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COSC 117 Project 3 Report

Brief Description:

For this project, I was prompted to write a program that generates the final grade of a COSC 117 student. The letter grade was to be calculated from the total point value calculated from a student's scores in 6 quizzes, 8 labs, 1 homework, 3 projects, 2 midterm exams, and their final exam. The student's first name, last name, and letter grade are then printed to the console.

Arrays used for this project:

In this project, I defined 4 double arrays of varying size depending on how many scores are correlated with each assignment type. The double arrays named quiz was a length of 6; lab had a length of 8; project had a length of 3; and mid (for midexam) was a length of 2. The arrays are meant to store each percentage score the student received from each of those assignment types.

Methods:

I defined two methods for this project. One was named avgScores with a double return data type. Its singular parameter is (double[]) arr that carries over each array and its elements. The purpose of this method is to calculate and return the average of each array called over from the main method. The other method was named finalGrade with a character return data type. Its parameters are (double q, double l, double p, double m, double h, and double f). These parameters represent the average scores of each array and the scores from the homework and final exam variables. The purpose of this method is to convert each variable's percentage score into a point value based on their grade weight; then it returns the character value from its corresponding point sum ranging between 0 and 100.

Algorithm steps:

1. Import the Java utility Scanner and assign keyboard to scanner for input to be taken from the user's keyboard

2. Define 6 final constants outside the main method for each array, the homework, and final exam grades. This is to turn their percentage grade into points later on when calculating the final letter grade. This represents grade weight.

3. Prompt the user to enter their first name and last name and define two String variables for the two names.

4. Define 4 double arrays that hold the grades for each type of assignments and the length of the array should be the number of grades in that assignment category:
    a. Array named quiz with a length of 6

   b. Array named lab with a length of 8
   c. Array named project with a length of 3
   d. Array named mid (for midexam) with a length of 2

5. Under each array, make a for loop that prompts the user to enter the value of each array element (their percentage scores)

6. Define 4 new double variables to store average values of each array. Their values are calls to a method that calculates the average of an array's elements
   a. avgQuiz, avgLab, avgProject, avgMidexam are the variable names
   b. methodName(argument) is the value for each variable

7. Define a new method avgScores with a double return data type and parameter (double[] arr) to calculate and return the average for each array to the four newly created variables in the main method.

8. Prompt the system to print the average scores and then print a new line

9. Define 2 new double variables, homework and finale, and prompt the user to enter their values

10. Define a new char variable finalLetter. Its value is a call to a method that calculates the sum of each assignment score's point value and converts the total number of points into a character value for the final letter grade. The method call has 6 arguments calling to the new method (representing each average and single percentage score)

11. Define a new method finalGrade with a char return data type and parameters (double 1, double l, double p, double m, double h, double f) to calculate the point value of each assignment type score, convert the sum of total points, and using if-else-if statements to convert the sum of points into a character value. The statements are based on intervals out of a 100-point total. The method returns the character value to the main method where it was called
    a. Sum >= 90 is an A
    b. Sum >= 80 is a B
    c. Sum >= 70 is a C
    d. Sum >=60 is a D
    e. Sum >= 0 is an E
    f. Otherwise: invalid input

12. Output the user's first name, last name, and final letter grade formatted neatly as shown below:

First Name	Last Name	Final Grade
Jade	Pearl	A

SOURCE CODE:

*Pro3.java

```java
import java.util.Scanner;

public class Pro3 {

    //final constants defined for each array for point calculation later on
    final static double QUIZ_PER = 0.1;
    final static double LAB_PER = 0.1;
    final static double PROJECT_PER = 0.3;
    final static double MIDEXAM_PER = 0.2;
    final static double HOMEWORK_PER = 0.1;
    final static double FINAL_PER = 0.2;

    public static void main(String[] args) {
        // TODO Auto-generated method stub
        Scanner keyboard = new Scanner (System.in);
        //Make string variables for first name and last name for user to enter
        System.out.print("Enter your first name: ");
        String first = keyboard.next();
        System.out.print("Enter your last name: ");
        String last = keyboard.next();

        //define a double array for quiz grades and make loop asking user to input values
        double[] quiz = new double[6];
        for (int i = 0; i < quiz.length; i++) {
            System.out.print("Enter your score for quiz " + (i+1) + ": ");
            quiz[i] = keyboard.nextDouble();
        }

        //define double array for lab grades and make loop asking user to input values
        double[] lab = new double[8];
        for (int i = 0; i < lab.length; i++) {
            System.out.print("Enter your lab " + (i+1) + " score: ");
            lab[i] = keyboard.nextDouble();
        }

        //define double array for project grades with loop for user to input values
        double[] project = new double[3];
        for (int i = 0; i < project.length; i++) {
            System.out.print("Enter your project " + (i+1) + " score: ");
            project[i] = keyboard.nextDouble();
        }
```

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42
43          //define double array for mid exam grades with loop for user to input values
44          double[] mid = new double[2];
45          for (int i = 0; i < mid.length; i++) {
46              System.out.print("Enter your midterm " + (i+1) + " score: ");
47              mid[i] = keyboard.nextDouble();
48          }
49
50          //define new variables to store the average values for calling to the new average method
51          //call to the method as each variable's value
52          double avgQuiz = avgScores(quiz);
53          double avgLab = avgScores(lab);
54          double avgProject = avgScores(project);
55          double avgMidExam = avgScores(mid);
56
57          //Print each average scores using the appropriate variables
58          System.out.printf("The averages for the quiz, lab, project, and mid exam scores are: %.2f, %.2f, %.2f, and %.2f ",
59                  avgQuiz, avgLab, avgProject, avgMidExam);
60          //make a new line to put the homework score on a separate line from the averages (for organization)
61          System.out.println();
62
63          //define the homework and final exam variables and prompt user to enter their value
64          System.out.print("Enter your homework score: ");
65          double homework = keyboard.nextDouble();
66          System.out.print("Enter your final exam score: ");
67          double finale = keyboard.nextDouble();
68
69          //define variable for the final letter grade for calling to the final grade method
70          char finalLetter;
71          finalLetter = finalGrade(avgQuiz, avgLab, avgProject, avgMidExam, homework, finale);
72          //call to method to return the final letter grade
73          System.out.println("First Name      Last Name      Final Grade");
74          System.out.printf("%-15s %-15s %-15s", first, last, finalLetter);
75
76      }
77
78      //method for calculating the average of the arrays
79      public static double avgScores(double[] arr) {
80          //define a variable sum to store the sum of all array elements
81          double sum = 0;
82          //make a for loop that takes the sum of each array element for the arrays initialized in the main method
83          for (int i = 0; i < arr.length; i++) {
84              sum += arr[i];
```

```
        }
        //return the average score for each array to the main method
        return sum/arr.length;
    }

    //method to calculate the final letter grade
    public static char finalGrade(double q, double l, double p, double m, double h, double f) {
        //make a double variable that will store the sum of all points
        double sum;
        //Initialize a character variable that will later be returned as the final letter grade
        char grade = 0;

        //define and initialize new double variables that will be the total points from each score contributing to the final grade
        double quizPoints = q * QUIZ_PER;
        double labPoints = l * LAB_PER;
        double projectPoints = p * PROJECT_PER;
        double midExamPoints = m * MIDEXAM_PER;
        double homeworkPoints = h * HOMEWORK_PER;
        double finalPoints = f * FINAL_PER;

        //finally initialize the sum variable with the value of the sum of all points together
        sum = quizPoints + labPoints + projectPoints + midExamPoints + homeworkPoints + finalPoints;

        //Make an if-else-if statement that categorizes a specific range of points as a letter grade
        //The character variable defined earlier will be assigned to the values in each statement
        //State that the inputs are invalid if the user inputs negative numbers instead of positive
        if (sum >= 90) {
            grade = 'A';
        }
        else if (sum >= 80) {
            grade = 'B';
        }
        else if (sum >= 70) {
            grade = 'C';
        }
        else if (sum >= 60) {
            grade = 'D';
        }
        else if (sum >=0) {
            grade = 'F';
        }
        else {
            System.out.print("Invalid inputs");

        }

        //return the char variable to the main method with its newly assigned character value
        return grade;
    }
}
```

TEST RESULTS/OUTPUT: