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Dr. Wang

COSC 120-751

10/30/2020

Project 2

Part 1: Algorithm

- a) The project is intended to take individual grades from a file, and calculate the final grades for each student. Each student has their grade data on one line in the file. The program will open the file, read the grades, perform the calculations, and close the file. The final grade calculation will be output at the end.
- b) The arrays we will need for this project are: quiz size, lab size, project size, and exam size. Quiz size will have an int data type, be named quiz[], have 10 elements, and be used for storing the quiz grades. Lab size will have an int data type, be named lab[], have 10 elements and be used for storing the lab grades. Project size will have an int data type, be named project[], have 3 elements and be used for storing the project grades. Exam size will have an int data type, be named exam[], have three elements and be used for storing exam grades.
- c) The functions we will need for the project are: get average, calculate grade, get letter, and get penalty. Get average will be named getaverage(), have a float return type, have int total and int size as its formal parameters. Its purpose is to calculate initial averages for each category, quiz, lab, project, and midterm. Calculate grade will be named calculategrade(), have float as the return type, have float avg1, float avg2, float avg3, float avg4 as its formal parameters. Its purpose is to calculate a total average grade from each of the four initial averages. Get penalty will be named getpenalty(), have a float return type, and have float average as its formal parameter. The purpose is to calculate the final grade with the attendance penalty included in the grade. The last function is get letter, and it will be named getletter(), have char return type, will have float totalavg, float projectavg as its formal parameters. Its purpose is to assign a letter grade to each student's grade based off their total average with the added condition of the project average being a certain amount. The function prototypes are as follows:

```
float getaverage(int total, int size);  
float calculategrade(float avg1, float avg2, float avg3, float avg4);  
char getletter(float totalavg, float projectavg);  
float getpenalty(float average);
```

- d) Pseudocode for the project is an overview of what the program does. First, the program opens the external file grade120.dat. It outputs a message saying if the file opened or not. Next, the program reads in the first name, last name, each of the four grades, the attendance, and the final grade of each student. Next, the program uses functions to calculate the final grade of each student given the conditions to get their grade. Next, the program outputs the final grades to the console and writes them in a separate file called letter120.dat

Part 2: Code

The source code is as follows:

```
//Nick Krisulevicz
//Project 2
//10/30/2020

#include <iostream>
#include <fstream>
#include <iomanip>
#include <string>

using namespace std;

//constants
const int QUIZSIZE = 10;
const int LABSIZE = 10;
const int PROJSIZE = 3;
const int EXAMSIZE = 3;
const int STUDENTS = 19;
const double ATTENDANCEPENALTY = 0.01;

//function prototypes
float getaverage(int total, int size);
float calculategrade(float avg1, float avg2, float avg3, float avg4);
char getletter(float totalavg, float projectavg);
float getpenalty(float average);

//main function
```

```
int main()
{
    //variables
    ifstream datain;
    ofstream dataout;
    string heading;
    string firstname;
    string lastname;
    int quiz[QUIZSIZE];
    int lab[LABSIZE];
    int project[PROJSIZE];
    int exam[EXAMSIZE];
    double attendance;
    double finalexam;
    int counter = 1;
    int total;
    int tempsize;
    float quizaverage = 0;
    float labaverage = 0;
    float projectaverage = 0;
    float examaverage = 0;
    float totalaverage = 0;
    float finalaverage = 0;
    char lettergrade;

    //opening the file
    dataout.open("letter120.dat");
    datain.open("grade120.dat");
    if (datain)
```

```
{  
    cout << "File found" << endl;  
}  
else  
{  
    cout << "File not found" << endl;  
}
```

//reading the grades from the file

```
while (!datain.eof())  
{  
    if (counter == 1 || counter == 2) //gets the first two lines as the heading  
    {  
        getline(datain, heading);  
        cout << heading << endl;  
    }  
    else if (counter < 22){ //stops reading the file after it has retrieved all the lines  
        break;  
    }  
    else //The process of reading the file contents  
    {  
        datain >> firstname;  
        datain >> lastname;  
  
        for (int i = 0; i < QUIZSIZE; i++) //puts quiz grades into array  
        {  
            datain >> quiz[i];  
            total = total + quiz[i];  
            cout << quiz[i];
```

```
}

tempsize = QUIZSIZE;

quizaverage = getaverage(total, tempsize);


total = 0;
for (int i = 0; i < LABSIZE; i++) //puts lab grades into array
{
    datain >> lab[i];
    total = total + lab[i];
    cout << lab[i];
}
tempsize = LABSIZE;
labaverage = getaverage(total, tempsize);


total = 0;
for (int i = 0; i < PROJSIZE; i++) //puts project grades into array
{
    datain >> project[i];
    cout << project[i];
}
tempsize = PROJSIZE;
projectaverage = getaverage(total, tempsize);


total = 0;
for (int i = 0; i < EXAMSIZE; i++) //puts exam grades into array
{
    datain >> exam[i];
    cout << exam[i];
}
```

```

    tempsize = EXAMSIZE;
    examaverage = getaverage(total, tempsize);

    datain >> finalexam;
    datain >> attendance;

    counter++;

    for (int i = 0; i < STUDENTS; i++) //calculates average grade for each student
    {
        totalaverage = calculategrade(quizaverage, labaverage, projectaverage, examaverage);
        finalaverage = getpenalty(totalaverage); //uses getpenalty function to adjust final grade
        cout << "Final average is " << finalaverage << endl;
    }

}

}

counter = 1;
while (!datain.eof()) //writes data to letter120.dat
{
    if (counter == 1 || counter == 2)
    {
        getline(datain, heading);
        dataout << heading;
        counter++;
    }
    else if (counter < 22)
    {

```

```

        break;
    }
    else{
        dataout << firstname;

        dataout << lastname;

        lettergrade = getletter(finalaverage, projectaverage);

        dataout << lettergrade;
    }
}

datain.close(); //closes grade120.dat file
dataout.close(); //closes letter120.dat file
return 0;
}

//getaverage function definition
float getaverage(int total, int size)
{
    return static_cast<float>(total/size);
}

//calculategrade function definition
float calculategrade(float avg1, float avg2, float avg3, float avg4)
{
    float totalavg = avg1 + avg2 + avg3 + avg4;

    float finalavg = totalavg / 4;

    return finalavg;
}

```

//getletter function definition

char getletter(float totalavg, float projectavg)

```
{
    char letter;
    if (totalavg >= 90.0 && projectavg >= 90.0)
    {
        letter = 'A';
    }
    else if (totalavg >= 90.0 && totalavg < 80.0 && projectavg >= 80.0)
    {
        letter = 'B';
    }
    else if (totalavg >= 80.0 && totalavg > 70.0 && projectavg >= 70.0)
    {
        letter = 'C';
    }
    else
    {
        letter = 'F';
    }
    return letter;
}
```

float getpenalty(float average)

```
{
    float penalty = average * ATTENDANCEPENALTY;
    float grade = average - penalty;
    return grade;
}
```


Part 3: Testing

The console output displayed the contents of grade120.dat just fine. The program also created letter120.dat when the program executed. However, the contents of letter120.dat would not write, and I could not figure out how to get it to write. The output the program finished with is as follows:

File found

First	Last	Q0	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	L0	L1	L2	L3	L4	L5	L6	L7	L8	L9	P0	P1	P2
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Kevin	Smith	90	100	100	100	98	97	87	100	85	87	89	100	100	100	100	90	100	98	90	100	98	98	98	90	90	98	88	0.00
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Morgan	Kelly	80	100	65	67	69	71	100	100	100	67	95	85	87	89	100	65	67	69	71	100	98	98	98	65	67	69	71	0.10
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Isaac	Newton	100	90	100	90	100	90	100	90	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0.00
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Cole	Jones	100	100	100	87	73	75	77	79	81	87	89	91	73	75	77	79	81	100	100	100	98	100	65	67	69	71	63	0.05
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Angela	Allen	100	100	100	87	89	91	93	95	100	100	100	100	100	100	100	95	97	100	98	98	98	90	73	75	77	79	81	0.02
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David	Cooper	56	58	60	62	64	100	100	100	87	73	75	77	100	100	77	79	81	100	100	100	98	70	72	74	76	78	88	0.00
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Nancy	Bailey	100	87	89	91	93	95	100	100	100	100	100	100	91	93	95	97	100	98	100	100	98	98	98	90	90	98	88	0.00
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Emily	Synder	65	67	69	71	62	64	73	75	77	58	60	62	79	66	68	70	72	81	74	76	78	90	90	74	76	98	88	0.00
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Lori	Austin	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0.02
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Jenny	Howard	56	58	60	62	71	62	64	73	100	66	68	70	72	74	76	78	100	100	100	60	62	79	66	68	70	68	70	0.03
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Anne	Lewis	100	86	58	60	100	71	62	64	73	94	66	68	90	72	74	76	78	67	68	69	70	71	98	88	76	78	68	0.04
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Nick	Johnson	100	100	89	91	73	75	77	79	81	100	100	100	98	100	100	95	85	87	89	100	98	98	98	80	76	78	98	0.01
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Nick Spickler 100 93 95 97 100 98 98 98 90 100 89 91 93 95 97 100 100 89 91 93 95 97
98 98 90 90 98 0.00

Joy Williams 75 77 58 60 62 79 66 68 70 72 81 100 100 71 62 64 73 94 66 98 90 90 98
68 90 88 77 0.00

Barbara Hood 100 67 95 85 87 89 91 93 95 97 85 87 100 100 100 71 62 64 73 94 66 68
98 98 90 90 88 0.00

Joe Hoarn 62 63 64 65 66 67 68 69 70 71 100 81 100 100 71 62 64 73 100 100 98 98
64 73 94 66 68 0.08

Payton Bardzell 100 100 100 97 87 67 95 85 87 89 91 93 95 97 100 100 100 95 85 87 89
100 98 90 90 78 98 0.00

Kim Ludwig 71 62 64 73 75 77 58 60 62 79 66 68 70 72 81 100 100 79 66 68 70 72 98
98 90 90 98 0.09

Susan Honks 100
100 90 90 88 100 100 100 100 0.00

Letter120.dat has no contents

In terms of help, Ashwin and Troy both asked me for help, and I could not give them an answer because I was struggling myself. I texted Cole and asked for help getting the program to write to letter120.dat, but he did not respond.