

Lecture 2

Chapter 1: Objects and Classes

Fundamental concepts

- object
- class
- method – called a function in C
- parameter [C]
- data type [C]
- field

Chapter 1 has no code – only concepts

Objects and classes

- Objects
 - represent ‘things’ from the real world, or from some problem domain (example: “the red car down there in the car park”)
 - also represent things which only exist in the program: arrays, messages, errors
- Classes
 - represent all objects of a kind (example: “car”)

Simple exercise:

- Open shapes project in BlueJ
- Create some circle objects

Methods and parameters

- objects have operations which can be invoked (Java calls them *methods*)
- methods may have parameters to pass them additional information needed to execute

Exercise: call `setVisible()` and other methods

Data types

- Parameters (and other data) have types
- Types include: int, long, float, double, boolean, char
- *Each class is also its own type*
- Objects can be passed as parameters

Fields

- An object has *attributes*: values stored in *fields*
- A field has a name, a type and a visibility modifier
- The values of an object's fields define its state

State

The screenshot shows the BlueJ Object Inspector window for an object named `circle1` of type `Circle`. The window title is "BlueJ: Object Inspector". The object's state is displayed as follows:

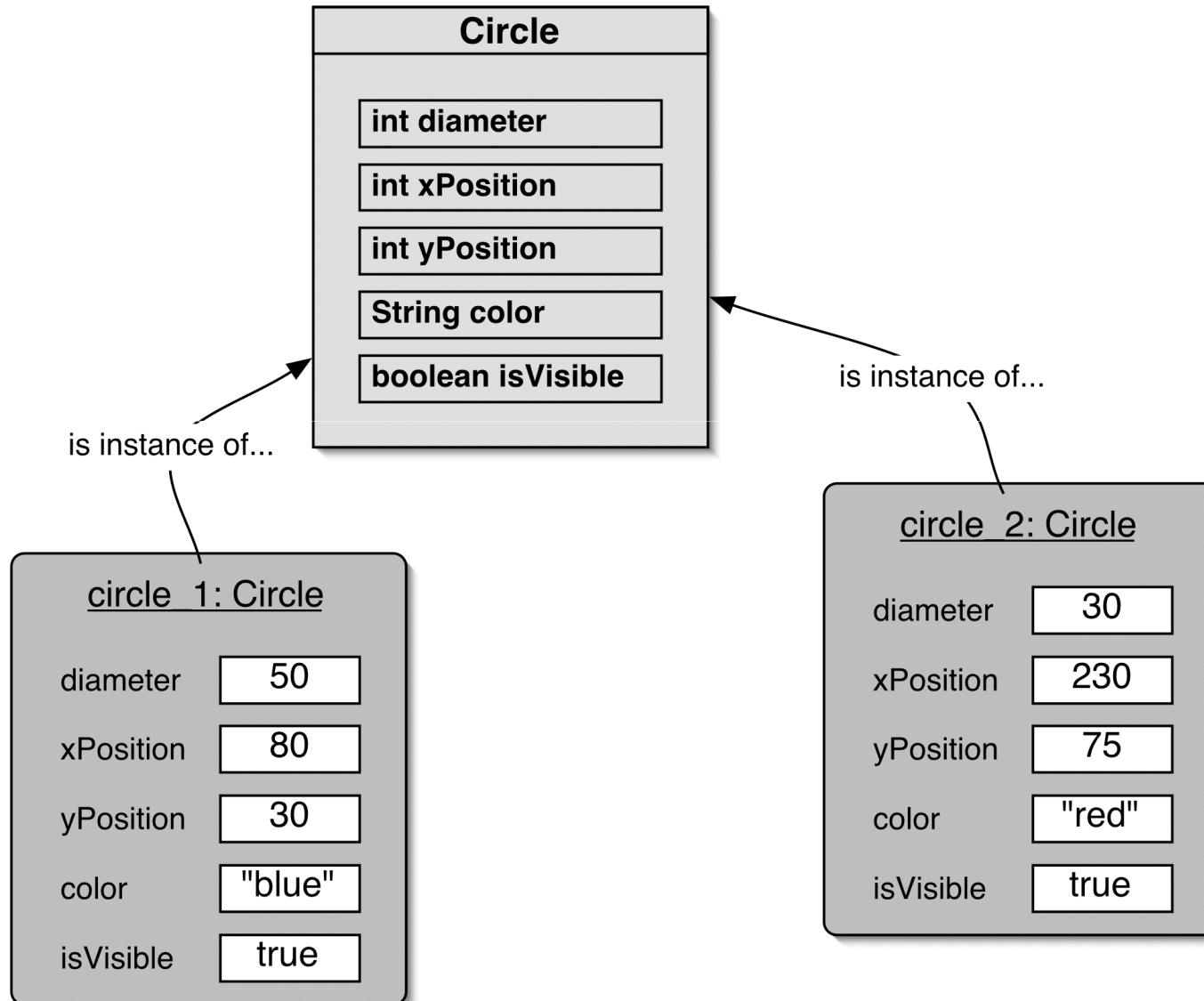
Field	Value
<code>private int diameter</code>	30
<code>private int xPosition</code>	70
<code>private int yPosition</code>	60
<code>private String color</code>	"blue"
<code>private boolean isVisible</code>	true

Buttons for "Inspect" and "Get" are located to the right of the field values. At the bottom of the window, there are buttons for "Show static fields" and "Close".

1 class, many objects

- Many objects can be created from the same class
- The class defines what fields all its objects have
- But each object stores its own set of values (each object has its own *state*)

Two circle objects



Object interaction

- Objects can call each other's methods
- Picture project is just like shapes project, but includes a Picture class
- A picture object will create and draw other objects
- Exercise: open Picture project, make Picture object and get it to draw picture

Source code

- Each class has source code (Java code) associated with it that defines its details (fields and methods)
- In BlueJ double click on class to view source code
 - BlueJ automatically saves any changes
- In Java source files must have the same name as the class they contain, with a “.java” extension e.g. “Circle.java”
 - Note that class names begin with an upper case letter
 - Object names begin with a lower case letter e.g. circle1, circle2 ...

Return values

- Methods may return a result via a return value
- Return values has a type
- The *void* return type means no value is returned
- Objects can be returned

Summary

- Classes are concepts
- Objects are instances of classes
- Use methods to communicate with objects
 - Methods have parameters
 - Parameters have types
- Objects store data in fields
 - Fields have types

Key concepts

Objects contain:

- Data (fields)
- Code (methods)

A class defines a type of object

OOP helps us organise data and code