Specification

This program reads the integers off separate text files and calculates the weighted grade for each category in our CS-102 class and then calculates and prints out the final total grade for the student whose grades are entered in the text file based on their scores throughout the beginning of class. (Note the grades can be changed from the text file to reflect different possible outcomes).

Analysis

- Inputs: User must input scores in the text files in order for the program to calculate the grade for each category.

  User may enter up to 100 assignments for each category

- Process: The program reads all integers in the "LAB.DAT" file and calculates that total multiplied by 0.3 in order to include the 30 percent weight on the final grade, then does the same by reading the "FINAL.DAT" file and "QUIZ.DAT" final.

- Outputs: The program outputs the percentage for the 4 categories (non-weighed labs, quizzes, final, and team project) then weighs them with the appropriate grading rubric as in the syllabus and adds up the numbers to calculate the final percentage for the grade.

Design

- lab.h –> Header file that includes all library functions and declares functions "AddElements" and "ReadNUmbers". Declares const int MAXSTUDENTS so the number of students does not exceed 100.
- lab.cpp –> Calls the ReadNumbers function in order to read off the integers through the text files "LAB.DAT", "FINAL.DAT", "QUIZ.DAT", and "PROJECT.DAT", then runs through the function AddElements to calculate the non-weighed average of the category. Prints out the grade for each category and the final grade of Omar Nasser.
- AddElements.cpp –> Adds up the total of the integers in each text file and divides by the number of scores inputted on each text file for each category.
- ReadNumbers.cpp –> Reads the numbers from the text files into an array and returns the number of elements read.
  - LAB.DAT –> Text file for each lab score out of 100
  - FINAL.DAT –> Text file for input of one final grade out of 100
  - QUIZ.DAT –> Text file for each quiz score out of 25
  - PROJECT.DAT –> Text file for input of the only team project out of 100

Implementation: lab.h

Header and included libraries

```
#include <iostream>
#include <fstream>
#include <iomanip>
#include "config.h"
#include <FL/Fl.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Value_Output.H>
const int Width = 400;
const int Height = 400;
const int MAXSTUDENTS = 100;

double ReadNumbers (std::string filename, double a[]);
double AddElements (double* a, int size);
```

Implementation: lab.cpp (main)

Main function that calls ReadNumbers and AddElements, also prints out the total of each category and calculates the weighed total.

```
#include "lab.h"
int main()
{

   Fl_Window* cw = new Fl_Window(Width,Height);
  Fl_Value_Output* lab_grade = new Fl_Value_Output(100, 20, 100, 20, "Lab Grade: ");
   Fl_Value_Output* final_grade = new Fl_Value_Output(100, 45, 100 , 20, "Final Grade: ");
    Fl_Value_Output* quiz_grade = new Fl_Value_Output(100, 70, 100 , 20, "Quiz Grade: ");
        Fl_Value_Output* team_grade = new Fl_Value_Output(100, 95, 100 , 20, "Team Grade: ");
          Fl_Value_Output* Final_grade = new Fl_Value_Output(130, 135, 130 , 40, "Final Grade: %");
  int nStudents;
  double grades[MAXSTUDENTS];
  double teamProject;
  double labGrade;
   double finalGrade;
  double quizGrade;
  nStudents = ReadNumbers("LAB.DAT", grades);
```

Implementation: lab.cpp (main)

Main function that calls ReadNumbers and AddElements, also prints out the total of each category and calculates the weighed total.

```
if (!nStudents){
  std::cout << " Cannot open ...DAT file or the file is empty.\n";
  return 0;
}
labGrade = AddElements(grades, nStudents) / nStudents;
std::cout << "The lab grade is "  << std::setprecision(1) << labGrade << std::endl;
   lab_grade->value(labGrade);
cw->redraw();
labGrade = labGrade * 0.3;

nStudents = ReadNumbers("FINAL.DAT", grades);
 if (!nStudents){
  std::cout << " Cannot open ...DAT file or the file is empty.\n";
  return 0;
}
  finalGrade = AddElements(grades, nStudents) / nStudents;
      final_grade->value(finalGrade);
```

Implementation: lab.cpp (main)

Main function that calls ReadNumbers and AddElements, also prints out the total of each category and calculates the weighed total.

```
  std::cout << "The final (test) grade is " << std::setprecision(3) << finalGrade << std::endl;
    finalGrade = finalGrade * 0.3;

  nStudents = ReadNumbers("QUIZ.DAT", grades);
  if (!nStudents){
    std::cout << " Cannot open ...DAT file or the file is empty.\n";
    return 0;
  }
  quizGrade = AddElements(grades, nStudents) / nStudents;
    quizGrade = quizGrade * 4;
        quiz_grade->value(quizGrade);
  cw->redraw();
   std::cout << "The quiz grade is " << std::setprecision(3) << quizGrade << std::endl;
 quizGrade = quizGrade * 0.3;

    nStudents = ReadNumbers("PROJECT.DAT", grades);
  if (!nStudents){
```

Implementation: AddElemenets.cpp

Goes through the text file and adds each element of the array, leaving the total numbers added in the text file and returns the total

```
#include "lab.h"
double AddElements (double* a, int size)
{
  double total = 0;
for  (int i=0; i< size; i++)
total += a[i];

return total;
}
```

Implementation: ReadNumbers.cpp

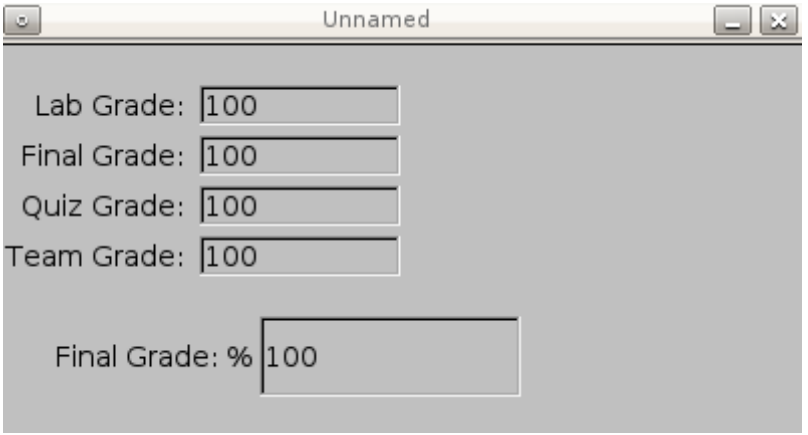
Reads numbers from text file into an array and returns number of elements read.

```
#include "lab.h"
double ReadNumbers (std::string filename, double a[])
{

int n=0;

std::ifstream inp(filename.c_str());


if (!inp)
return 0;

while (n < MAXSTUDENTS && inp >> a[n])
{
n++;
}
return n;
}
```

Test

Testcases to determine if the program is working properly

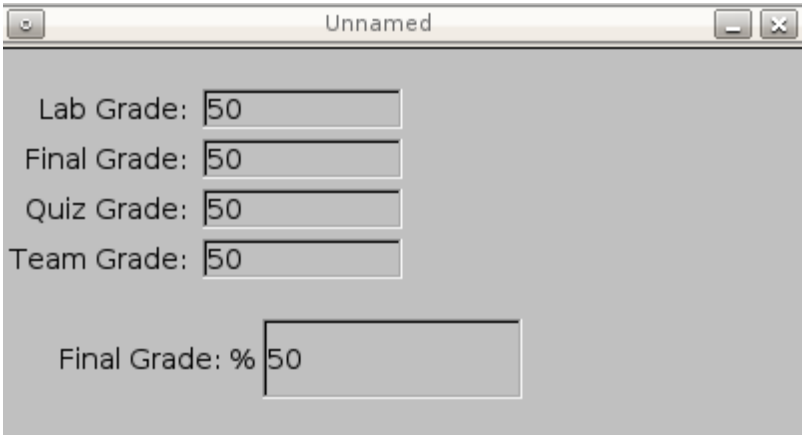
- Testcase 1: If the user sets the score for 100/100 for every assignment (or 25 for quizzes) the perfect score should indicate the final grade is 100 percent if every assignment the user received 100 percent.



Test

Testcases to determine if the program is working properly

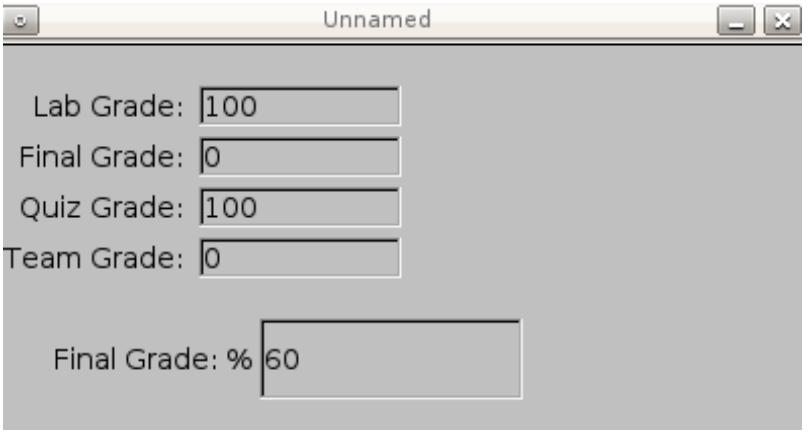
- Testcase 2: If the user sets the score for 50/100 for every assignment (or half-credit for quizzes) the score should indicate the final grade is 50 percent if every assignment the user received was given half credit for.



Test

Testcases to determine if the program is working properly

- Testcase 3: If the user sets the score they got for all the labs and quizzes 100 percent score and 0 credit on the team project and FInal, the outcome should show 60 percent because the final is worth 30 percent of the final grade and the team project is worth 10 percentm therefore leaving the user unable to attain 40 percent of their grade only leaving 60 percent.



Test

Testcases to determine if the program is working properly

- Testcase 4: This is a testcase of my grade (with a 90 given on final and 95 on team project to not leave it blank) Using the grades on the canvas account as inputs for LAB.DAT and QUIZ.DAT file.