

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.      No.\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.              No.\n-----\n";
            cout<<" 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 -----
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```

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.
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 No.	Roll

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 |--