Static Analysis Report for Team A6

Project Team
Team 4

Latest update on:
2020-06-17

Team Information
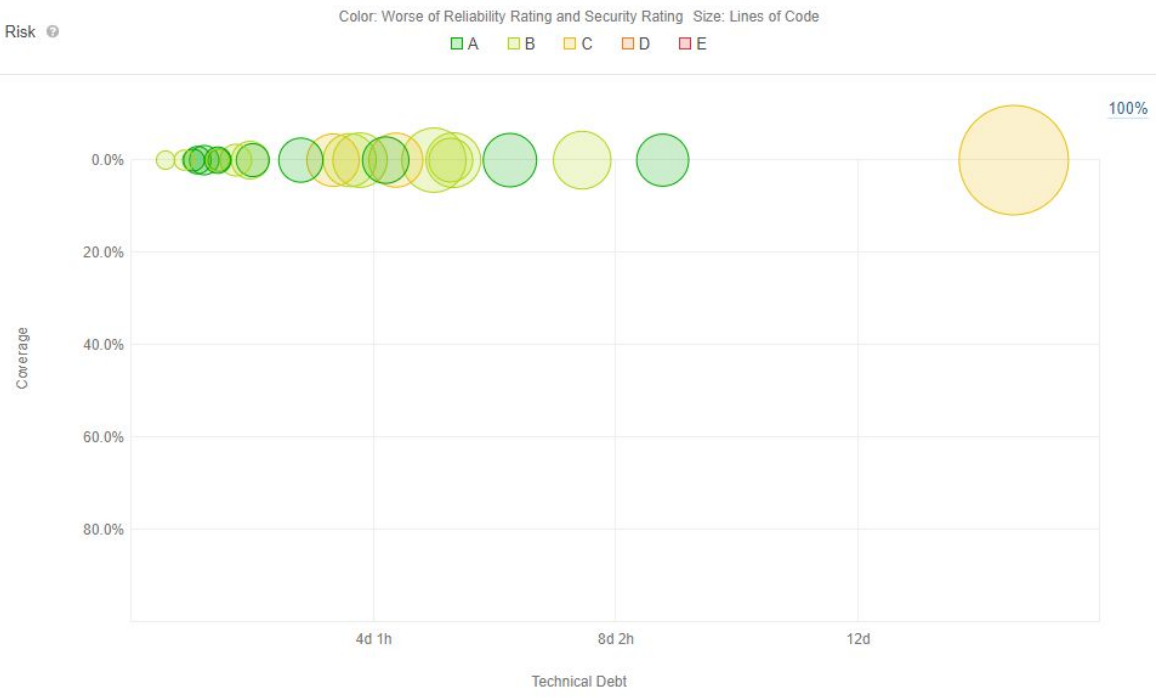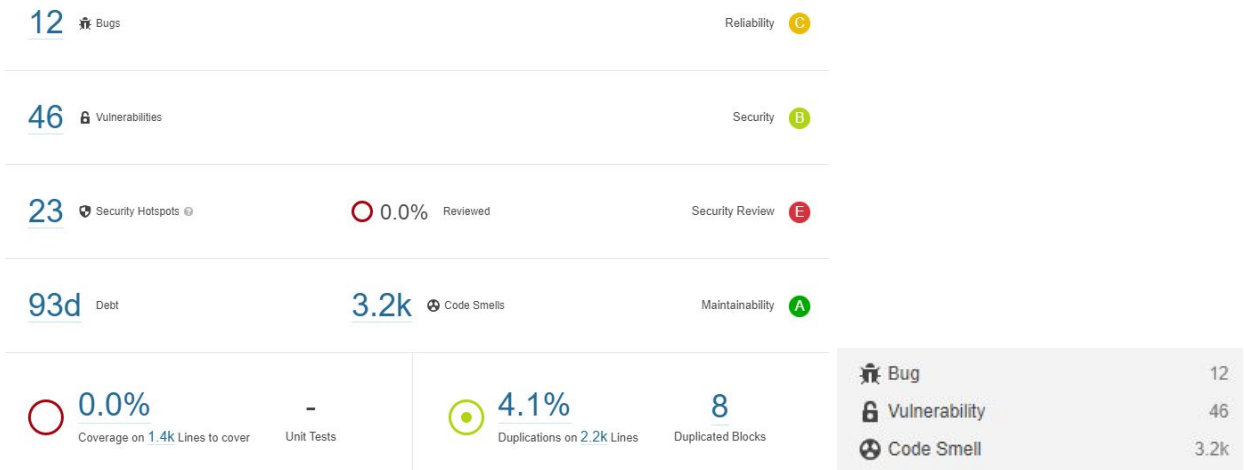
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Table of Contents

1. Static Analysis

1.1 Overview

12	🐞 Bugs	Reliability	**C**
46	🔒 Vulnerabilities	Security	**B**
23	🛡 Security Hotspots ⓘ	⭕ 0.0% Reviewed	Security Review	**E**
93d Debt	**3.2k** ⚙ Code Smells	Maintainability	**A**

⭕ **0.0%** Coverage on 1.4k Lines to cover	– Unit Tests	
⦿ **4.1%** Duplications on 2.2k Lines	**8** Duplicated Blocks	

🐞 Bug	12
🔒 Vulnerability	46
⚙ Code Smell	3.2k

\<Bug>

Severity			
❗ Blocker	0	⭣ Minor	9
⭡ Critical	0	ⓘ Info	0
🐞 Major	3		

\<Vulnerability>

Severity			
❗ Blocker	0	⭣ Minor	46
⭡ Critical	0	ⓘ Info	0
🐞 Major	0		

\<Code smell>

❗ Blocker	4	⭣ Minor	2.2k
⭡ Critical	48	ⓘ Info	138
🐞 Major	764		

Risk ⓘ

Color: Worse of Reliability Rating and Security Rating   Size: Lines of Code

🟩 A 🟩 B 🟨 C 🟧 D 🟥 E

< Project Overview>

1.2 Bugs (12개)

- ## Major(3개)

src/main/java/clock/Game.java

	Either re-interrupt this method or rethrow the "InterruptedException". Why is this an issue?	11 days ago ▾ L100 % ▼▾
	🐞 Bug ▾ 🔴 Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment	🏷 cwe, error-handling, multi-threading ▾

src/main/java/clock/ModeManager.java

	Unread field: clock.ModeManager.beep Why is this an issue?	10 days ago ▾ L38 % ▼▾
	🐞 Bug ▾ 🔴 Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment	🏷 performance ▾

src/main/java/clock/WatchSystem.java

	Either re-interrupt this method or rethrow the "InterruptedException". Why is this an issue?	9 days ago ▾ L168 % ▼▾
	🐞 Bug ▾ 🔴 Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment	🏷 cwe, error-handling, multi-threading ▾

- ## Minor(9개)

src/main/java/clock/Background.java

	Cast one of the operands of this multiplication operation to a "float". Why is this an issue?	10 days ago ▾ L31 % ▼▾
	🐞 Bug ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment	🏷 cert, cwe, overflow, sans-top25-risky ▾
	Use a "double" or "BigDecimal" instead. Why is this an issue?	10 days ago ▾ L44 % ▼▾
	🐞 Bug ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment	🏷 cert ▾
	Use a "double" or "BigDecimal" instead. Why is this an issue?	10 days ago ▾ L49 % ▼▾
	🐞 Bug ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment	🏷 cert ▾
	Save and re-use this "Random". Why is this an issue?	10 days ago ▾ L73 % ▼▾
	🐞 Bug ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment	🏷 owasp-a6 ▾

src/main/java/clock/Buzzer.java

	Use "Thread.currentThread().getContextClassLoader()" instead. Why is this an issue?	5 days ago ▾ L15 % ▼▾
	🐞 Bug ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment	🏷 jee ▾

src/main/java/clock/Hurdle.java

	Use a "double" or "BigDecimal" instead. Why is this an issue?	2 days ago ▾ L33 % ▼▾
	🐞 Bug ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment	🏷 cert ▾

src/main/java/clock/WatchSystem.java

	Add an end condition to this loop. Why is this an issue?	8 days ago ▾ L171 % ▼▾
	🐞 Bug ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment	🏷 cert ▾

src/main/java/util/Resource.java

	Use "Thread.currentThread().getContextClassLoader()" instead. Why is this an issue?	5 days ago ▾ L16 % ▼▾
	🐞 Bug ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment	🏷 jee ▾
	Use "Thread.currentThread().getContextClassLoader()" instead. Why is this an issue?	5 days ago ▾ L28 % ▼▾
	🐞 Bug ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment	🏷 jee ▾

- 분석 예시

```
        try{
            Thread.sleep(msSleep, nanoSleep);
        } catch (InterruptedException e){
```

Either re-interrupt this method or rethrow the "InterruptedException". Why is this an issue?   11 days ago ▾ L100 🔗
🐞 Bug ▾ 🔴 Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 cwe, error-handling, multi-threading ▾

```
            e.printStackTrace();
        }
        lastTime = System.nanoTime();
    }
}
```

InterruptedException handling 시 logging 이외에 thread의 interrupted state 분명히 명시할 것 (ex) Thread.currentThread.interrupt()

```
    stopwatch = new Stopwatch();
```

Unread field: clock.ModeManager.beep Why is this an issue?   10 days ago ▾ L
🐞 Bug ▾ 🔴 Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment   🏷 perform

메소드내에서 사용하지 않는 불필요한 코드임.

1.3 Vulnerability (46개)

- Minor (46개)

    (1) Throwable.printStackTrace() should not be called (42개)

src/main/java/clock/Buzzer.java

Use a logger to log this exception. Why is this an issue?		10 days ago ▾ L17 % ▼▾
🔓 Vulnerability ▾ 🟢 Minor ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment		🏷 cwe, error-handling, owasp-a3 ▾

src/main/java/clock/Game.java

Use a logger to log this exception. Why is this an issue?		11 days ago ▾ L101 % ▼▾
🔓 Vulnerability ▾ 🟢 Minor ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment		🏷 cwe, error-handling, owasp-a3 ▾

src/main/java/clock/ModeManager.java

Use a logger to log this exception. Why is this an issue?		9 days ago ▾ L56 % ▼▾
🔓 Vulnerability ▾ 🟢 Minor ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment		🏷 cwe, error-handling, owasp-a3 ▾

src/main/java/clock/WatchSystem.java

Use a logger to log this exception. Why is this an issue?		8 days ago ▾ L43 % ▼▾
🔓 Vulnerability ▾ 🟢 Minor ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment		🏷 cwe, error-handling, owasp-a3 ▾

Use a logger to log this exception. Why is this an issue?		9 days ago ▾ L169 % ▼▾
🔓 Vulnerability ▾ 🟢 Minor ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment		🏷 cwe, error-handling, owasp-a3 ▾

src/main/java/util/Resource.java

Use a logger to log this exception. Why is this an issue?		11 days ago ▾ L20 % ▼▾
🔓 Vulnerability ▾ 🟢 Minor ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment		🏷 cwe, error-handling, owasp-a3 ▾

Use a logger to log this exception. Why is this an issue?		5 days ago ▾ L31 % ▼▾
🔓 Vulnerability ▾ 🟢 Minor ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment		🏷 cwe, error-handling, owasp-a3 ▾

src/test/java/clock/AlarmTest.java

Use a logger to log this exception. Why is this an issue?		7 days ago ▾ L30 % ▼▾
🔓 Vulnerability ▾ 🟢 Minor ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment		🏷 cwe, error-handling, owasp-a3 ▾

- 분석예시

```
try {
    beepSound = Applet.newAudioClip(Resource.class.getClassLoader().getResource("resources/beep.wav"));
}catch (Exception e){
    e.printStackTrace();
```

Use a logger to log this exception. Why is this an issue?	10 days ago ▾ L17 %
🔓 Vulnerability ▾ 🟢 Minor ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment	🏷 cwe, error-handling, owasp-a3 ▾

```
    }
}
```

Exception handling시 printStackTrace보다는 Logger.log() 사용할 것.

(2) Member variable visibility should be specified (3개)

src/main/java/clock/Background.java

Explicitly declare the visibility for "posX". Why is this an issue?   11 days ago ▾ L87 % ▾
🔒 Vulnerability ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   No tags ▾

Explicitly declare the visibility for "image". Why is this an issue?   11 days ago ▾ L88 % ▾
🔒 Vulnerability ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   No tags ▾

src/main/java/clock/Game.java

Explicitly declare the visibility for "floatSpeed". Why is this an issue?   3 days ago ▾ L20 % ▾
🔒 Vulnerability ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   No tags ▾

- 분석 예시

```
private class ImageBackground{
     float posX;
```

Explicitly declare the visibility for "posX". Why is this an issue?   10 days ago ▾ L87 %
🔒 Vulnerability ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   No tags ▾

```
     BufferedImage image;
```

Explicitly declare the visibility for "image". Why is this an issue?   10 days ago ▾ L88 %
🔒 Vulnerability ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   No tags ▾

좀 더 명백하게 private 접근지정자 지정할 것.

(3) "public static field" should be constant(1개)

src/main/java/clock/Stopwatch.java

Make this "public static isPaused" field final Why is this an issue?   6 days ago ▾ L14 % ▾
🔒 Vulnerability ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 20min effort Comment   cert, cwe ▾

- 분석 예시

```
     public static boolean isPaused;
```

Make this "public static isPaused" field final Why is this an issue?   6 days ago ▾ L14 %
🔒 Vulnerability ▾ 🟢 Minor ▾ ○ Open ▾ Not assigned ▾ 20min effort Comment   cert, cwe ▾

final 로 명시 권장

1.4 Codesmell (3.2k)

- Blocker (4개)

src/main/java/clock/Dinosaur.java

Rename field "jumping" to prevent any misunderstanding/clash with field "JUMPING" defined on line 18.   10 days ago ▾ L32 🔗 ▼▾
☐ Why is this an issue?
⊗ Code Smell ▾ ❗ Blocker ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment   🏷 confusing ▾

src/main/java/clock/Game.java

"background" is the name of a field in "Component". Why is this an issue?   11 days ago ▾ L16 🔗 ▼▾
☐ ⊗ Code Smell ▾ ❗ Blocker ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   🏷 confusing ▾

src/main/java/clock/WatchSystem.java

"background" is the name of a field in "Component". Why is this an issue?   8 days ago ▾ L24 🔗 ▼▾
☐ ⊗ Code Smell ▾ ❗ Blocker ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   🏷 confusing ▾

"font" is the name of a field in "Component". Why is this an issue?   8 days ago ▾ L28 🔗 ▼▾
☐ ⊗ Code Smell ▾ ❗ Blocker ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   🏷 confusing ▾

(분석 예시)

```
18                        private static final int JUMPING = 1;

          private BufferedImage jumping;
```

Rename field "jumping" to prevent any misunderstanding/clash with field "JUMPING"   10 days ago ▾ L32 🔗
defined on line 18. Why is this an issue?
⊗ Code Smell ▾ ❗ Blocker ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment   🏷 confusing ▾

Methods and field names should not be the same or differ only by capitalization-
변수명 혼동 가능성 있음.

```
public class WatchSystem extends JPanel implements MouseListener, KeyListener, Runnable {
    public ModeManager Watch;

    private BufferedImage background;
```

"background" is the name of a field in "Component". Why is this an issue?   8 days ago ▾ L24 🔗
⊗ Code Smell ▾ ❗ Blocker ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   🏷 confusing ▾

```
    private long isLongpress;
    private long timeOut;

    private Font font;
```

"font" is the name of a field in "Component". Why is this an issue?   8 days ago ▾ L28 🔗
⊗ Code Smell ▾ ❗ Blocker ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment   🏷 confusing ▾

Child class fields should not shadow parent class- JPanel에 background component와 font component 존재함

- Critical (48개)

(1) Instance method should not write to static fields (31개)

(분석 예시)

static으로 선언된 timeUnit을 non-static method에서 사용
-> 둘 중 하나 static 제거나 추가하기

(2) Fields in a "Serializable" class should either be transient or serializable (6개)

Make "timeThread" transient or serializable. Why is this an issue? 8 days ago ▾ L10 ⚬ ▼▾
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 cwe, serialization ▾

Make "thread" transient or serializable. Why is this an issue? 11 days ago ▾ L19 ⚬ ▼▾
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 cwe, serialization ▾

Make "replayButtonImage" transient or serializable. Why is this an issue? 11 days ago ▾ L24 ⚬ ▼▾
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 cwe, serialization ▾

Make "gameOverButtonImage" transient or serializable. Why is this an issue? 11 days ago ▾ L25 ⚬ ▼▾
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 cwe, serialization ▾

Make "background" transient or serializable. Why is this an issue? 8 days ago ▾ L24 ⚬ ▼▾
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 cwe, serialization ▾

Make "thread" transient or serializable. Why is this an issue? 9 days ago ▾ L30 ⚬ ▼▾
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 cwe, serialization ▾

(분석 예시)

```
private Thread timeThread;
```

Make "timeThread" transient or serializable. Why is this an issue? 8 days ago ▾ L10 ⚬
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 cwe, serialization ▾

timeThread를 serialize하게 할지 말지 명확히 할 것

(3) 'Switch' statements should have 'default' clauses

Add a default case to this switch. Why is this an issue? 10 days ago ▾ L58 ⚬ ▼▾
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment 🏷 cert, cwe ▾

(분석 예시)

```
        switch (state){
```

Add a default case to this switch. Why is this an issue? 10 days ago ▾ L58 ⚬
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 5min effort Comment 🏷 cert, cwe ▾

```
            case NORMAL_RUN:
                g.drawImage(normalRunAnim.getFrame(), (int) posX, (int) posY, null);
                break;
            case JUMPING:
                g.drawImage(jumping, (int) posX, (int) posY, null);
                break;
            case DEATH:
                g.drawImage(deathImage, (int) posX, (int) posY, null);
                break;
        }
```

가급적 Default문 작성하기

(4) Use proper class loader(3개)

In J2EE, getClassLoader() might not work as expected. Use Thread.currentThread().getContextClassLoader() instead.
☐ Why is this an issue?
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment
5 days ago ▾ L15 🔗 ▼▾
🏷 No tags ▾

In J2EE, getClassLoader() might not work as expected. Use Thread.currentThread().getContextClassLoader() instead.
☐ Why is this an issue?
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment
5 days ago ▾ L16 🔗 ▼▾
🏷 No tags ▾

In J2EE, getClassLoader() might not work as expected. Use Thread.currentThread().getContextClassLoader() instead.
☐ Why is this an issue?
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment
5 days ago ▾ L28 🔗 ▼▾
🏷 No tags ▾

(분석 예시)

```
beepSound = Applet.newAudioClip(Resource.class.getClassLoader().getResource("resources/beep.wav"));
```

In J2EE, getClassLoader() might not work as expected. Use
Thread.currentThread().getContextClassLoader() instead. Why is this an issue?
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment
5 days ago ▾ L15 🔗
🏷 No tags ▾

getClassLoader()는 잘 작동이 안될 수 있으므로
Thread.currentThread.getContextClassLoader() 사용 권장

(5) String literals should not be duplicated (3개)

Define a constant instead of duplicating this literal "resources/scoreboard.ttf" 3 times. Why is this an issue?
☐
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 8min effort Comment
5 days ago ▾ L52 🔗 ▼▾
🏷 design ▾

Define a constant instead of duplicating this literal "isPaused" 5 times. Why is this an issue?
☐
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 12min effort Comment
7 days ago ▾ L19 🔗 ▼▾
🏷 design ▾

(분석 예시)

```
top = Resource.getFont( 1 "resources/scoreboard.ttf", 60);
```

Define a constant instead of duplicating this literal "resources/scoreboard.ttf" 3 times.
Why is this an issue?
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 8min effort Comment
5 days ago ▾ L52 🔗
🏷 design ▾

```
        main = Resource.getFont( 2 "resources/scoreboard.ttf", 170);
        sub = Resource.getFont( 3 "resources/scoreboard.ttf", 60);
    } catch (Exception e) {
        e.printStackTrace();
    }
```

반복되는 String은 변수에 저장할 것

(6) Empty catch block (1개)

Avoid empty catch blocks Why is this an issue?
☐
⊗ Code Smell ▾ ⬆ Critical ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment
2 days ago ▾ L133 🔗 ▼▾
🏷 error-handling ▾

(분석)

```
    }catch(IllegalAccessException e){

    }
```

Avoid empty catch blocks Why is this an issue? 2 days ago ▾ L133 %

⊗ Code Smell ▾ ⓐ Critical ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment 🏷 error-handling ▾

Catch 블락 비우지 말것.

- Major(764개)

(1) Law of Demeter (375개)

☐ **Potential violation of Law of Demeter (method chain calls)** Why is this an issue? 8 days ago ▾ L33 % ▼▾
⊗ Code Smell ▾ ⓐ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 No tags ▾

(분석 예시)

```
        g.drawString(String.format("%8s",data[0].substring(5, 8)), 100 , 388);
```

Potential violation of Law of Demeter (method chain calls) Why is this an issue? 3 days ago ▾ L234 %

⊗ Code Smell ▾ ⓐ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 No tags ▾

데메테르 법칙 위반함.
- 데메테르 법칙: 최소한의 정보만 접근 및 보유, 느슨하게 결합함.
  - 클래스의 필드이거나 메소드, 파라미터로 받은 메소드와 같이 가까운 것만 호출하고 그 외 2,3차는 호출하지 않는다.

(2) Bean Members should serialize (82개)

☐ **Found non-transient, non-static member. Please mark as transient or provide accessors.** Why is this an issue? 9 days ago ▾ L12 % ▼▾
⊗ Code Smell ▾ ⓐ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 No tags ▾

(분석 예시)

```
    private WatchSystem watchSystem;
```

Found non-transient, non-static member. Please mark as transient or provide accessors. 9 days ago ▾ L12 %
Why is this an issue?
⊗ Code Smell ▾ ⓐ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 No tags ▾

Bean 클래스이거나 간접적 혹은 Bean으로부터 직접적으로 참조된 클래스는 직렬화(serializable)가 필요함

(3) Avoid Print Stack Trace (42개)

☐ **Avoid printStackTrace(); use a logger call instead.** Why is this an issue? 11 days ago ▾ L17 % ▼▾
⊗ Code Smell ▾ ⓐ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment 🏷 error-handling ▾

(분석 예시)

```
        }catch (Exception e){
            e.printStackTrace();
```

Avoid printStackTrace(); use a logger call instead. Why is this an issue?   11 days ago ▾ L17 %

⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   30min effort   Comment   🏷 error-handling ▾

예외 처리시 printStackTrace 보다는 Logger.log() 사용 권장

(4) Immutable Field (38개)

☐ **Private field 'watchSystem' could be made final; it is only initialized in the declaration or constructor.** Why is this an issue?   9 days ago ▾ L12 % 🔽
⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   10min effort   Comment   🏷 No tags ▾

src/main/java/clock/Alarm.java

☐ **Private field 'alarms' could be made final; it is only initialized in the declaration or constructor.** Why is this an issue?   10 days ago ▾ L7 % 🔽
⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   10min effort   Comment   🏷 No tags ▾

☐ **Private field 'toggle' could be made final; it is only initialized in the declaration or constructor.** Why is this an issue?   10 days ago ▾ L8 % 🔽
⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   10min effort   Comment   🏷 No tags ▾

src/main/java/clock/Background.java

☐ **Private field 'listBackground' could be made final; it is only initialized in the declaration or constructor.** Why is this an issue?   11 days ago ▾ L15 % 🔽
⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   10min effort   Comment   🏷 No tags ▾

☐ **Private field 'land1' could be made final; it is only initialized in the declaration or constructor.** Why is this an issue?   11 days ago ▾ L16 % 🔽
⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   10min effort   Comment   🏷 No tags ▾

☐ **Private field 'land2' could be made final; it is only initialized in the declaration or constructor.** Why is this an issue?   11 days ago ▾ L17 % 🔽
⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   10min effort   Comment   🏷 No tags ▾

☐ **Private field 'land3' could be made final; it is only initialized in the declaration or constructor.** Why is this an issue?   11 days ago ▾ L18 % 🔽
⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   10min effort   Comment   🏷 No tags ▾

☐ **Private field 'dinosaur' could be made final; it is only initialized in the declaration or constructor.** Why is this an issue?   11 days ago ▾ L20 % 🔽
⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   10min effort   Comment   🏷 No tags ▾

(분석 예시)


```
    private WatchSystem watchSystem;
```

Private field 'watchSystem' could be made final; it is only initialized in the declaration or constructor.   9 days ago ▾ L12 %
Why is this an issue?

⊗ Code Smell ▾   ⬣ Major ▾   ○ Open ▾   Not assigned ▾   10min effort   Comment   🏷 No tags ▾

final 추가해야함.

(5) "static" members should be accessed statically (15개)

src/main/java/clock/Stopwatch.java

Change this instance-reference to a static reference. Why is this an issue?   8 days ago ▾ L60 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 5min effort Comment   🏷 pitfall ▾

Change this instance-reference to a static reference. Why is this an issue?   yesterday ▾ L63 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 5min effort Comment   🏷 pitfall ▾

Change this instance-reference to a static reference. Why is this an issue?   yesterday ▾ L74 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 5min effort Comment   🏷 pitfall ▾

Change this instance-reference to a static reference. Why is this an issue?   8 days ago ▾ L82 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 5min effort Comment   Micros

Change this instance-reference to a static reference. Why is this an issue?   8 days ago ▾ L88 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 5min effort Comment   🏷 pitfall ▾

src/main/java/clock/Time.java

Change this instance-reference to a static reference. Why is this an issue?   8 days ago ▾ L27 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 5min effort Comment   🏷 pitfall ▾

Change this instance-reference to a static reference. Why is this an issue?   yesterday ▾ L86 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 5min effort Comment   🏷 pitfall

src/main/java/clock/Timer.java

Change this instance-reference to a static reference. Why is this an issue?   💡 Synchronized classes Vector,

(분석 예시)

```
public void updateStopw(){
    if (this.isPaused == false)
```

Change this instance-reference to a static reference. Why is this an issue?   8 days ago ▾ L60 🔗
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 5min effort Comment   🏷 pitfall ▾

static 변수는 바꿀 때마다 한 클래스의 여러 인스턴스들에서 동시에 변경되므로
static을 제외하는 것이 좋음.

(6) Visibility Modifier (14개)

src/main/java/clock/Background.java

Variable 'posX' must be private and have accessor methods. Why is this an issue?   11 days ago ▾ L87 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment   🏷 No tags ▾

Variable 'image' must be private and have accessor methods. Why is this an issue?   11 days ago ▾ L88 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment   🏷 No tags ▾

src/main/java/clock/Cactus.java

Variable 'CactusposX' must be private and have accessor methods. Why is this an issue?   3 days ago ▾ L11 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment   🏷 No tags ▾

src/main/java/clock/Dinosaur.java

Variable 'score' must be private and have accessor methods. Why is this an issue?   11 days ago ▾ L27 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment   🏷 No tags ▾

src/main/java/clock/Game.java

Variable 'floatSpeed' must be private and have accessor methods. Why is this an issue?   3 days ago ▾ L20 🔗 ▼▾
☢ Code Smell ▾ 🔴 Major ▾ ◯ Open ▾ Not assigned ▾ 10min effort Comment   🏷 No tags ▾

(분석 예시)

주요 변수들은 private으로 선언하고 접근할 수 있는 getter, setter를 생성

(7) Avoid catching generic exceptions such as NullPointerException,
    RuntimeException, Exception in try-catch block (11개)

(분석 예시)

Exception으로 처리하지 말고 NullPointerException 등 정확하게 특정하여
catch할 것

(8) Illegal Catch

src/main/java/clock/Buzzer.java

Catching 'Exception' is not allowed. Why is this an issue?   6 days ago ▾ L16 ⚲ ▼▾
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 error-handling ▾

src/main/java/clock/ModeManager.java

Catching 'Exception' is not allowed. Why is this an issue?   10 days ago ▾ L55 ⚲ ▼▾
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 error-handling ▾

src/main/java/clock/WatchSystem.java

Catching 'Exception' is not allowed. Why is this an issue?   9 days ago ▾ L42 ⚲ ▼▾
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 error-handling ▾

src/main/java/util/Resource.java

Catching 'Exception' is not allowed. Why is this an issue?   12 days ago ▾ L19 ⚲ ▼▾
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 error-handling ▾

Catching 'Exception' is not allowed. Why is this an issue?   6 days ago ▾ L30 ⚲ ▼▾
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 error-handling ▾

(분석 예시)

```
try {
    beepSound = Applet.newAudioClip(Resource.class.getClassLoader().getResource("resources/beep.wav"));
}catch (Exception e){
```

Catching 'Exception' is not allowed. Why is this an issue?   6 days ago ▾ L16 ⚲
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 error-handling ▾

```
    e.printStackTrace();
    }
}
```

Exception, RuntimeException 등으로 catch하지 말 것

(9) Missing Constructor

src/main/java/clock/Background.java

Class should define a constructor. Why is this an issue?   11 days ago ▾ L86 ⚲ ▼▾
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment   🏷 No tags ▾

src/main/java/util/Resource.java

Class should define a constructor. Why is this an issue?   12 days ago ▾ L12 ⚲ ▼▾
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment   🏷 No tags ▾

src/test/java/clock/AlarmTest.java

Class should define a constructor. Why is this an issue?   8 days ago ▾ L11 ⚲ ▼▾
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment   🏷 No tags ▾

src/test/java/clock/GameTest.java

Class should define a constructor. Why is this an issue?   8 days ago ▾ L11 ⚲ ▼▾
⊗ Code Smell ▾ ⚠ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment   🏷 No tags ▾

src/test/java/clock/ModeManagerTest.java

(분석 예시)

```
    private class ImageBackground{
```

Class should define a constructor. Why is this an issue?   11 days ago ▾ L86 ％

⊗ Code Smell ▾ △ Major ▾ ○ Open ▾ Not assigned ▾ 30min effort Comment   🏷 No tags ▾

생성자를 만들 것

(10)   At Least One Constructor

src/main/java/clock/Background.java

Each class should declare at least one constructor Why is this an issue?   11 days ago ▾ L89 ％ ▼▾

⊗ Code Smell ▾ △ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 No tags ▾

src/test/java/clock/AlarmTest.java

Each class should declare at least one constructor Why is this an issue?   3 days ago ▾ L183 ％ ▼▾

⊗ Code Smell ▾ △ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 No tags ▾

src/test/java/clock/GameTest.java

Each class should declare at least one constructor Why is this an issue?   4 days ago ▾ L30 ％ ▼▾

⊗ Code Smell ▾ △ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 No tags ▾

src/test/java/clock/ModeManagerTest.java

Each class should declare at least one constructor Why is this an issue?   4 days ago ▾ L70 ％ ▼▾

⊗ Code Smell ▾ △ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 No tags ▾

src/test/java/clock/StopwatchTest.java

(분석 예시)

```
    private class ImageBackground{
        float posX;
        BufferedImage image;
    }
```

Each class should declare at least one constructor Why is this an issue?   11 days ago ▾ L89 ％

⊗ Code Smell ▾ △ Major ▾ ○ Open ▾ Not assigned ▾ 15min effort Comment   🏷 No tags ▾

[Major]

(11)   Assignment To Non Final Static (6개)

src/main/java/clock/Alarm.java

Possible unsafe assignment to a non-final static field in a constructor. Why is this an issue? — 4 days ago ▾ L11 🔗 ▼
⊗ Code Smell ▾ ⬡ Major ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment — 🏷 No tags ▾

src/main/java/clock/ModeManager.java

Possible unsafe assignment to a non-final static field in a constructor. Why is this an issue? — 4 days ago ▾ L25 🔗 ▼
⊗ Code Smell ▾ ⬡ Major ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment — 🏷 No tags ▾

src/main/java/clock/Stopwatch.java

Possible unsafe assignment to a non-final static field in a constructor. Why is this an issue? — 6 days ago ▾ L14 🔗 ▼
⊗ Code Smell ▾ ⬡ Major ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment — 🏷 No tags ▾

src/main/java/clock/Time.java

Possible unsafe assignment to a non-final static field in a constructor. Why is this an issue? — 9 days ago ▾ L20 🔗 ▼
⊗ Code Smell ▾ ⬡ Major ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment — 🏷 No tags ▾

src/main/java/clock/Timer.java

Possible unsafe assignment to a non-final static field in a constructor. Why is this an issue? — 9 days ago ▾ L8 🔗 ▼
⊗ Code Smell ▾ ⬡ Major ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment — 🏷 No tags ▾

Possible unsafe assignment to a non-final static field in a constructor. Why is this an issue? — 9 days ago ▾ L9 🔗 ▼
⊗ Code Smell ▾ ⬡ Major ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment — 🏷 No tags ▾

(분석 예시)

```
private static int timeUnit[];
```

Possible unsafe assignment to a non-final static field in a constructor. Why is this an issue? — 4 days ago ▾ L11 🔗
⊗ Code Smell ▾ ⬡ Major ▾ ○ Open ▾ Not assigned ▾ 10min effort Comment — 🏷 No tags ▾

static 변수를 생성자에서 선언하면 모든 인스턴스들이 공유하는 static 변수의 값이 인스턴스를 만들 때마다 달라지므로 static이 아닌 변수로 바꿀 것

(12)   Static fields should not be updated in constructors (6개)

src/main/java/clock/Alarm.java

Remove this assignment of "timeUnit". Why is this an issue? yesterday ▾ L19 % ▼▾

⊗ Code Smell ▾ ⬥ Major ▾ ○ Open ▾ Not assigned ▾ 20min effort Comment ◥ No tags ▾

src/main/java/clock/ModeManager.java

Remove this assignment of "beepCount". Why is this an issue? yesterday ▾ L45 % ▼▾

⊗ Code Smell ▾ ⬥ Major ▾ ○ Open ▾ Not assigned ▾ 20min effort Comment

MySQLWo

src/main/java/clock/Stopwatch.java

Remove this assignment of "isPaused". Why is this an issue? 8 days ago ▾ L22 % ▼▾

⊗ Code Smell ▾ ⬥ Major ▾ ○ Open ▾ Not assigned ▾ 20min effort Comment ◥ No tags ▾

src/main/java/clock/Time.java

Remove this assignment of "isSetTime". Why is this an issue? 8 days ago ▾ L27 % ▼▾

⊗ Code Smell ▾ ⬥ Major ▾ ○ Open ▾ Not assigned ▾ 20min effort Comment ◥ No tags ▾

src/main/java/clock/Timer.java

Remove this assignment of "isPaused". Why is this an issue? 8 days ago ▾ L17 % ▼▾

⊗ Code Smell ▾ ⬥ Major ▾ ○ Open ▾ Not assigned ▾ 20min effort Comment ◥ No tags ▾

Remove this assignment of "isSetTimer". Why is this an issue? 8 days ago ▾ L18 % ▼▾

⊗ Code Smell ▾ ⬥ Major ▾ ○ Open ▾ Not assigned ▾ 20min effort Comment ◥ No tags ▾

(분석 예시)

```java
public Alarm() {
    alarms = new LinkedList<Calendar>();
    toggle = new LinkedList<Boolean>();
    timeUnit = new int[2];
```

Remove this assignment of "timeUnit". Why is this an issue? yesterday ▾ L19 1 %

⊗ Code Smell ▾ ⬥ Major ▾ ○ Open ▾ Not assigned ▾ 20min effort Comment ◥ No tags ▾

static 변수를 생성자에서 선언하면 모든 인스턴스들이 공유하는 static 변수의
값이 인스턴스를 만들 때마다 달라지므로 static이 아닌 변수로 바꿀 것

1.5 Coverage

● Intellij의 Junit을 통해 code coverage를 확인하였음.

Element	Class, %	Method, %	Line, %
Alarm	100% (1/1)	84% (11/13)	91% (61/67)
Background	33% (1/3)	16% (1/6)	12% (6/47)
Buzzer	100% (1/1)	50% (1/2)	62% (5/8)
Cactus	0% (0/1)	0% (0/5)	0% (0/22)
Dinosaur	100% (1/1)	10% (1/10)	25% (13/52)
Game	100% (1/1)	9% (1/11)	7% (5/69)
Hurdle	0% (0/1)	0% (0/6)	0% (0/34)
ModeManager	0% (0/1)	0% (0/14)	0% (0/195)
Stopwatch	100% (1/1)	72% (8/11)	52% (32/61)
Time	100% (1/1)	70% (7/10)	85% (68/80)
Timer	100% (1/1)	69% (9/13)	61% (49/80)
WatchSystem	0% (0/1)	0% (0/13)	0% (0/72)
Worldtime	100% (1/1)	40% (4/10)	55% (20/36)

60% classes, 31% lines covered in package 'clock'

- WatchSystem, Modemanager은 Unit Test에 대한 내용이 전혀 없어서 0%가 나왔음.

- Unit Test 실행
  57개의 테스트 중 56개 pass, 1개 fail됨.

Tests failed: 1, passed: 56 of 57 tests – 328 ms

clock	335 ms
✔ AlarmTest	29 ms
❗ GameTest	181 ms
✔ ModeManagerTest	8 ms
✔ StopwatchTest	42 ms
✔ TimerTest	51 ms
✔ TimeTest	10 ms
✔ WatchSystemTest	6 ms
✔ WorldtimeTest	8 ms

- 실패 원인

```
java.lang.IllegalAccessException: Class clock.WorldtimeTest can not access a member of class clock.Worldtime with modifiers "private" <1 internal call>
    at java.lang.reflect.AccessibleObject.slowCheckMemberAccess(AccessibleObject.java:296)
    at java.lang.reflect.AccessibleObject.checkAccess(AccessibleObject.java:288)
    at java.lang.reflect.Field.get(Field.java:390)
    at clock.WorldtimeTest.requestWorldtime(WorldtimeTest.java:24) <15 internal calls>
    at java.util.ArrayList.forEach(ArrayList.java:1257) <5 internal calls>
    at java.util.ArrayList.forEach(ArrayList.java:1257) <17 internal calls>

java.lang.IllegalAccessException: Class clock.WorldtimeTest can not access a member of class clock.Worldtime with modifiers "private" <1 internal call>
    at java.lang.reflect.AccessibleObject.slowCheckMemberAccess(AccessibleObject.java:296)
    at java.lang.reflect.AccessibleObject.checkAccess(AccessibleObject.java:288)
    at java.lang.reflect.Field.get(Field.java:390)
    at clock.WorldtimeTest.calWorldTime(WorldtimeTest.java:123) <15 internal calls>
    at java.util.ArrayList.forEach(ArrayList.java:1257) <5 internal calls>
    at java.util.ArrayList.forEach(ArrayList.java:1257) <17 internal calls>
```

- Eclipse 의 Eclemma 플러그인을 이용하여 전체 코드 커버리지를 확인함.

Element	Coverage	Covered Instructions	Missed Instructions	Total Instructions
test2	49.4 %	3,059	3,134	6,193
src/main/java	33.3 %	1,344	2,686	4,030
(default package)	0.0 %	0	62	62
clock	33.7 %	1,305	2,565	3,870
Alarm.java	80.7 %	330	79	409
Background.java	8.3 %	17	187	204
Buzzer.java	33.3 %	6	12	18
Cactus.java	0.0 %	0	111	111
Dinosaur.java	22.1 %	49	173	222
Game.java	5.5 %	13	225	238
Hurdle.java	0.0 %	0	184	184
ModeManager.java	0.0 %	0	822	822
Stopwatch.java	44.0 %	109	139	248
Time.java	90.8 %	356	36	392
Timer.java	52.5 %	170	154	324
WatchSystem.java	0.0 %	0	256	256
Worldtime.java	57.7 %	255	187	442
util	39.8 %	39	59	98
src/test/java	79.3 %	1,715	448	2,163
clock	79.3 %	1,715	448	2,163
AlarmTest.java	93.8 %	423	28	451
GameTest.java	6.8 %	3	41	44
ModeManagerTest.java	100.0 %	18	0	18
StopwatchTest.java	87.2 %	238	35	273
TimerTest.java	96.1 %	323	13	336
TimeTest.java	95.4 %	472	23	495
WatchSystemTest.java	100.0 %	16	0	16
WorldtimeTest.java	41.9 %	222	308	530

```java
1  package clock;
2
3  import java.util.*;
4
5  public class Worldtime implements Mode{
6
7      private int curCity;
8      private int timeDiff[];
9      private String city[];
10     private boolean isSummerTime;
11     private Calendar worldClock;
12     private Calendar GMT9;
13
14     public Worldtime(Calendar curTime) {
15         timeDiff = new int[] {-20, -19, -18, -17, -16, -15, -14, -13, -12, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3};
16         city = new String[] {"PAGO PAGO", "HAWAII", "ALASKA", "LA", "DENVER", "CHICAGO", "NEW YORK", "CARACAS", "SAO PAULO", "FERNANDO", "AZORES", "LOND
17         curCity = 20;
18         isSummerTime = false;
19
20         GMT9 = curTime;
21         calWorldTime();
22     }
23
24     public String[] requestWorldtime(Calendar curTime) {
25         update(curTime);
26         calWorldTime();
27         // TODO implement here
28         if(isSummerTime == true)
29             return new String[] {"WORLD-" + city[curCity] + "(S)", String.format("%02d", worldClock.get(Calendar.HOUR_OF_DAY)) + ":" + String.format("%0
30         else
31             return new String[] {"WORLD-" + city[curCity], String.format("%02d", worldClock.get(Calendar.HOUR_OF_DAY)) + ":" + String.format("%02d", wor
32     }
```

위와 같이 코드가 지나가는 부분은 초록색, 지나가지 않는 부분은 빨간색으로
나타난다.