Third Year B. Tech (EL & CE)

Semester: V   **Subject:** Object-Oriented Programming Lab

Name: Shreerang Mhatre   **Class: SY**

Roll No: 52   **Batch: A3**

Experiment No: 06

Name of the Experiment: File and exception Handling

Performed on: 29/11/2023

Submitted on: 29/11/2023

Problem Statement:

A School maintains the mark sheets of all standard students in the following format:
PRN
Student Name
Maths
Physics
Chemistry
Total %
Grade

A teacher put marks for the student by his/her PRN and the system checks whether marks
for different subjects are negative or not. If it is negative, the system displays appropriate
message otherwise updates the files by storing the marks across the subjects. The system calculates
the total percentage after putting marks for all three subjects and accordingly finds the grade.
Whenever an administrator wants to search a student's record, he/she inputs student PRN and
the system searches the file and displays whether there is available or not, otherwise an
appropriate message is displayed. An administrator can also delete/modify a record of a student.
Design such system using c++ Program with file and exception handling.

Output:

```
D:\Object Oriented Programming\r>cd "d:\Object Orientedogramming\r\" && g++ rough.c++ -o rough
&& "d:\Object Onted Programming\r\"rough

***** Student Record System *****
1. Add Student Record
2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 1
Enter PRN: 123456789
Enter Student Name: Shreerang
Enter marks for Maths: 89
Enter marks for Physics: 78
Enter marks for Chemistry: 97
Record added successfully!

***** Student Record System *****
1. Add Student Record
2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
Enter PRN to modify: 123456789
Enter new marks for Maths: 91
Enter new marks for Physics: 92
Enter new marks for Chemistry: 93
Record modified successfully!

***** Student Record System *****
1. Add Student Record
2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
PRN: 123456789
Name: Shreerang
Maths: 91
Physics: 92
Chemistry: 93
Total Percentage: 92%
Grade: A

***** Student Record System *****
1. Add Student Record
```

Code:

```cpp
#include <iostream>
#include <fstream>
#include <string>

using namespace std;

class Student {
public:
    int prn;
    string name;
    float maths;
    float physics;
    float chemistry;
    float totalPercentage;
    char grade;

    // Member functions
    void calculatePercentageAndGrade() {
        totalPercentage = (maths + physics + chemistry) / 3.0;

        if (totalPercentage >= 90) {
            grade = 'A';
        } else if (totalPercentage >= 80) {
            grade = 'B';
        } else if (totalPercentage >= 70) {
            grade = 'C';
        } else if (totalPercentage >= 60) {
            grade = 'D';
        } else {
            grade = 'F';
        }
    }
};

void addStudentRecord() {
    ofstream outfile("students.txt", ios::app);

    if (!outfile.is_open()) {
```

```cpp
        cerr << "Error opening file for writing!" << endl;
        return;
}

Student student;
cout << "Enter PRN: ";
cin >> student.prn;

// Check if PRN already exists
ifstream infile("students.txt");
Student tempStudent;
bool prnExists = false;

while (infile >> tempStudent.prn >> tempStudent.name >> tempStudent.maths >> tempStudent.physics
>> tempStudent.chemistry >> tempStudent.totalPercentage >> tempStudent.grade) {
    if (tempStudent.prn == student.prn) {
        prnExists = true;
        break;
    }
}

infile.close();

if (prnExists) {
    cout << "PRN already exists. Please use modify option to update the record." << endl;
    return;
}

cout << "Enter Student Name: ";
cin.ignore();
getline(cin, student.name);

cout << "Enter marks for Maths: ";
cin >> student.maths;

if (student.maths < 0) {
    cerr << "Error: Marks cannot be negative!" << endl;
    return;
}

cout << "Enter marks for Physics: ";
cin >> student.physics;

if (student.physics < 0) {
    cerr << "Error: Marks cannot be negative!" << endl;
    return;
}

cout << "Enter marks for Chemistry: ";
cin >> student.chemistry;
```

```cpp
    if (student.chemistry < 0) {
      cerr << "Error: Marks cannot be negative!" << endl;
      return;
    }

    // Calculate total percentage and grade
    student.calculatePercentageAndGrade();

    // Write to file
    outfile << student.prn << " " << student.name << " " << student.maths << " " << student.physics
    << " " << student.chemistry << " " << student.totalPercentage << " " << student.grade << endl;

    outfile.close();

    cout << "Record added successfully!" << endl;
}

void searchStudentRecord() {
    ifstream infile("students.txt");

    if (!infile.is_open()) {
      cerr << "Error opening file for reading!" << endl;
      return;
    }

    int searchPRN;
    cout << "Enter PRN to search: ";
    cin >> searchPRN;

    Student student;
    bool found = false;

    while (infile >> student.prn >> student.name >> student.maths >> student.physics >>
    student.chemistry >> student.totalPercentage >> student.grade) {
      if (student.prn == searchPRN) {
        found = true;
        break;
      }
    }

    infile.close();

    if (found) {
      cout << "Record found:" << endl;
      cout << "PRN: " << student.prn << endl;
      cout << "Name: " << student.name << endl;
      cout << "Maths: " << student.maths << endl;
      cout << "Physics: " << student.physics << endl;
      cout << "Chemistry: " << student.chemistry << endl;
      cout << "Total Percentage: " << student.totalPercentage << "%" << endl;
      cout << "Grade: " << student.grade << endl;
    } else {
```

```cpp
        cout << "Record not found." << endl;
    }
}

void modifyStudentRecord() {
    ifstream infile("students.txt");
    ofstream outfile("temp.txt");

    if (!infile.is_open() || !outfile.is_open()) {
        cerr << "Error opening file for reading or writing!" << endl;
        return;
    }

    int modifyPRN;
    cout << "Enter PRN to modify: ";
    cin >> modifyPRN;

    Student student;
    bool found = false;

    while (infile >> student.prn >> student.name >> student.maths >> student.physics >>
    student.chemistry >> student.totalPercentage >> student.grade) {
        if (student.prn == modifyPRN) {
            found = true;
            break;
        }

        outfile << student.prn << " " << student.name << " " << student.maths << " "
        << student.physics << " " << student.chemistry << " " << student.totalPercentage
        << " " << student.grade << endl;
    }

    if (!found) {
        cout << "Record not found." << endl;
        infile.close();
        outfile.close();
        return;
    }

    cout << "Enter new marks for Maths: ";
    cin >> student.maths;

    if (student.maths < 0) {
        cerr << "Error: Marks cannot be negative!" << endl;
        infile.close();
        outfile.close();
        return;
    }

    cout << "Enter new marks for Physics: ";
    cin >> student.physics;

    if (student.physics < 0) {
```

```cpp
        cerr << "Error: Marks cannot be negative!" << endl;
        infile.close();
        outfile.close();
        return;
    }

    cout << "Enter new marks for Chemistry: ";
    cin >> student.chemistry;

    if (student.chemistry < 0) {
        cerr << "Error: Marks cannot be negative!" << endl;
        infile.close();
        outfile.close();
        return;
    }

    // Calculate total percentage and grade
    student.calculatePercentageAndGrade();

    // Write modified record to file
    outfile << student.prn << " " << student.name << " " << student.maths << " " << student.physics
    << " " << student.chemistry << " " << student.totalPercentage << " " << student.grade << endl;

    // Copy the rest of the records
    while (infile >> student.prn >> student.name >> student.maths >> student.physics >>
    student.chemistry >> student.totalPercentage >> student.grade) {
        outfile << student.prn << " " << student.name << " " << student.maths << " "
        << student.physics << " " << student.chemistry << " " << student.totalPercentage << " "
        << student.grade << endl;
    }

    infile.close();
    outfile.close();

    // Rename temp file to original file
    remove("students.txt");
    rename("temp.txt", "students.txt");

    cout << "Record modified successfully!" << endl;
}

int main() {
    int choice;

    do {
        cout << "\n***** Student Record System *****" << endl;
        cout << "1. Add Student Record" << endl;
        cout << "2. Search Student Record" << endl;
        cout << "3. Modify Student Record" << endl;
        cout << "4. Quit" << endl;
        cout << "Enter your choice: ";
        cin >> choice;
```

```cpp
        switch (choice) {
            case 1:
                addStudentRecord();
                break;

            case 2:
                searchStudentRecord();
                break;

            case 3:
                modifyStudentRecord();
                break;

            case 4:
                cout << "Exiting program. Goodbye!" << endl;
                break;

            default:
                cout << "Invalid choice. Please enter a valid option." << endl;
        }

    } while (choice != 4);

    return 0;
}
```

```cpp
/*
Name: Shreerang Mhatre
Rollno: 52
Batch: A3
Exp: 6 - file and exception handling

Problrm statement:

A School maintains the mark sheets of all standard students in the following format:
PRN
Student Name
Maths
Physics
Chemistry
Total %
Grade

A techer put marks for the student by his/her PRN and the system checks whether marks
for different subjects are negative or not. If it is negative, the  system displays appropriate
messagr otherwise updates the files by storing the marks across the subjects. The system calculates
the total percentage after putting marks for all three subjectsand accordinglyfinds the grade.
Whenever an  administrator wants to search a studenets record , he/she inputs student PRN and
the system searches the file and displays wheather theit is available or not, otherwise  an
appropriate message is displayed. An administrator can also delete/modify a record of a student.
Design such system using c++ Program with file and exception handling.
*/
#include <iostream>
#include <fstream>
#include <string>

using namespace std;

class Student {
public:
    int prn;
    string name;
    float maths;
```

Terminal output:

```
Microsoft Windows [Version 10.0.19045.3693]
(c) Microsoft Corporation. All rights reserved.

D:\Object Oriented Programming\r>cd "d:\Object Oriented
ogramming\r\" && g++ rough.c++ -o rough && "d:\Object O
nted Programming\r\"rough

***** Student Record System *****
1. Add Student Record
2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 1
Enter PRN: 123456789
Enter Student Name: Shreerang
Enter marks for Maths: 89
Enter marks for Physics: 78
Enter marks for Chemistry: 97
Record added successfully!

***** Student Record System *****
1. Add Student Record
2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
Enter PRN to modify: 123456789
Enter new marks for Maths: 91
Enter new marks for Physics: 92
Enter new marks for Chemistry: 93
Record modified successfully!

***** Student Record System *****
1. Add Student Record
2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
PRN: 123456789
Name: Shreerang
Maths: 91
```

Second screenshot:

```cpp
#include <fstream>
#include <string>

using namespace std;

class Student {
public:
    int prn;
    string name;
    float maths;
    float physics;
    float chemistry;
    float totalPercentage;
    char grade;

    // Member functions
    void calculatePercentageAndGrade() {
        totalPercentage = (maths + physics + chemistry) / 3.0;

        if (totalPercentage >= 90) {
            grade = 'A';
        } else if (totalPercentage >= 80) {
            grade = 'B';
        } else if (totalPercentage >= 70) {
            grade = 'C';
        } else if (totalPercentage >= 60) {
            grade = 'D';
        } else {
            grade = 'F';
        }
    }
};

void addStudentRecord() {
    ofstream outfile("students.txt", ios::app);

    if (!outfile.is_open()) {
```

Terminal output (second screenshot):

```
Microsoft Windows [Version 10.0.19045.3693]
(c) Microsoft Corporation. All rights reserved.

D:\Object Oriented Programming\r>cd "d:\Object Oriented
ogramming\r\" && g++ rough.c++ -o rough && "d:\Object O
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***** Student Record System *****
1. Add Student Record
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Enter your choice: 1
Enter PRN: 123456789
Enter Student Name: Shreerang
Enter marks for Maths: 89
Enter marks for Physics: 78
Enter marks for Chemistry: 97
Record added successfully!

***** Student Record System *****
1. Add Student Record
2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
Enter PRN to modify: 123456789
Enter new marks for Maths: 91
Enter new marks for Physics: 92
Enter new marks for Chemistry: 93
Record modified successfully!

***** Student Record System *****
1. Add Student Record
2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
PRN: 123456789
Name: Shreerang
Maths: 91
```

```cpp
void addStudentRecord() {
    ofstream outfile("students.txt", ios::app);

    if (!outfile.is_open()) {
        cerr << "Error opening file for writing!" << endl;
        return;
    }

    Student student;
    cout << "Enter PRN: ";
    cin >> student.prn;

    // Check if PRN already exists
    ifstream infile("students.txt");
    Student tempStudent;
    bool prnExists = false;

    while (infile >> tempStudent.prn >> tempStudent.name >> tempStudent.maths >> tempStudent.physics
        >> tempStudent.chemistry >> tempStudent.totalPercentage >> tempStudent.grade) {
        if (tempStudent.prn == student.prn) {
            prnExists = true;
            break;
        }
    }

    infile.close();

    if (prnExists) {
        cout << "PRN already exists. Please use modify option to update the record." << endl;
        return;
    }

    cout << "Enter Student Name: ";
    cin.ignore();
    getline(cin, student.name);
```



```cpp
        cout << "PRN already exists. Please use modify option to update the record." << endl;
        return;
    }

    cout << "Enter Student Name: ";
    cin.ignore();
    getline(cin, student.name);

    cout << "Enter marks for Maths: ";
    cin >> student.maths;

    if (student.maths < 0) {
        cerr << "Error: Marks cannot be negative!" << endl;
        return;
    }

    cout << "Enter marks for Physics: ";
    cin >> student.physics;

    if (student.physics < 0) {
        cerr << "Error: Marks cannot be negative!" << endl;
        return;
    }

    cout << "Enter marks for Chemistry: ";
    cin >> student.chemistry;

    if (student.chemistry < 0) {
        cerr << "Error: Marks cannot be negative!" << endl;
        return;
    }

    // Calculate total percentage and grade
    student.calculatePercentageAndGrade();

    // Write to file
    outfile << student.prn << " " << student.name << " " << student.maths << " " << student.physics
```

```cpp
119         }
120
121         // Calculate total percentage and grade
122         student.calculatePercentageAndGrade();
123
124         // Write to file
125         outfile << student.prn << " " << student.name << " " << student.maths << " " << student.physics
126         << " " << student.chemistry << " " << student.totalPercentage << " " << student.grade << endl;
127
128         outfile.close();
129
130         cout << "Record added successfully!" << endl;
131     }
132
133     void searchStudentRecord() {
134         ifstream infile("students.txt");
135
136         if (!infile.is_open()) {
137             cerr << "Error opening file for reading!" << endl;
138             return;
139         }
140
141         int searchPRN;
142         cout << "Enter PRN to search: ";
143         cin >> searchPRN;
144
145         Student student;
146         bool found = false;
147
148         while (infile >> student.prn >> student.name >> student.maths >> student.physics >>
149         student.chemistry >> student.totalPercentage >> student.grade) {
150             if (student.prn == searchPRN) {
151                 found = true;
152                 break;
153             }
154         }
155
156         infile.close();
```

```cpp
154         }
155
156         infile.close();
157
158         if (found) {
159             cout << "Record found:" << endl;
160             cout << "PRN: " << student.prn << endl;
161             cout << "Name: " << student.name << endl;
162             cout << "Maths: " << student.maths << endl;
163             cout << "Physics: " << student.physics << endl;
164             cout << "Chemistry: " << student.chemistry << endl;
165             cout << "Total Percentage: " << student.totalPercentage << "%" << endl;
166             cout << "Grade: " << student.grade << endl;
167         } else {
168             cout << "Record not found." << endl;
169         }
170     }
171
172     void modifyStudentRecord() {
173         ifstream infile("students.txt");
174         ofstream outfile("temp.txt");
175
176         if (!infile.is_open() || !outfile.is_open()) {
177             cerr << "Error opening file for reading or writing!" << endl;
178             return;
179         }
180
181         int modifyPRN;
182         cout << "Enter PRN to modify: ";
183         cin >> modifyPRN;
184
185         Student student;
186         bool found = false;
187
188         while (infile >> student.prn >> student.name >> student.maths >> student.physics >>
189         student.chemistry >> student.totalPercentage >> student.grade) {
190             if (student.prn == modifyPRN) {
```

Screenshot 1:

```cpp
        while (infile >> student.prn >> student.name >> student.maths >> student.physics >>
        student.chemistry >> student.totalPercentage >> student.grade) {
            if (student.prn == modifyPRN) {
                found = true;
                break;
            }

            outfile << student.prn << " " << student.name << " " << student.maths << " "
            << student.physics << " " << student.chemistry << " " << student.totalPercentage
            << " " << student.grade << endl;
        }

        if (!found) {
            cout << "Record not found." << endl;
            infile.close();
            outfile.close();
            return;
        }

        cout << "Enter new marks for Maths: ";
        cin >> student.maths;

        if (student.maths < 0) {
            cerr << "Error: Marks cannot be negative!" << endl;
            infile.close();
            outfile.close();
            return;
        }

        cout << "Enter new marks for Physics: ";
        cin >> student.physics;

        if (student.physics < 0) {
            cerr << "Error: Marks cannot be negative!" << endl;
            infile.close();
            outfile.close();
            return;
```

Terminal output:

```
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Record added successfully!

***** Student Record System *****
1. Add Student Record
2. Search Student Record
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4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
Enter PRN to modify: 123456789
Enter new marks for Maths: 91
Enter new marks for Physics: 92
Enter new marks for Chemistry: 93
Record modified successfully!

***** Student Record System *****
1. Add Student Record
2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
PRN: 123456789
Name: Shreerang
Maths: 91
```

Screenshot 2:

```cpp
        // Calculate total percentage and grade
        student.calculatePercentageAndGrade();

        // Write modified record to file
        outfile << student.prn << " " << student.name << " " << student.maths << " " << student.physics
        << " " << student.chemistry << " " << student.totalPercentage << " " << student.grade << endl;

        // Copy the rest of the records
        while (infile >> student.prn >> student.name >> student.maths >> student.physics >>
        student.chemistry >> student.totalPercentage >> student.grade) {
            outfile << student.prn << " " << student.name << " " << student.maths << " "
            << student.physics << " " << student.chemistry << " " << student.totalPercentage << " "
            << student.grade << endl;
        }

        infile.close();
        outfile.close();

        // Rename temp file to original file
        remove("students.txt");
        rename("temp.txt", "students.txt");

        cout << "Record modified successfully!" << endl;
}

int main() {
    int choice;

    do {
        cout << "\n***** Student Record System *****" << endl;
        cout << "1. Add Student Record" << endl;
        cout << "2. Search Student Record" << endl;
        cout << "3. Modify Student Record" << endl;
        cout << "4. Quit" << endl;
        cout << "Enter your choice: ";
        cin >> choice;
```

Terminal output:

```
Microsoft Windows [Version 10.0.19045.3693]
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ogramming\r\" && g++ rough.c++ -o rough && "d:\Object O
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4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
PRN: 123456789
Name: Shreerang
Maths: 91
```
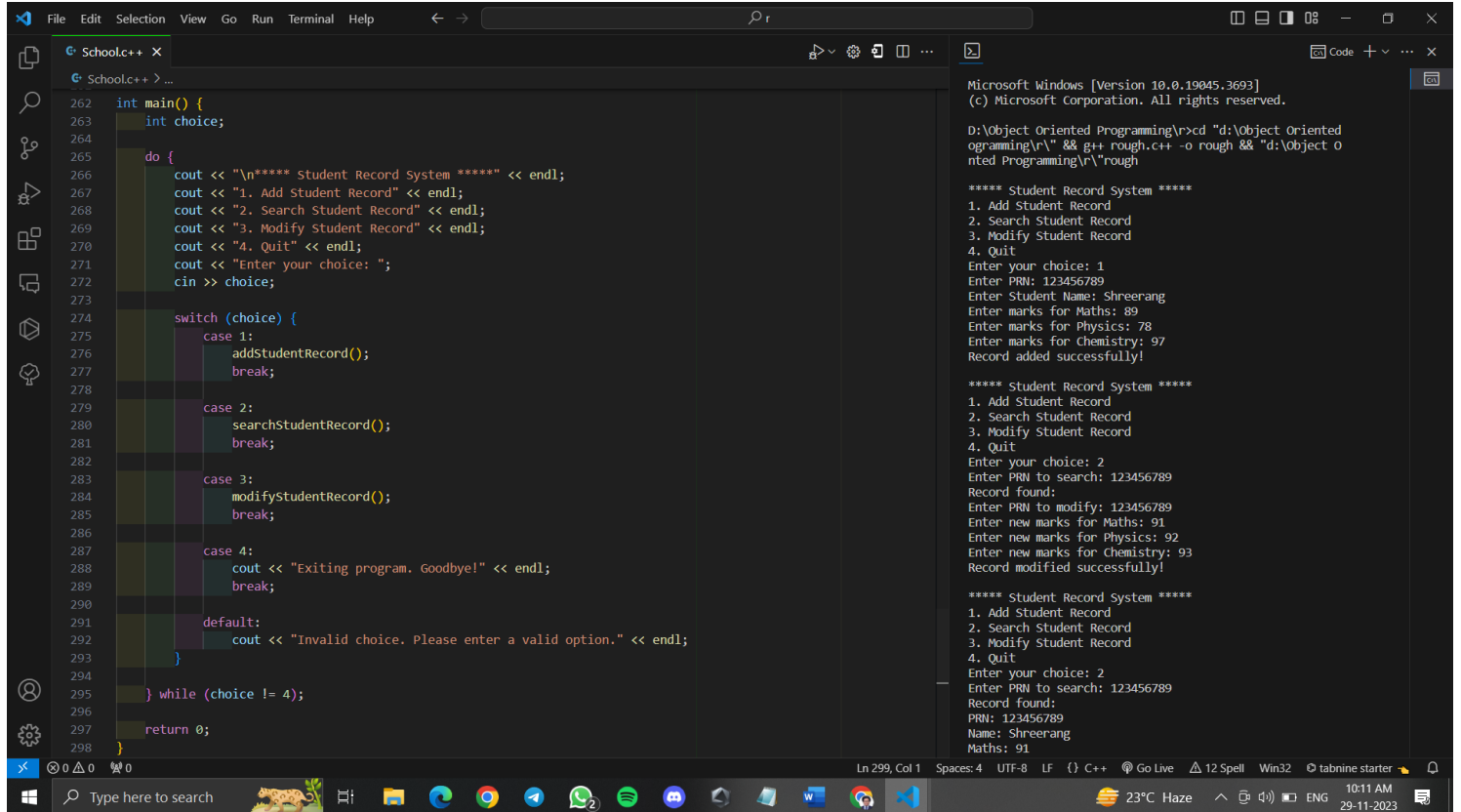
```cpp
int main() {
    int choice;

    do {
        cout << "\n***** Student Record System *****" << endl;
        cout << "1. Add Student Record" << endl;
        cout << "2. Search Student Record" << endl;
        cout << "3. Modify Student Record" << endl;
        cout << "4. Quit" << endl;
        cout << "Enter your choice: ";
        cin >> choice;

        switch (choice) {
            case 1:
                addStudentRecord();
                break;

            case 2:
                searchStudentRecord();
                break;

            case 3:
                modifyStudentRecord();
                break;

            case 4:
                cout << "Exiting program. Goodbye!" << endl;
                break;

            default:
                cout << "Invalid choice. Please enter a valid option." << endl;
        }

    } while (choice != 4);

    return 0;
}
```

Terminal output:

```
Microsoft Windows [Version 10.0.19045.3693]
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ogramming\r\" && g++ rough.c++ -o rough && "d:\Object O
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2. Search Student Record
3. Modify Student Record
4. Quit
Enter your choice: 2
Enter PRN to search: 123456789
Record found:
PRN: 123456789
Name: Shreerang
Maths: 91
```