Assignment no 1

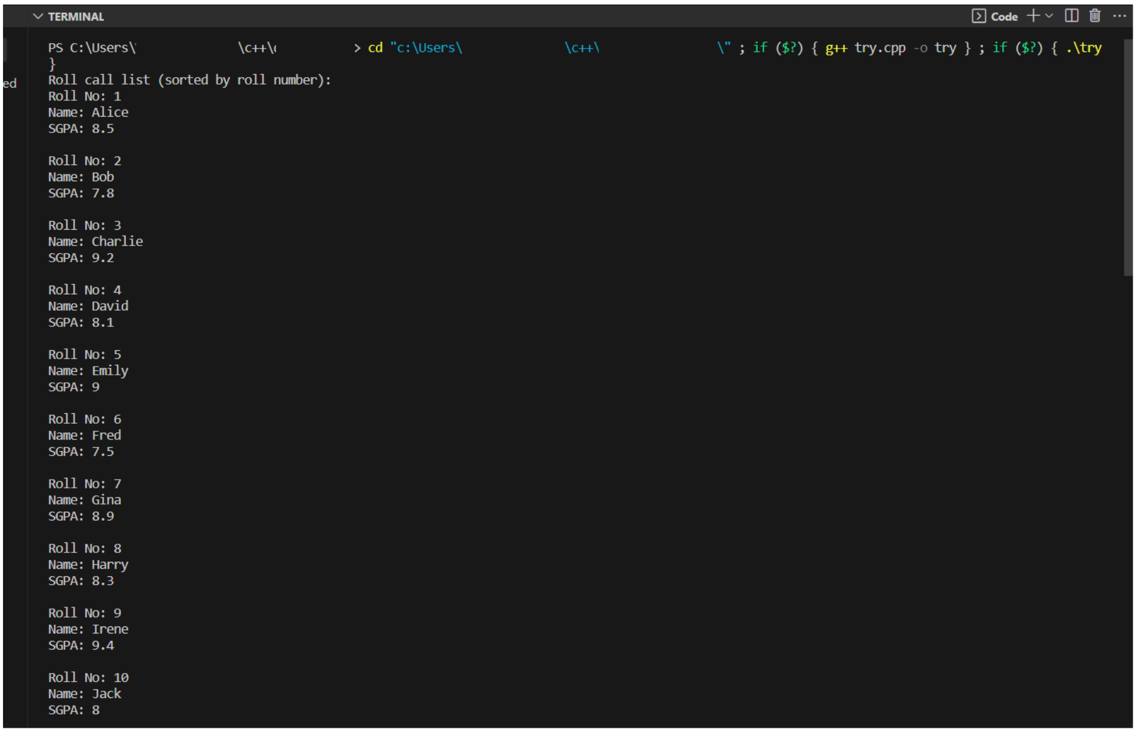
C++

```
#include<iostream>
#include <vector>
using namespace std;

class Student {
public:
int rollNo;
string name;
float SGPA;

Student(int rollNo, string name, float SGPA) {
this->rollNo = rollNo;
this->name = name;
this->SGPA = SGPA;
}

void prints() const {
cout << "Roll No: " << rollNo << endl;
cout << "Name: " << name << endl;
cout << "SGPA: " << SGPA << endl;
}
};

void bubbleSortByRollNo(vector<Student>& students) {
int n = students.size();
for(inti=0;i<n-1;i++){
for(intj=0;j<n-i-1;j++){
                    if (students[j].rollNo > students[j + 1].rollNo) {
swap(students[j], students[j + 1]);
}
}
}
}

void insertionSortByName(vector<Student>& students) {
for (int i = 1; i < students.size(); i++) {
Student key = students[i];
intj=i-1;

         while (j >= 0 && students[j].name > key.name) {
students[j + 1] = students[j];
j--;
}
students[j + 1] = key;
}
```

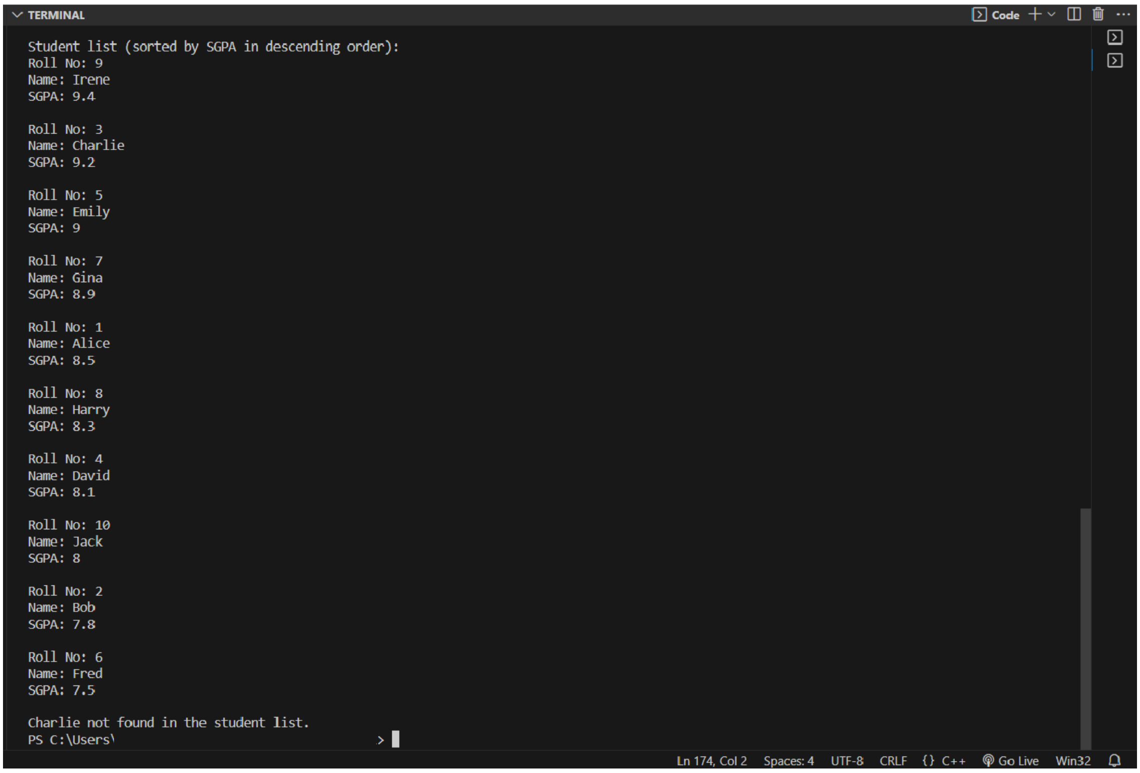
```
}

int partition(vector<Student>& students, int low, int high) {
Student pivot = students[high];
int i = (low - 1);

for (int j = low; j < high; j++) {
if (students[j].SGPA > pivot.SGPA) {
i++;
swap(students[i], students[j]);
}
}

swap(students[i + 1], students[high]);
return (i + 1);
}

void quickSortBySGPA(vector<Student>& students, int low, int high) {
if (low < high) {
int pivot = partition(students, low, high);

quickSortBySGPA(students, low, pivot - 1);
quickSortBySGPA(students, pivot + 1, high);
}
}

bool binarySearchByName(vector<Student>& students, string name) {
int low = 0;
int high = students.size() - 1;

while (low <= high) {
int mid = low + (high - low) / 2;

if (students[mid].name == name) {
return true;
} else if (students[mid].name < name) {
low = mid + 1;
} else {
high = mid - 1;
}
}

return false;
}

int main() {
vector<Student> students = {
Student(1, "Alice", 8.5),
Student(2, "Bob", 7.8),
Student(3, "Charlie", 9.2),
Student(4, "David", 8.1),
Student(5, "Emily", 9.0),
Student(6, "Fred", 7.5),
Student(7, "Gina", 8.9),
Student(8, "Harry", 8.3),
Student(9, "Irene", 9.4),
Student(10, "Jack", 8.0)
};

// Task a: Design a roll call list using Bubble Sort
            cout << "Roll call list (sorted by roll number):" << endl;
bubbleSortByRollNo(students);
for (const Student& student : students) {
student.prints();
cout << endl;
}

// Task a: Design a roll call list using Bubble Sort
cout << "Roll call list (sorted by roll number):" << endl;
bubbleSortByRollNo(students); // Sort students by roll number

for (const Student& student : students) {
student.prints(); // Use 'student' here
cout << endl;
}

// Task b: Sort students alphabetically by name using Insertion Sort
cout << "Student list (sorted alphabetically by name):" << endl;
insertionSortByName(students); // Sort students by name

for (const Student& student : students) {
student.prints(); // Use 'student' here
cout << endl;
}
// Task c: Sort students by SGPA (descending order) using Quick Sort
cout << "Student list (sorted by SGPA in descending order):" << endl;
quickSortBySGPA(students, 0, students.size() - 1); // Sort students by
SGPA

for (const Student &student : students) {
student.prints(); // Use 'student' here
cout << endl;
}
// Task d: Search for a student by name
string searchName = "Charlie";
bool found = binarySearchByName(students, searchName);

if (found) {
cout << searchName << " found in the student list." << endl;
} else {
```

```cpp
    cout << searchName << " not found in the student list." << endl;
}

return 0;

}
```

output -



```
PS C:\Users\              \c++\           > cd "c:\Users\              \c++\              \" ; if ($?) { g++ try.cpp -o try } ; if ($?) { .\try
}
Roll call list (sorted by roll number):
Roll No: 1
Name: Alice
SGPA: 8.5

Roll No: 2
Name: Bob
SGPA: 7.8

Roll No: 3
Name: Charlie
SGPA: 9.2

Roll No: 4
Name: David
SGPA: 8.1

Roll No: 5
Name: Emily
SGPA: 9

Roll No: 6
Name: Fred
SGPA: 7.5

Roll No: 7
Name: Gina
SGPA: 8.9

Roll No: 8
Name: Harry
SGPA: 8.3

Roll No: 9
Name: Irene
SGPA: 9.4

Roll No: 10
Name: Jack
SGPA: 8
```



```
Student list (sorted by SGPA in descending order):
Roll No: 9
Name: Irene
SGPA: 9.4

Roll No: 3
Name: Charlie
SGPA: 9.2

Roll No: 5
Name: Emily
SGPA: 9

Roll No: 7
Name: Gina
SGPA: 8.9

Roll No: 1
Name: Alice
SGPA: 8.5

Roll No: 8
Name: Harry
SGPA: 8.3

Roll No: 4
Name: David
SGPA: 8.1

Roll No: 10
Name: Jack
SGPA: 8

Roll No: 2
Name: Bob
SGPA: 7.8

Roll No: 6
Name: Fred
SGPA: 7.5

Charlie not found in the student list.
PS C:\Users\                    >
```