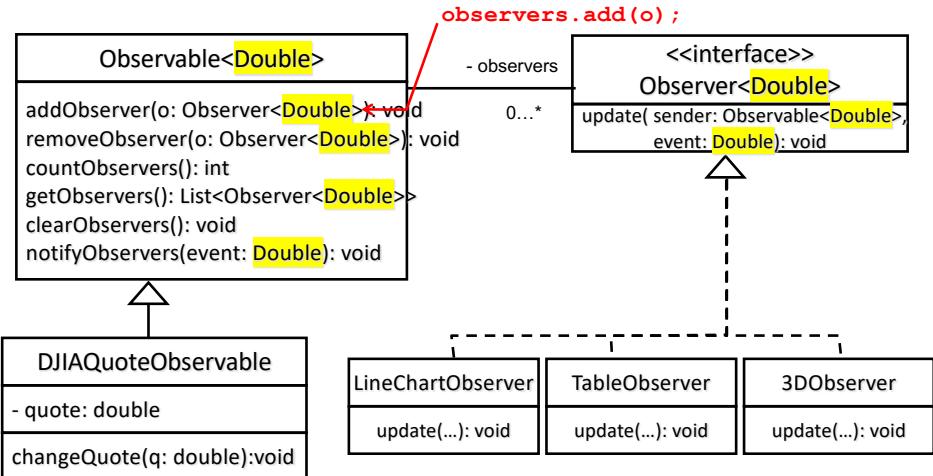


Recap: Observer Design Pattern

- Intent
 - Event notification
 - Define a **one-to-many dependency** between objects so that, when one object changes its state, all its dependents are **notified automatically**
- a.k.a
 - Publish-Subscribe (pub/sub)
 - Event source - event listener
- Two key participants (classes/interfaces)
 - **Observable** (model, publisher or subject)
 - Propagates an **event** to its dependents (observers) when its state changes.
 - **Observer** (view and subscriber)
 - Receives **events** from an observable object.

Registration

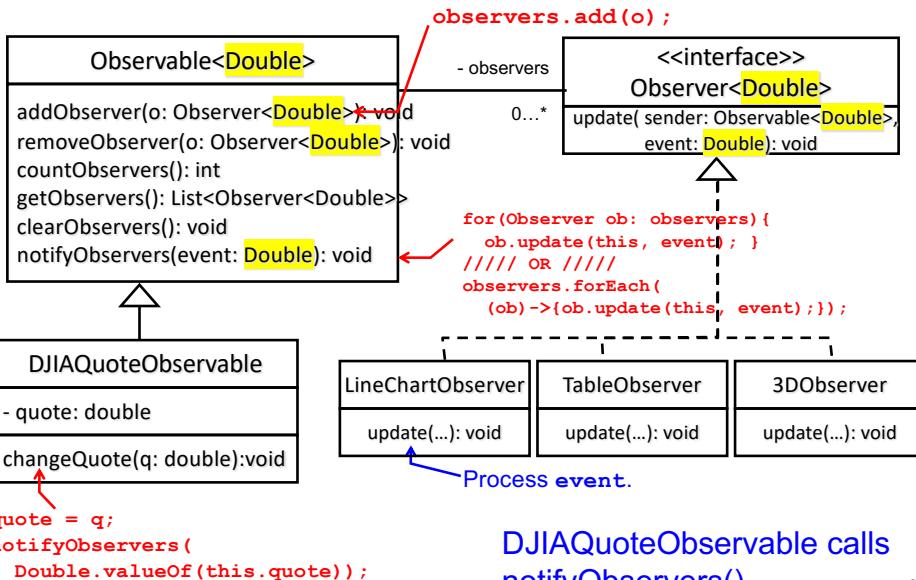


Each Observer calls **addObserver()** on **DJIAQuoteObservable**.

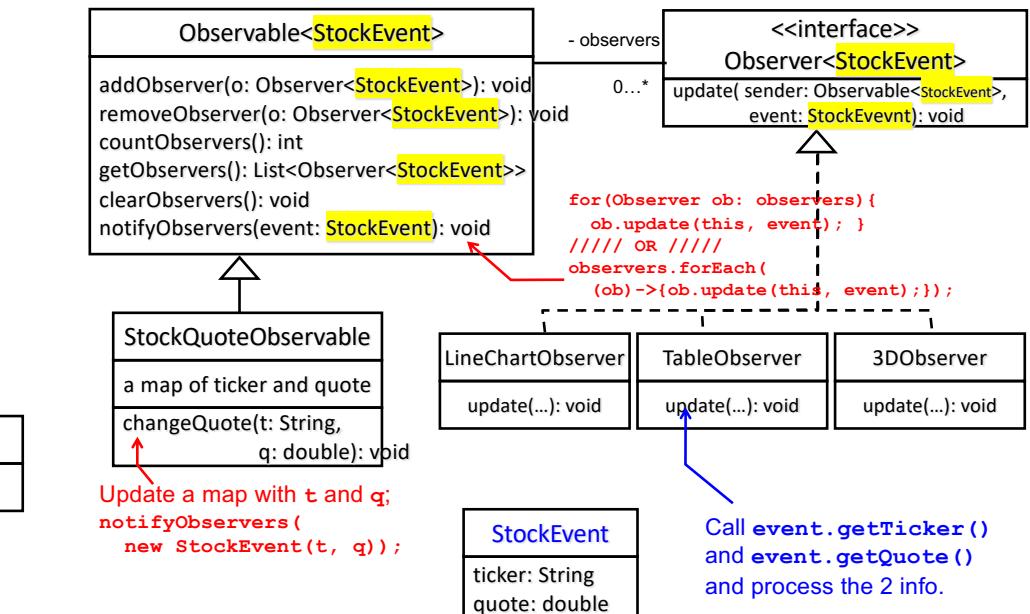
1

2

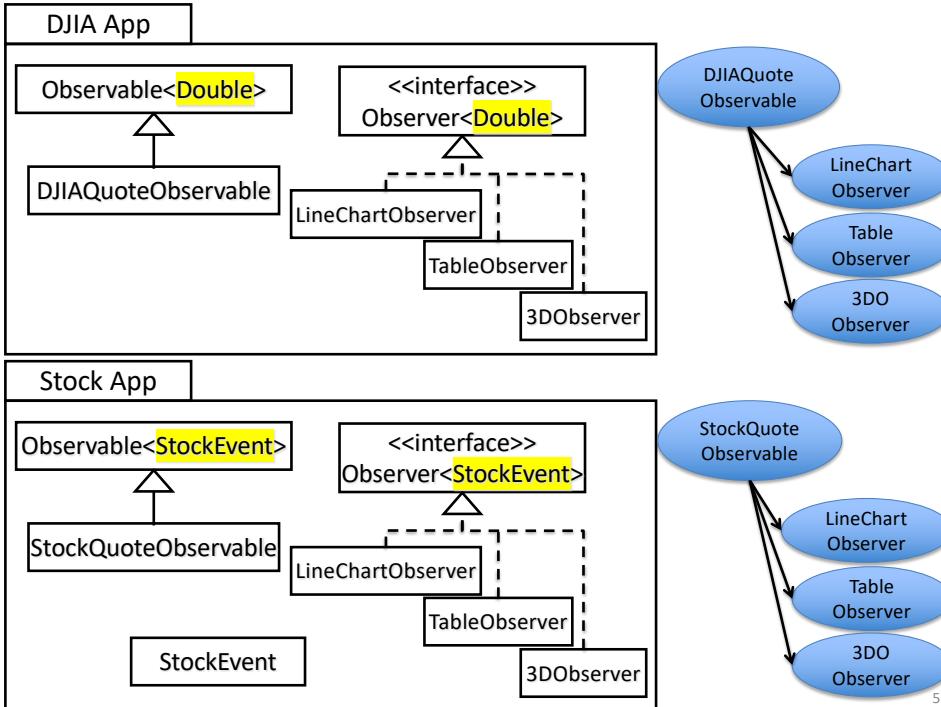
One-to-Many Event Notification



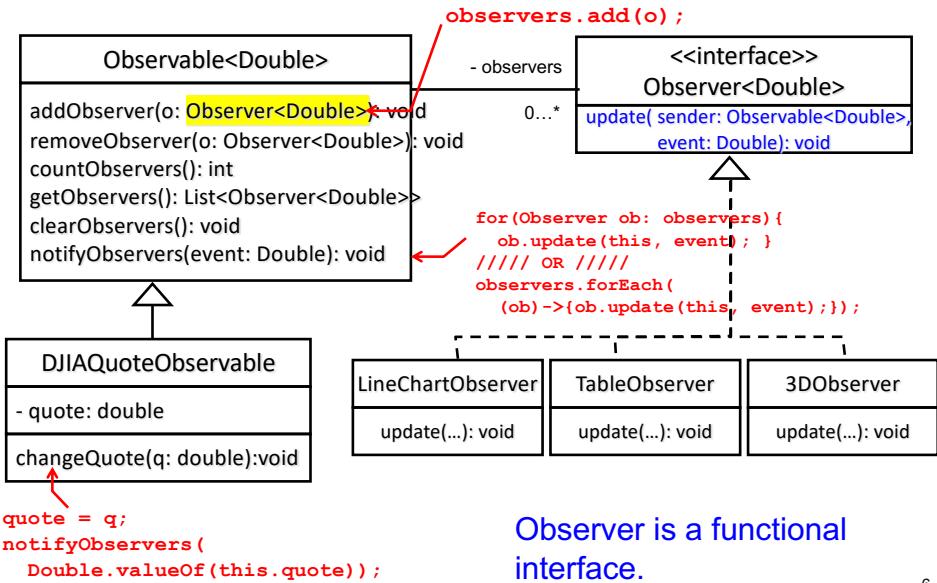
DJIAQuoteObservable calls **notifyObservers()**.



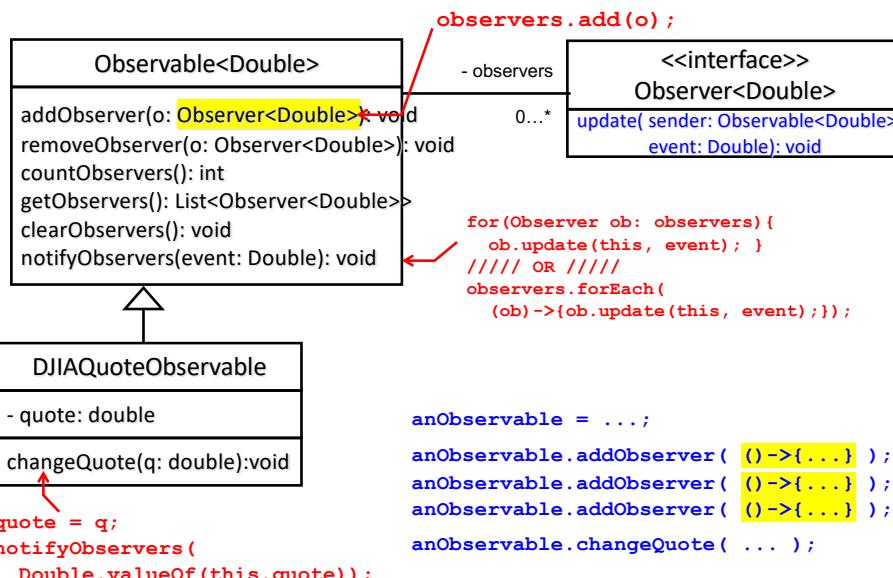
3



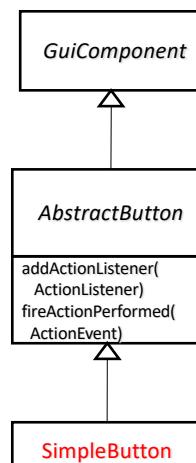
Replacing Observers with LEs



Observer is a functional interface.



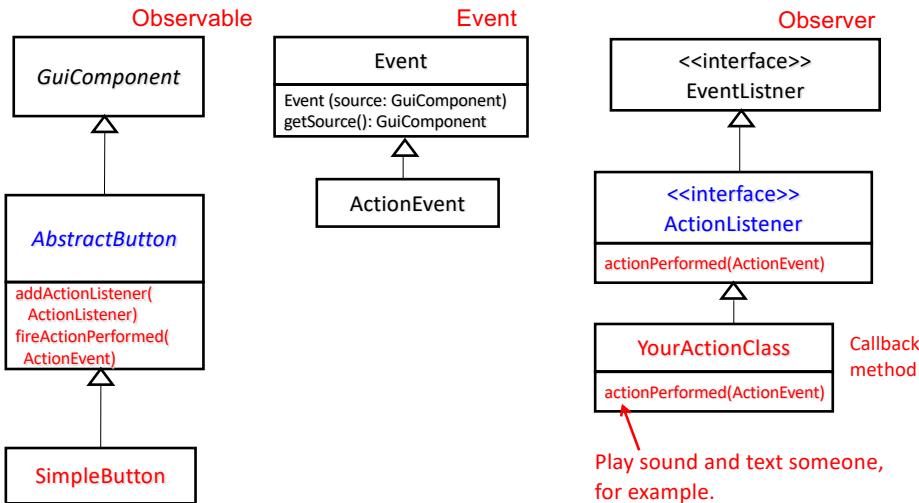
Exercise: Observer in a GUI Framework



- GUI framework
 - A framework (a set of classes and interfaces) that helps you develop GUI apps.
- Any GUI frameworks have classes and interfaces that represent major GUI components,
 - so you don't have to implement them yourself from scratch.
 - e.g., windows, buttons, menus, text boxes, check boxes, sliders, scrollbars, etc.

SimpleButton btn = new SimpleButton("OK");

OK



```

SimpleButton btn = new SimpleButton("OK");
btn.addActionListener(
    new YourActionClass());
  
```

OK

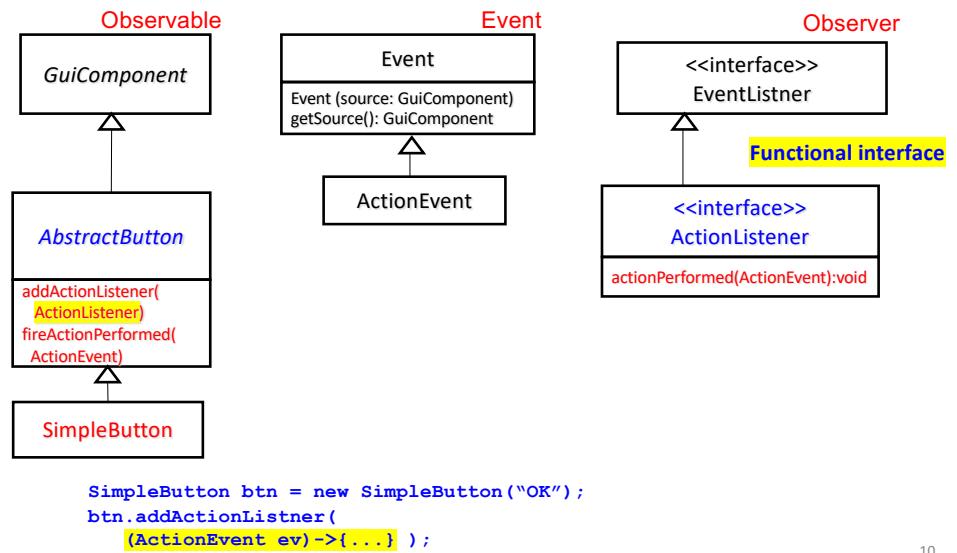
When the button is clicked, the underlying GUI framework detects that and calls `fireActionPerformed()` on the button.

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HW 16

- Recall HW 5, where you built your own example application of the Observer design pattern.
- Re-write your code with LEs.
 - Replace Observer classes with LEs.

A Lambda Expression as an Event Listener (Observer)



```

SimpleButton btn = new SimpleButton("OK");
btn.addActionListener(
    (ActionEvent ev) ->{...} );
  
```

10

HW 17

- Your file system code base performs iterations with loops (i.e., external iterations).
 - e.g., `Directory's getChildren()`
- Replace all those external iterations with internal iterations.
- Revise your HW 14 solution.