

CISC 3115 TY3

# C04c: Static Data Fields and Methods

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# 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

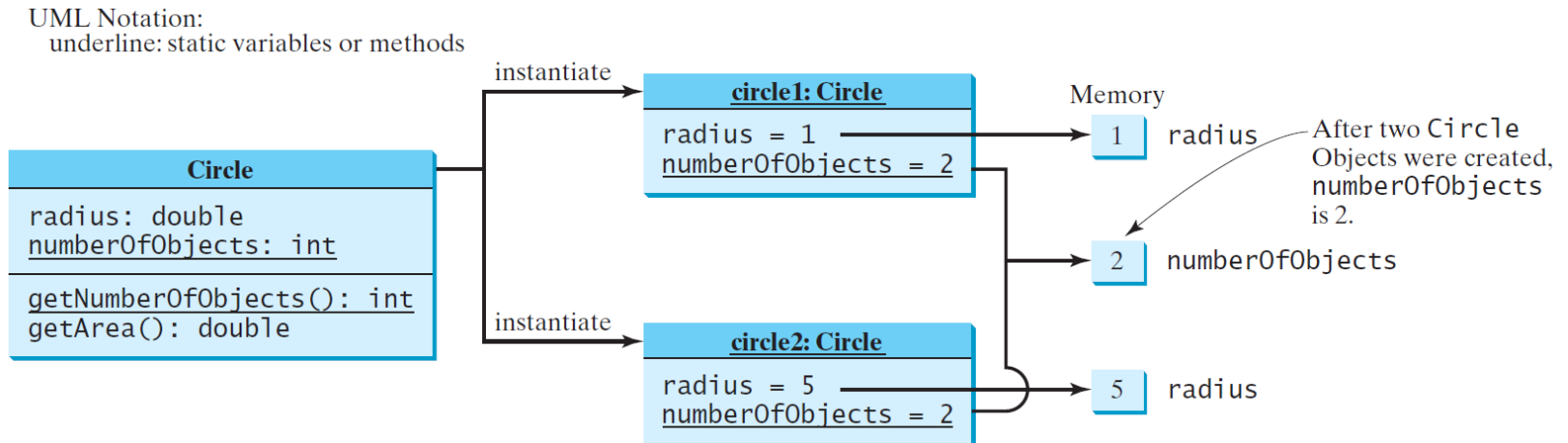
```
class Circle {  
    double radius = 1.0; /* instance variable */  
    void getArea() { /* instance method */  
        return radius * radius * Math.PI;  
    }  
}
```

# 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 final 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