ICS 102 Lab Project (Term 191)

Design a Student class that has the following properties:

* private instance variables:
  + private int studentID
  + private String name
  + private double[] grade
* An appropriate constructor
* The following public methods:
  + public int getStudentID( )
  + public String getName( )
  + public double[ ] getGrades( )
  + public void addGrade(double grade) throws IllegalArgumentException
  + public void modifyGrade(double grade, int quizNum ) throws IllegalArgumentException
  + public String toString( )
  + public boolean equals(Object obj) - comparison based on studentID only

Your **StudentDriver** program must have the following main menu:

**1. Display Grade Info for all students**

**2. Display Grade Info for a particular student**

**3. Display quiz averages for all students**

**4. Modify a particular quiz grade for a particular student**

**5. Add quiz grades for a particular quiz for all students**

**6. Add New Student**

**7. Delete Student**

**8. Exit**

**Please select your choice:**

Implement a well-structured Java program that uses the **Student** class and **StudentDriver** class to enable an instructor to maintain student grades of up to 4 quizzes. The grade information is kept in a text-file of the form:

|  |
| --- |
| 91007 Ahmad Said 50.0  91004 Hassan Khan 45.5  91003 Suleiman Wasim 72.6  91002 Majed Sameer 60.0  91006 Muhammad Adel 85.5  91005 Muhsim Zuheir 70.0  91001 Muneeb Abdullatif 30.0 |

where each line of the text-file contains a **unique** student ID, the student first and second names, followed by up to four quiz grades (The above diagram shows the grades for the first quiz only)

When your program starts, it will read all the information in the input file. It will create an array of Students objects. Then it will display the menu shown above.

Your program must loop as long as **option 8** has not been selected. It must display an appropriate error message if an invalid choice is entered. After executing each of the options 1 to 7, your program must pause and display the message: **“Press Enter key to continue . . .”** . Your program must display the main menu after pressing the Enter key. Each of the options must be implemented in separate static methods. The code for **“Press Enter key to continue . . .”** must also be implemented is a separate static method.

The options must have the following behaviors:

**Option 1: Display Grade Info for all students**

It displays the grade information of all students. The option must be implemented by reading directly from grades text-file. It then waits for the Enter key to be pressed before returning control to the main menu:

Please select your choice: **1**

StudentID Student Name Quiz01

91007 Ahmad Said 50.0

91004 Hassan Khan 45.5

91003 Suleiman Wasim 72.6

91002 Majed Sameer 60.0

91006 Muhammad Adel 85.5

91005 Muhsim Zuheir 70.0

91001 Muneeb Abdullatif 30.0

Press Enter key to continue . . .

**Note: The number of quizzes displayed depends on the number of quizzes in the grades text-file. Initially, if the file has no quiz grades; it has only student IDs and their corresponding names.**

**Option 2: Display Grade Info for a particular student**

It prompts for and reads the studentID. It then searches for this studentID in the array of students’ objects. If the ID is not found an appropriate error message is displayed, otherwise; the student information is displayed. In both cases, the option waits for the Enter key to be pressed before returning control to the main menu.

|  |
| --- |
| Please select your choice: **2**  Enter studentID: 9**1006**  StudentID Student Name Quiz01 Quiz02 Quiz03 Quiz04  91006 Muhammad Adel 85.5 90.0 95.0 98.0  Press Enter key to continue . . . |
| Please select your choice: **2**  Enter accountID: **91552**  Error: Invalid student ID  Press Enter key to continue . . . |

**Option 3: Display quiz averages for all students**

The option displays the quiz grades and quiz averages of all students. Control is then returned to the main menu after pressing the Enter key.

|  |
| --- |
| Please select your choice: **3**  StudentID Student Name Average  91007 Ahmad Said 65.1  91004 Hassan Khan 56.3  91003 Suleiman Wasim 80.7  91002 Majed Sameer 60.6  91006 Muhammad Adel 92.1  91005 Muhsim Zuheir 83.3  91001 Muneeb Abdullatif 51.0  Press Enter key to continue . . . |

Note: The average depends on the number of quizzes. Your program must work correctly for any number of quizzes taken. An error message must be displayed if students have not taken any quiz.

**Option 4. Modify a particular quiz grade for a particular student**

It prompts for and reads a studentID, the quiz number, and the new quiz grade. If the quiz number is invalid, or the new quiz grade is negative or greater than 100 an appropriate error message is displayed; otherwise it searches for this studentID in the students array. If the studentID is not found an appropriate error message is displayed, otherwise; the student grade is updated in the array of objects.

|  |
| --- |
| Please select your choice: **4**  Please enter studentID: **91003**  Please enter quiz number to modify: **2**  Please enter new quiz 2 grade: **80.0**  Before grade modification: 91003 Suleiman Wasim 72.6 75.0 85.0 90.0 80.7  After grade modification: 91003 Suleiman Wasim 72.6 80.0 85.0 90.0 80.7  Press Enter key to continue . . . |
| Please select your choice: **4**  Please enter quiz number to modify: **6**  Please enter new quiz 6 grade: **70.0**  Error: Invalid quiz number  Press Enter key to continue . . . |

Control is returned to the main menu after pressing the Enter key.

**Option 5: Add quiz grades for the next quiz for all students**

It prompts the user to enter student grades for quiz **n + 1**, where **n** is the current number of quizzes for each student. The program then prompts for and reads the new quiz grade of each student and update the quiz array of each student object.

|  |
| --- |
| Please select your choice: **5**  Please enter quiz grades for Quiz#3  Please enter grade for student : 91007  **60.5**  Please enter grade for student : 91004  **70.0**  Please enter grade for student : 91003  **85.0**  Please enter grade for student : 91002  **55.5**  Please enter grade for student : 91006  **95.0**  Please enter grade for student : 91005  **90.5**  Please enter grade for student : 91001  **66.5**  Press Enter key to continue . . . |

**Note:** An error message must be displayed when any invalid grade is entered.

**Option 6: Add New Student**

It prompts for and read the ID of the student to be added. It will check if a student with same id already exists in the Students array. If not, it will be added by reading the remaining information i.e. name and quizzes and added as a student object to the array of students.

If the student with same id already exists, an error message will be displayed.

**Option 7: Delete Student**

To implement option 7, search the Students array for the studentID of the student to be deleted. If found, delete it from the array by moving all students objects after this student one location to the left. If the studentID does not exist, display an error;

**Option 8: Exit**

Save all data to the file, then terminate the program.

**Note:**

* Your project must not use parallel arrays. IT MUST USE an array of Student objects.
* Your project must not use 2D-arrays.
* Use the clause **throws FileNotFoundException** or **throws IOException** for each method that performs File I/O.
* **The project must your own work.**
* **You must not share code with any other project group.**
* **Teams of 3 students will be formed. Choose your partners from any of my lab sections and send me your ids.**
* **The deadline will be announced soon on the blackboard.**
* **Project demo slots of 15 to 20 minutes per group will be announced later. All group members are required to attend the project demo together. A grade of zero will be given for any student not attending the Project Demo.**
* **Cheating in any form will result in a grade of F in the course.**