

EXPERIMENT NO:1

SEARCHING AND SORTING

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Class: SE

Branch: IT

Batch: C

Roll No: 548

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#include<bits/stdc++.h>
using namespace std;
struct name
{
    char firstname[10];
    char lastname[12];
};

struct profile
{
    name student_name;
    float CGPA;
    int Roll_no;
};

class student_data
{
private :
    struct profile std_db[15]={"Priya", "Jadhav", 9.89, 9, "Abhijeet", "Ingle", 9.8, 6, "Kunal", "Bhosale", 9.54, 13,
    "Pratik", "Shinde", 9.12, 4, "Ayush", "Kale", 9.65, 3, "Kunal", "Kachare", 9.5, 5, "Sumit", "Inamdar", 9.01, 12,
    "Sanika", "Joshi", 9.2, 11, "Atharva", "Kakade", 9.8, 2, "Mrunal", "Pawar", 9.45, 7, "Kalyani", "Nimbalkar", 8.97,
    15, "Tanmay", "Bhise", 8.85, 14, "Shruti", "Jagdale", 9.74, 1, "Neha", "Gore", 8.86, 10, "Akshay", "Kumbhar",
    8.98, 8};
    int n = 15;

public :
    void view(int n)
    {
        cout<<"\n\n Student      Name          CGPA      Roll\n No.          No.\n-----\n";
        for (int i = 0; i <= n-1; i++)
        {
            cout<<"  "<<i+1<<"."<<std_db[i].student_name.firstname<<""
            "<<std_db[i].student_name.lastname;
            cout<<"  ->>- "<<std_db[i].CGPA<<"  ->>- "<<std_db[i].Roll_no<<"\n\n";
        }
    }
}
```

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}

void search_cgpa(float r) //linear search on CGPA
{
    cout<<"\n\n< Searching in CGPA using Linear Search...>\n-----";
    int t = 1;
    for (int i = 0; i < n; i++)
    {
        if(std_db[i].CGPA == r)
        {
            cout<<"\n#\n<<t<<" Details of Student with CGPA "<<std_db[i].CGPA<< " - ";
            cout<<"\n\n Student      Name      CGPA      Roll\n No.-----\n-----\n";
            cout<< " <<i+1<<".   <<std_db[i].student_name.firstname<<
"<<std_db[i].student_name.lastname;
            cout<<" ->- "<<std_db[i].CGPA<< " ->- "<<std_db[i].Roll_no;
            cout<<"\n-----";
            t++;
            continue;
        }
    }
    if(t == 0)
    {
        cout<<"\n Student ""<<r<<" not found or Input correct CGPA";
    }
}

void sort_names(int n) //insertion sort for sorting names
{
    for (int k=n-1; k>0; k--)
    {
        struct profile temp = std_db[k];
        int j = k-1;
        while (j >= 0 && strcmp(temp.student_name.firstname, std_db[j].student_name.firstname) < 0)
//compares both the strings character by character
        {
            std_db[j+1] = std_db[j];
            j = j-1;
        }
        std_db[j+1] = temp;
    }
}

void sort_CGPA(int l, int k) //sorting CGPA using quick sorting
{
    int r = k-1;
    if (l>=r) return;
    int i=l;
    int j=r+1;
    struct profile prec;
    int p = std_db[l].CGPA; //Select pivot element
    prec = std_db[l]; //temporarily storing pivot record prec
    while(1)
    {
        do{ i++; } while (std_db[i].CGPA < p && i <= r);

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do{ j--; } while (std_db[j].CGPA > p && j >= l);
if(i >= j) break;
struct profile temp;
temp = std_db[j];
std_db[j] = std_db[i];
std_db[i] = temp;
}
std_db[l] = std_db[j];
std_db[j] = prec;
sort_CGPA(l,j); //left list
sort_CGPA(j+1,r); //right list
student_data :: view(10);
}

void sort_RollNo() //sorting roll no. in ascending order using bubble sort
{
for (int i = 0; i < n; i++)
{
    for (int j = 0; j < n-1; j++)
    {
        if((std_db[j].Roll_no) < (std_db[j+1].Roll_no)) //Swapping
        {
            struct profile temp;
            temp = std_db[j];
            std_db[j] = std_db[j+1];
            std_db[j+1] = temp;
        }
    }
}
student_data :: view(n);
}

void search_name()
{
cout<<"\n Enter student name to be searched : ";
char search[10];
cin>>search;
cout<<"\n< Searching name using Binary Search...>";
int lower = 0, upper, mid;
upper = n - 1;
mid = (lower + upper)/2;
student_data :: sort_names(n);
while (lower <= upper)
{
    if(strcmp(std_db[mid].student_name.firstname, search)<0)
    {
        lower = mid + 1;
    }
    else if(strcmp(std_db[mid].student_name.firstname, search)==0)
    {
        cout<<"\n\n# Details of Student with name "<<std_db[mid].student_name.firstname<<"-";
        cout<<"\n\n Student      Name      CGPA      Roll\n No.-----\n";
        cout<<"\n 1.    "<<std_db[mid].student_name.firstname<<""
"<<std_db[mid].student_name.lastname;

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        cout<<" ->>- "<<std_db[mid].CGPA<<" ->>- "<<std_db[mid].Roll_no;
        cout<<"\n-----";
        break;
    }
    else
    {
        upper = mid - 1;
        mid = (lower + upper)/2;
    }
}
if(lower > upper)
{
    cout<<"\n Student ""<<search<<"" details not found or Input correct name";
}
}
};

int main()
{
    struct profile std_db[15]={"Priya", "Jadhav", 9.89, 9, "Abhijeet", "Ingle", 9.8, 6, "Kunal", "Bhosale", 9.54, 13,
    "Pratik", "Shinde", 9.12, 4, "Ayush", "Kale", 9.65, 3, "Kunal", "Kachare", 9.5, 5, "Sumit", "Inamdar", 9.01, 12,
    "Sanika", "Joshi", 9.2, 11, "Atharva", "Kakade", 9.8, 2, "Mrunal", "Pawar", 9.45, 7, "Kalyani", "Nimbalkar", 8.97,
    15, "Tanmay", "Bhise", 8.85, 14, "Shruti", "Jagdale", 9.74, 1, "Neha", "Gore", 8.86, 10, "Akshay", "Kumbhar", 8.98,
    8};
    student_data std; // object creation
    cout<<"-----\n\t\t----- SE IT Student Database -----\\n-----\n";
    std.view(15);
    char stopApp;
    stopApp = 'Y','y';
    // while(stopApp == 'Y')
    do
    {
        cout<<"\\n\\nSelect action from following : \\n";
        cout<<"> 1. VIEW RECORDS\\n> 2. SORT ROLL NO.(Using Bubble sort)\\n> 3. SORT NAME(insertion
sort)\\n> 4. SORT CGPA(Toppers)\\n> 5. SEARCH CGPA\\n> 6. SEARCH NAME\\n> 7. EXIT\\n Enter choice
(1/2/3/4/5/6/7): ";
        int choice;
        cin>>choice;
        switch(choice)
        {
            case 1:
                std.view(15);
                break;

            case 2:
                cout<<"\\n< Sorting Roll No. wise using Bubble Sort...>";
                std.sort_RollNo();
                break;

            case 3:
                cout<<"\\n< Sorting name alphabetically using Insertion Sort...>";
                std.sort_names(15);
                std.view(15);
        }
    }
}
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        break;

case 4:
cout<<"\n< Sorting top 10 CGPA using Quick Sort...>";
    std.sort_CGPA(0, 10);
    break;

case 5:
cout<<"\n Enter Student CGPA to be searched : ";
    float r;
    cin>>r;
    std.search_cgpa(r);
    break;

case 6:
std.search_name();
    break;

case 7:
cout<<" >Exited successful<\n --| END OF CODE |--";
    return 0;

default:
    cout<<"\n Invalid choice !";
}

cout<<"\n\nDo you want to continue (Y/N) ? : ";
cin>>stopApp;
if (stopApp == 'N' | 'n')
{
    continue;

}
else exit;
}while(toupper(stopApp) == 'Y');

}

```

Output:

----- SE IT Student Database -----

Student No.	Name	CGPA	Roll No.
1.	Priya Jadhav	->>- 9.89	->>- 9
2.	Abhijeet Ingle	->>- 9.8	->>- 6
3.	Kunal Bhosale	->>- 9.54	->>- 13
4.	Pratik Shinde	->>- 9.12	->>- 4

5. Ayush Kale ->>- 9.65 ->>- 3
6. Kunal Kachare ->>- 9.5 ->>- 5
7. Sumit Inamdar ->>- 9.01 ->>- 12
8. Sanika Joshi ->>- 9.2 ->>- 11
9. Atharva Kakade ->>- 9.8 ->>- 2
10. Mrunal Pawar ->>- 9.45 ->>- 7
11. Kalyani Nimbalkar ->>- 8.97 ->>- 15
12. Tanmay Bhise ->>- 8.85 ->>- 14
13. Shruti Jagdale ->>- 9.74 ->>- 1
14. Neha Gore ->>- 8.86 ->>- 10
15. Akshay Kumbhar ->>- 8.98 ->>- 8

Select action from following :

- > 1. VIEW RECORDS
- > 2. SORT ROLL NO.(Using Bubble sort)
- > 3. SORT NAME(insertion sort)
- > 4. SORT CGPA(Toppers)
- > 5. SEARCH CGPA
- > 6. SEARCH NAME
- > 7. EXIT

Enter choice (1/2/3/4/5/6/7): 1

Student No.	Name	CGPA	Roll No.
<hr/>			
1.	Priya Jadhav	->>- 9.89	->>- 9
2.	Abhijeet Ingle	->>- 9.8	->>- 6
3.	Kunal Bhosale	->>- 9.54	->>- 13
4.	Pratik Shinde	->>- 9.12	->>- 4
5.	Ayush Kale	->>- 9.65	->>- 3
6.	Kunal Kachare	->>- 9.5	->>- 5
7.	Sumit Inamdar	->>- 9.01	->>- 12
8.	Sanika Joshi	->>- 9.2	->>- 11
9.	Atharva Kakade	->>- 9.8	->>- 2

10. Mrunal Pawar ->>- 9.45 ->>- 7
11. Kalyani Nimbalkar ->>- 8.97 ->>- 15
12. Tanmay Bhise ->>- 8.85 ->>- 14
13. Shruti Jagdale ->>- 9.74 ->>- 1
14. Neha Gore ->>- 8.86 ->>- 10
15. Akshay Kumbhar ->>- 8.98 ->>- 8

Do you want to continue (Y/N) ?:y

Select action from following :

- > 1. VIEW RECORDS
 - > 2. SORT ROLL NO.(Using Bubble sort)
 - > 3. SORT NAME(insertion sort)
 - > 4. SORT CGPA(Toppers)
 - > 5. SEARCH CGPA
 - > 6. SEARCH NAME
 - > 7. EXIT
- Enter choice (1/2/3/4/5/6/7): 2

< Sorting Roll No. wise using Bubble Sort...>

Student No.	Name	CGPA	Roll No.
<hr/>			
1.	Kalyani Nimbalkar	->>- 8.97	->>- 15
2.	Tanmay Bhise	->>- 8.85	->>- 14
3.	Kunal Bhosale	->>- 9.54	->>- 13
4.	Sumit Inamdar	->>- 9.01	->>- 12
5.	Sanika Joshi	->>- 9.2	->>- 11
6.	Neha Gore	->>- 8.86	->>- 10
7.	Priya Jadhav	->>- 9.89	->>- 9
8.	Akshay Kumbhar	->>- 8.98	->>- 8
9.	Mrunal Pawar	->>- 9.45	->>- 7
10.	Abhijeet Ingle	->>- 9.8	->>- 6
11.	Kunal Kachare	->>- 9.5	->>- 5

12. Pratik Shinde ->>- 9.12 ->>- 4
13. Ayush Kale ->>- 9.65 ->>- 3
14. Atharva Kakade ->>- 9.8 ->>- 2
15. Shruti Jagdale ->>- 9.74 ->>- 1

Do you want to continue (Y/N) ?: **Y**

Select action from following :

- > 1. VIEW RECORDS
- > 2. SORT ROLL NO.(Using Bubble sort)
- > 3. SORT NAME(insertion sort)
- > 4. SORT CGPA(Toppers)
- > 5. SEARCH CGPA
- > 6. SEARCH NAME
- > 7. EXIT

Enter choice (1/2/3/4/5/6/7): **3**

< Sorting name alphabetically using Insertion Sort...>

Student No.	Name	CGPA	Roll No.
-------------	------	------	----------

1. Abhijeet Ingle ->>- 9.8 ->>- 6
2. Akshay Kumbhar ->>- 8.98 ->>- 8
3. Atharva Kakade ->>- 9.8 ->>- 2
4. Ayush Kale ->>- 9.65 ->>- 3
5. Kalyani Nimbalkar ->>- 8.97 ->>- 15
6. Kunal Bhosale ->>- 9.54 ->>- 13
7. Kunal Kachare ->>- 9.5 ->>- 5
8. Mrunal Pawar ->>- 9.45 ->>- 7
9. Neha Gore ->>- 8.86 ->>- 10
10. Pratik Shinde ->>- 9.12 ->>- 4
11. Priya Jadhav ->>- 9.89 ->>- 9
12. Sanika Joshi ->>- 9.2 ->>- 11
13. Shruti Jagdale ->>- 9.74 ->>- 1
14. Sumit Inamdar ->>- 9.01 ->>- 12

15. Tanmay Bhise ->>- 8.85 ->>- 14

Do you want to continue (Y/N) ?: **Y**

Select action from following :

- > 1. VIEW RECORDS
- > 2. SORT ROLL NO.(Using Bubble sort)
- > 3. SORT NAME(insertion sort)
- > 4. SORT CGPA(Toppers)
- > 5. SEARCH CGPA
- > 6. SEARCH NAME
- > 7. EXIT

Enter choice (1/2/3/4/5/6/7): **4**

< Sorting top 10 CGPA using Quick Sort...>

Student No.	Name	CGPA	Roll No.

1.	Priya Jadhav	->>- 9.89	->>- 9
2.	Abhijeet Ingle	->>- 9.8	->>- 6
3.	Kunal Bhosale	->>- 9.54	->>- 13
4.	Mrunal Pawar	->>- 9.45	->>- 7
5.	Sanika Joshi	->>- 9.2	->>- 11
6.	Sumit Inamdar	->>- 9.01	->>- 12
7.	Akshay Kumbhar	->>- 8.98	->>- 8
8.	Kalyani Nimbalkar	->>- 8.97	->>- 15
9.	Neha Gore	->>- 8.86	->>- 10
10.	Tanmay Bhise	->>- 8.85	->>- 14

Do you want to continue (Y/N) ?: **Y**

Select action from following :

- > 1. VIEW RECORDS
- > 2. SORT ROLL NO.(Using Bubble sort)
- > 3. SORT NAME(insertion sort)
- > 4. SORT CGPA(Toppers)
- > 5. SEARCH CGPA

> 6. SEARCH NAME

> 7. EXIT

Enter choice (1/2/3/4/5/6/7): 5

Enter Student CGPA to be searched : 9.89

< Searching in CGPA using Linear Search...>

#1 Details of Student with CGPA 9.89 -

Student No.	Name	CGPA	Roll No.
9.	Priya Jadhav	->>- 9.89	->>- 9

Do you want to continue (Y/N) ?: y

Select action from following :

> 1. VIEW RECORDS

> 2. SORT ROLL NO.(Using Bubble sort)

> 3. SORT NAME(insertion sort)

> 4. SORT CGPA(Toppers)

> 5. SEARCH CGPA

> 6. SEARCH NAME

> 7. EXIT

Enter choice (1/2/3/4/5/6/7): 6

Enter student name to be searched : Priya Jadhav

< Searching name using Binary Search...>

Details of Student with name Priya -

Student	Name	CGPA	Roll
1.	Priya Jadhav	->>- 9.89	->>- 9

Do you want to continue (Y/N) ?: y

Select action from following :

> 1. VIEW RECORDS

> 2. SORT ROLL NO.(Using Bubble sort)

> 3. SORT NAME(insertion sort)

> 4. SORT CGPA(Toppers)

> 5. SEARCH CGPA

> 6. SEARCH NAME

> 7. EXIT

Enter choice (1/2/3/4/5/6/7): 7

>Exited successful<

--| END OF CODE |--