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CS 61B
Fall 2019

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Summary of Conventions Enforced by the style61b Program

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1 Running the Program

On the instructional machines, you can run our version of the open-source `checkstyle` program with the command

```
style61b FILE.java ...
```

where *FILE*.java...denotes one or more names of Java source files. The program will exit normally if there are no style violations, and otherwise will exit with a non-zero exit code.

‘Style61b’ is a simple script that invokes `checkstyle` configured with our official style parameters. You can use it on a home installation that has Java by copying `~cs61b/lib/checkstyle/ucb-checkstyle.jar` to your computer and using the command

```
java -cp DIR/ucb-checkstyle.jar ucb.checkstyle.Main FILE ...
```

on Unix, Mac, or Linux installations (where DIR is the directory in which you store `ucb-checkstyle.jar`). Reverse the ‘/’ for Windows.

2 Style Checks

The `style61b` program enforces the following conventions.

Whitespace

- W1. Each file must end with a newline sequence.
- W2. Files may not contain horizontal tab characters. Use blanks only for indentation.
- W3. No line may contain trailing blanks.
- W4. Do NOT put whitespace: a. Around the ‘<’ and ‘>’ within a generic type designation (`List<Integer>`, not `List_<Integer>`, or `List<_Integer_>`). b. After the prefix operators ‘!’, ‘--’, ‘++’, ‘~’, unary ‘-’, or unary ‘+’. c. Before the tokens ‘;’ or the suffix operators ‘--’ and ‘++’. d. After ‘(’ or before ‘)’. e. After ‘.’

- W5. DO put whitespace: a. After ‘;’, ‘,’, or type casts (e.g., (String)_␣x, not (String)x). b. Around binary operators (e.g., ‘*’, ‘+’) and comparison operators. c. Around assignment operators (e.g., ‘=’, ‘+=’). d. Around ‘?’ and ‘:’ in the ternary conditional operator (x>0 ? x : -x). e. Around the keywords `assert`, `catch`, `do`, `else`, `finally`, `for`, `if`, `return`, `synchronized`, `try`, and `while`.
- W6. In general, break (insert newlines in) lines before an operator, as in

```
... + 20 * X
    + Y;
```

- W7. Do not separate a method name from the ‘(’ in a method call with blanks. However, you may separate them with a newline followed by blanks (for indentation) on long lines.

Indentation We’ve tried to set up Emacs on the instructional machines to follow the rules here:

- I1. The basic indentation step is 4 spaces.
- I2. Indent code by the basic indentation step for each block level (blocks are generally enclosed in ‘{’ and ‘}’), as in

```
if (x > 0) {
    r = -x;
} else {
    r = x;
}
```

- I3. Indent ‘case’ labels at the same level as their enclosing ‘switch’, as in

```
switch (op) {
case '+':
    addOpnds(x, y);
    break;
default:
    ERROR();
}
```

- I4. Indent continued lines by the basic indentation step.

Braces

- BR1. Use ‘{ }’ braces around the statements of all `if`, `while`, `do`, and `for` statements.
- BR2. Place a ‘}’ brace on the same line as a following `else`, `finally`, or `catch`, as in

```
if (x > 0) {
    y = -x;
} else {
    y = x;
}
```

- BR3. Put the ‘{’ that opens a block at the end of a line. Generally, it goes at the end of the `if`, `for`, `while`, `switch`, `do`, method header, or class header that contains it. If line length forces it to the next line, do not indent it, and put it alone on the line.

Comments

- C1. Every class and field must have a Javadoc (`/** ... */`) comment. Every method must either have a Javadoc comment, or an `@Override` annotation.
- C2. Each parameter of a method must be mentioned in its Javadoc comment, using either a `@param` tag, or spelled out in all capital letters in running text. Parameters that begin with “dummy”, “ignored”, or “unused” do not need to be commented.
- C3. Methods that return non-void values must describe them in their Javadoc comment either with a `@return` tag or in a phrase in running text that contains the word “return,” “returning,” or “returns.”
- C4. The Javadoc comment on every class must contain an `@author` tag.
- C5. Each Javadoc comment must start with a properly formed sentence, starting with a capital letter and ending with a period.
- C6. Do not use C++-style (`/**`) comments. If they appear in a skeleton file provided by the staff, they are intended to be removed.
- C7. In method bodies, use `/* ... */`-style comments only at the beginning of the method. That is, avoid internal comments.
- C8. Comments must appear alone on their line(s).

Names

- N1. Names of static final constants must be in all capitals (e.g., `RED`, `DEFAULT_NAME`).
- N2. Names of parameters, local variables, and methods must start with a lower-case letter, or consist of a single, upper-case letter.
- N3. Names of types (classes), including type parameters, must start with a capital letter.
- N4. Names of packages must start with a lower-case letter.
- N5. Names of instance variables and non-final class (static) variables must start with either a lower-case letter or `'_'`.

Imports

- IM1. Do not use `'import PACKAGE.*'`, unless the package is `java.lang.Math`, `java.lang.Double`, or `org.junit.Assert`. `'import static CLASS.*'` is OK.
- IM2. Do not import the same class or static member twice.
- IM3. Do not import classes or members that you do not use.

Assorted Java Style Conventions

- S1. Write array types with the ‘[]’ after the element-type name, not after the declarator. Write `String[]_names`, not `String_names[]`.
- S2. Write any modifiers for methods, classes, or fields in the following order:
- a. `public`, `protected`, or `private`.
 - b. `abstract` or `static`.
 - c. `final`, `transient`, or `volatile`.
 - d. `synchronized`.
 - e. `native`.
 - f. `strictfp`.
- S3. Do not explicitly modify methods, fields, or classes where the modification is redundant:
- a. Do not label methods in interfaces or annotations as `public` or `abstract`.
 - b. Do not label fields in interfaces or annotations as `static`, `public`, or `final`.
 - c. Do not label methods in final classes as `final`.
 - d. Do not label nested interfaces `static`.
- S4. Do not use empty blocks (‘ ’ with only whitespace or comments inside) for control statements. There is one exception: a catch block may consist solely of comments having the form
- `/* Ignore EXCEPTIONNAME. */`
- S5. Avoid “magic numbers” in code by giving them symbolic names, as in

```
public static final MAX_SIZE = 100;
```

Exceptions are the numerals -10 through 10, plus 0.5, -0.5, 0.25, -0.25.

- S6. Do not try to catch the exceptions `Exception`, `RuntimeError`, or `Error`.
- S7. Write ‘`b`’ rather than ‘`b == true`’ and ‘`!b`’ rather than ‘`b == false`’.
- S8. Replace

```
if (condition) {
    return true;
} else {
    return false;
}
```

with just

```
return condition;
```

- S9. Only static final fields of classes may be public. Other fields must be

`private` or `protected`.

- S10. Classes that have only static methods and fields must not have a public (or defaulted) constructor.
- S11. Classes that have only private constructors must be declared `final`.

Avoiding Error-Prone Constructs

- E1. If a class overrides `equals`, it must also override `hashCode`.
- E2. Local variables and parameters must not shadow field names. The preferred way to handle, e.g., getter/setter methods that simply control a field is to prefix the field name with `'_'`, as in

```
public double getWidth() {
    return _width;
}

public void setWidth(double width) {
    _width = width;
}
```

- E3. Do not use nested assignments, such as `if ((x = next()) != null) ...`.
- E4. Include a `default` case in every `switch` statement.
- E5. End every arm of a `switch` statement either with a `break` statement or a comment of the form

```
/* fall through */
```

- E6. Do not compare String literals with `'=='`. Write

```
if (x.equals("something"))
```

and not

```
if (x == "something")
```

There are cases where you really want to use `'=='`, but you are unlikely to encounter them in this class.

Limits

- L1. No file may be longer than 2000 lines.
- L2. No line may be longer than 80 characters.
- L3. No method may be longer than 60 lines.
- L4. No method may have more than 8 parameters.
- L5. Every file must contain exactly one outer class (nested classes are OK).