

Some miscellaneous concepts

Static Variables & Methods, Javadoc and Calculated Data

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Topic List



1. Static Variables

2. Static Methods

3. Javadoc

4. Storing calculated data

Instance vs **Static** (Class) Variables

Instance

Multiple objects created from the same class blueprint,

- each have their own **distinct copies of *instance variables***.

Static

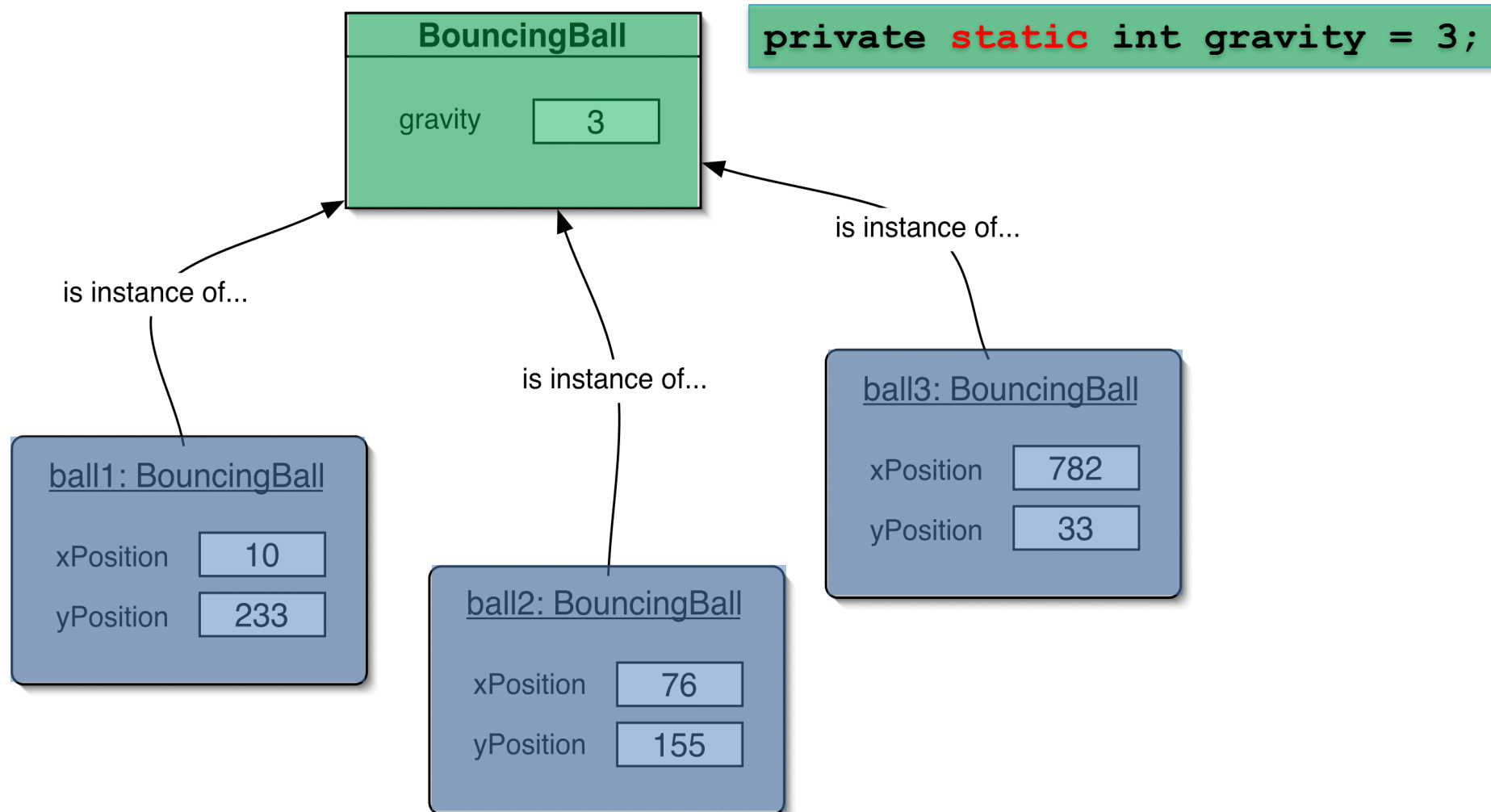
For **variables** that are common to all objects (instances)

- Use the **static** modifier.

Fields that have the static modifier in their declaration are called:

- ***static fields*** or ***class variables***.

Instance vs **Static** (Class) Variables



CONSTANTS

```
private static final int GRAVITY = 3;
```

- **Private** : access modifier, as usual
- **Static** : class variable
- **final** : constant (cannot change the value).

*Naming standard for final fields is ALL CAPITALS.

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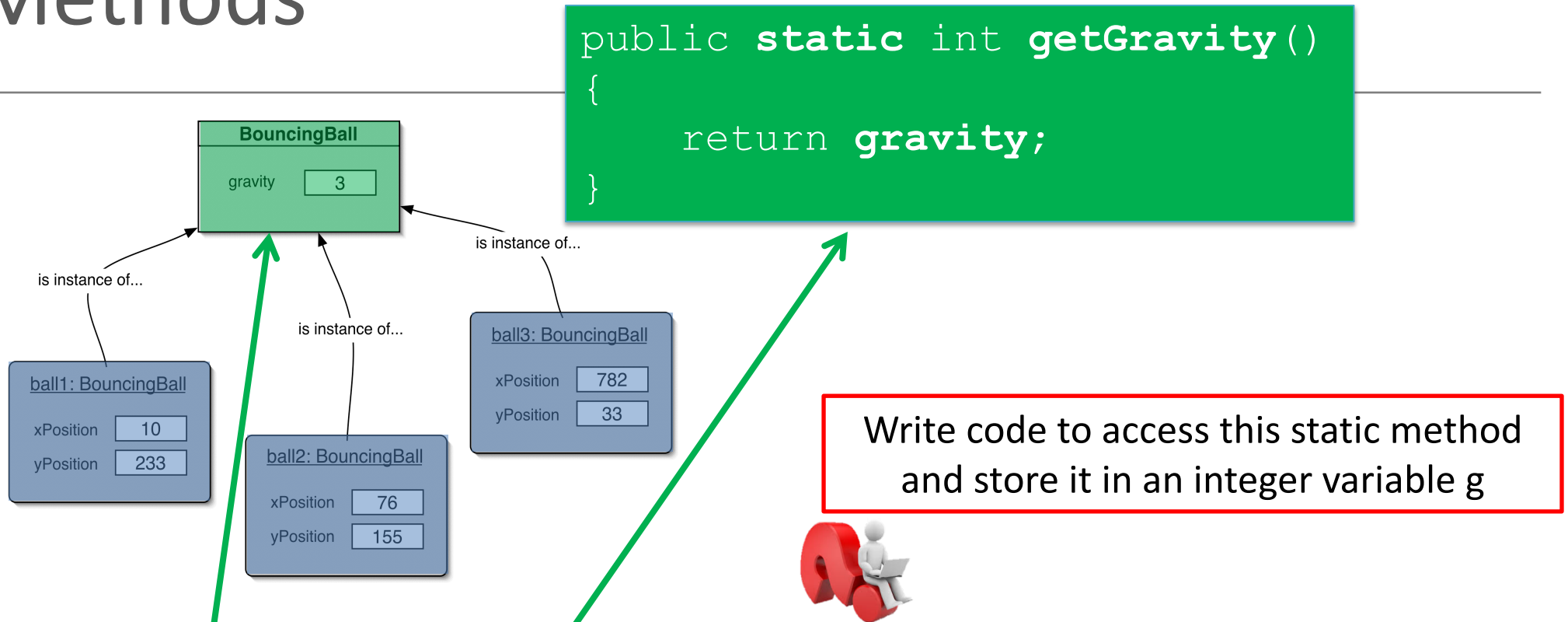
4. Storing calculated data

Static Methods

- Java supports **static methods** as well as static variables.
- Static methods
 - have the **static** modifier in their declarations
 - should be **invoked with the class name**, without the need for creating an instance of the class, as in:

ClassName.methodName(args)

Static Methods



A common use for static methods is **to access static fields.**

E.g. we could add a **static method** to the **BouncingBall** class to access the **gravity** static field:

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Writing class documentation



- Your own classes should be documented the same way library classes are.
- Other people should be able to use your class without reading the implementation.
- Make your class a 'library class'!

Example of Library Documentation



String (Java Platform SE 8 x)

Secure | <https://docs.oracle.com/javase/8/docs/api/java/lang/String.html>

OVERVIEW PACKAGE **CLASS** USE TREE DEPRECATED INDEX HELP

PREV CLASS NEXT CLASS FRAMES NO FRAMES ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD DETAIL: FIELD | CONSTR | METHOD

compact1, compact2, compact3
java.lang

Class String

java.lang.Object
java.lang.String

All Implemented Interfaces:
Serializable, CharSequence, Comparable<String>

```
public final class String
extends Object
implements Serializable, Comparable<String>, CharSequence

The String class represents character strings. All string
objects are constant; their values cannot be changed after
they are created. Because strings are immutable they can be shared. For example:
```

```
String str = "abc";
```

is equivalent to:

```
char data[] = {'a', 'b', 'c'};
String str = new String(data);
```

String (Java Platform SE 8 x)

Secure | <https://docs.oracle.com/javase/8/docs/api/java/lang/String.html>

Method Summary

All Methods	Static Methods	Instance Methods	Concrete Methods	Deprecated Methods
Modifier and Type	Method and Description			
char		charAt (int index)		Returns the char value at the specified index.
int		codePointAt (int index)		Returns the character (Unicode code point) at the specified index.
int		codePointBefore (int index)		Returns the character (Unicode code point) before the specified index.
int		codePointCount (int beginIndex, int endIndex)		Returns the number of Unicode code points in the specified text range of this String.
int		compareTo (String anotherString)		Compares two strings lexicographically.
int		compareToIgnoreCase (String str)		Compares two strings lexicographically, ignoring case differences.
String		concat (String str)		Concatenates the specified string to the end of this string.
boolean		contains (CharSequence s)		Returns true if and only if this string contains the specified sequence of char values.

Elements of documentation - **class**



*Documentation for a **class** should include:*

- **class name**
- **comment** describing the overall purpose and characteristics of the class
- **version number**
- **authors' names**
- **constructor** documentation (for all constructors)
- **method** documentation (for all methods)

Elements of documentation - **methods**



*The documentation for each **constructor** and **method** should include:*

- **method name**
- **return type**
- **return value** description
- **method purpose** and function description
- **parameter names and types**
- **parameter** description (for each parameter)

Javadoc

- **javadoc comment** - start symbol:

/**

- Immediately before a...

- **class declaration** is read as a *class comment*.
- **method signature** is read as a *method comment*.

- Other special key symbols for formatting documentation include:

@version

@author

@param

@return

Javadoc

Class comment:

```
/**
```

```
* The Responder class represents a response  
* generator object. It is used to generate an  
* automatic response.
```

```
*
```

```
* @author Michael Kölling and David J. Barnes
```

```
* @version 1.0 (30.Mar.2006)
```

```
*/
```

Javadoc

Method comment:

```
/**
```

```
* Read a line of text from standard input (the text  
* terminal), and return it as a set of words.
```

```
*
```

```
* @param prompt A prompt to print to screen.
```

```
* @return A set of Strings, where each String is  
* one of the words typed by the user
```

```
*/
```

```
public HashSet<String> getInput(String prompt)
```

```
{
```

```
    ...
```

```
}
```


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The danger lurking within!

Calculated data

```
public class Employee
{
    private double salary;
    private double deductions;
    private double netSalary;
    :
    :

    public void calculateNetSalary()
    {
        netSalary = salary - deductions;
    }

    public void setSalary(double salary)
    {
        this.salary = salary;
    }
}
```

netSalary is calculated data.

!!! DATA INTEGRITY WARNING !!!

- **netSalary field** can contain **stale data**.
- Don't store **netSalary** in a field
- Calculate this when needed instead
- **calculateNetSalary()**

NB: setSalary()
doesn't recalculate the net salary?

Calculated data

```
public class Employee
{
    private double salary;
    private double deductions;
    :

    public double calculateNetSalary()
    {
        return (salary - deductions);
    }

    public void setSalary(double salary)
    {
        this.salary = salary;
    }
}
```

netSalary field

- is no longer declared.

calculateNetSalary()

- now returns the result of the calculation.

No calculated data is stored, so **no stale data!**

Summary

1. Static Variables

- Class variables
- Shared between multiple instances
- Add final turns it into a CONSTANT

2. Static Methods

- Used for accessing static variables

3. Javadoc

- Modifying comments means we can run the Javadoc compiler on our code to generate the documentation, similar to Java library documentation

4. Storing calculated data

- Don't!
- Write a method instead to calculate at runtime
- Avoids STALE data

**Any
Questions?**

