**Project Overview**

Your project will be a C++ program that calculates **SGPA (Semester Grade Point Average)** and **CGPA (Cumulative Grade Point Average)** based on user input. It will take course grades and credit hours as input, perform necessary calculations, and display the results.

**Features You Can Add**

Here are some essential and advanced features you might consider:

**Basic Features**

* **User Input System:** Users can enter subject names, grades, and credit hours.
* **SGPA Calculation:** Compute SGPA based on grades and credit hours for a semester.
* **CGPA Calculation:** Keep track of previous semesters and compute CGPA over multiple semesters.
* **Grade Validation:** Ensure that users input grades in a valid format (A, B, C, etc.).
* **Simple Console Interface:** Display results in a structured format.

**Advanced Features**

* File **Handling:** Save semester details to a file for future reference.
* **Graphical UI:** Instead of a console application, you can create a GUI using libraries like Qt or SFML.
* **Database Integration:** Use SQLite or MySQL to store student records.
* **Grade Calculation Based on Percentage:** If users enter their marks, the program could automatically assign grades.
* **Predictive Analysis:** Suggest the grades needed in future semesters to achieve a target CGPA.
* **Error Handling:** Ensure smooth execution by preventing invalid inputs and division by zero errors.
* **User Authentication:** Allow multiple users to store their records securely.

**Technical Requirements**

* **Programming Language:** C++
* **Data Structures:** Arrays, structs, or classes for storing subject details.
* **File Handling:** For storing CGPA records across multiple sessions.
* **File Handling:** For storing CGPA records across multiple sessions.
* **Basic Mathematics:** Weighted average formula for SGPA/CGPA calculations.

**Project Structure**

1. **Welcome Screen**
2. **Input Module** (Subject names, grades, credit hours)
3. **SGPA Calculation Module**
4. **CGPA Calculation Module**
5. **Data Storage & Retrieval**
6. **Display Results**
7. **Error Handling & Exit Option**