

CSC207H Lecture 6

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Design Patterns

- ▶ A general repeatable solution to a commonly occurring problem in software design
- ▶ Not a finished design that can be transformed directly into code
- ▶ A description or template for how to solve a problem that can be used in many different situations.

Source: https://sourcemaking.com/design_patterns

Design Patterns

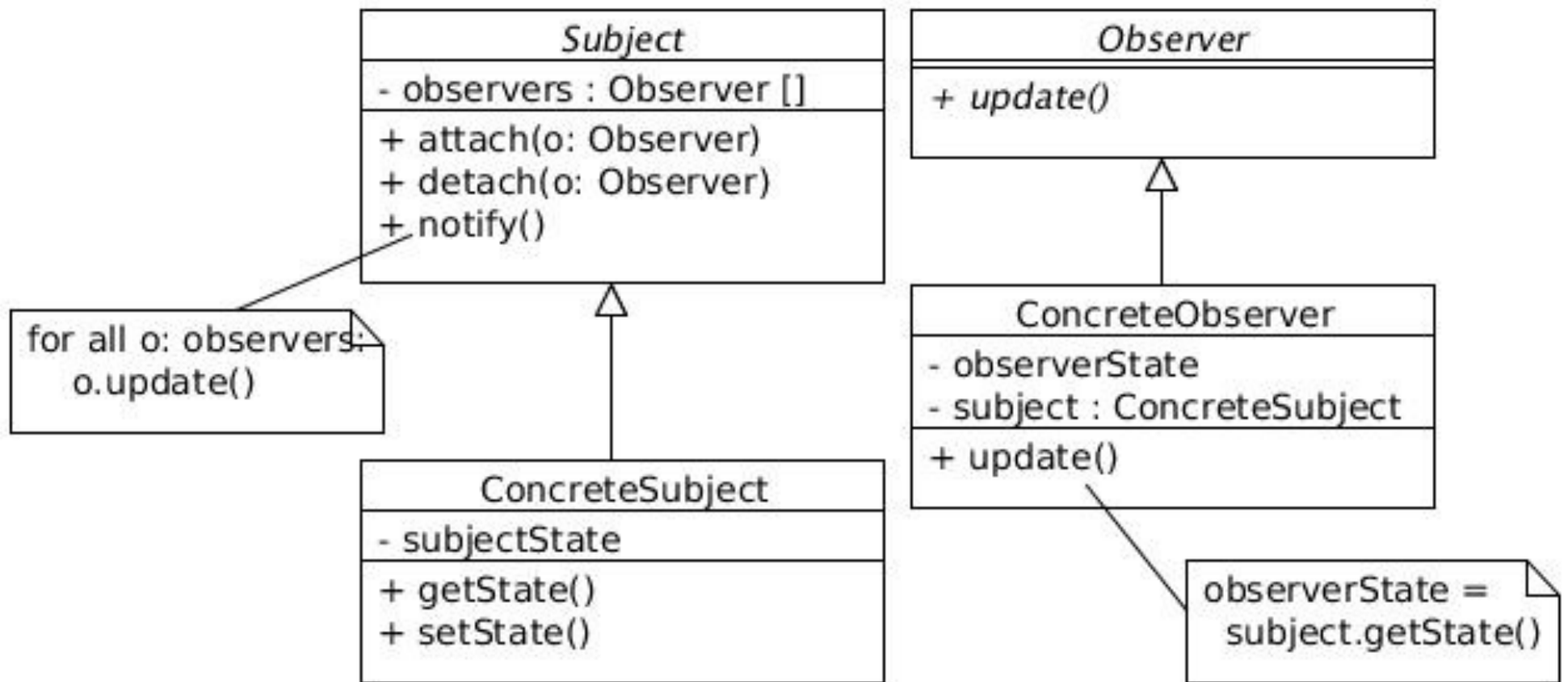
- ▶ Using the patterns results in flexible, malleable, maintainable code. It usually allows plug and play additions to existing code.
- ▶ Gives developers a vocabulary to talk about recurring class organizations. Now when you look at a class diagram, and parts are labelled with certain patterns, you can better understand the relationships between the classes.

Observer Design Pattern

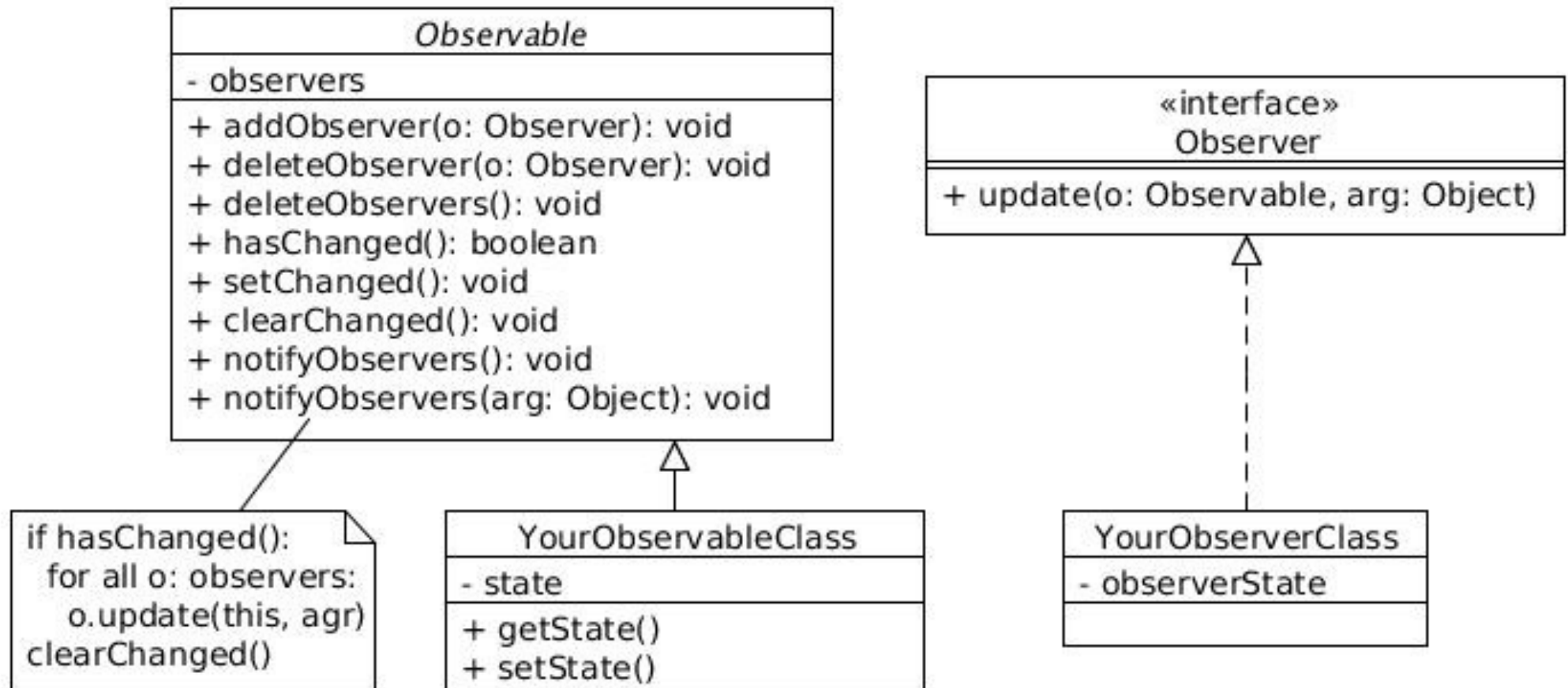
Scenario:

- ▶ Need to maintain consistency between related objects.
- ▶ Two aspects, one dependent on the other.
- ▶ An object should be able to notify other objects without making assumptions about who these objects are.

Observer: Standard Solution



Observer: Java Implementation



Singleton Design Pattern

Scenario:

- ▶ Application needs one, and only one, instance of an object
- ▶ Must ensure that it's not possible to create more than one instance of a singleton class

Singleton: Solution

Singleton
- instance: Singleton
+ getInstance(): Singleton - Singleton()

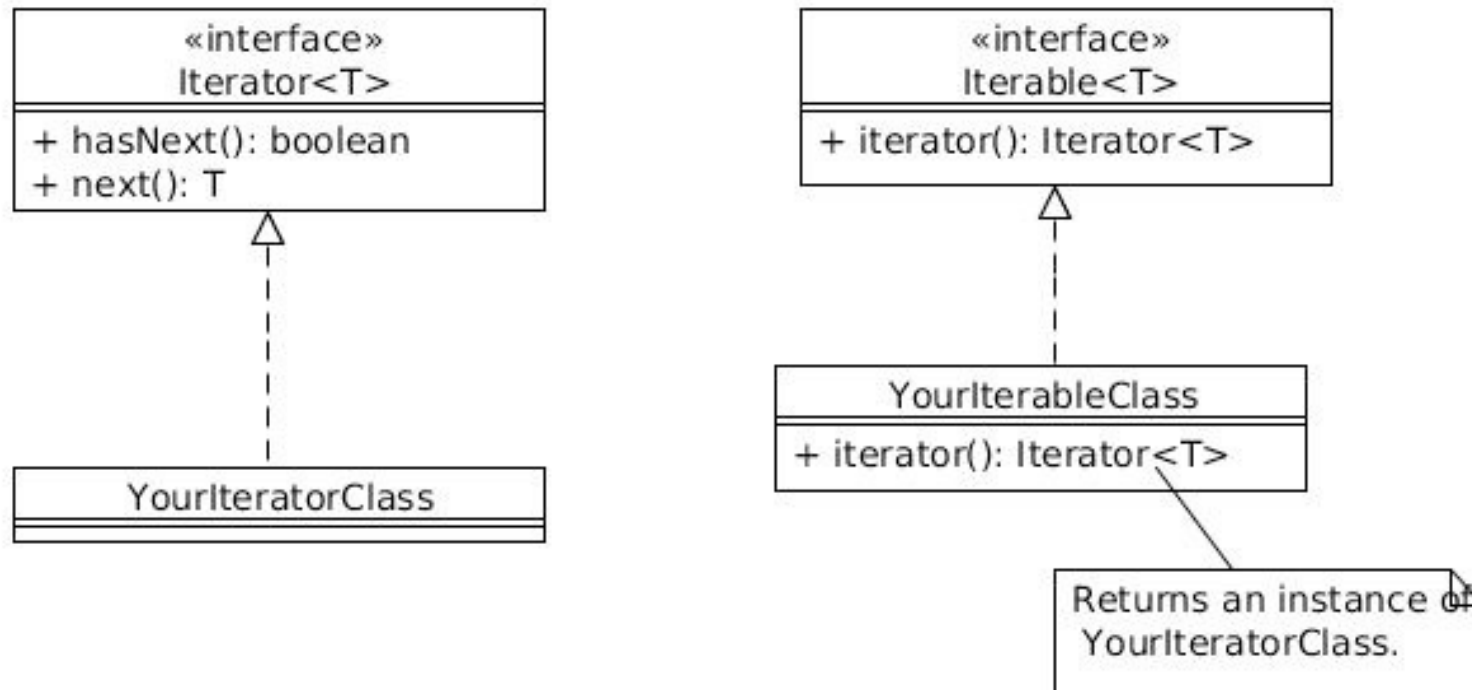
Clients access a Singleton instance solely through Singleton's getInstance() operation.

Iterator Design Pattern

Scenario:

- ▶ Need to go through (iterate over) a collection of elements
- ▶ Want to be able to have multiple, independent iterators over the elements of the container
- ▶ Do not want to expose the underlying representation (i.e., should not reveal how the elements are stored)

Iterator Design Pattern: Java



Composite Design Pattern

Scenario:

- ▶ Need to manipulate hierarchical collection of 'primitive' and 'composite' objects
- ▶ Use this pattern whenever you have "composites that contain components, each of which could be a composite".

Source: https://sourcemaking.com/design_patterns/composite

Composite Design Pattern

