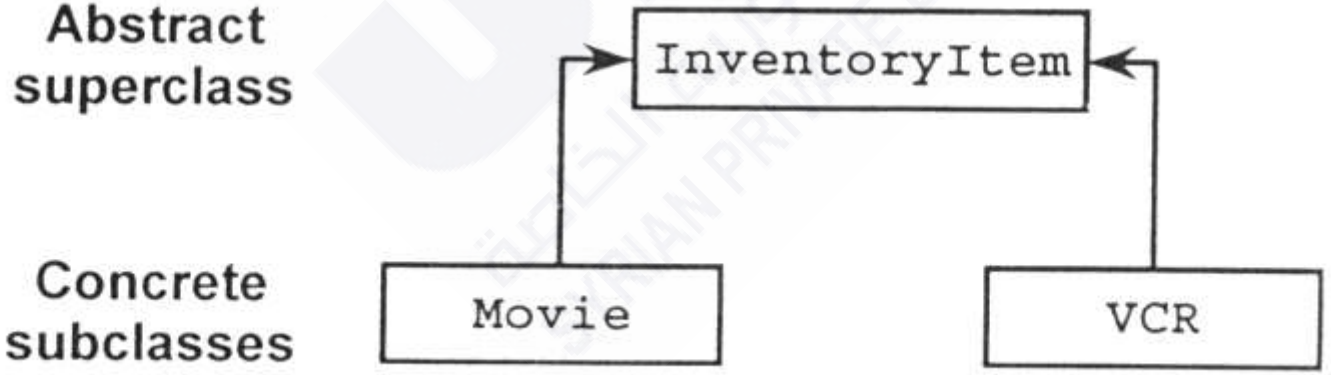
Structuring Code by Using Abstract Classes and Interfaces

Defining Abstract Classes

- An abstract class cannot be instantiated.
- Abstract methods must be implemented by subclasses.
- Interfaces support multiple inheritance.

is the specification of a set of methods, which is similar to an abstract class.



Defining Abstract Classes

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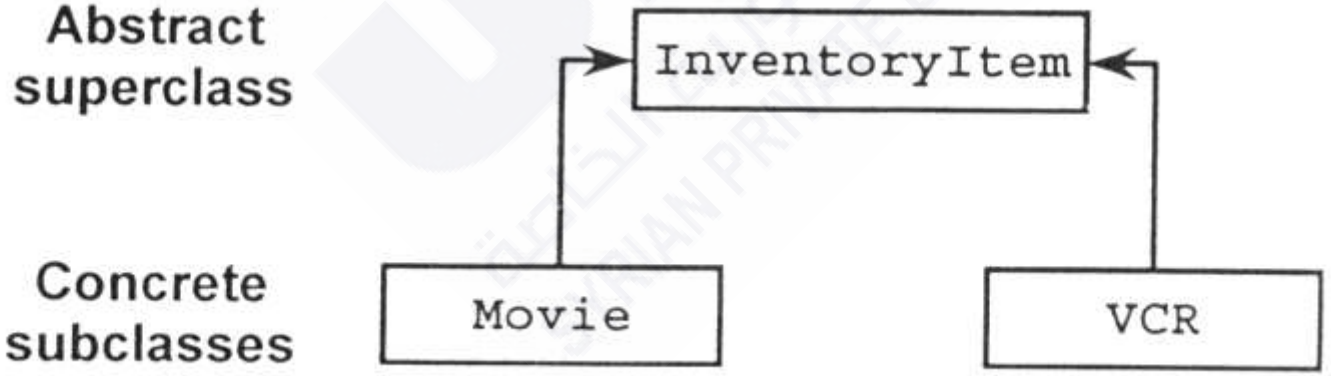
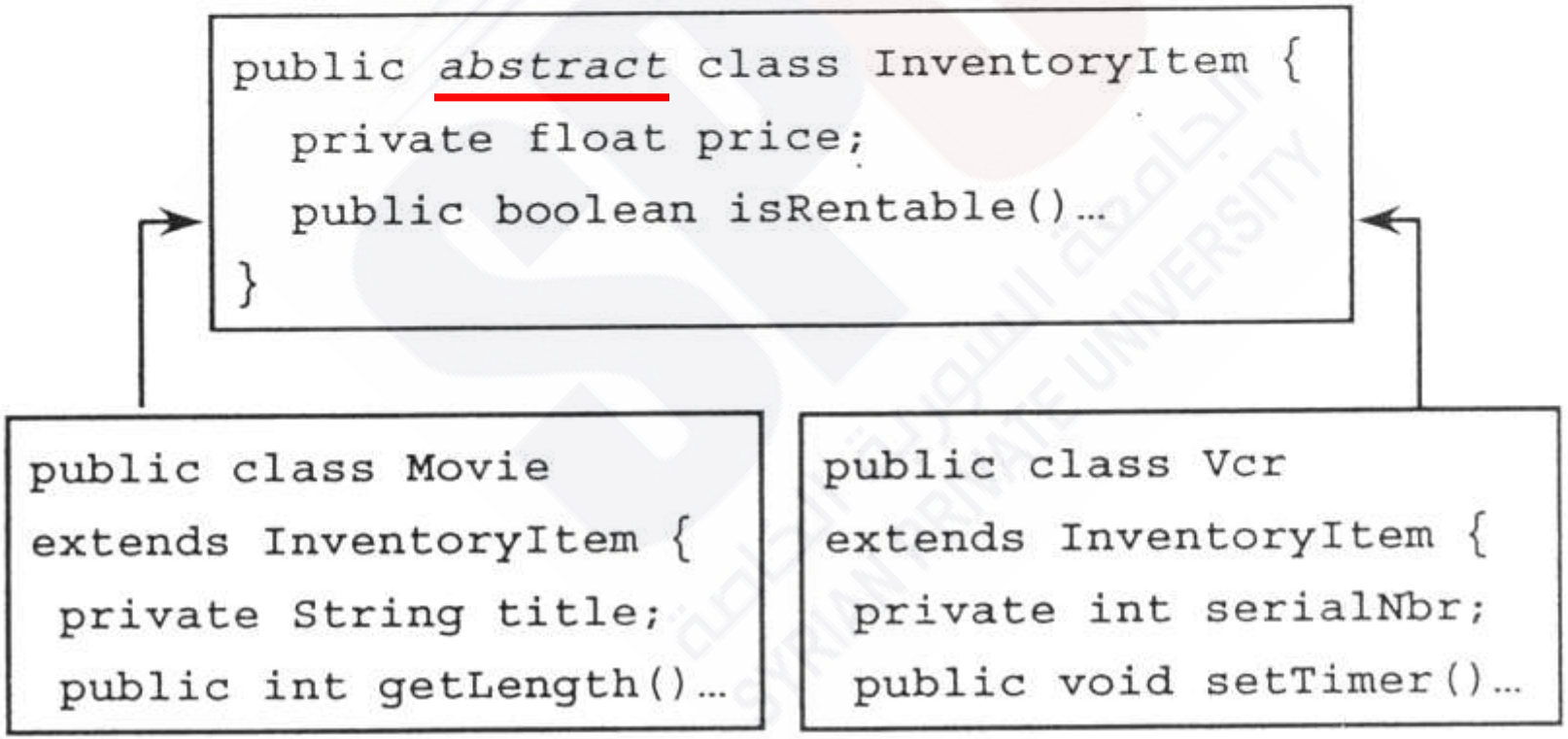
Provide multiple inheritance. Class can implement an unlimited number of interfaces but can only extend one superclass.



Creating Abstract Classes

- Use the `abstract` keyword to declare a class as abstract.



What Are Abstract Methods?

- An abstract method:
  - Is an implementation placeholder
  - Is part of an abstract class
  - Must be overridden by a concrete subclass
- Each concrete subclass can implement the method differently.

Defining Abstract Methods

- Use the `abstract` keyword to declare a method as abstract:
  - Provide the method signature only.
  - The class must also be abstract.
- Why is this useful?
  - Declare the structure of a given class without providing complete implementation of every method.

```
public abstract class InventoryItem {
  public abstract boolean isRentable();
  ...
```

Abstract classes can contain method that are not declared as abstract.

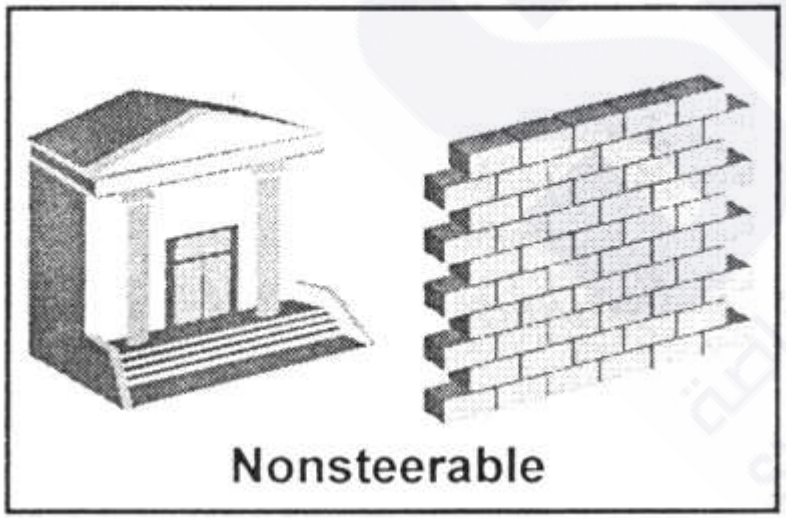
Defining and Using Interfaces

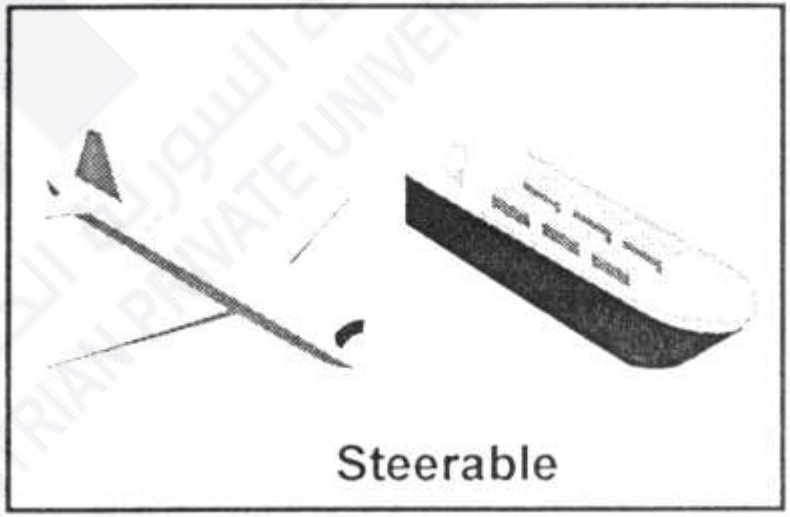
- An interface is like a fully abstract class:
  - All of its methods are abstract.
  - All variables are `public static final`.
- An interface lists a set of method signatures without any code details.
- A class that implements the interface must provide code details for all the methods of the interface.
- A class can implement many interfaces but can extend only one class.

```
class Movie extends InventoryItem implements Sortable , Listable {
   ……..
}
```

Examples of Interfaces

- Interfaces describe an aspect of behavior that different classes require.
- For example, classes that can be steered support the "steerable" interface.
- Classes can be unrelated.





Creating Interfaces

- Use `interface` keyword:

```
public interface Steerable {
  int MAXTURN = 45;
  void turnLeft(int deg);
  void turnRight(int deg);
}
```

public static final

public abstract

- All methods are `public abstract`.
- All variables are `public static final`.

Implementing Interfaces

Use `implements` keyword.

```
public class Yacht extends Boat
      implements Steerable
  public void turnLeft(int deg) {…}
  public void turnRight(int deg) {…}
}
```