1. Project Objective

The objective of this project is to design and implement a **menu-driven C++ application** that tracks student performance. The project allows users to **manage student records**, calculate statistics, predict performance, and generate reports. This helps in applying **programming fundamentals**, logical problem solving, and teamwork.

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2. Features

1. **Add New Student:**
    - Add students with roll number or name.
    - Prevent duplicate roll numbers.
2. **View All Students:**
    - Display all students with average marks, grade, and attendance status.
3. **Search Student:**
    - Search by roll number or name.
    - Display detailed student information.
4. **Update Student Information:**
    - Enter marks for 5 subjects and attendance
    - Automatically calculate total, average, and grade.
5. **Delete Student Record:**
    - Delete any student with confirmation.
6. **Class Statistics:**
    - Calculate class average, highest and lowest performers.
    - Pass/fail statistics and attendance statistics.
7. **Top 5 Students:**
    - Display ranking based on average marks.
8. **AI Performance Prediction:**
    - Predict final score based on current marks, attendance.

    - Provide predicted grade.
9. **Generate Reports:**
    - Individual student reports.
    - Class performance summary.
10. **Save Data to File:**
    - Save all student data to a text file for permanent storage.

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3. Programming Concepts Used

- **Variables and data types** (int, float, string, vector)
- **Functions** (for menu, calculations, AI prediction)
- **Structures** (struct Student)
- **Loops and conditions** (for menus, validations, statistics)
- **File handling** (save data and generate reports)
- **Vectors** (store multiple students and marks)
- **String manipulation** (searching, formatting, uppercase/lowercase)

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4. Real-world Applications

- Can be used in schools, colleges, or coaching centers to track student performance.
- Teachers can monitor attendance, grades.

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5. Conclusion

This project demonstrates the **practical application of programming fundamentals** in a real-world scenario. It emphasizes clean code, logical problem solving, teamwork, and version control.