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10.1: An Introduction to Inheritance

- Inheritance is a mechanism for extending existing classes by adding methods and fields.
- The more general class is called a superclass. The more specialized class that inherits from the superclass is called the subclass.
- Every class extends the Object class either directly or indirectly.
- Inheriting from a class differs from implementing an interface: The subclass inherits behavior and state from the superclass.
- Inheritance allows for code reuse.
- When defining a subclass, you specify added instance fields, added methods, and changed or overridden methods.

10.2 Inheritance Hierarchies

- Sets of classes can form complex inheritance hierarchies.
- Common properties between subclasses are collected into a superclass.
- The subclasses support all methods from the superclass, but their implementations may be modified to match the specialized purposes of the subclasses.

10.3: Inheriting Instance Fields and Methods

- If you want to modify a private superclass field, you must use a public method of the superclass.
- A subclass has no access to private fields of its superclass.
- Use the super keyword to call a method of the superclass.

10.4: Subclass Construction

- To call the superclass constructor, you use the super keyword in the first statement of the subclass constructor.
- If a subclass constructor does not call the superclass constructor, the superclass is constructed with its default constructor (that is, the constructor that has no parameters).
    - For the most part, subclass constructors have some parameters that they pass on to the superclass and others that they use to initialize subclass fields.

10.5: Converting Between Subclass and Superclass Types

- Subclass references can be converted to superclass references.

- Conversion of references is different from a numerical conversion, such as a conversion from an integer to a floating-point number.
- The instanceof operator tests whether an object belongs to a particular type.

10.6: Polymorphism

- In Java, method calls are always determined by the type of the actual object, not the type of the object reference.
- You cannot store all account references in variables of type Object because the compiler needs to check that only legal methods are invoked.
- You should always manually check which files and methods should print what and whether the correct methods have been called with the correct values.

10.7: Access Control

- A field or method that is not declared as public, private, or protected can be accessed by all classes in the same package, which is usually not desirable.
- Package access for fields is rarely useful, and most fields are given package access by accident because the programmer simply forgot the private keyword.
    - Methods should typically be defined as public or private.
    - Classes and interfaces can have public or package access. Classes that are generally useful should have public access.

10.8: Object: The Cosmic Superclass

- In Java, every class that is defined without an explicit extends clause automatically extends the class Object.
- Define the toString method to yield a string that describes the object state.
- Define the equals method to test whether two objects have equal state.
- The clone method makes a new object with the same state as an existing object.

10.9: Using Inheritance to Customize Frames

- Define a JFrame subclass for a complex frame.
- The frame class makes it easier to organize the code that constructs the user-interface elements.
- When using JFrame, you still need a main method.

10.10: Processing Text Input

- Use JTextField components to provide space for user input. Place a JLabel next to each text field.
    - Users can type additional characters, but then a part of the contents of the field becomes invisible.

- You should have a button for the user to click, confirming that the input that the user entered is ready for processing.
- The getText method returns a String object.

10.11: Text Areas

- Use a JTextArea to show multiple lines of text.
- If you want to use a text field or text area for display purposes only, call the setEditable method like this: textArea.setEditable(false);
- You can add scroll bars to any component with a JScrollPane.