**Assignment 3 - Basic Design Patterns - CSE 564**

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**Class Diagram:**

Diagram

Description automatically generated

**Class diagram legend:**

Purple - decorator pattern

Orange - singleton pattern

Brown - singleton + observer pattern (observer concrete class)

Pink - singleton + observer pattern (observable concrete class)

Green - observer and observable classes

Yellow - other classes/interfaces

**Patterns implemented:**

**1. Decorator Pattern:**

Drawable is the top interface which is realized by the Line class (base class of the decorator pattern) and the Decorator class. Dots and Bar classes are the decorators that can be added to the line graph. Dots and Bar inherit from the Decorator class.

**2. Singleton Pattern**:

The AverageEvaluator, PlotPanel and RandomNumberGenerator are all singleton classes that create new instances of their respective classes when called. Drawable has an association with AverageEvaluator due to AverageEvaluator’s method being used in Line, Dots and Bar classes.

PlotPanel creates instances of itself - dot panel, line panel, bar panel.

**3. Observer Pattern:**

The PlotPanel is the concrete class and realizes from the Observer class. It observes the data flow from RandomNumberGenerator. The RandomNumberGenerator is the concrete class and extends from the Observable class. It generates the random numbers that are plotted on the graphs in the panels. This data is observed by the Observer class and the PlotPanel eventually.