl**;for(**i**=**0**;**i**<**SIZE**;**i**++)**

**{**

**if(**s**[**i**].**flag**==**1**)**

**{**

cout**<<**i**<<"\t"<<**s**[**i**].**d1**.**Roll\_no**<<"\t"<<**s**[**i**].**d1**.**name**<<"\t"<<**s**[**i**].**chain**<<**endl**;**

**}**

**}**

**}**

**};**

**int** main**()**

**{**

hash h**;**

**int** choice**,**key**;**

**do**

**{**

cout**<<"Enter your Choice"<<**endl**;**

cout**<<"1. Insert the data"<<**endl**;**

cout**<<"2. Display the data"<<**endl**;**

cout**<<"3. Search for a Record"<<**endl**;**

cout**<<"4. QUIT"<<**endl**;**

cin**>>**choice**;**

**switch(**choice**)**

**{**

**case** 1**:**h**.**accept**();**

**break;**

**case** 2**:**h**.**display**();**

**break;**

**case** 3**:**cout**<<"Enter the key to be searched"<<**endl**;**\cin**>>**key**;**

h**.**search**(**key**);**

**break;**

**default:**

cout**<<"Enter a valid choice"<<**endl**;**

**}**

**}while(**choice**!=**4**);**

**return** 0**;**

**}**

*/\** **OUTPUT:**

Enter your Choice

1. Insert the data
2. Display the data
3. Search for a Record
4. QUIT

1

Enter the number of elements to be inserted:

13

Enter the data

18

Enter the name

ABC

Enter the data

41

Enter the name

BCD

Enter the data

22

Enter the name

CDE

Enter the data

44

Enter the name

DEF

Enter the data

45

Enter the name

EFG

Enter the data

59

Enter the name

FGH

Enter the data

32

Enter the name

GHI

Enter the data

31

Enter the name

HIJ

Enter the data

73

Enter the name

IJK

Enter the data

57

Enter the name

JKL

Enter the data

58

Enter the name

KLM

Enter the data

23

Enter the name

LMN

Enter the data

77

Enter the name

MNO

Enter your Choice

1. Insert the data
2. Display the data
3. Search for a Record
4. QUIT

|  |  |  |  |
| --- | --- | --- | --- |
| 2 |  |  |  |
| INDEX | ROLL NO NAMECHAIN | | |
| 0 | 57 | JKL | -1 |
| 1 | 58 | KLM | -1 |
| 2 | 41 | BCD | -1 |
| 3 | 32 | GHI | 1 |
| 4 | 44 | DEF | 11 |
| 5 | 18 | ABC | 4 |
| 6 | 45 | EFG | 3 |
| 7 | 59 | FGH | -1 |
| 8 | 73 | IJK | -1 |
| 9 | 22 | CDE | -1 |
| 10 | 23 | LMN | -1 |
| 11 | 31 | HIJ | 0 |

12 77 MNO -1

Enter your Choice

1. Insert the data
2. Display the data
3. Search for a Record
4. QUIT

3

Enter the key to be searched

41

Record Found at position 2

Enter your Choice

1. Insert the data
2. Display the data
3. Search for a Record
4. QUIT

3

Enter the key to be searched

59

Record Found at position 7

Enter your Choice

1. Insert the data
2. Display the data
3. Search for a Record
4. QUIT

3

Enter the key to be searched

77

Record Found at position 12

Enter your Choice

1. Insert the data
2. Display the data
3. Search for a Record
4. QUIT

3

Enter the key to be searched

73

Record Found at position 8

Enter your Choice

1. Insert the data
2. Display the data
3. Search for a Record
4. QUIT

3

Enter the key to be searched

24

Record Not Found in the hash table

Enter your Choice

1. Insert the data
2. Display the data
3. Search for a Record
4. QUIT