

软件测试

一、编写码农时钟酒店代码

程序位于 W4/unit-test/src 中。

二、静态检查

1. 对项目“unit-test”进行代码风格检查

unit-test 是码农时钟酒店的代码。我们使用 CheckStyle 工具对其进行检查，其中的规则采用 Google Checks 进行，可以得到以下结果：

The screenshot displays the CheckStyle output for a project named 'unit-test' using the 'Google Checks' rule set. The output is organized into a tree structure showing the number of items found in each file.

Rules: Google Checks

Checkstyle found 50 item(s) in 4 file(s)

- CityClock.java : 20 item(s)**
 - 'member def modifier' has incorrect indentation level 4, expected level should be 2. (4:0) [IndentationCheck]
 - 'METHOD_DEF' should be separated from previous statement. (5:0) [EmptyLineSeparatorCheck]
 - 'method def modifier' has incorrect indentation level 4, expected level should be 2. (5:0) [IndentationCheck]
 - 'method def' child has incorrect indentation level 8, expected level should be 4. (7:0) [IndentationCheck]
 - WhitespaceAround: '+' is not preceded with whitespace. (7:28) [WhitespaceAroundCheck]
 - WhitespaceAround: '+' is not followed by whitespace. Empty blocks may only be represented as {} when not part of a multi-block statement (4.1.3) (7:29) [WhitespaceAroundCheck]
 - WhitespaceAround: '+' is not preceded with whitespace. (7:38) [WhitespaceAroundCheck]
 - WhitespaceAround: '+' is not followed by whitespace. Empty blocks may only be represented as {} when not part of a multi-block statement (4.1.3) (7:39) [WhitespaceAroundCheck]
 - WhitespaceAround: '%' is not preceded with whitespace. (7:42) [WhitespaceAroundCheck]
 - WhitespaceAround: '%' is not followed by whitespace. Empty blocks may only be represented as {} when not part of a multi-block statement (4.1.3) (7:43) [WhitespaceAroundCheck]
 - 'method def rcurlly' has incorrect indentation level 4, expected level should be 2. (8:0) [IndentationCheck]
 - 'method def modifier' has incorrect indentation level 4, expected level should be 2. (10:0) [IndentationCheck]
 - 'method def' child has incorrect indentation level 8, expected level should be 4. (11:0) [IndentationCheck]
 - 'method def rcurlly' has incorrect indentation level 4, expected level should be 2. (12:0) [IndentationCheck]
 - 'ctor def modifier' has incorrect indentation level 4, expected level should be 2. (14:0) [IndentationCheck]
 - WhitespaceAround: '!' is not preceded with whitespace. (14:36) [WhitespaceAroundCheck]
 - 'ctor def' child has incorrect indentation level 8, expected level should be 4. (15:0) [IndentationCheck]
 - WhitespaceAround: '=' is not preceded with whitespace. (15:23) [WhitespaceAroundCheck]
 - WhitespaceAround: '=' is not followed by whitespace. Empty blocks may only be represented as {} when not part of a multi-block statement (4.1.3) (15:24) [WhitespaceAroundCheck]
 - 'ctor def rcurlly' has incorrect indentation level 4, expected level should be 2. (16:0) [IndentationCheck]
- Clock.java : 3 item(s)**
 - 'member def modifier' has incorrect indentation level 4, expected level should be 2. (4:0) [IndentationCheck]
 - 'METHOD_DEF' should be separated from previous statement. (5:0) [EmptyLineSeparatorCheck]
 - 'method def modifier' has incorrect indentation level 4, expected level should be 2. (5:0) [IndentationCheck]
- HotelWorldClockSystem.java : 7 item(s)**
 - 'member def modifier' has incorrect indentation level 4, expected level should be 2. (7:0) [IndentationCheck]
 - 'method def modifier' has incorrect indentation level 4, expected level should be 2. (9:0) [IndentationCheck]
 - 'method def' child has incorrect indentation level 8, expected level should be 4. (10:0) [IndentationCheck]
 - 'method def rcurlly' has incorrect indentation level 4, expected level should be 2. (11:0) [IndentationCheck]
 - 'method def modifier' has incorrect indentation level 4, expected level should be 2. (13:0) [IndentationCheck]
 - 'method def' child has incorrect indentation level 8, expected level should be 4. (14:0) [IndentationCheck]
 - 'method def rcurlly' has incorrect indentation level 4, expected level should be 2. (15:0) [IndentationCheck]
- PhoneClock.java : 20 item(s)**
 - 'member def modifier' has incorrect indentation level 4, expected level should be 2. (4:0) [IndentationCheck]
 - 'member def modifier' has incorrect indentation level 4, expected level should be 2. (5:0) [IndentationCheck]
 - 'ctor def modifier' has incorrect indentation level 4, expected level should be 2. (7:0) [IndentationCheck]
 - 'ctor def' child has incorrect indentation level 8, expected level should be 4. (8:0) [IndentationCheck]
 - 'ctor def rcurlly' has incorrect indentation level 4, expected level should be 2. (9:0) [IndentationCheck]
 - 'method def modifier' has incorrect indentation level 4, expected level should be 2. (11:0) [IndentationCheck]
 - Missing a Javadoc comment. (11:5) [JavadocMethodCheck]
 - 'method def' child has incorrect indentation level 8, expected level should be 4. (12:0) [IndentationCheck]
 - 'if' construct must use '{}'. (13:0) [NeedBracesCheck]
 - 'if' has incorrect indentation level 8, expected level should be 4. (13:0) [IndentationCheck]
 - 'for' has incorrect indentation level 8, expected level should be 4. (14:0) [IndentationCheck]
 - 'for' child has incorrect indentation level 12, expected level should be 6. (15:0) [IndentationCheck]
 - 'for rcurlly' has incorrect indentation level 8, expected level should be 4. (16:0) [IndentationCheck]
 - 'method def rcurlly' has incorrect indentation level 4, expected level should be 2. (17:0) [IndentationCheck]
 - 'method def modifier' has incorrect indentation level 4, expected level should be 2. (19:0) [IndentationCheck]
 - 'method def' child has incorrect indentation level 8, expected level should be 4. (20:0) [IndentationCheck]
 - 'method def rcurlly' has incorrect indentation level 4, expected level should be 2. (21:0) [IndentationCheck]
 - 'method def modifier' has incorrect indentation level 4, expected level should be 2. (23:0) [IndentationCheck]
 - 'method def' child has incorrect indentation level 8, expected level should be 4. (25:0) [IndentationCheck]
 - 'method def rcurlly' has incorrect indentation level 4, expected level should be 2. (26:0) [IndentationCheck]

可以看到 50 个检查建议。其中有 48 个都是缩进错误（IDEA 默认 4 个空格，规范要求 2 个），空行错误（方法和属性之间要间隔一行）和空格错误（运算符前后需要各加一个空格）

其余两个分别是 Javadoc 未添加和大括号未添加错误。前者在于 setTime()方法与平常使用的 setter 方法不一样，因此需要注释来说明。后者则是因为使用了 if (xxx) return;语句，应当改为 if (xxx) {return;}，即使只有一行 return。

2. 对项目 “unit-test” 进行缺陷静态检查

为了得到错误报告，特改其中一行为以下语句。

```
public class HotelWorldClockSystem {  
    private List<CityClock> cityClocks = new ArrayList<CityClock>();
```

得到以下错误信息，该错误显示后面一个<>中不应当有文字：



其余代码没有问题。

三、Happy Path 测试代码（动态检查）

一共有两个测试，均验证通过。第一个是检查设置时间为 9 点后，北京时间是否依然是九点。第二个是检查设置时间为 23 点后，伦敦和纽约时间是否同时修改为正确时间。测试代码在 W4/unit-test/test 中。