Designing with Interfaces

OO A&D Principle

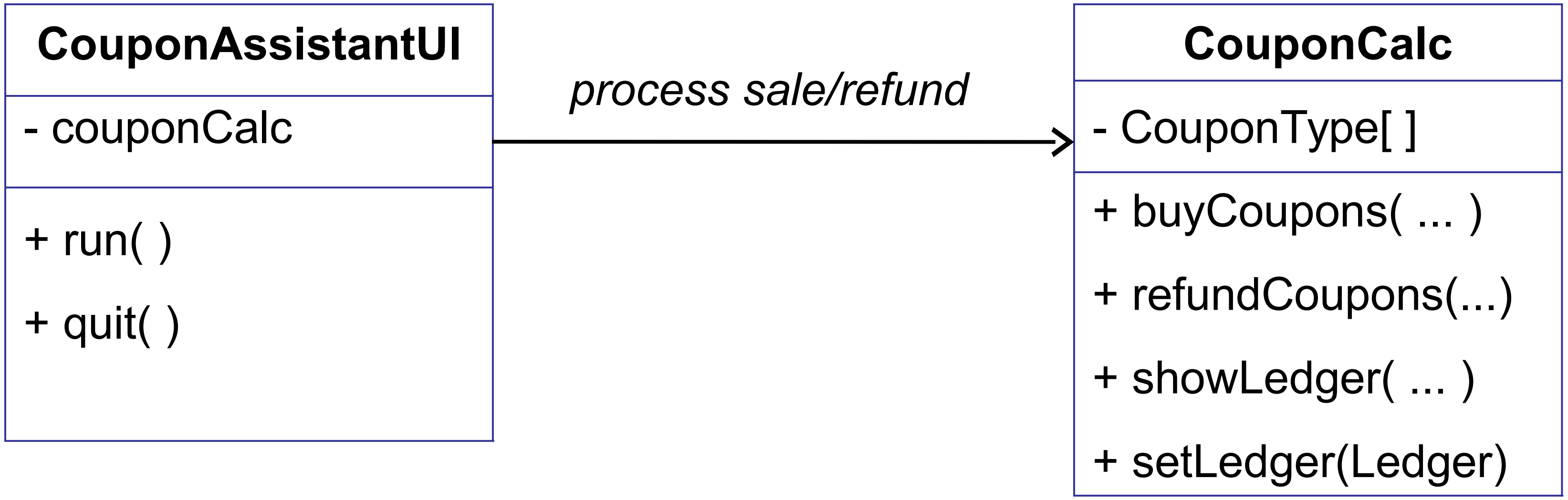
"*Program to an interface, not an implementation*"

meaning:

"Program to the *specification* (of an object's behavior), don't depend on its *implementation* (which may change)".

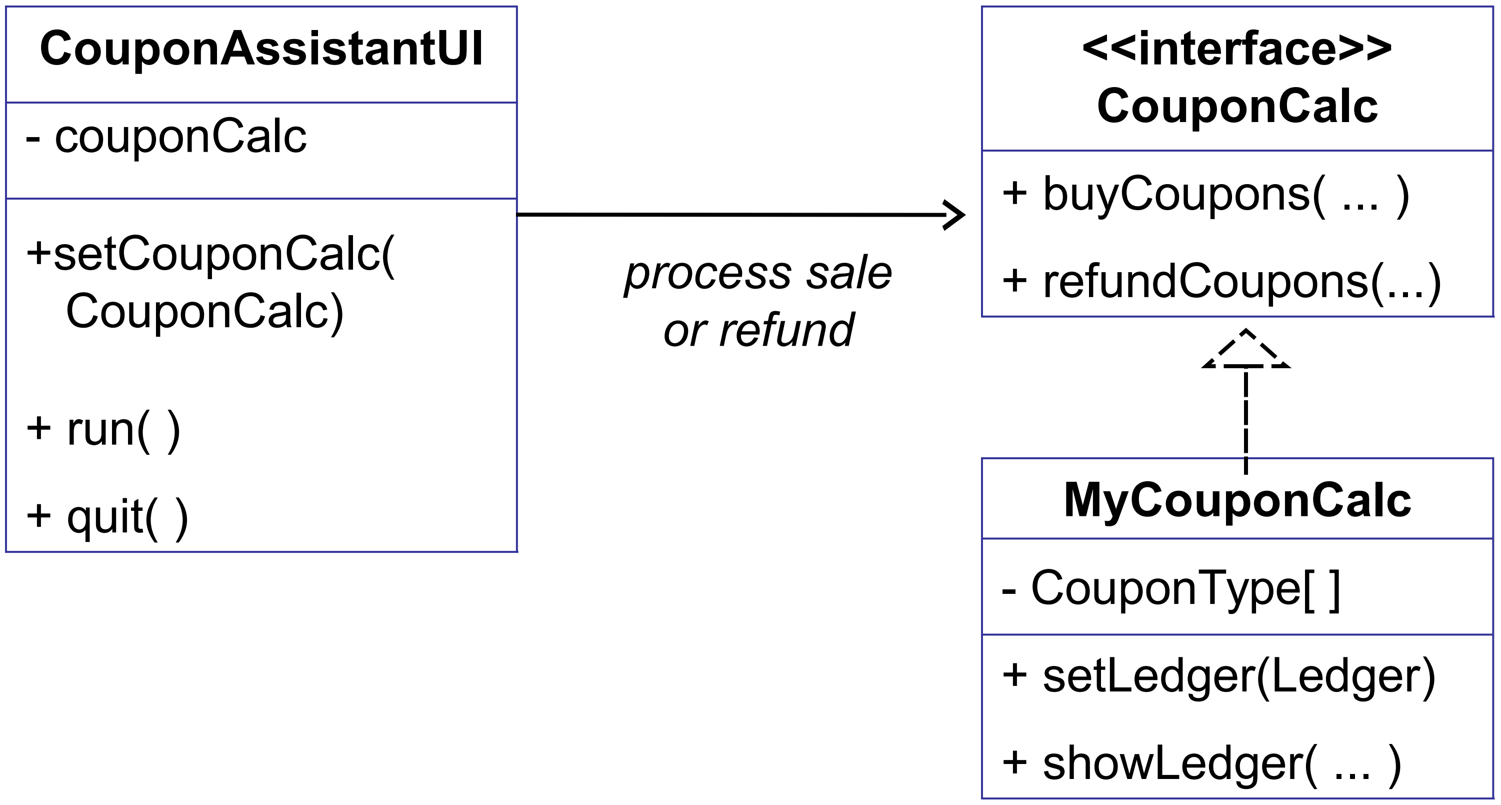
Designing with Interfaces (1)

1. Use interfaces to "protect" one class from another class whose implementation may change.
2. Reduces *coupling* between classes.
3. Decide what *behavior* a class should provide,



Designing with Interfaces (2)

4. Create an interface for the required behavior.
5. Clients use the Interface type, not the actual type.
6. Providers *implement* the interface.



Designing with Interfaces (3)

- Interface is like a *service contract* for providers.
- Use a "set" method to *inject* the actual service provider object into the service user:

```
class Main {
  public static void init( ) {
     CouponCalc mycalc = new MyCouponCalc( );
     couponAssistant.setCouponCalc( mycalc );
     couponAssistant.run( );
  }
```

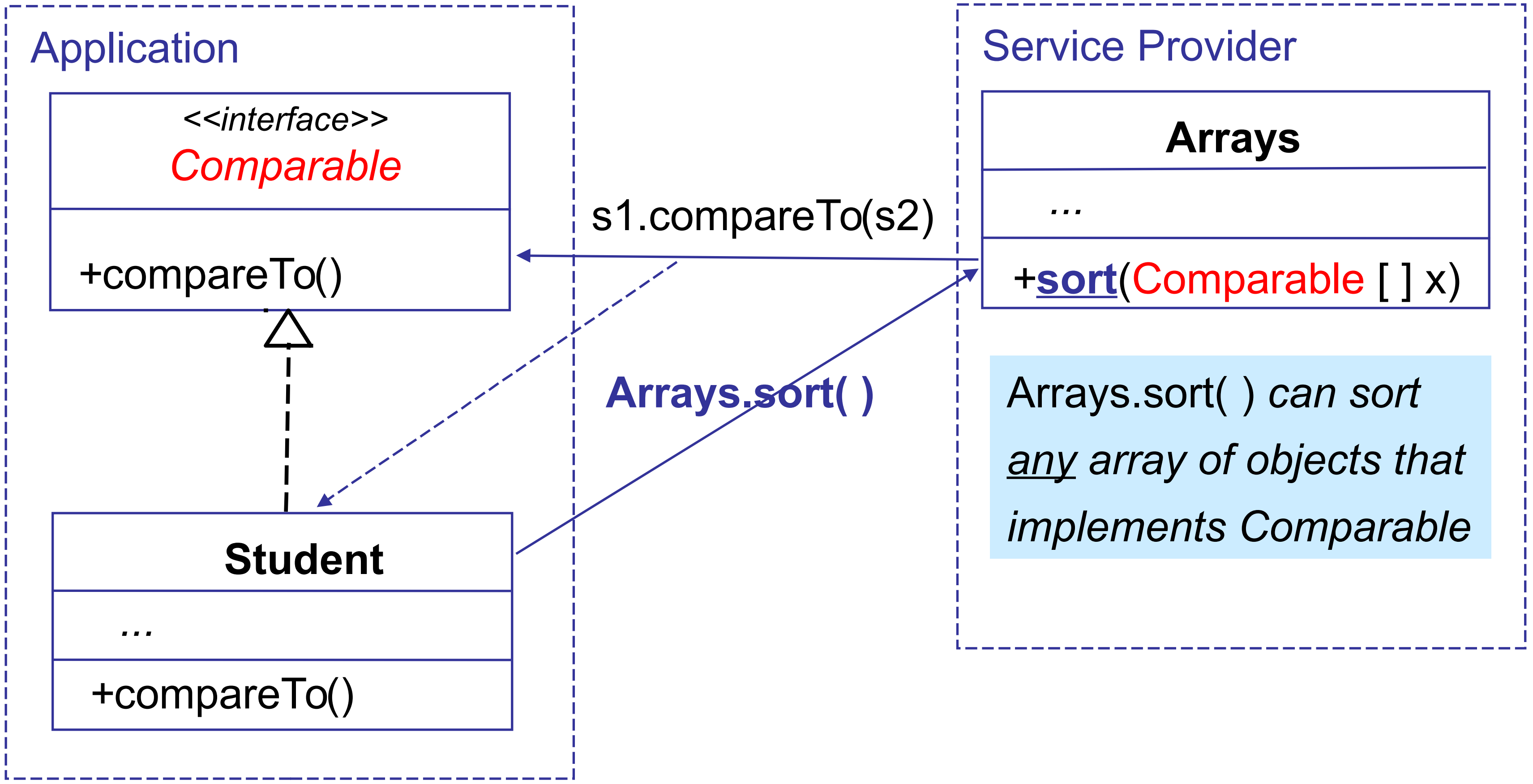
CouponAssistantUI
- couponCalc: calc

+setCouponCalc(calc: CouponCalc)
 	
+ run( )
+ quit( )

This is called "*Dependency Injection*".

Designing with Interfaces

- Interface can be used to define required behavior of a *client.*

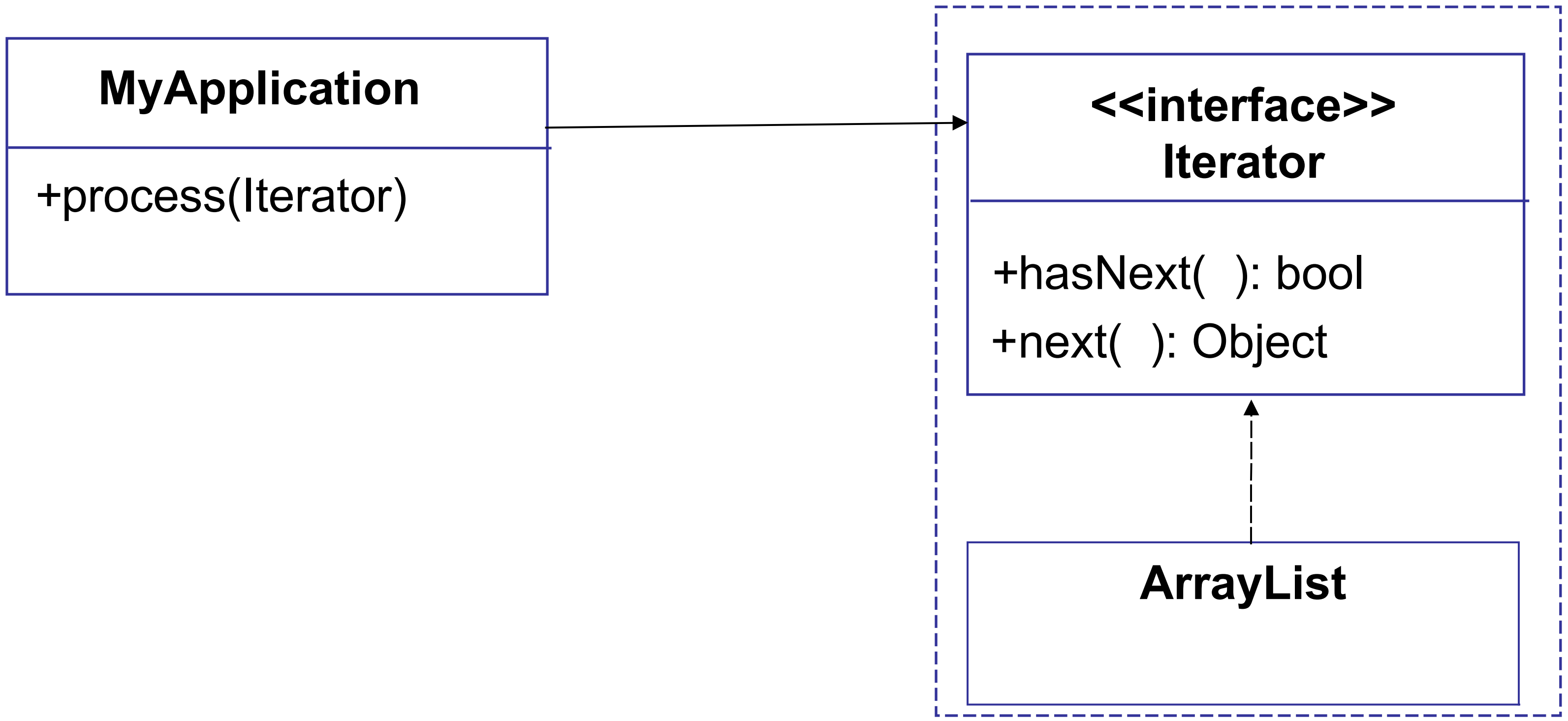


Arrays.sort( ) *can sort* *any array of objects that implements Comparable*

Iterator Interface

Pattern: we want to visit every member of a collection, and we want this to work for *any kind of collection*.

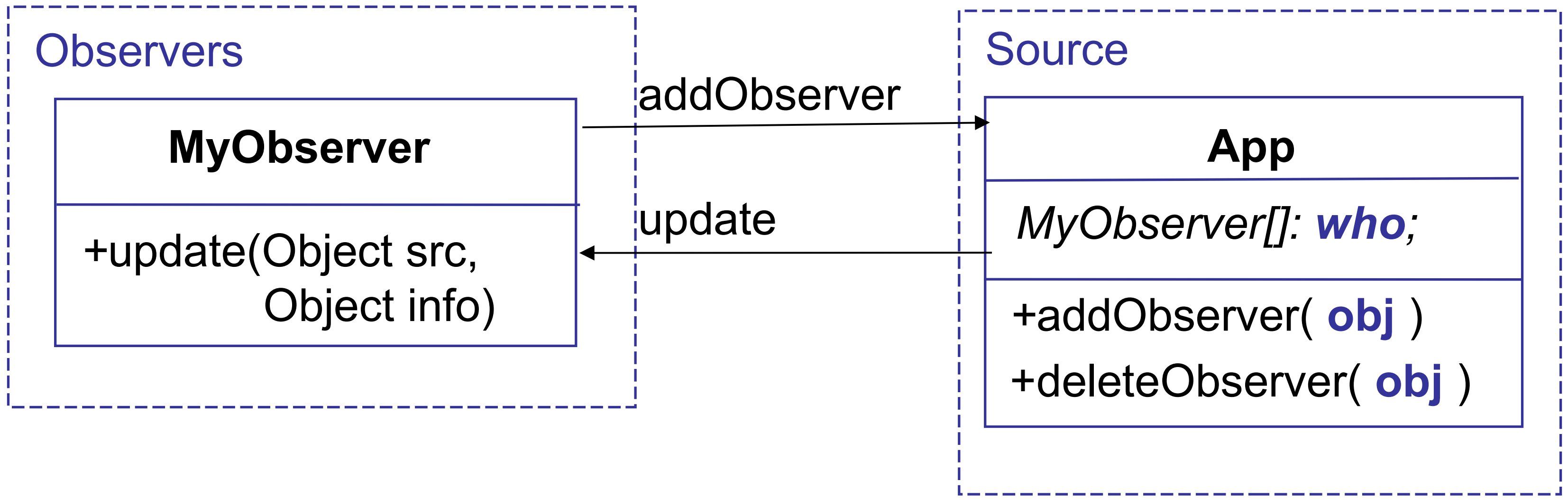
Solution: design an *interface* for the behavior we want. Require that all collections implement this interface.



Interface for the Observer Pattern

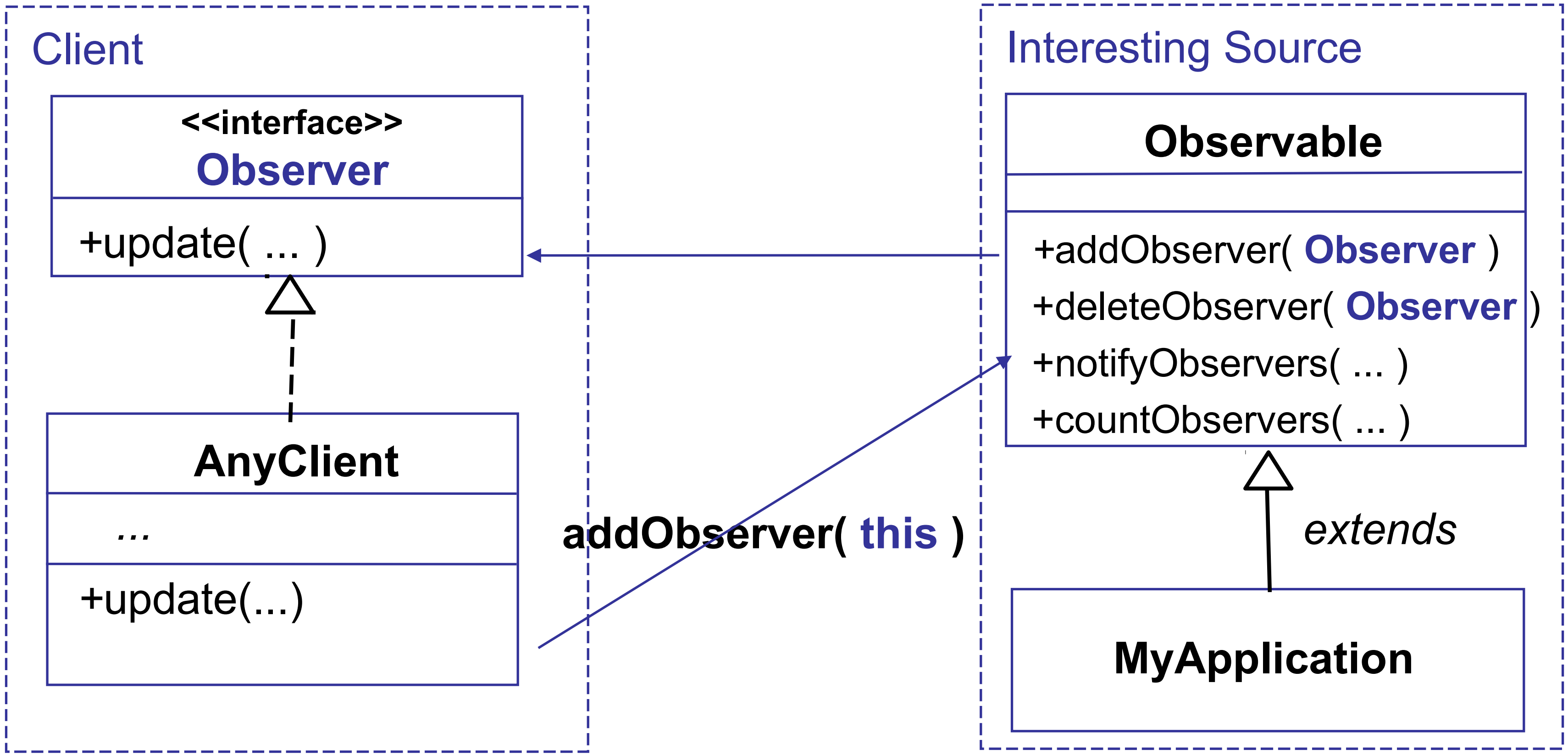
Pattern: one object is the source if "interesting" events. Other objects want to be notified when an interesting event occurs.

Solution: objects ***register*** themselves as Observers. Then the "interesting" event occurs, the source calls the Observers' `update( )` method.



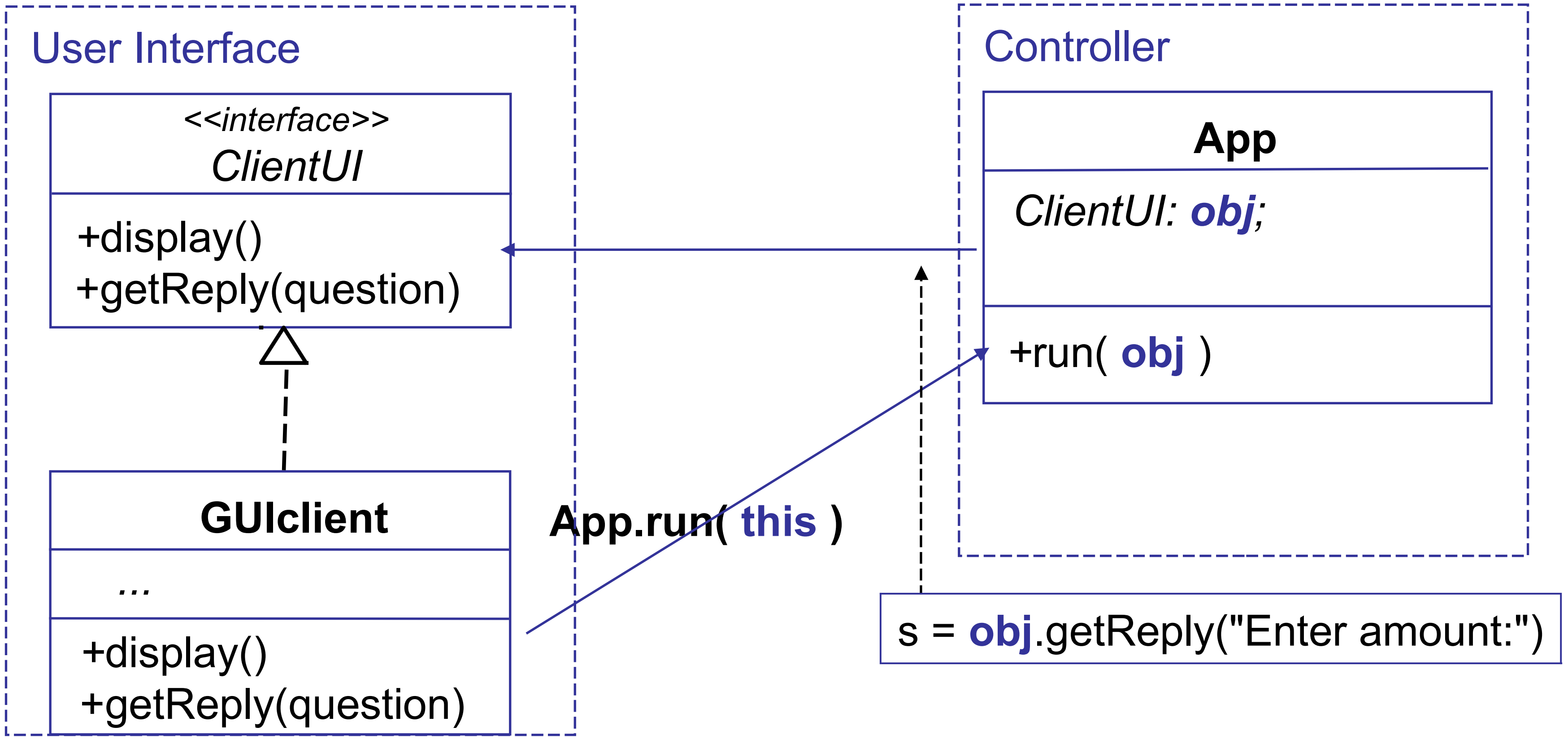
Interface for Observer Pattern

- The Java Observer interface specifies client behavior
- Observable abstract class provides the server side.



Interface for View-Controller Pattern

- Interfaces are used to separate an application's "user interface" from the "logic engine" of the application.
- Interface reduces dependency between components.



Interfaces You Should Know

Interface	**What it specifies**
`Comparable<T>`	compareTo(T other)
`Comparator<T>`	compare(T x, T y)
`Iterator<T>`	hasNext() and next()
	iterating over collections
`Iterable<T>`	iterator()
	a way of creating iterators
`Cloneable`	safe to call clone()