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;
}
```