Assignment #5

Design Patterns

CS 4354 Fall 2012
Instructor: Jill Seaman

Due: before class **Monday, 11/26/2012** (upload electronic copy by 11:30am)

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1. We want to implement a Java class to represent a student and their scores from a class they are enrolled in. The Student class must provide at least the following methods:

```
Student(String name);              //constructor
void addAssignmentScore (double as);  //0 or more assignments
void addExamScore (double es);        //0 or more exams
Iterator getAssignmentIterator();     //java.util.Iterator
Iterator getExamIterator();           //java.util.Iterator
double getAverage();               //the final class average
```

   The algorithm to compute the average can be selected at runtime. It also must be possible to add new algorithms to compute the average to the program without modifying the Student class.

   Your task: Develop a design for Student that satisfies the above requirements, then implement your design. Which design pattern could you use?

   Use the following two algorithms for computing the average in your implementation:
   A. The Assignment average contributes 40%, and the Exam average contributes 60% to the final class average.
   B. Use the same percentages as the first algorithm, but first drop the lowest Assignment score.

2. We want to use an existing user interface component to display the Student scores to the screen. To do that, we want to reuse the Student class without changing it. The user interface component requires a class that implements the interface java.util.Iterator<E>. We will have a class StudentIterator that implements Iterator<Double>.

```
Iterator<E> {
  boolean hasNext(); //Returns true if the iteration has more elems
  E next();          //Returns the next element in the iteration
  void remove();     // (throw UnsupportedOperationException)
}
```

   Your task: Develop a design for StudentIterator that allows us to reuse Student and to implement Iterator, then implement your design. Which design pattern could you use?

3. We want to extend our design with a class that tracks the current letter grade of a given Student object (90-100=A, 80-89.9=B, etc.). Whenever the Student object is *changed*, the tracker has to be adapted automatically.

   Your task: Develop a design for the tracker, then implement your design. You are allowed to modify the Student class. Which design pattern could you use?

Logistics:

Please submit your java files in a single zip file (assign5_xxxxxx.zip). The xxxxx is your TX State NetID (mine is js236).

Submit:

A. an electronic copy only of your java classes, using the Assignments tool on the TRACS website for this class.

B. UML diagrams showing the design of each of the three problems (on paper, bring to class).