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)

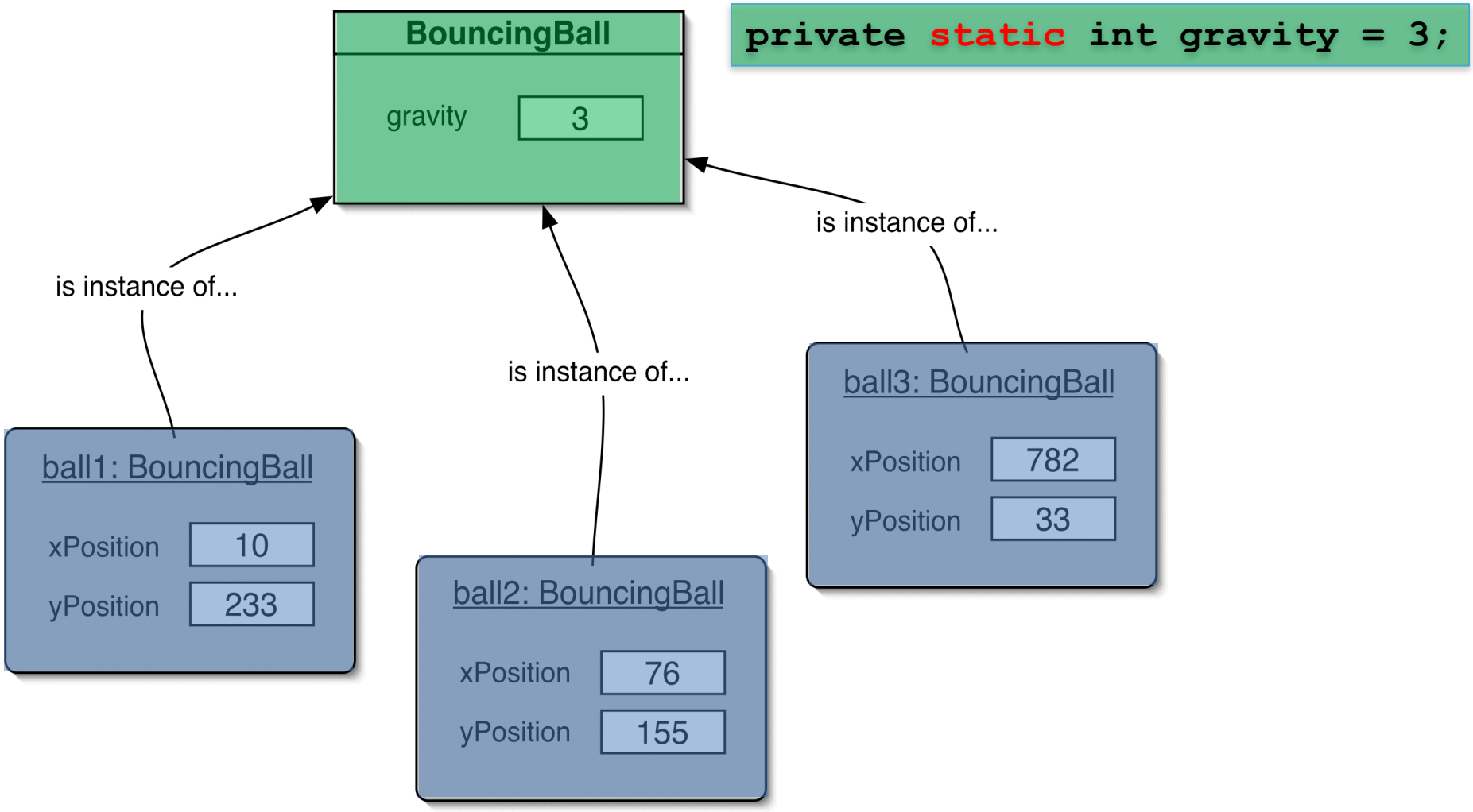
- Use the **static** modifier.

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

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

https://docs.oracle.com/javase/tutorial/java/javaOO/classvars.html

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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Static Methods

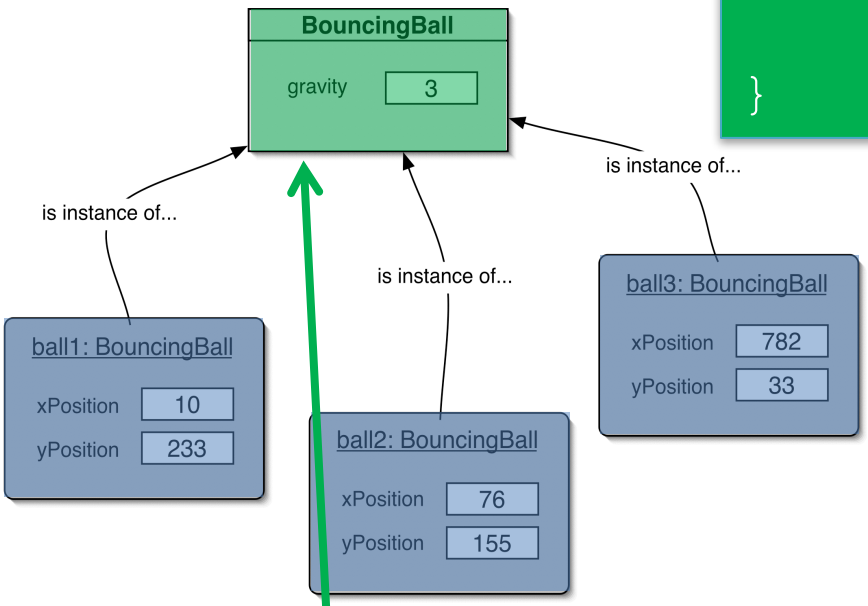
- Java supports **static methods** as well as static variables.

- 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

```
public static int getGravity()
{
    return gravity;
}
```



Write code to access this static method and store it in an integer variable g

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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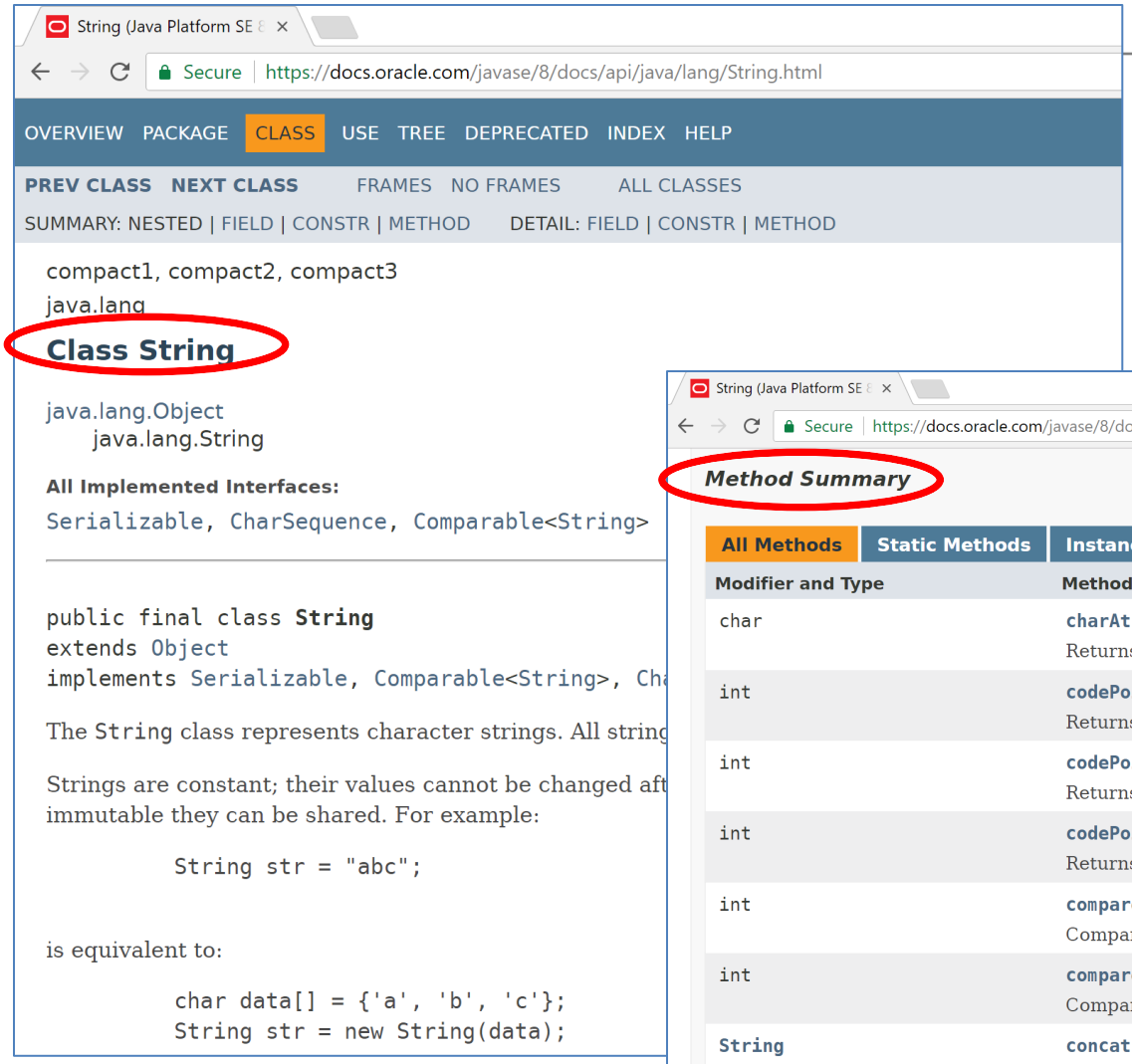
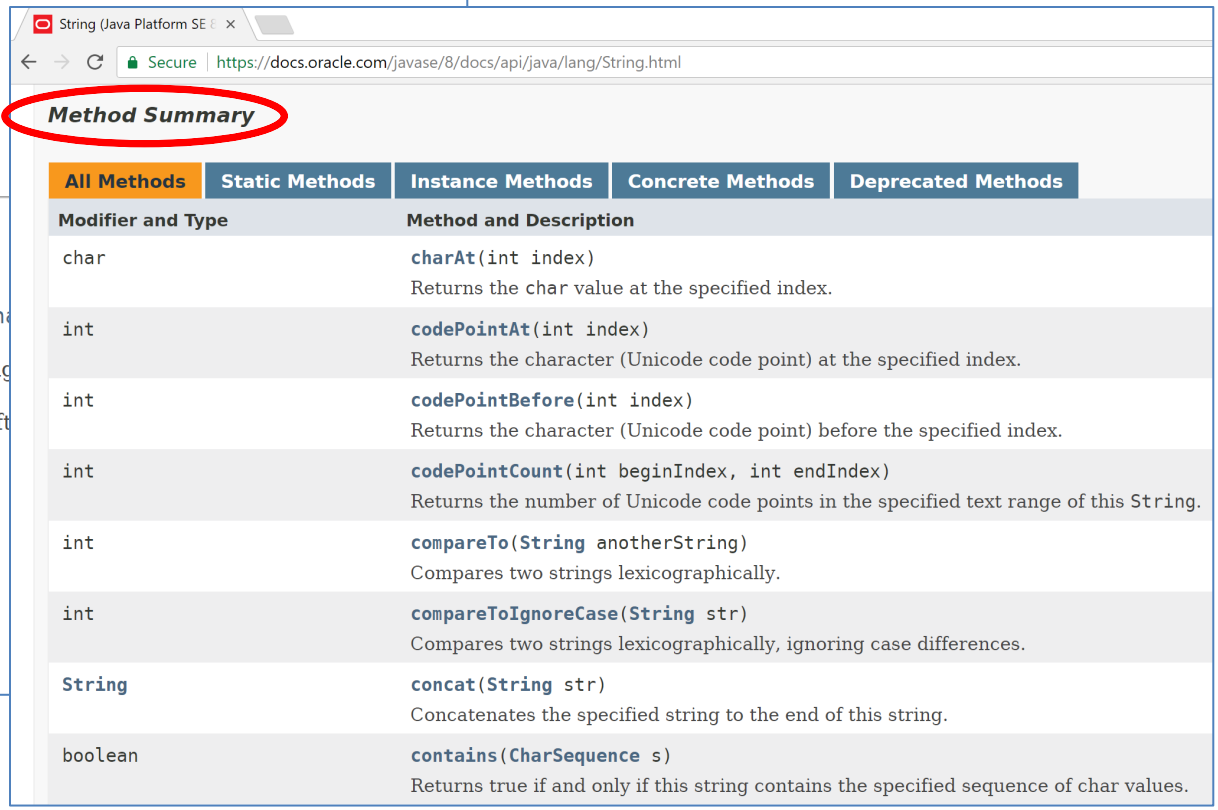
Writing class **documentation**

- 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



Java Documentation



Elements of documentation - **class**

Documentation for a class should include:

- **class name**
- **comment** describing the overall purpose and characteristics of the class
- **version number**
- **author**s' 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

netSalary is 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;
      }
}
```

!!! 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?