

//Assignment 1 (b)

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#include <iostream>

#include <cstring> // for strcmp

using namespace std;

struct Student {

    int id;

    char name[50];

    float cgpa;

};

void addStudent(Student*& students, int& count) {

    // Increase size (like realloc)

    Student* temp = new Student[count + 1];

    // Copy old data

    for (int i = 0; i < count; i++) {

        temp[i] = students[i];

    }

    // Add new student

    cout << "Enter Student ID: ";

    cin >> temp[count].id;

    cout << "Enter Student Name: ";

    cin.ignore();

    cin.getline(temp[count].name, 50);

    cout << "Enter CGPA: ";

    cin >> temp[count].cgpa;

    // Free old memory and update pointer

    delete[] students;

    students = temp;
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        count++;
    }

    void displayStudents(Student* students, int count) {

        cout << "\n--- Student List ---\n";

        for (int i = 0; i < count; i++) {

            cout << "ID: " << students[i].id

                << ", Name: " << students[i].name

                << ", CGPA: " << students[i].cgpa << endl;

        }

    }

    // Bubble Sort by Name (Alphabetical)

    void bubbleSortByName(Student* students, int count) {

        for (int i = 0; i < count - 1; i++) {

            for (int j = 0; j < count - i - 1; j++) {

                if (strcmp(students[j].name, students[j + 1].name) > 0) {

                    swap(students[j], students[j + 1]);

                }

            }

        }

    }

    // Selection Sort by CGPA

    void selectionSortByCGPA(Student* students, int count, bool ascending) {

        for (int i = 0; i < count - 1; i++) {

            int idx = i;

            for (int j = i + 1; j < count; j++) {

                if (ascending) {

                    if (students[j].cgpa < students[idx].cgpa)

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        idx = j;
    } else {
        if (students[j].cgpa > students[idx].cgpa)
            idx = j;
    }
}
swap(students[i], students[idx]);
}
}

int main() {
    Student* students = nullptr;
    int count = 0;
    int choice;
    do {
        cout << "\n=== Student Database Menu ===\n";
        cout << "1. Add Student\n";
        cout << "2. Display Students\n";
        cout << "3. Sort by Name (Bubble Sort)\n";
        cout << "4. Sort by CGPA Ascending (Selection Sort)\n";
        cout << "5. Sort by CGPA Descending (Selection Sort)\n";
        cout << "6. Exit\n";
        cout << "Enter your choice: ";
        cin >> choice;

        switch (choice) {
            case 1:
                addStudent(students, count);

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        break;
    case 2:
        displayStudents(students, count);
        break;
    case 3:
        bubbleSortByName(students, count);
        cout << "Sorted by Name.\n";
        break;
    case 4:
        selectionSortByCGPA(students, count, true);
        cout << "Sorted by CGPA (Ascending).\n";
        break;
    case 5:
        selectionSortByCGPA(students, count, false);
        cout << "Sorted by CGPA (Descending).\n";
        break;
    case 6:
        cout << "Exiting...\n";
        break;
    default:
        cout << "Invalid choice!\n";
    }
} while (choice != 6);

delete[] students; // Free memory
return 0;
}

```

//OUTPUT

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 1

Enter Student ID: 77

Enter Student Name: Deepak

Enter CGPA: 9.6

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 1

Enter Student ID: 14

Enter Student Name: Vipul

Enter CGPA: 8.6

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 1

Enter Student ID: 12

Enter Student Name: Sachin

Enter CGPA: 8.8

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 2

--- Student List ---

ID: 77, Name: Deepak, CGPA: 9.6

ID: 14, Name: Vipul, CGPA: 8.6

ID: 12, Name: Sachin, CGPA: 8.8

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 3

Sorted by Name.

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 2

--- Student List ---

ID: 77, Name: Deepak, CGPA: 9.6

ID: 12, Name: Sachin, CGPA: 8.8

ID: 14, Name: Vipul, CGPA: 8.6

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)

4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 4

Sorted by CGPA (Ascending).

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 2

--- Student List ---

ID: 14, Name: Vipul, CGPA: 8.6

ID: 12, Name: Sachin, CGPA: 8.8

ID: 77, Name: Deepak, CGPA: 9.6

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 5

Sorted by CGPA (Descending).

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 2

--- Student List ---

ID: 77, Name: Deepak, CGPA: 9.6

ID: 12, Name: Sachin, CGPA: 8.8

ID: 14, Name: Vipul, CGPA: 8.6

=== Student Database Menu ===

1. Add Student
2. Display Students
3. Sort by Name (Bubble Sort)
4. Sort by CGPA Ascending (Selection Sort)
5. Sort by CGPA Descending (Selection Sort)
6. Exit

Enter your choice: 5