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5. Write a C++ program to implement simple index on primary key for a file of student objects. Implement add(),search(),delete() using the index.

Index

A structure containing a set of entries, each consisting of a key field and a reference field, Which is used to locate records in a data file.

Key field

The part of an index which contains keys.

Reference field

    The part of an index which contains information to locate records.

- An index imposes order on a file without rearranging the file.
- Indexing works by indirection.

Simple Index for Entry-Sequenced Files

Simple index

- An index in which the entries are a key ordered linear list. Simple indexing can be useful when the entire index can be held in memory. Changes (additions and deletions) require both the index and the data file to be changed.

- Updates affect the index if the key field is changed, or if the record is moved. An update which moves a record can be handled as a deletion followed by an addition.
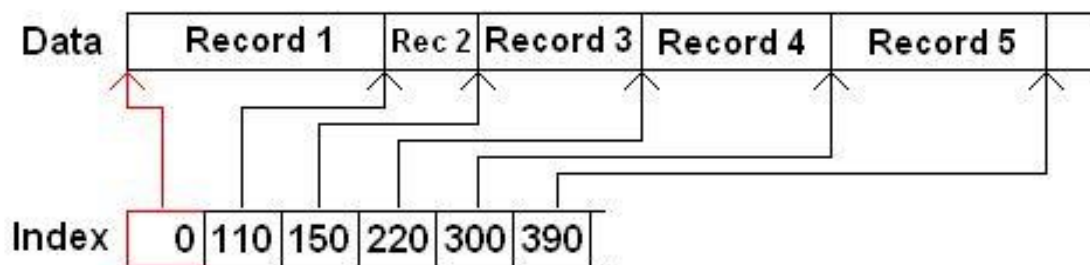
File_structure5.ccp

```cpp
#include<iostream.h>
#include<string.h>
#include<fstream.h>
#include<stdlib.h>
#include<conio.h>

int n=0,index=0;

class student
{
    public: char name[20],usn[20],branch[5];
        int sem;

        void insert(fstream &f1,fstream &f2)
        {
            cout<<"Enter Name: ";
            cin>>name;
            cout<<"Enter USN: ";
            cin>>usn;
            cout<<"Enter Sem: ";
            cin>>sem;
            cout<<"Enter Branch: ";
            cin>>branch;
            write(f1,f2);
        }

        void write(fstream &f1,fstream &f2)
        {
            f1<<++index<<"\t"<<usn<<"\n";
            f2<<name<<"\t"<<usn<<"\t"<<sem<<"\t"<<branch<<"\n"
            ;
        }

        void display(fstream &f2)
        {
            f2>>name>>usn>>sem>>branch;
            cout<<name<<"\t"<<usn<<"\t"<<sem<<"\t"<<branch<<"\n"
            ;
        }

        int search(fstream &f1,char key[20])
        {
            int i,x;
            for(i=1;i<=n;i++)
            {
                f1>>x>>usn;
                if(strcmp(usn,key)==0)
                    return i;
            }
            cout<<"Record not found\n";
```

```
                            return 0;
                }

                int remove(fstream &f1,char key[20])
                {
                        int i;
                        i=search(f1,key);
                        return i;
                }
};

void main()
{
        fstream f1,f2;
        student s[20],p;
        int ch,k=0,i;
        clrscr();
        f1.open("m1.txt",ios::trunc);
        f2.open("mn1.txt",ios::trunc);
        f1.close();
        f2.close();
        for(;;)
        {
                cout<<"1.Insert 2.Display 3.Search 4.Delete 5.Exit\n";
                cout<<"Enter choice: ";
                cin>>ch;
                switch(ch)
                {
                        case 1: f1.open("m1.txt",ios::app);
                                f2.open("mn1.txt",ios::app);
                                cout<<"Enter no. of students: ";
                                cin>>k;
                                n=n+k;
                                for(int i=1;i<=k;i++)
                                        s[i].insert(f1,f2);
                                f1.close();
                                f2.close();
                                break;
                        case 2: f2.open("mn1.txt",ios::in);
                                for(i=1;i<=n;i++)
                                        s[i].display(f2);
                                f2.close();
                                break;
                        case 3: char usn[20];
                                cout<<"Enter USN to search: ";
                                cin>>usn;
                                f1.open("m1.txt",ios::in);
                                f2.open("mn1.txt",ios::in);
                                int j=p.search(f1,usn);
```

```
                        if(j!=0)
                        {
                                cout<<"Record found & Details are\n";
                                cout<<"Name="<<s[j].name<<"\n"<<"USN="<<s[j].usn<<"\n"
                                <<"Sem="<<s[j].sem<<"\n"<<"Branch="<<s[j].branch<<"\n"
                                ;
                        }
                        f1.close();
                        f2.close();
                        break;
                case 4: f1.open("m1.txt",ios::in);
                        f2.open("mn1.txt",ios::in);
                        cout<<"Enter USN to delete: ";
                        cin>>usn;
                        j=p.remove(f1,usn);
                        if(j!=0)
                        {
                                for(i=j;i<n;i++)
                                        s[i]=s[i+1];
                                cout<<"Deletion successfull\n";
                        }
                        n--;
                        index--;
                        f1.close();
                        f2.close();
                        f1.open("m1.txt",ios::trunc|ios::app);
                        f2.open("mn1.txt",ios::trunc|ios::app);
                        index=0;
                        for(i=1;i<=n;i++)
                                s[i].write(f1,f2);
                        f1.close();
                        f2.close();
                        break;
                default:exit(0);
            }
        }
}
```

Output :

```
1.Insert 2.Display 3.Search 4.Delete
5.Exit Enter u'r choice : 1

Enter the no. of students :2
Enter the details:
Name: ajay
USN: 1vk07is002
Sem: 6
Branch: ise

Name: rahul
```

```
USN: 1vk07cs045
Sem: 6
Branch: cse

1.Insert 2.Display 3.Search 4.Delete 5.Exit

Enter u'r choice: 2
ajay        1vk07is002        6        ise
rahul       1vk07cs045        6        cse


1. Insert 2.Display 3.Search 4.Delete
5.Exit Enter u'r choice :3
Enter USN to
search: 1vk07is002
ajay             1vk07is002        6            ise

1. Insert 2.Display 3.Search 4.Delete
5.Exit Enter u'r choice: 4


Enter USN whose record is to be deleted:
1vk07cs045 Deletion succesfull


1. Insert 2.Display 3.Search 4.Delete
5.Exit Enter u'r choice: 5
```