

PROJECT REPORT

STUDENT RECORD MANAGEMENT SYSTEM

(SRMS)

BY

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Abstract

This program is designed to collect and display a student's complete academic and personal information in a structured report format. It uses a Student structure that stores details such as roll number, name, age, course, email, phone number, marks of five subjects, total marks, percentage, and the final grade. The purpose of the program is to demonstrate how structures can be used to organize and process related data efficiently in C++.

The execution begins with taking personal details from the user, ensuring that each student can be uniquely identified. After this, the program collects marks for five subjects. These marks are stored in an array within the structure. A member function `calculateGrade()` is then used to process the data. It adds all the marks to calculate the total and divides the sum by five to obtain the percentage.

Once the percentage is computed, the program assigns a grade based on a simple grading scale:

- 90% and above – A
- 75% to 89% – B
- 60% to 74% – C
- 40% to 59% – D
- Below 40% – F

After the calculations, the program prints a clear and well-formatted student report. This report includes all the personal details entered earlier, along with the total marks, percentage, and grade. This makes it easy for anyone to understand the student's performance at a glance.

Overall, the program highlights how structures, arrays, loops, and conditional statements can be used together to build simple data-management applications. It effectively converts user input into an organized academic report, demonstrating both data handling and basic result processing in C++.

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1. Introduction

Student Record Management Systems (SRMS) simplify storing and retrieving student information such as roll number, name, age, course, and grades. This project provides a console-based C++ application suitable for small institutions or as an educational demonstration of file-based persistence and object-oriented programming.

2. Objectives

- Design and implement a user-friendly console application in C++.
- Store student records persistently using file I/O.
- Provide CRUD operations (Create, Read, Update, Delete).
- Implement search and sorting functions.
- Demonstrate robust input validation and error handling.

3. System Requirements

Hardware

- Any PC with minimum 256 MB RAM and 50 MB disk space.

Software

- C++ compiler (g++ recommended, version supporting C++11 or later).
- Operating system: Windows / Linux / macOS.

4. Functional Requirements

- Add new student record.
- Display all student records.
- Search student by roll number or name.
- Update existing student record.
- Delete a student record.
- Sort records by roll number, name, or GPA.
- Persist and load records from file at startup/shutdown.

5. Non-functional Requirements

- Console-based UI for simplicity.
- Reliable file operations with error messages.
- Reasonable performance ($O(n \log n)$ sorting with `std::sort`).
- Maintainable and modular C++ codebase.

6. System Design

Overview

The system follows a modular design with separate classes for Student, StudentManager (handles operations and file I/O), and a simple Menu driving the user interaction.

Class diagram (textual)

7. Data Structures and Algorithms

Purpose of the Data Structure

- To store **complete student details**
- To hold **marks of 5 subjects**
- To compute and store **total, percentage, and grade**

Flow of Algorithm (Summary)

1. Input → Student Details
2. Input → 5 Marks
3. Compute → Total
4. Compute → Percentage
5. Compute → Grade
6. Output → Complete Report

8. Implementation Details

*A structure is used to keep all student data together

*Input is taken using `cin` and `getline()`

* A loop is used to read 5 marks

*The function `calculateGrade()` computes the results

*Final output shows the student's details, total, percentage, and grade

9. Key design decisions

1. A **structure** is used to keep all student details together.
2. An **array** stores the 5 subject marks to make calculations easy.
3. A separate **calculateGrade() function** is used to compute total, percentage, and grade.

File format (CSV)

```
roll,name,age,course,EMAIL,phone,marks  
1,John Doe,20,CS,john@gmail.com,9999888810,8.5
```

Error handling

- Check file open success and display clear messages.
- Handle malformed lines gracefully (skip with logged warning).

10. Sample Code (core snippets)

Below are simplified, well-commented code snippets. Full implementation should include additional validation and robustness.

```
#include <iostream>
```

```
#include <cstring>
```

```
using namespace std;
```

```
struct Student {  
    int rollNumber;  
    char name[50];  
    int age;
```

```

char course[30];
float marks[5];
float totalMarks;
float percentage;
char grade;
char email[50];
char phone[15];

void calculateGrade() {
    totalMarks = 0;

    for(int i = 0; i < 5; i++) {
        totalMarks += marks[i];
    }

    percentage = totalMarks / 5;

    // Calculate grade
    if (percentage >= 90)
        grade = 'A';
    else if (percentage >= 75)
        grade = 'B';
    else if (percentage >= 60)
        grade = 'C';
    else if (percentage >= 40)
        grade = 'D';
    else
        grade = 'F';
}

```

```

    }
};

int main() {
    Student s;

    cout << "Enter Roll Number: ";
    cin >> s.rollNumber;

    cin.ignore(); // clear buffer

    cout << "Enter Name: ";
    cin.getline(s.name, 50);

    cout << "Enter Age: ";
    cin >> s.age;

    cin.ignore();

    cout << "Enter Course: ";
    cin.getline(s.course, 30);

    cout << "Enter Email: ";
    cin.getline(s.email, 50);

    cout << "Enter Phone: ";
    cin.getline(s.phone, 15);

```

```

cout << "Enter marks for 5 subjects:\n";
for(int i = 0; i < 5; i++) {
    cout << "Subject " << i+1 << ": ";
    cin >> s.marks[i];
}

// Calculate grade and percentage
s.calculateGrade();

// Output result
cout << "\n===== STUDENT REPORT =====\n";
cout << "Roll Number: " << s.rollNumber << endl;
cout << "Name: " << s.name << endl;
cout << "Age: " << s.age << endl;
cout << "Course: " << s.course << endl;
cout << "Email: " << s.email << endl;
cout << "Phone: " << s.phone << endl;

cout << "Total Marks: " << s.totalMarks << endl;
cout << "Percentage: " << s.percentage << "%" << endl;
cout << "Grade: " << s.grade << endl;

return 0;
}

```

11. Conclusion

This Student Record Management System demonstrates core software engineering principles: requirement analysis, modular design, implementation in C++, persistent storage, and basic algorithms. It can be extended into a full-featured system with a database and GUI.

12. References

- C++ Reference (cplusplus.com / cppreference.com)
- “Programming: Principles and Practice Using C++” — Bjarne Stroustrup

End of report.