

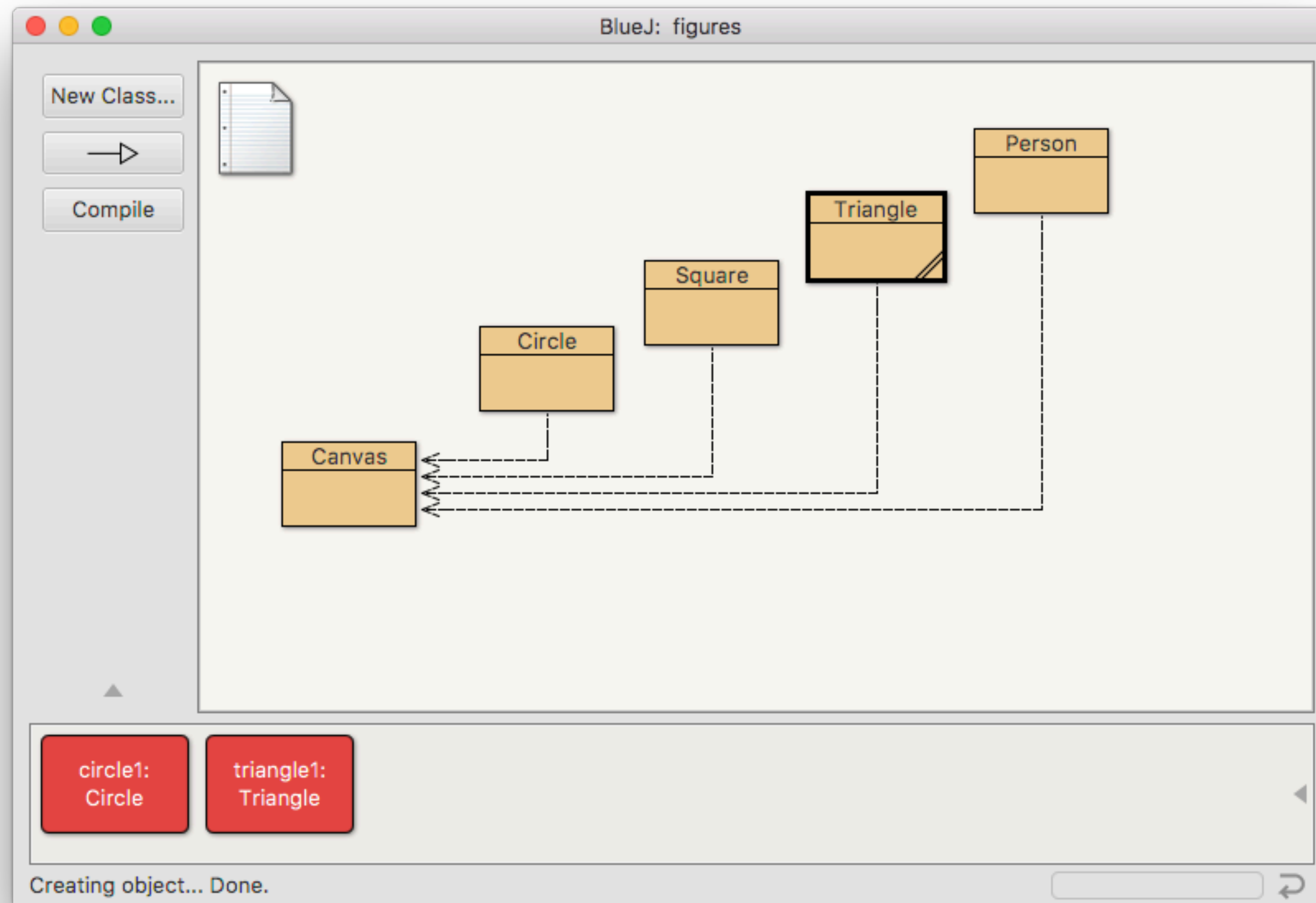
# Programming Practice and Applications

## Classes and objects

Michael Kölling

# Classes and objects

- Fundamental concepts.
- Class: category or type of ‘thing’. Like a template or blueprint.
- Object: belongs to a particular class and has individual characteristics.



# Fundamental concepts

- object
- class
- method
- parameter
- data type

# Classes and Objects

- **A class**
  - represents all similar objects of a kind (example: “car”)
- **objects**
  - represent ‘things’ from the real world, or from some problem domain;
  - example: “that red car in the parking lot”.

# Methods and Parameters

- Objects have operations which can be invoked (Java calls them **methods**).
- Methods may have **parameters** to pass additional information needed to execute.
  - Parameters introduce variation into the effect of method calls.

# Other observations

- Many distinct **instances** can be created from a single class.
- An object has **attributes**: values stored in **fields**.
- The class defines what fields an object has, but each object stores its own set of values (the **state** of the object).

# State

circle1 : Circle

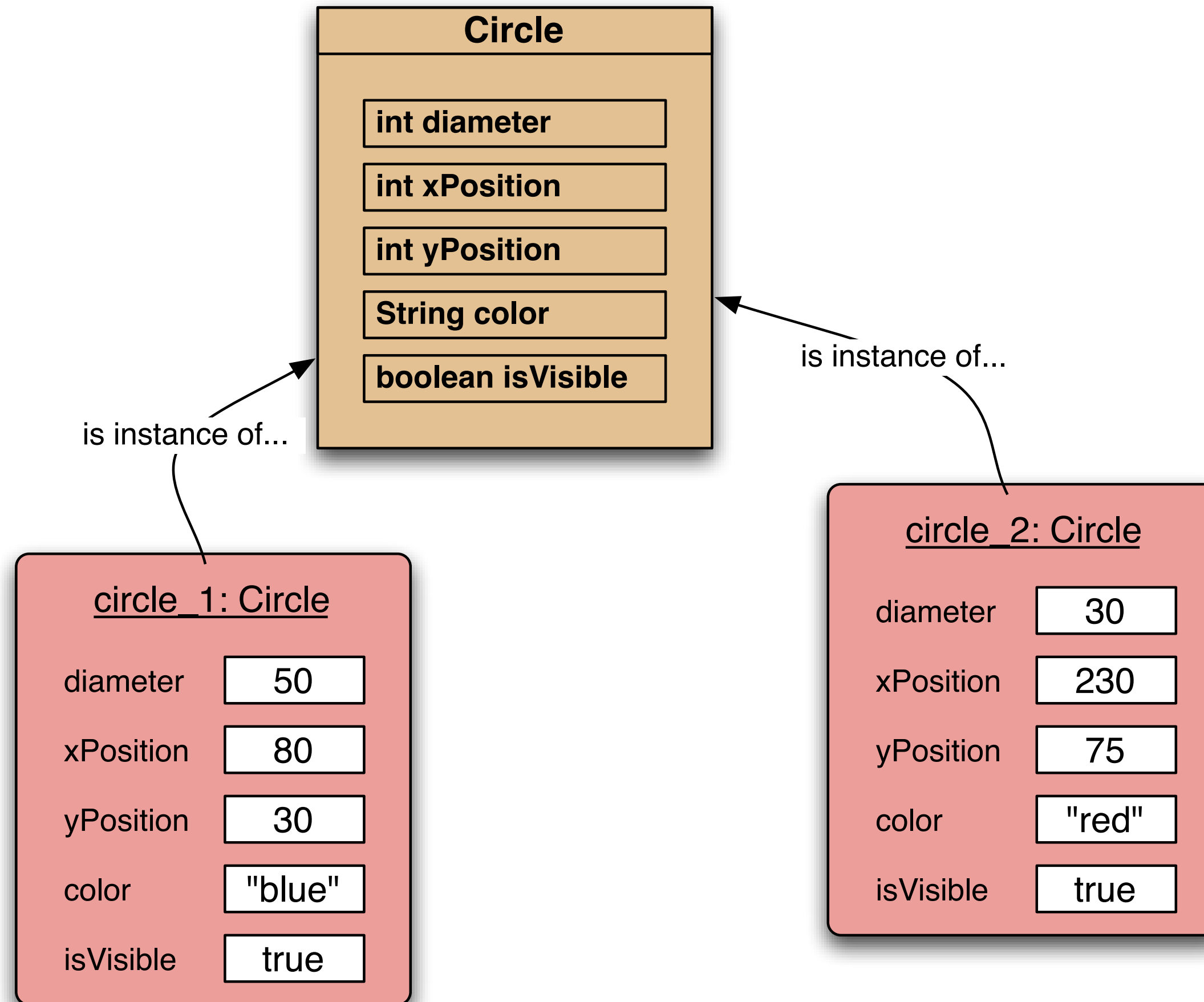
private int diameter	68	Inspect Get
private int xPosition	230	
private int yPosition	130	
private String color	"blue"	
private boolean isVisible	true	

Show static fields

Close



# Two circle objects



# Source code

- Each class has **source code** associated with it that defines its details (attributes and methods).
- The source code is written to obey the rules of a particular programming language.
- We will explore this in detail in the next lecture.

# Return values

- All the methods in the figures project have void return types; but ...
- ... methods may return a result via a return value.
- Such methods have a **non-void return type**.

# Review

- Classes model concepts.
- Source code realises those concepts.
- Source code defines:
  - What objects can do (methods).
  - What data they store (attributes).
- Objects come into existence with pre-defined attribute values.
- The methods determine what objects do with their data.

# Review

- When a method is called, an object:
  - Alters its state, and/or
  - Uses its data to decide what to do.
- Some methods take parameters that affect their actions.
- Methods without parameters typically use their state to decide what to do.
- Some methods return a value.

# Review

- Most programs contain multiple classes.
- At runtime, objects interact with each other to realise the overall effect of the program.