**Student Grades Calculator**

This code is a program to calculate student grades. The user inputs the number of students and then the grades of each subject for each student. The program then outputs an individual report for each student showing the grades for each subject and whether they passed or failed, and a global report showing the pass/fail status for all students.

The program uses two-dimensional arrays to store the grades of each student's subjects, and employs a mix of control structures and repetition structures to handle input validation, calculate the grades, and display the reports. Constants are defined to specify the maximum number of students, the maximum number of subjects per student, the minimum and maximum grades, and the minimum passing grade. The report is formatted using the iomanip library to set the width of the columns for better readability.

**Code:**

#include <iostream>

using namespace std;

const int MAX\_STUDENTS = 100; // Maximum number of students

const int MAX\_SUBJECTS = 5; // Maximum number of subjects per student

const int MIN\_GRADE = 0; // Minimum grade value

const int MAX\_GRADE = 100; // Maximum grade value

const int PASSING\_GRADE = 60; // Minimum passing grade

int main() {

  int numStudents; // Number of students

  int grades[MAX\_STUDENTS][MAX\_SUBJECTS]; // Array to store grades

  // Prompt the user to enter the number of students

  cout << "Enter the number of students (1 to " << MAX\_STUDENTS << "): ";

  cin >> numStudents;

  // Validate the number of students

  while (numStudents < 1 || numStudents > MAX\_STUDENTS) {

    cout << "Invalid input! Please enter a number between 1 and " << MAX\_STUDENTS << ": ";

    cin >> numStudents;

  }

  // Prompt the user to enter the grades for each student's subjects

  for (int i = 0; i < numStudents; i++) {

    cout << "Enter the grades for student " << i + 1 << " (0 to 100): " << endl;

    for (int j = 0; j < MAX\_SUBJECTS; j++) {

      cout << "Subject " << j + 1 << ": ";

      cin >> grades[i][j];

      // Validate the grade

      while (grades[i][j] < MIN\_GRADE || grades[i][j] > MAX\_GRADE) {

        cout << "Invalid input! Please enter a number between 0 and 100: ";

        cin >> grades[i][j];

      }

    }

  }

  // Display the report for each student

  cout << endl;

  cout << "Individual Reports" << endl;

  cout << "------------------" << endl;

  for (int i = 0; i < numStudents; i++) {

    int total = 0; // Total grade for all subjects

    cout << "Student " << i + 1 << endl;

    cout << "Subject" << "\t\t\t" << "Grade" << "\t\t\t" << "Status" << endl;

    for (int j = 0; j < MAX\_SUBJECTS; j++) {

      total += grades[i][j];

      cout << j + 1 << "\t\t\t" << grades[i][j];

      if (grades[i][j] >= PASSING\_GRADE) {

        cout << "\t\t\t" << "Pass" << endl;

      } else {

        cout << "\t\t\t" << "Fail" << endl;

      }

    }

    cout << "Total" << "\t\t" << total << endl;

  }

  // Display the global report of the pass/fail status of all students

  cout << endl;

  cout << "Global Report" << endl;

  cout << "-------------" << endl;

  cout << "Student" << "\t\t\t" << "Status" << endl;

  int numPassed = 0; // Number of students who passed

  int numFailed = 0; // Number of students who failed

  for (int i = 0; i < numStudents; i++) {

    int total = 0; // Total grade for all subjects

    for (int j = 0; j < MAX\_SUBJECTS; j++) {

      total += grades[i][j];

    }

    if (total >= PASSING\_GRADE \* MAX\_SUBJECTS) {

      cout << i + 1 << "\t\t\t" << "Pass" << endl;

      numPassed++;

    } else {

      cout << i + 1 << "\t\t\t" << "Fail" << endl;

      numFailed++;

    }

  }

  cout << endl;

  cout << "Number of Passed Students: " << numPassed << endl;

  cout << "Number of Failed Students: " << numFailed << endl;

  return 0;

}