Source Code Styling
Lecture 14

Waterford Institute of Technology

March 7, 2016

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Presentation Outline

Estimated duration presentation

Questions at end presentation

Topics discussed:

- Importance of style
- Available style conventions
- What style includes
- Consequences of poor styling
- Use of JavaDoc

Java language style guide

What is a style guide: is it necessary?

A style guide:

- Describes rules to use when writing code, for example;
  - Where to locate curly braces
  - Where to use whitespace
- Convention is to adhere to guide rules
  - Convention: community-wide agreement to comply with non-legally binding practices

Style guide

An approach to styling to your code

Presentation based on Google style guide because:

- The guide is being maintained:
  - Last changed: March 2014
- Official Java guide 20 years old
  - Some of its rules no longer always adhered to in practice.
  - Example 2 spaces now usual for indentation rather than traditional 4 spaces.
  - However, more recent Oracle online guide referenced below.

Style guide

Advantages

- Easier to understand code
- Helps communication among developer team
- Helps maintainers
- Improves efficiency
- Reduces risk of error, for example:
  - `int index=startTime+1;`
  - `int index = startTime + i;`

Style guide

Why bother?

This code works fine:

```
public int newCustomer(String name, int balance){int accNmr =
   nextAccountNumber;if(accountNumberSet.contains(accNmr) == true){
   System.out.println("Fatal error: invalid account number");return
   Integer.MIN_VALUE;}accountNumberSet.add(accNmr);Customer
   customer = new Customer(name, accNmr, balance);customers.add(
   customer);customerRecord.put(accNmr, customer);
   nextAccountNumber += 1;return accNmr;}
```

Style guide

Why bother?

Same code but styled:

```
public int newCustomer(String name, int balance)
{
    int accNmr = nextAccountNumber;
    if (accountNumberSet.contains(accNmr) == true) {
        System.out.println("Fatal error: invalid account number");
        return Integer.MIN_VALUE;
    }
    accountNumberSet.add(accNmr);
    Customer customer = new Customer(name, accNmr, balance);
    customers.add(customer);
    customerRecord.put(accNmr, customer);
    nextAccountNumber += 1;
    return accNmr;
}
```

Google Java Style

File name

- Source file name case sensitive
- File name and corresponding class name begin with upper case letter
  - *Circle.java* : ok
  - *circle.java* : not ok

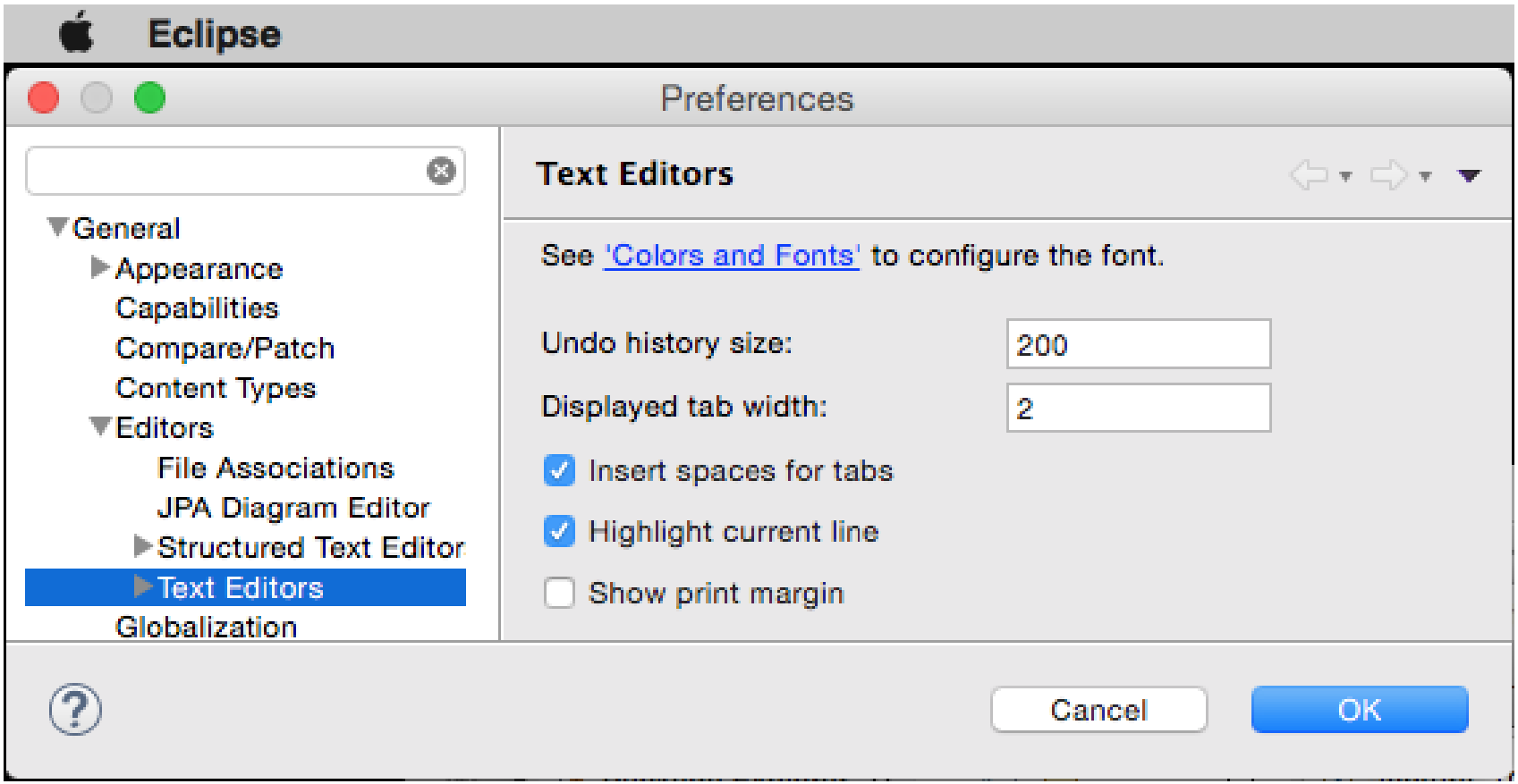
```
/*
 * @file Circle.java
 */
public class Circle
{

}
```

Formatting

Indentation

- Indent 2 spaces
  - Do not use Tab characters to indent
  - Check IDE configuration



Formatting

Tabs v Spaces

Some reasons to prefer spaces:

- Community preference.
- Spaces more robust.
- Tabs do not work as expected with some software.
- Tabs can vary between editors.

Formatting

Braces where optional

Braces are used with if, else, for, do and while statements, even when the body is empty or contains only a single statement.

```
// this is what the guide calls for
// here for is followed by a single statement
for (int i = 0; i < a.length; i += 1) {
  a[i] *= 2;
}
```

```
// omission of {} is legal in this example
// and we have already seen this style in labs
for (int i = 0; i < a.length; i += 1)
  a[i] *= 2;
```

Formatting

Positioning of braces

Two styles possible: a language design error?

```
// this is what the guide calls for
for (int i = 0; i < a.length; i += 1) {
  a[i] *= 2;
  b[size - 1 - i] = a[i];
}
```

```
// here is another style
for (int i = 0; i < a.length; i += 1)
{
  a[i] *= 2;
  b[size - 1 - i] = a[i];
}
```

Formatting

Empty blocks may be concise

As example consider a default constructor that does nothing

```
public class Circle {
  public Circle() {

  }
}
```

```
// written concisely
public class Circle {
  public Circle() {}
}
```

Formatting

Block indentation + 2 spaces

```
public class Financials
{
  public static String generatePin() {
    String pin = new String();
    for (int i = 0; i < NUMBER_PIN_DIGITS; i += 1) {
      pin += Byte.toString((byte)(Math.random()*9 +1));
    }
    return pin;
  }
}
```

Formatting

Vertical whitespace

A single blank line appears between:

- constructors
- methods
- within method bodies to create logical groupings

```
public class Cylinder
{
  double radius;
  double height;

  public Circle() {}

  double area() {
    return Math.PI*Math.pow(radius, 2);
  }

}
```

Formatting

Horizontal whitespace

A single space appears:

- separating reserved word from open parens

  for (int i = 0; i < size; i++)

- before { in situation similar to here:

  for (int i = 0; i < size; i++) {. . . }

- On both sides of the double slash (//) that begins an end-of-line comment.
- Between type & variable of declaration

  ArrayList<String> list;

Formatting

Horizontal whitespace

A single space appears:

- Optional just inside both braces of an array initializer

```
new int[] {5, 6}; // ok
new int[] { 5, 6 }; // ok
```

- After comma, colon, semi-colon.

```
switch (month) {
  case 5 : monthString = "May";
}
```

- On both sides colon in ternary operator

```
boolean b = x > y ? true : false;
```

- On both sides colon enhanced for (foreach)

```
for (String s : strings) {. . . }
```

Formatting

Horizontal whitespace

A single space appears after:

- Closing parens of cast

```
int x = (int) obj.getPosition();
```

- Both sides binary and ternary operators

```
boolean b = x > y ? true : false;
int index = startIndex + i; // ok (clear)
int index=startIndex+i; // not ok (error prone)
```

Formatting

Horizontal alignment never required

```
private int x; // this is fine
private Color color; // this too

private int     x;      // permitted, but future edits
private Color color;  // may leave it unaligned
```

Formatting

Horizontal alignment never required

```
private int     x;      // permitted, but future edits
private Color color;  // may leave it unaligned
private Friendship friendship;  // refactored code: now what?
```

Google Style Guide

That one-line change now has a "blast radius."

This can at worst result in pointless busywork,

but at best it still corrupts version history information,

slows down reviewers and exacerbates merge conflicts.

Formatting

One statement per line

However, we have seen when this rule is broken with advantage:

- example merge sort (Sedgewick & Wayne)

```
for (int k = lo; k <= hi; k++)
{
   if (i > mid)                  a[k] = aux[j++];
   else if (j > hi)              a[k] = aux[i++];
   else if (aux[j] < aux[i]) a[k] = aux[j++];
   else                          a[k] = aux[i++];
}
```

Formatting

One variable per declaration

Each variable whether field (instance or class) or local:

- declared individually

```
// this is ok
int a;
int b;

// this is legal but not ok
int a, b;
```

Formatting

Comments

Used to help reader understand code

```
/*
 * This is
 * okay
 */

 // And so
 // is this

 /* Or you may
  * even use this style */
```

Naming

Rules to apply naming identifiers

Rules applicable to all identifiers

- Use only ASCII letters and digits
  - int `circleOfFire100`;
- Exception: underscore in constant names
- Class names written UpperCamelCase
  - public class `CircleOfFire`
- Method names written lowerCamelCase
  - int `getRadiusCircleOfFire()`;
- Constant names ALL_UPPER_CASE

JavaDoc

Formatting

Where JavaDoc used:

- public class
- public member of class
- protected member of class

```
/** An especially short bit of Javadoc. */
```

```
/**
 * Multiple lines of Javadoc text are written here,
 * wrapped normally...
 */
public int method(String p1) { ... }
```

JavaDoc

Formatting

```
/**
 * @file    Circle.java
 * @brief   This class describes a geometric 2-d circle . . .
 * @version 1.0 April 1, 2014
 * @author  . . .
 */
public class Circle
{
   double radius

   /**
    * Constructs a new Circle object defined by user-supplied parameters
    * @param radius  radius of circle
    */
   public Cone(double radius) { . . .}
}
```

Summary

Styling code

- Importance of style
- Various style conventions
- What style to use?
  - Styling consistency throughout project
- What style includes
  - Selection names for files, fields & methods
  - Formatting such as whitespace, indentation, braces, comments.
- JavaDoc

Referenced Material

1. Google Java Style.

`https://google-styleguide.googlecode.com/svn/trunk/javaguide.html`

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1. How to Write Doc Comments for the Javadoc Tool

`http://www.oracle.com/technetwork/articles/java/index-137868.html`

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