Observer Pattern
Pattern

- Software Design Pattern:
  - Allows discussion, implementation, and reuse of proven software designs.

- Gang of Four
  - A pioneering book on design patterns by 4 authors: Gamma, Helm, Johnson, Vlissides.
Observer pattern motivation

- Imagine you are writing an automatic day-planner:
  - It reads in the user's interests, plus information about the world, and suggest what they should do.

- Possible design idea:
  - You want to use different objects for cultural planning, sports planning, and sight-seeing.
  - Some objects bring in information about the world; your planning-objects use these info objects.

- Challenge:
  - All of these objects need to know the weather.
  - Your weather object gets updates now and then.
  - How do you tell..
Possible Idea

- **Have the weather object call each info. object:**
  ```java
  class Weather
  {
      void newDataUpdate()
      {
          String weatherData = ...;
          culturePlanner.update(weatherData);
          sportsPlanner.update(weatherData);
          sightseeingPlanner.update(weatherData);
          // Change here EVERY time you get a new planner.
      }
  }
  ```

- **Bad because:**
  - Weather object is...
  - Every new planner you get, you'll have to change the weather object's code, recompile, and re-run.
The observer pattern

• Observer Pattern:

• Produces a one to many relationship:
  - one object observed (called the subject)
  - many objects observing (called the observers).

• Great because it loosely couples objects:
  - Object with something to report does not need a hard-coded list of who to tell; ...
Observer

• Button Example
  – Button knows of a click; Game Activity \textit{wants} to know.
  – Activity creates anonymous OnClickListener
    • Activity registers it with button as a listener.

• Benefit:...
Observer Pattern

• Context
  – An object, called the subject, is source of events
  – One or more observer objects want to be notified when such an event occurs.

• Solution
  – Define an observer interface type.
    All..
  – Subject maintains a collection of observers.
  – Subject supplies methods for attaching and detaching observers.
  – Whenever an event occurs, the subject..