

C++ Programming Assignment

Title: Multi-Student Performance Management System

(Nested Menus + Functions)

Problem Context:

An institute wants a console-based academic analytics system that can handle multiple students, each enrolled in multiple subjects.

The system must be menu-driven with nested menus and implemented only using functions and arrays.

Data Model:

- Maximum students: 50
- Maximum subjects per student: 10
- Store Student ID, Student Name, and subject-wise marks
- Use parallel arrays only (no structures or classes)

Main Menu (Level 1):

1. Student Operations
2. Reports & Analytics
3. Exit

Student Operations Menu (Level 2):

1. Add New Student
2. Enter / Update Marks
3. View Student Details

4. Back to Main Menu

Functions to Implement:

1. addStudent(int ids[], string names[], int &count)

- Adds a new student
- Prevents overflow beyond 50 students

2. searchStudent(int ids[], int count, int key)

- Returns index if student found, else -1

3. inputMarks(int marks[][10], int index, int subjects)

- Accepts and validates marks (0-100)

4. displayStudent(...)

- Displays student details
- Shows average, grade, and pass/fail status

Reports & Analytics Menu (Level 2):

1. Class Average

2. Top Scorer

3. Student-wise Result Summary

4. Back to Main Menu

5. calculateStudentAverage(...)

6. calculateClassAverage(...)

7. findTopScorer(...)

8. calculateGrade(float avg)

9. isPass(...)

Grade Rules:

≥ 90 : A

≥ 75 : B

≥ 60 : C

≥ 40 : D

< 40 : F

Constraints:

- No global variables
- No classes or structures
- No STL
- No recursion
- Use arrays, loops, and functions only

Bonus:

- Handle duplicate IDs
- Rank list
- Subject-wise toppers

Learning Outcomes:

- Mastery of functions
- Nested menu handling
- Real-world logic building