THE OBSERVER PATTERN

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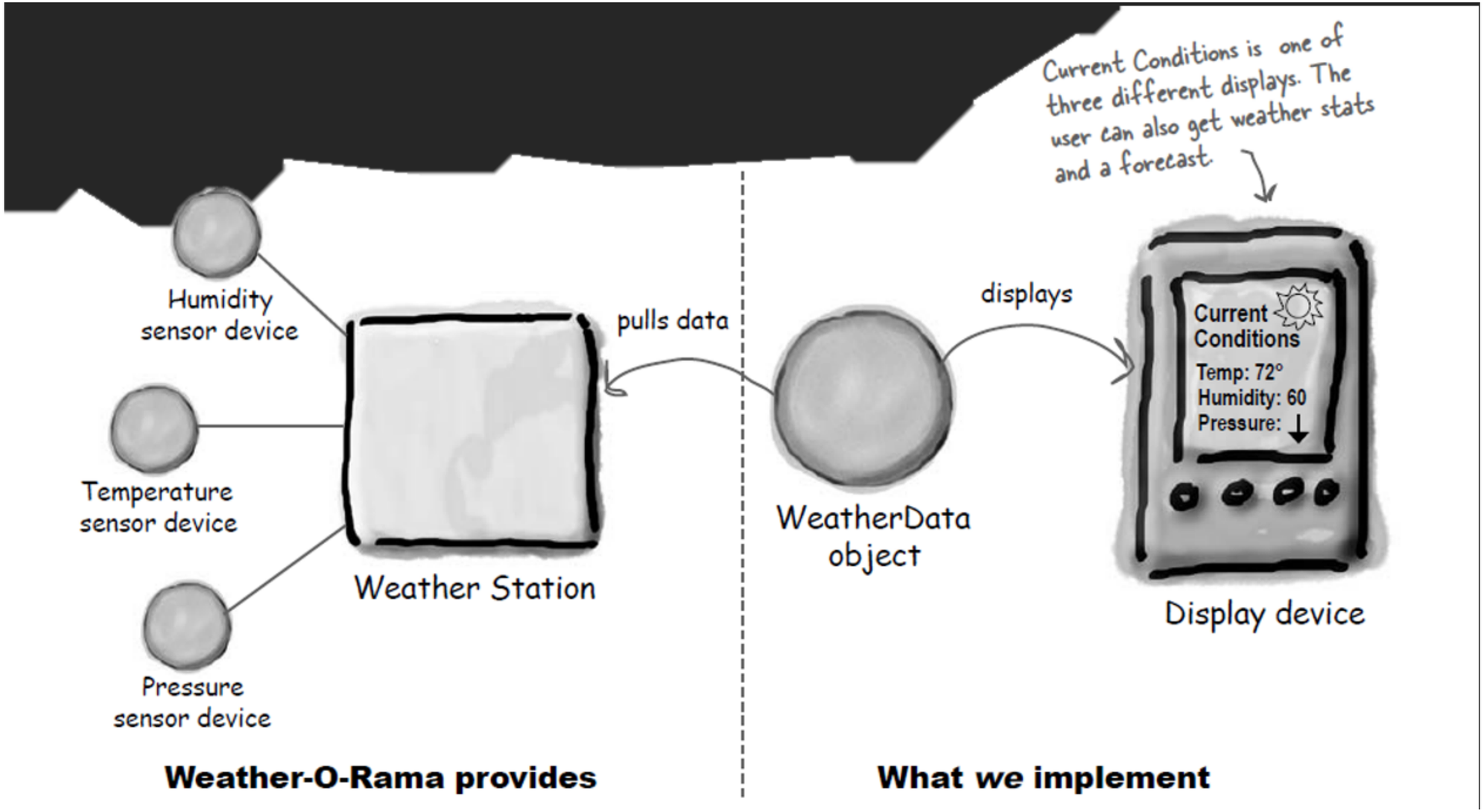
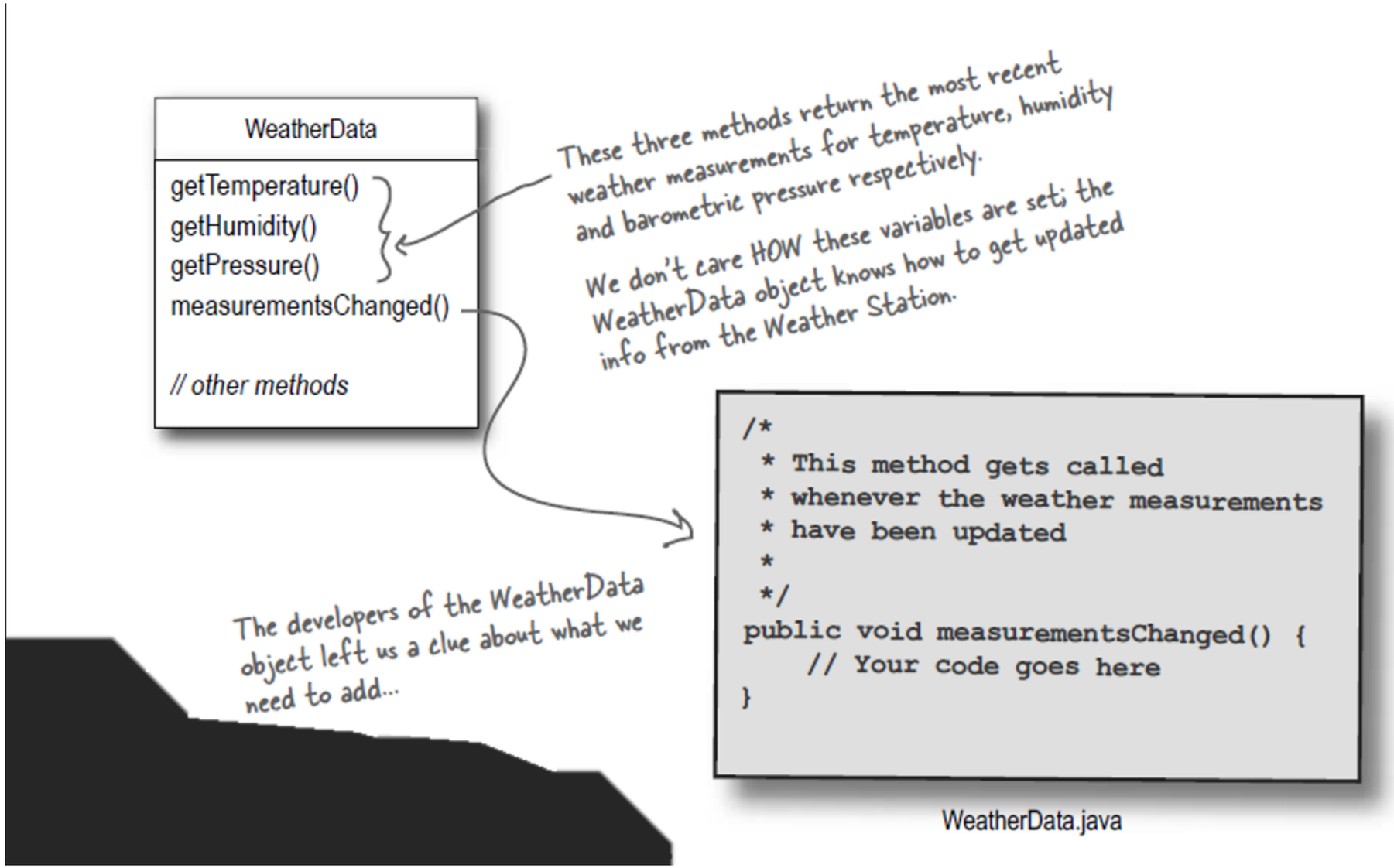
PURPOSE


Current Conditions is one of three different displays. The user can also get weather stats and a forecast.
Humidity sensor device
Temperature sensor device
Pressure sensor device
Weather Station
pulls data
WeatherData object
displays
Current Conditions
Temp: 72°
Humidity: 60
Pressure:
Display device
Weather-O-Rama provides
What we implement

UPDATE THE THREE DISPLAYS



IDEAS

FIRST IDEA

```
public class WeatherData {

    // instance variable declarations

    public void measurementsChanged() {

        float temp = getTemperature();
        float humidity = getHumidity();
        float pressure = getPressure();

        currentConditionsDisplay.update(temp, humidity, pressure);
        statisticsDisplay.update(temp, humidity, pressure);
        forecastDisplay.update(temp, humidity, pressure);
    }

    // other WeatherData methods here
}
```

Grab the most recent measuremets by calling the WeatherData's getter methods (already implemented).

Now update the displays...

Call each display element to update its display, passing it the most recent measurements.

PROBLEM

Can't encapsulate what changes

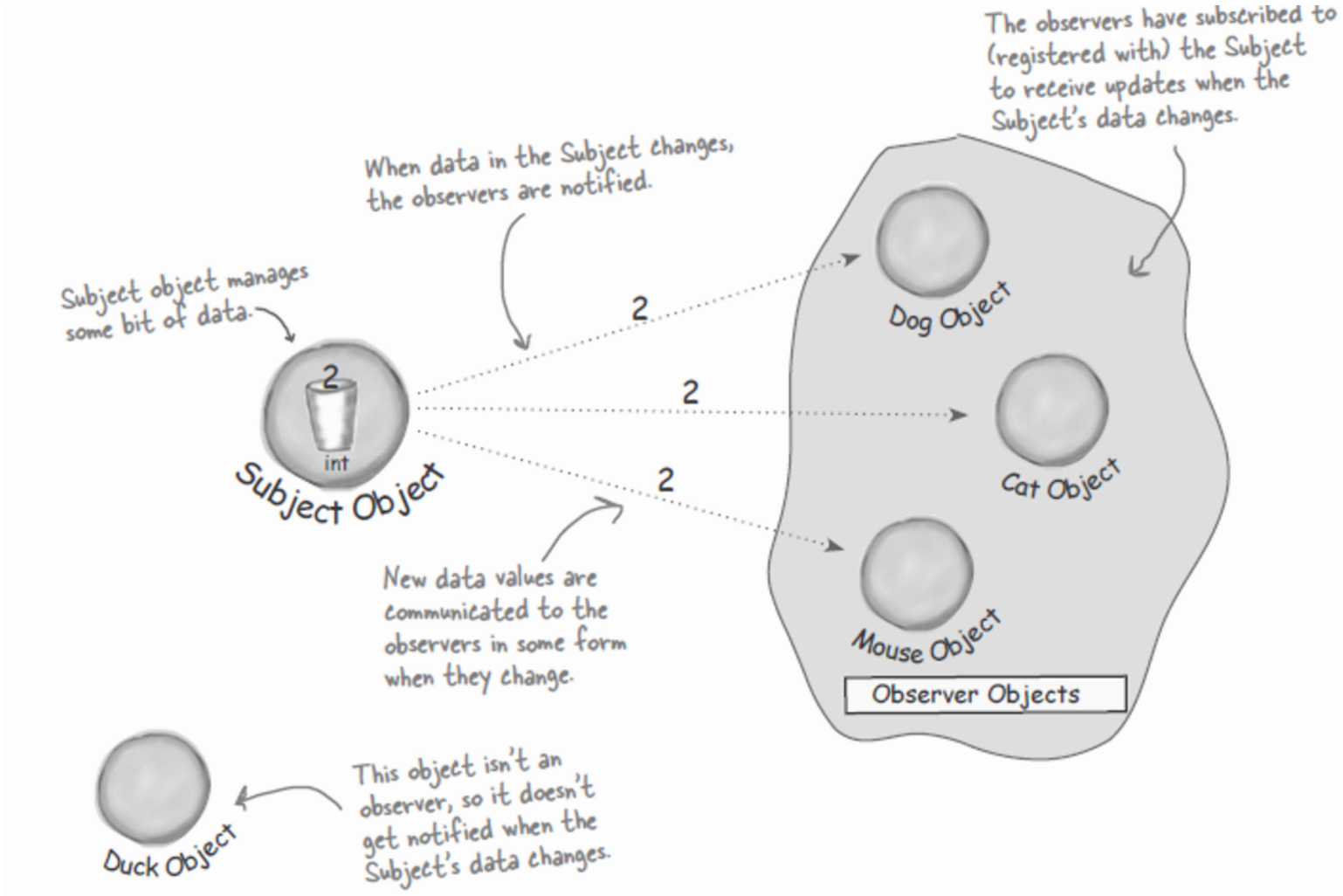
Must make changes to the program to add or remove

SOLUTION

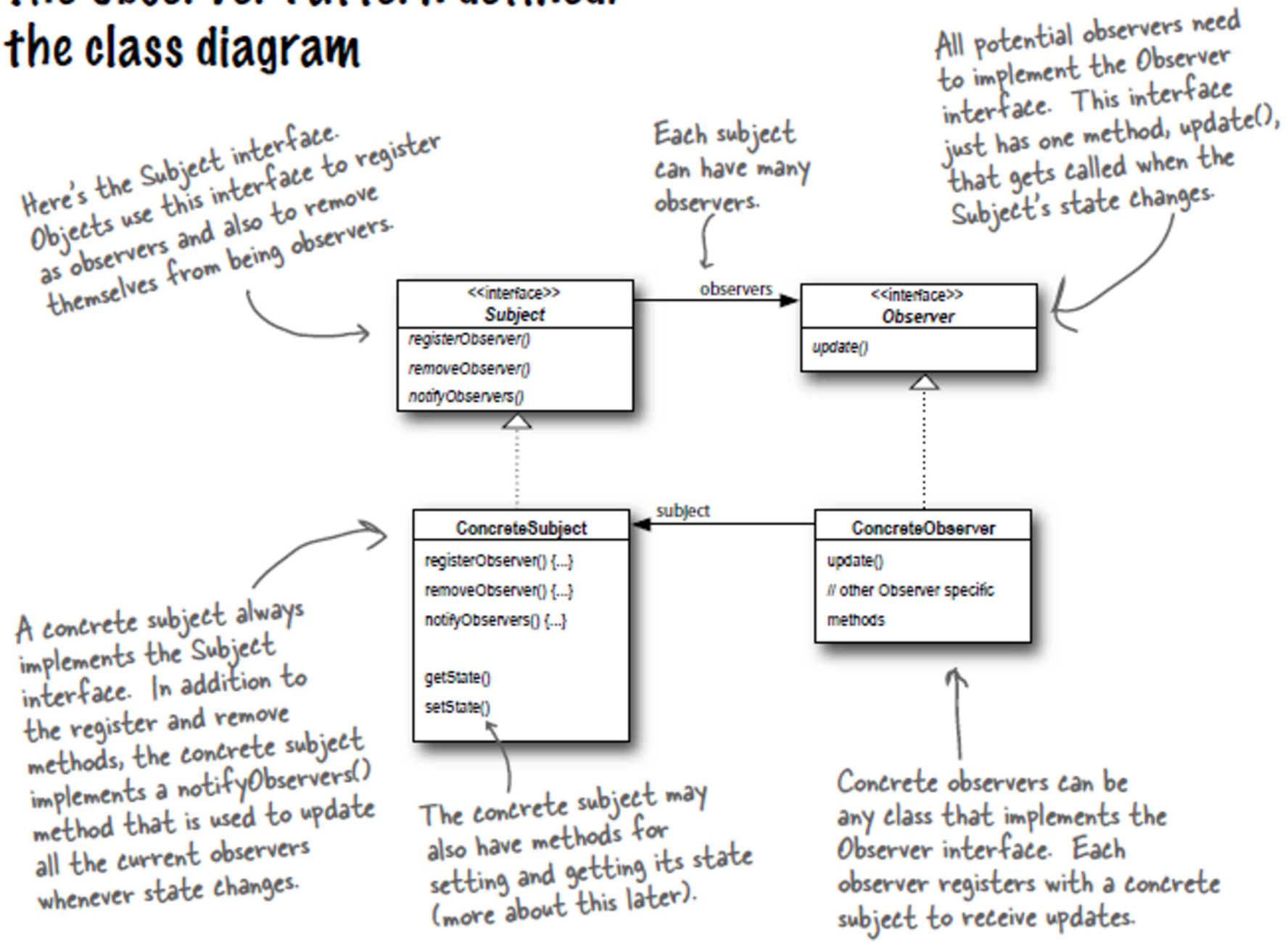
SUBSCRIBE

Subscribe for our news and events

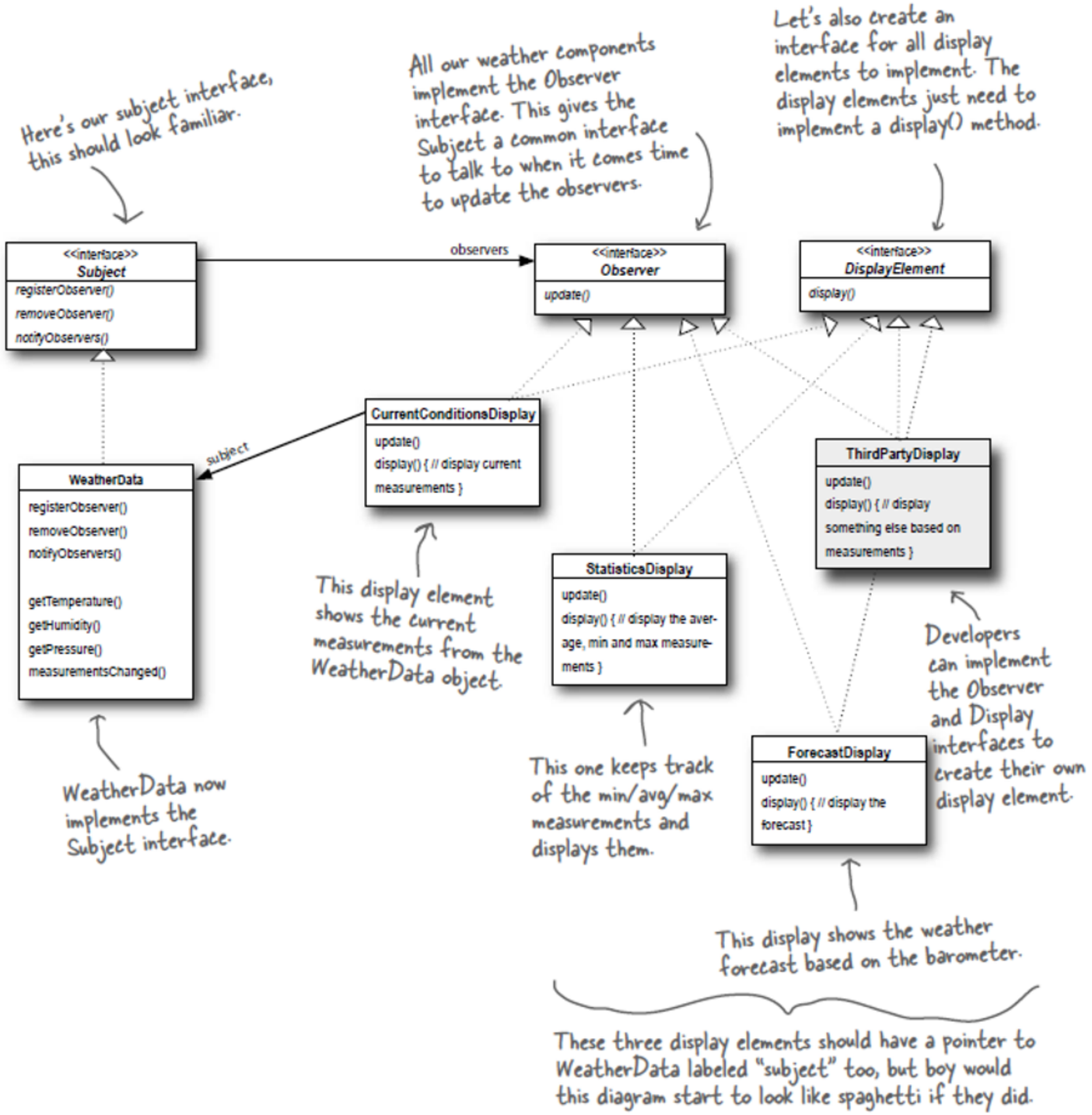
SOLUTION


The observers have subscribed to (registered with) the Subject to receive updates when the Subject's data changes.
When data in the Subject changes, the observers are notified.
Subject object manages some bit of data.
2
int
Subject Object
2
2
2
Dog Object
Cat Object
Mouse Object
Observer Objects
New data values are communicated to the observers in some form when they change.
Duck Object
This object isn't an observer, so it doesn't get notified when the Subject's data changes.

The Observer Pattern defined: the class diagram



SCHEMA


Here's our subject interface, this should look familiar.
All our weather components implement the Observer interface. This gives the Subject a common interface to talk to when it comes time to update the observers.
Let's also create an interface for all display elements to implement. The display elements just need to implement a display() method.
<<interface>>
Subject
registerObserver()
removeObserver()
notifyObservers()
observers
<<interface>>
Observer
update()
<<interface>>
DisplayElement
display()
CurrentConditionsDisplay
update()
display() { // display current measurements }
subject
WeatherData
registerObserver()
removeObserver()
notifyObservers()
getTemperature()
getHumidity()
getPressure()
measurementsChanged()
ThirdPartyDisplay
update()
display() { // display something else based on measurements }
StatisticsDisplay
update()
display() { // display the average, min and max measurements }
ForecastDisplay
update()
display() { // display the forecast }
This display element shows the current measurements from the WeatherData object.
Developers can implement the Observer and Display interfaces to create their own display element.
WeatherData now implements the Subject interface.
This one keeps track of the min/avg/max measurements and displays them.
This display shows the weather forecast based on the barometer.
These three display elements should have a pointer to WeatherData labeled "subject" too, but boy would this diagram start to look like spaghetti if they did.

PSEUDOCODE

Pseudocode for the Observable Class.

Behind the Scenes

```
setChanged() {
   changed = true
}

notifyObservers(Object arg) {
   if (changed) {
      for every observer on the list {
         call update (this, arg)
      }
      changed = false
   }
}

notifyObservers() {
   notifyObservers(null)
}
```

The setChanged() method sets a changed flag to true.

notifyObservers() only notifies its observers if the changed flag is TRUE.

And after it notifies the observers, it sets the changed flag back to false.

THANKS FOR LISTENING