COSC 120 Project 2
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Problem
Given a data file containing students and their grades for a class, calculate their final letter grade and final percentage. Also calculate the minimum grades they have in quizzes and labs, and the maximum grades they have in projects and midterms. Print all the values to the console neatly formatted, for every student.

Arrays
quizzes: A float array with a size of 10 that stores grade values of every quiz a student has taken.
labs: A float array with a size of 10 that stores grade values of every lab the student has turned in.
projects: A float array with a size of 3 that stores grade values of every project the student has completed
midterms: A float array with a size of 3 that stores grade values of every midterm the student has taken.
card: A float array of size 6 that holds the average grade of every section in the class, and any points to be taken off for attendance.

Function Prototypes
char getLetter(float): Returns a letter corresponding to the letter grade of the student, with an input of a floating point number representing the final grade.
float getMax(float[], int): Returns a floating point number of the maximum grade in the input array. Also takes an input of the size of the array.
float getMin(float[], int): Returns a floating point number of the minimum grade in the input array. Also takes an input of the size of the array.
float getAverage(float[], int): Returns a floating point number of the average grade in the input array. Aso takes in an input of the size of the array.
float getFinalGrade(float[], int): Returns a floating point number of the final grade of the student, using the averages of the grades in the input array. Also takes in an input of the size of the array.

Psuedocode

// Initialize the input stream of the file
// Read the first 2 header lines
// Loop through each line representing a different student
// Declare variables for their first and last names
// Declare an array of arrays. The array represents their grade card, and each sub array represents different parts
// (i.e. Array 0 is a list of all their quiz grades. Array 1 is a list of all their lab grades. etc.
// Calculate the minimum grade in the Quiz array.
// Calculate the minimum grade in the Lab array.
// Calculate the maximum grade in the Project array.
// Calculate the maximum grade in the Midterm array
// Use the values in all the arrays to calculate the averages.
// Use the averages and the weights of the grades to calculate the final grade
// Take the final grade, apply any point deduction from attendance
// Convert the end grade to a letter scale.

Source Code

```cpp
#include <iostream>
#include <fstream>
#include <string>
#include <iomanip>
using namespace std;

// How many grading sections are there?
// Quizzes, labs, projects, midterms, final, attendance.
const int NUM_SECTIONS = 6;

//How many of those sections are actually stored in arrays?
// Quizzes, labs, projects, midterms.
const int NUM_ARRAYS = 4;

// Constants for how many grades are in each section
const int QUIZ_SIZE = 10;
const int LAB_SIZE = 10;
const int PROJECT_SIZE = 3;
const int MIDTERM_SIZE = 3;

// Constants for the weights of the grading sections
const float QUIZ_WEIGHT = 0.10;
const float LAB_WEIGHT = 0.10;
const float PROJECT_WEIGHT = 0.20;
const float MIDTERM_WEIGHT = 0.30;
const float FINALEX_WEIGHT = 0.30;
```

```cpp
//An array of size equal to the number of grade sections, to contain an array for each section.
//Stores the pointer of every array.

char getLetter(float);
float getMax(float[], int);
float getMin(float[], int);
float getAverage(float[], int);
float getFinalGrade(float[], int);
```

```cpp
int main()
{
    ifstream dataIn;
    string headingLine;
    string firstName, lastName;
    float quizes[QUIZ_SIZE], labs[LAB_SIZE], projects[PROJECT_SIZE], midterms[MIDTERM_SIZE];
    float finalEx, attendance, finalGrade;
    float avgQuiz, avgLab, avgProj, avgMT;
    float minQuiz, minLab, maxProject, maxMT;
    char letter;

    // open the file
    dataIn.open("COSC120Grades.txt");

    // exception for file open
    if (dataIn.fail())
    {
        cout << "Input file open error!" << endl;
        return 0;
    }

    //read the header lines
    for (int i = 0; i < 2; i++) {
        getline(dataIn, headingLine);
    }


    cout << "FirstName  LastName  Min_Quiz  Min_Lab  Max_Project  Max_MidT  FinalGrade  FinalLetter" << endl;
```

```cpp
//Read through the file until there is nothing left to read.
while (!dataIn.eof()) {

    dataIn >> firstName;
    dataIn >> lastName;

    //Read in the quizes.
    for (int q = 0; q < QUIZ_SIZE; q++) {
        dataIn >> quizes[q];
    }
    //Read in the labs.
    for (int l = 0; l < LAB_SIZE; l++) {
        dataIn >> labs[l];
    }
    //Read in the projects
    for (int p = 0; p < PROJECT_SIZE; p++) {
        dataIn >> projects[p];
    }
    //Read in the midterms
    for (int m = 0; m < MIDTERM_SIZE; m++) {
        dataIn >> midterms[m];
    }
    //Read in the final exam
    dataIn >> finalEx;
    //Read in the attendance deduction
    dataIn >> attendance;

    minQuiz = getMin(quizes, QUIZ_SIZE);
    minLab = getMin(labs, LAB_SIZE);
    maxProject = getMax(projects, PROJECT_SIZE);
    maxMT = getMax(midterms, MIDTERM_SIZE);

    avgQuiz = getAverage(quizes, QUIZ_SIZE);
    avgProj = getAverage(projects, PROJECT_SIZE);
    avgMT = getAverage(midterms, MIDTERM_SIZE);
    avgLab = getAverage(labs, LAB_SIZE);
```

```cpp
        float card[] = {avgQuiz, avgLab, avgProj, avgMT, finalEx, attendance};
        finalGrade = getFinalGrade(card, NUM_SECTIONS);
        letter = getLetter(finalGrade);

        //Output all the results
        cout << fixed << setprecision(2) << left;
        cout << setw(11) << firstName;
        cout << setw(10) << lastName;
        cout << setw(10) << minQuiz;
        cout << setw(9) << minLab;
        cout << setw(13) << maxProject;
        cout << setw(10) << maxMT;
        cout << setw(12) << finalGrade;
        cout << letter;
        cout << endl;
    }
}
```

```cpp
    float getMax(float arr[], int size){
        float max = arr[0];

        for (int i = 1; i < size; i++) {
            if (arr[i] > max) max = arr[i];
        }
        return max;
    }

    float getMin(float arr[], int size) {
        float min = arr[0];

        for (int i = 1; i < size; i++) {
            if (arr[i] < min) min = arr[i];
        }
        return min;
    }

    float getAverage(float arr[], int size) {
        float total = 0;

        for (int i = 0; i < size; i++) {
            total += arr[i];
        }
        return (total / size);
    }

    char getLetter(float val){
        if (val >= 90) return 'A';
        else if (val >= 80) return 'B';
        else if (val >= 70) return 'C';
        else if (val >= 60) return 'D';
        else { return 'F'; }
    }
```

```cpp
float getFinalGrade(float card[], int size) {

    float grade = ((card[0] * QUIZ_WEIGHT) + (card[1] * LAB_WEIGHT) + (card[2] * PROJECT_WEIGHT) + (card[3] * MIDTERM_WEIGHT) + (card[4] * FINALEX_WEIGHT));

    return (grade - (card[5] * grade));

}
```

Outputs

Testing calculations not regarding output formatting:

```
Kevin Smith 0.9291 F
Morgan Kelly 0.69723 F
Isaac Newton 0.934 F
Cole Jones 0.706547 F
Angela Allen 0.825454 F
David Cooper 0.8169 F
Nancy Bailey 0.9309 F
Emily Synder 0.8229 F
Lori Austin 0.91924 F
Jenny Howard 0.67997 F
Anne Lewis 0.724736 F
Nick Johnson 0.896841 F
Nick Spickler 0.956033 F
Joy Williams 0.811933 F
Barbara Hood 0.870167 F
Joe Hoarn 0.700979 F
Payton Bardzell 0.928333 F
Kim Ludwig 0.798161 F
Susan Honks 0.978667 F
```

Obviously I need to move the decimal point over 2 places.

```
Kevin Smith 92.91 A
Morgan Kelly 69.723 D
Isaac Newton 93.4 A
Cole Jones 70.6547 C
Angela Allen 82.5454 B
David Cooper 81.69 B
Nancy Bailey 93.09 A
Emily Synder 82.29 B
Lori Austin 91.924 A
Jenny Howard 67.997 D
Anne Lewis 72.4736 C
Nick Johnson 89.6841 B
Nick Spickler 95.6033 A
Joy Williams 81.1933 B
Barbara Hood 87.0167 B
Joe Hoarn 70.0979 C
Payton Bardzell 92.8333 A
Kim Ludwig 79.8161 C
Susan Honks 97.8667 A
```

Need to set the decimal to 2 places

```
Kevin Smith 92.91 A
Morgan Kelly 69.72 D
Isaac Newton 93.40 A
Cole Jones 70.65 C
Angela Allen 82.55 B
David Cooper 81.69 B
Nancy Bailey 93.09 A
Emily Synder 82.29 B
Lori Austin 91.92 A
Jenny Howard 68.00 D
Anne Lewis 72.47 C
Nick Johnson 89.68 B
Nick Spickler 95.60 A
Joy Williams 81.19 B
Barbara Hood 87.02 B
Joe Hoarn 70.10 C
Payton Bardzell 92.83 A
Kim Ludwig 79.82 C
Susan Honks 97.87 A
```

Testing formatting:

```
FirstName   LastName    Min_Quiz    Min_Lab     Max_Project     Max_MidT    FinalGrade      FinalLette
Kevin       Smith       85.00       89.00       98.00           98.00       92.91           A
Morgan      Kelly       65.00       65.00       98.00           69.00       69.72           D
Isaac       Newton      90.00       100.00      98.00           98.00       93.40           A
Cole        Jones       73.00       73.00       100.00          71.00       70.65           C
Angela      Allen       87.00       95.00       98.00           79.00       82.55           B
David       Cooper      56.00       75.00       98.00           78.00       81.69           B
Nancy       Bailey      87.00       91.00       98.00           98.00       93.09           A
Emily       Synder      58.00       60.00       90.00           98.00       82.29           B
Lori        Austin      100.00      100.00      98.00           98.00       91.92           A
Jenny       Howard      56.00       60.00       79.00           70.00       68.00           D
Anne        Lewis       58.00       66.00       98.00           88.00       72.47           C
Nick        Johnson     73.00       85.00       98.00           80.00       89.68           B
Nick        Spickler    90.00       89.00       98.00           98.00       95.60           A
Joy         Williams    58.00       62.00       98.00           90.00       81.19           B
Barbara     Hood        67.00       62.00       98.00           98.00       87.02           B
Joe         Hoarn       62.00       62.00       98.00           94.00       70.10           C
Payton      Bardzell    67.00       85.00       100.00          90.00       92.83           A
Kim         Ludwig      58.00       66.00       98.00           98.00       79.82           C
Susan       Honks       100.00      100.00      90.00           100.00      97.87           A


FirstName   LastName    Min_Quiz    Min_Lab     Max_Project     Max_MidT    FinalGrade      FinalLetter
Kevin       Smith       85.00       89.00       98.00           98.00       92.91           A
Morgan      Kelly       65.00       65.00       98.00           69.00       69.72           D
Isaac       Newton      90.00       100.00      98.00           98.00       93.40           A
Cole        Jones       73.00       73.00       100.00          71.00       70.65           C
Angela      Allen       87.00       95.00       98.00           79.00       82.55           B
David       Cooper      56.00       75.00       98.00           78.00       81.69           B
Nancy       Bailey      87.00       91.00       98.00           98.00       93.09           A
Emily       Synder      58.00       60.00       90.00           98.00       82.29           B
Lori        Austin      100.00      100.00      98.00           98.00       91.92           A
Jenny       Howard      56.00       60.00       79.00           70.00       68.00           D
Anne        Lewis       58.00       66.00       98.00           88.00       72.47           C
Nick        Johnson     73.00       85.00       98.00           80.00       89.68           B
Nick        Spickler    90.00       89.00       98.00           98.00       95.60           A
Joy         Williams    58.00       62.00       98.00           90.00       81.19           B
Barbara     Hood        67.00       62.00       98.00           98.00       87.02           B
Joe         Hoarn       62.00       62.00       98.00           94.00       70.10           C
Payton      Bardzell    67.00       85.00       100.00          90.00       92.83           A
Kim         Ludwig      58.00       66.00       98.00           98.00       79.82           C
Susan       Honks       100.00      100.00      90.00           100.00      97.87           A
```

Final Output:

FirstName	LastName	Min_Quiz	Min_Lab	Max_Project	Max_MidT	FinalGrade	FinalLetter
Kevin	Smith	85.00	89.00	98.00	98.00	92.91	A
Morgan	Kelly	65.00	65.00	98.00	69.00	69.72	D
Isaac	Newton	90.00	100.00	98.00	98.00	93.40	A
Cole	Jones	73.00	73.00	100.00	71.00	70.65	C
Angela	Allen	87.00	95.00	98.00	79.00	82.55	B
David	Cooper	56.00	75.00	98.00	78.00	81.69	B
Nancy	Bailey	87.00	91.00	98.00	98.00	93.09	A
Emily	Synder	58.00	60.00	90.00	98.00	82.29	B
Lori	Austin	100.00	100.00	98.00	98.00	91.92	A
Jenny	Howard	56.00	60.00	79.00	70.00	68.00	D
Anne	Lewis	58.00	66.00	98.00	88.00	72.47	C
Nick	Johnson	73.00	85.00	98.00	80.00	89.68	B
Nick	Spickler	90.00	89.00	98.00	98.00	95.60	A
Joy	Williams	58.00	62.00	98.00	90.00	81.19	B
Barbara	Hood	67.00	62.00	98.00	98.00	87.02	B
Joe	Hoarn	62.00	62.00	98.00	94.00	70.10	C
Payton	Bardzell	67.00	85.00	100.00	90.00	92.83	A
Kim	Ludwig	58.00	66.00	98.00	98.00	79.82	C
Susan	Honks	100.00	100.00	90.00	100.00	97.87	A