CISC 3115 TY2

Static Data Fields and Methods

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Notice

- The slides are always subject to change.

Outline

- Just discussed

  - Default constructor

  - Accessing objects via reference variables

  - Primitive and reference variables

  - Garbage collection

  - A few classes in the Java Library (Java API)

- Instance and static data fields and methods

"Static" and "Instance"

- Instance variables, instance methods

- Static variables, static methods, constants

Instance Variables and Methods

- Instance variables belong to an object of a class, i.e., a specific instance of the class

- Instance methods are invoked by an object of the class, i.e., an instance of the class.

- Defined in a class without using the "static" modifier
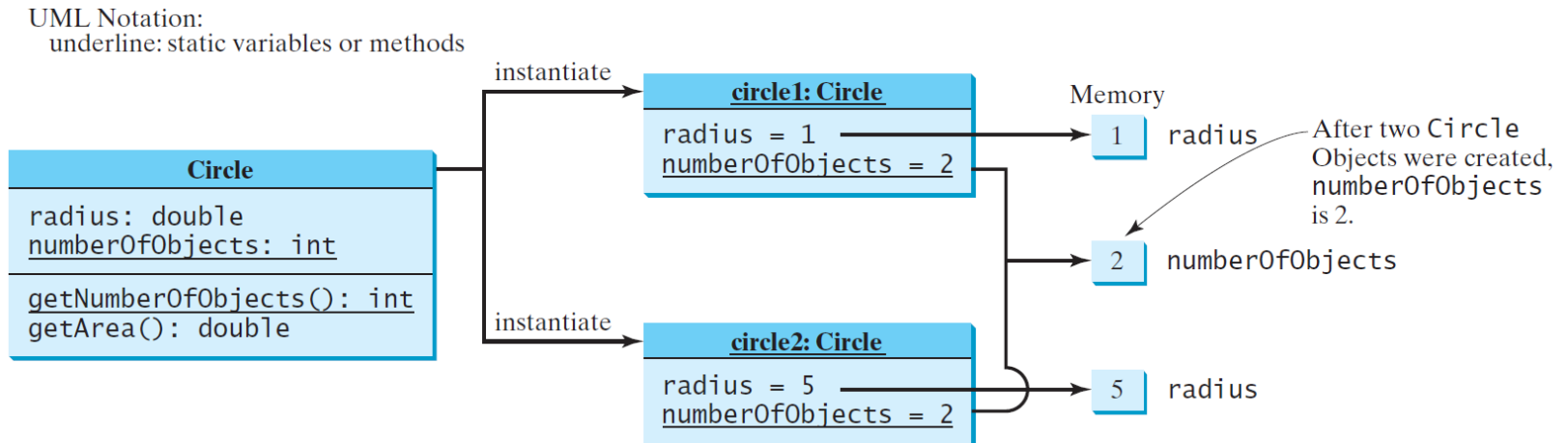
```
class Circle {

    double radius = 1.0;   /* instance variable */

    void getArea() {       /* instance method */

        return radius * radius * Math.PI;

    }

}
```

Static Variables, Methods, and Constants

- Static variables are shared by all the objects (or instances) of the class.

- Static methods are not tied to a specific object (or instance).

- Static constants are <u>final</u> variables shared by all the objects (or instances) of the class.

  - Defined using the "final" modifier

  - Convention: all caps, separated by "_" between words.

- Defined using the "static" modifier

- Also class variables, class methods

Static Variables and Methods: UML Class Diagram

- In the UML class diagram, we underline the static variables or methods

Static and Instance: Example

- Demonstrate the roles of instance and class variables and their uses.

  - A static (or class) variable numberOfObjects to track the number of Circle objects created.

    - See Circle.java and TestCircle.java in the Sample Programs for this lecture

Questions: Instance and Static?

- In an instance method, can you

  - invoke an instance method?

  - access an instance variable?

  - invoke a static method?

  - access a static variable?

- In a static method, can you

  - invoke an instance method?

  - access an instance variable?

  - invoke a static method?

  - access a static variable?

Questions: Instance and Static?

- In an instance method, can you
  - invoke an instance method? ✅
  - access an instance variable? ✅
  - invoke a static method? ✅
  - access a static variable? ✅
- In a static method, can you
  - invoke an instance method? ❌
  - access an instance variable? ❌
  - invoke a static method? ✅
  - access a static variable? ✅

Questions?

- Instance variables/data fields, instance methods

- Static variables/data fields, static methods

- Constants