CS520 Module 5 Assignment

General Rules for Homework Assignments

- You are strongly encouraged to add comments throughout the program. Doing so will help your facilitator to understand your programming logic and grade you more accurately.
- You must work on your assignments individually. You are not allowed to copy the answers from the others. *However*, you are encouraged to discuss the approaches to the homework assignments with your section mates and the facilitator in your section via the discussion board.
- Each assignment has a strict deadline. However, you are still allowed to submit your assignment within 2 days after the deadline with a penalty. 15% of the credit will be deducted unless you made previous arrangements with your facilitator and professor. Assignments submitted 2 days after the deadline will not be graded.
- When the term *lastName* is referenced in an assignment, please replace it with your last name.

You are strongly encouraged to add comments into your program!

Create a new Java Project in Eclipse named HW5_*lastName* and complete the following requirements.

Create a package named *cs520.hw5.* Using this package, create the following classes.

1. Create a class named *Student* as follows. The class keeps track of the student's homework grades. This is a modification of HW3 using arraylist.

    a. The instance (or member) private variables – *name* (String), *homeworks* (an integer ArrayList).
    b. A single constructor with name as its argument. Also, initialize the *homeworks* arraylist.
    c. The public *get* and *set* methods for the *name* instance variable.
    d. A void *addHomeworkGrade* method which takes one argument – the new homework grade.
    e. A public *computeAverage* method which takes no arguments and returns a *double* showing the average homework grade for this student.
    f. Override the *toString* method to return the string representation of this object in the format "The <*studentName*>*'s* average grade is <the computed average>".

2. Create a *Test* class to test the following functionality in its *main* method.
    a. Declare and initialize an empty *Queue* of *Student* objects named *studentQueue*.

b. Declare and initialize an empty *HashMap* named *studentMap*. The keys will be the names of the students and the entries in the map will be the corresponding student objects.

c. Use the *BufferedReader* class to read the *data.txt* file. The contents of the file are shown below. Create the data.txt file in HW5_*lastName*.

d. Read the contents of the text file one line at a time using a loop. The program should work for any number of input lines. In this loop,
    1. Invoke the *processInputData* method for each line read. This method returns the corresponding *Student* object.
    2. Add this *Student* object to the *studentQueue*.
    3. Insert this *Student* object into the *studentMap* using the student's *name* as the key.

e. After the loop is processed, do the following.
    1. Iterate over the *studentQueue* and display each element to the console.
    2. Access the keys of the *studentMap* and assign them to an appropriate variable. Create an iterator over the keys. Iterate over each key in this set and display the associated object in the map to the console.

Write a private method *processInputData* with return type *Student* which processes its string input argument and returns the corresponding *Student* object as follows.

1. Tokenize the string argument using the *StringTokenizer* class using the *comma* as the delimiter, or using the String *split* method.
2. Extract the *name* token. Create a *Student* object and assign to the local variable *currentStudent*.
3. Using a *while* loop, read the next homework grade token. Use the *addHomeworkGrade* method on the student object to add the homework grade for this homework.
4. Display the string representation of the *currentStudent* object to the console.
5. The method should return the *currentStudent* object.

Sample Input data.txt file:

```
Alice,44,79,85,72,77,57
Bob,79,94,70,71,71,51
Charlie,95,99,41,55,65,50
Dave,87,89,88,55,74,63
Ed,82,51,44,67,73,49
```

Sample Output:

```
Input file processing...
Alice's average grade is 69.00
Bob's average grade is 72.67
Charlie's average grade is 67.50
Dave's average grade is 76.00
Ed's average grade is 61.00

Iterating over the student list...
Alice's average grade is 69.00
Bob's average grade is 72.67
Charlie's average grade is 67.50
Dave's average grade is 76.00
Ed's average grade is 61.00

Iterating over the student map...
Alice's average grade is 69.00
Charlie's average grade is 67.50
Dave's average grade is 76.00
Ed's average grade is 61.00
Bob's average grade is 72.67
```

Submission:

Create an archive of your Eclipse project using the following steps. Select the HW5_*lastName* project in the Eclipse IDE's *Package Explorer* or the *Navigator* window.

Click *File->Export*. Select the *General->Archive File* option. Click *Next*.

Specify the "*To archive file:"* entry as say, C:\Temp\HW5_*lastName*.zip.

The zip file will be created and stored in the C:\Temp folder.

Submit this zip file as an attachment in the Assignment Section.