Lab6

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**I. Classes, Predicates, Methods**

1.What is the data type of the variable ourDogs?

It is a List of Dogs.

2.What is the size() of ourDogs, and what are the elements it contains?  
2 elements(Dog("Louise", false, 5) and Dog("Coco", false, 7))

3.Assume we change our predicate in the above example to:

Predicate<Dog> dp = (d) -> d.isMale() && d.getAge() > 5;

Now, what is the size() of ourDogs, and what are the elements it contains?

1 element(Dog("Fido", true, 10))

#### ****II. Implement Code****

*/\*\*  
 \* This class represents the transmission box of an automatic car. The transmission box  
 \* has a current speed, a current gear and 4 speed thresholds for the 5 gears in order.  
 \*/*public class TransmissionBox {  
  
 private int currentSpeed; // current speed of the transmission box  
 private int currentGear; // current gear  
  
 // Speed thresholds representing going from 1 to 2, or 2 to 3 (or back), etc.  
 private final int thresholdOne;  
 private final int thresholdTwo;  
 private final int thresholdThree;  
 private final int thresholdFour;  
  
 */\*\*  
 \* Construct a TransmissionBox object and initializes it to the current speed and 4  
 \* speed thresholds.  
 \** ***@param*** *currentSpeed the current speed  
 \** ***@param*** *thresholdOne the first threshold, representing going from 1 to 2 or back.  
 \** ***@param*** *thresholdTwo the second threshold, representing going from 2 to 3 or back.  
 \** ***@param*** *thresholdThree the third threshold, representing going from 3 to 4 or back.  
 \** ***@param*** *thresholdFour the fourth threshold, representing going from 4 to 5 or back.  
 \*/* public TransmissionBox(int currentSpeed, int thresholdOne,  
 int thresholdTwo, int thresholdThree,  
 int thresholdFour) throws IllegalArgumentException {  
 if (currentSpeed < 0 || currentSpeed > 300) throw new IllegalArgumentException("The current speed is invalid");  
 this.currentSpeed = currentSpeed;  
 if (thresholdOne < 0) throw new IllegalArgumentException("The threshold one setting is invalid");  
 this.thresholdOne = thresholdOne;  
 if (thresholdTwo <= thresholdOne) throw new IllegalArgumentException("The threshold two setting is invalid");  
 this.thresholdTwo = thresholdTwo;  
 if (thresholdThree <= thresholdTwo) throw new IllegalArgumentException("The threshold three setting is invalid");  
 this.thresholdThree = thresholdThree;  
 if (thresholdFour <= thresholdThree) throw new IllegalArgumentException("The threshold four setting is invalid");  
 this.thresholdFour = thresholdFour;  
 if (currentSpeed >= thresholdFour) currentGear = 5;  
 else if (currentSpeed >= thresholdThree) currentGear = 4;  
 else if (currentSpeed >= thresholdTwo) currentGear = 3;  
 else if (currentSpeed >= thresholdOne) currentGear = 2;  
 else currentGear = 1;  
 }  
  
 */\*\*  
 \* Returns a TransmissionBox object with speed increased by 2 and the appropriate gear.  
 \** ***@return*** *a TransmissionBox object with speed increased by 2 and the appropriate gear.  
 \*/* public TransmissionBox speedIncrease() {  
 int newSpeed = this.currentSpeed \* 2;  
 TransmissionBox newTransmissionBox = new TransmissionBox(newSpeed, thresholdOne,thresholdTwo, thresholdThree, thresholdFour);  
 if (newSpeed >= thresholdFour) newTransmissionBox.currentGear = 5;  
 else if (newSpeed >= thresholdThree) newTransmissionBox.currentGear = 4;  
 else if (newSpeed >= thresholdTwo) newTransmissionBox.currentGear = 3;  
 else if (newSpeed >= thresholdOne) newTransmissionBox.currentGear = 2;  
 else newTransmissionBox.currentGear = 1;  
 return newTransmissionBox;  
 }  
  
 */\*\*  
 \* Returns a TransmissionBox object with speed decreased by 2 and the appropriate gear.  
 \** ***@return*** *a TransmissionBox object with speed decreased by 2 and the appropriate gear.  
 \*/* public TransmissionBox speedDecrease() {  
 int newSpeed = this.currentSpeed / 2;  
 TransmissionBox newTransmissionBox = new TransmissionBox(newSpeed, thresholdOne,thresholdTwo, thresholdThree, thresholdFour);  
 if (newSpeed >= thresholdFour) newTransmissionBox.currentGear = 4;  
 else if (newSpeed >= thresholdThree) newTransmissionBox.currentGear = 3;  
 else if (newSpeed >= thresholdTwo) newTransmissionBox.currentGear = 2;  
 else if (newSpeed >= thresholdOne) newTransmissionBox.currentGear = 1;  
 else newTransmissionBox.currentGear = 0;  
 return newTransmissionBox;  
 }  
  
 */\*\*  
 \* Returns the current speed of a TransmissionBox.  
 \** ***@return*** *currentSpeed.  
 \*/* public int getSpeed() { return this.currentSpeed;}  
  
 */\*\*  
 \* Returns the current gear of a TransmissionBox.  
 \** ***@return*** *currentGear.  
 \*/* public int getCurrentGear() { return this.currentGear;}  
  
 */\*\*  
 \* Returns a string with the current speed and current gear of the TransmissionBox.  
 \** ***@return*** *str.  
 \*/* @Override  
 public String toString() {  
 return "The current speed is " + currentSpeed + " and the current gear is " + currentGear;  
 }  
}

#### ****III. Conceptual Design****

A diagram of a diagram

Description automatically generated

1.What relationship does AbstractShape have with Point2D?

Association relationship, AbstractShape has a Point2D

Using a UML class diagram create a design for the following (you can defer declaring the types for any instance variables as long as you represent the concepts appropriately):

A Person may own zero or more Residences. Each residence has some mortgage amount, and each residence is able to automatically have its taxes assessed. A residence is at a single Location, which has an address and insurance rating. Finally, there are two specific types of residences we are concerned with (for now): Houses and Condominiums.

