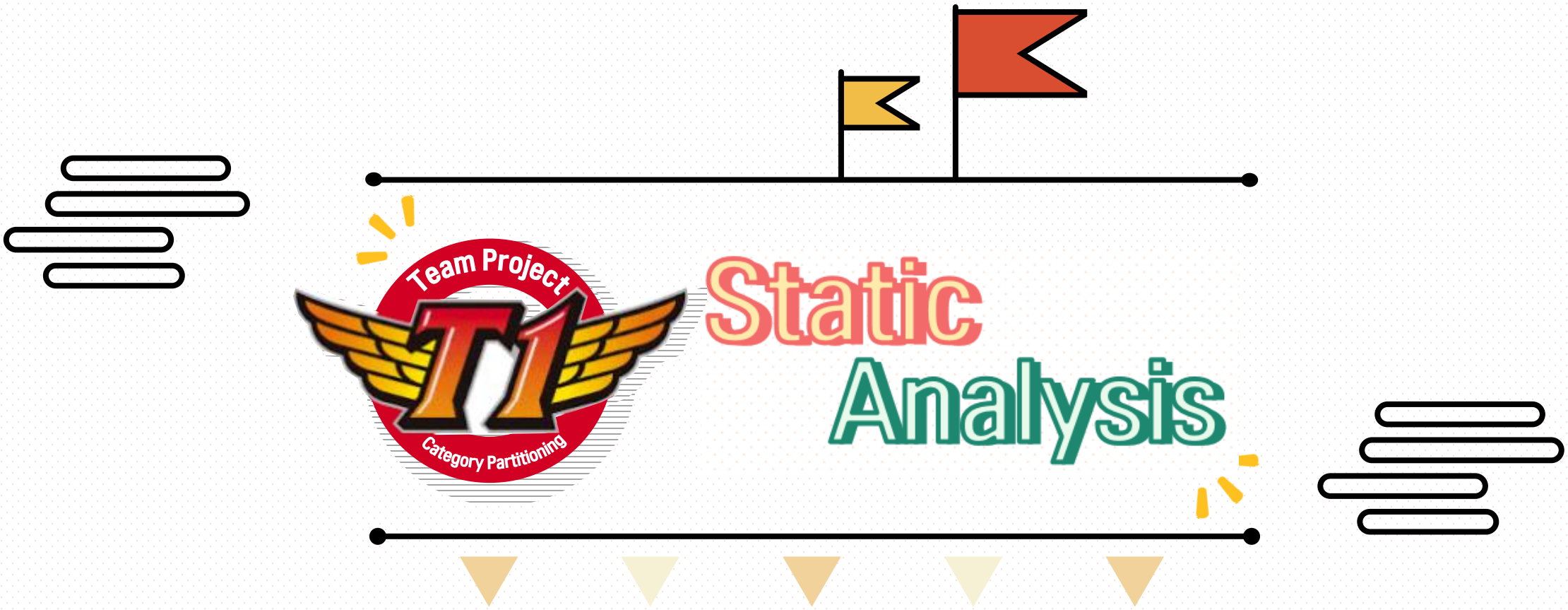

Team Project
Category Partitioning
Static
Analysis

오늘의 발표자

'김동권'

201312243

Team Project

T1

Category Partitioning

INDEX

Tool

Sonar Qube + Eclipse Plugin

sonarqube

CSI

PMD
DON'T SHOOT THE MESSENGER

FindBugs
because it's easy

eclipse
Plug in

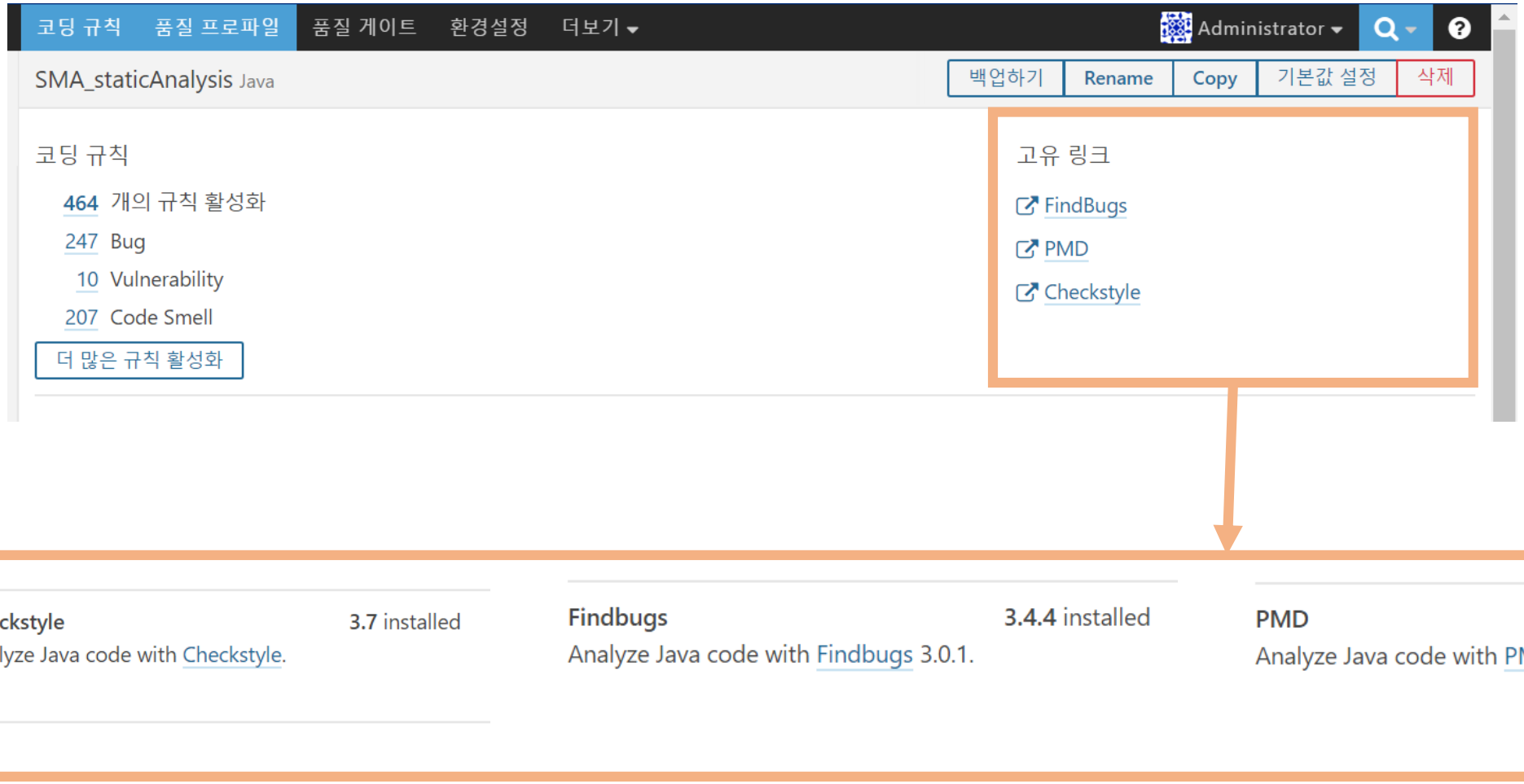
CSI

FindBugs
because it's easy

metrics

2 SonarQube

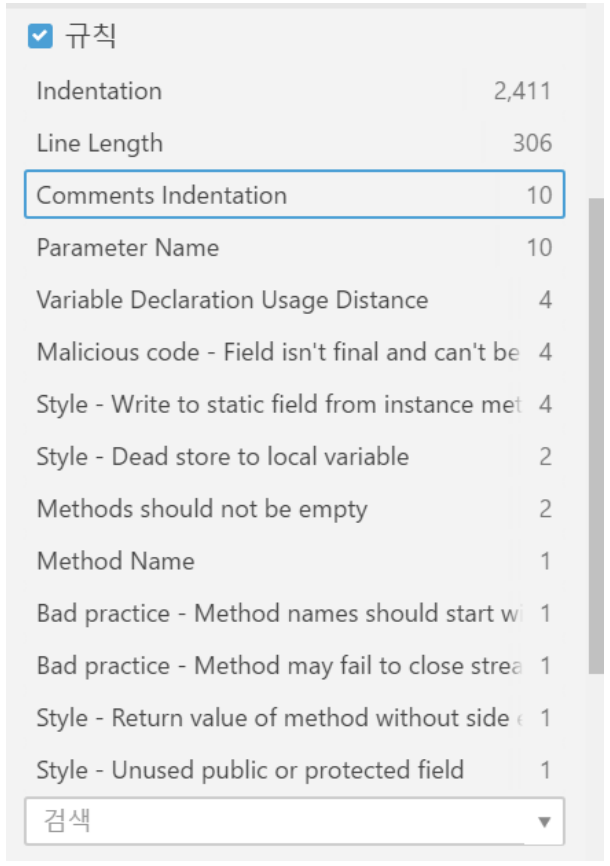
Sonar Qube_Rules



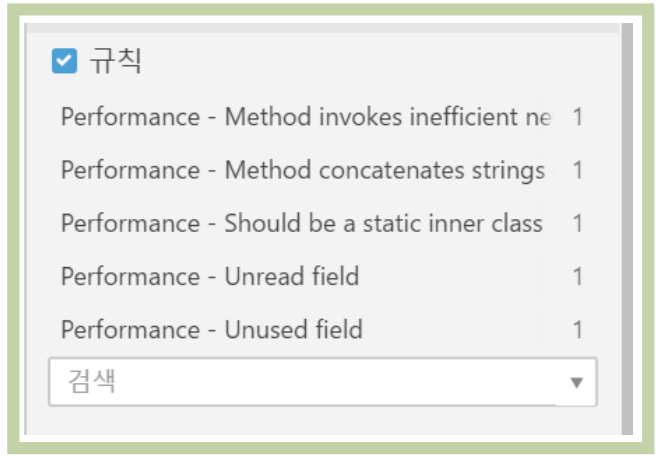
2 SonarQube

T3 Result

Code Smell

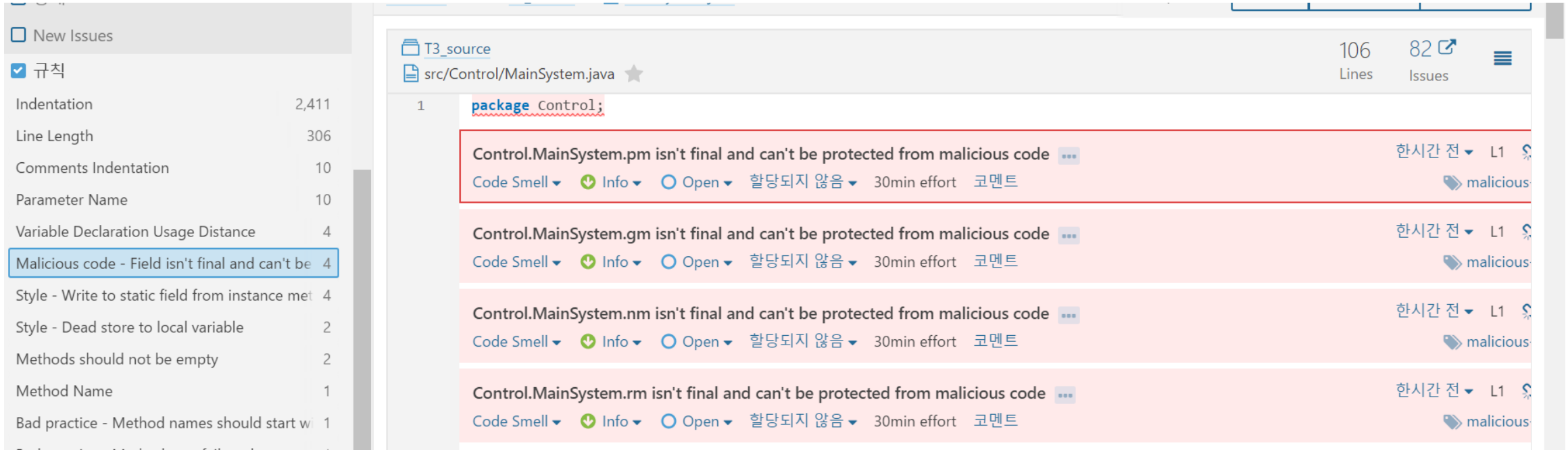


Bugs



2 SonarQube

T3 Result_Code Smell



(static) gm, rm, nm, pm 모두 해당. 여러 인스턴스가 조작 될 경우 오류 가능성 존재.

2 SonarQube

T3 Result_Code Smell

```
50
51          public GUIManager() {
```

Add a nested comment explaining why this method is empty, throw an UnsupportedOperationException or complete the implementation. ...

40분 전 L51

Code Smell Critical Open 할당되지 않음 5min effort 코멘트 su

```
52
53          }
54
```

```
90          @Override
91          public void actionPerformed(ActionEvent e) {
```

Add a nested comment explaining why this method is empty, throw an UnsupportedOperationException or complete the implementation. ...

42분 전 L91

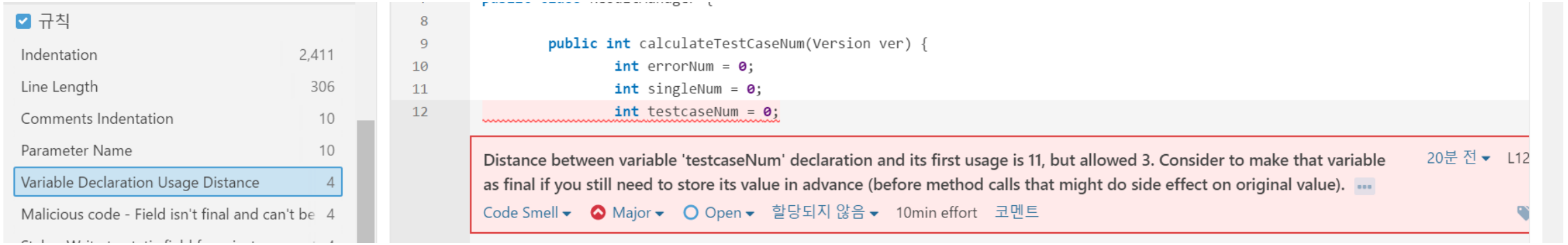
Code Smell Critical Open 할당되지 않음 5min effort 코멘트 suspicious

```
92          }
```

빈 Method

2 SonarQube

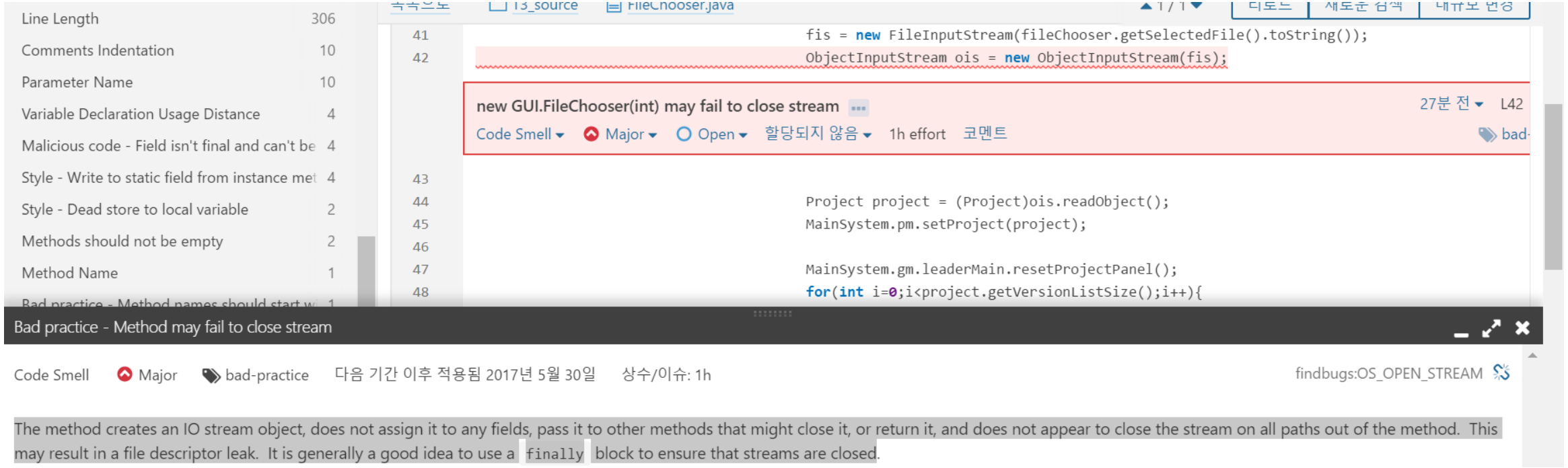
T3 Result_Code Smell



변수 선언과 첫번째 사용간의 distance . ->문제가 될 것 같지 않음.

2 SonarQube

T3 Result_Code Smell



File stream Close (X).

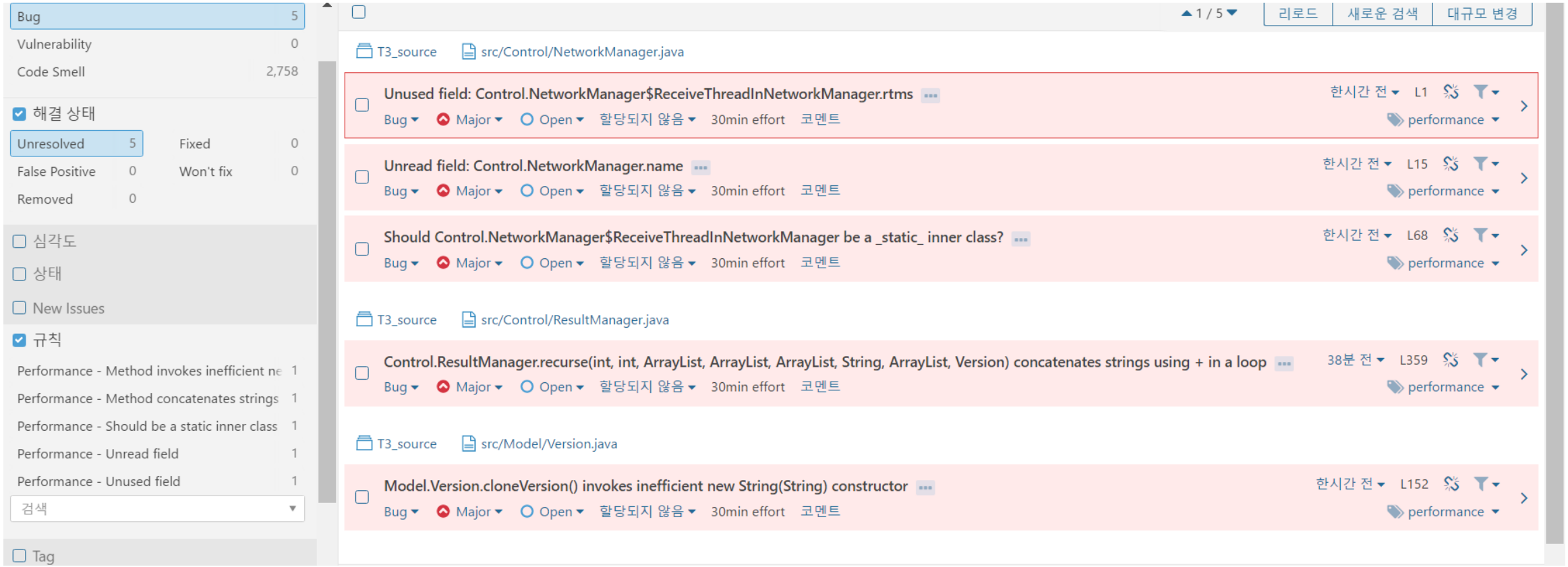
2 SonarQube

T3 Result_Code Smell

Return 외에 아무 기능을 하지 않음.

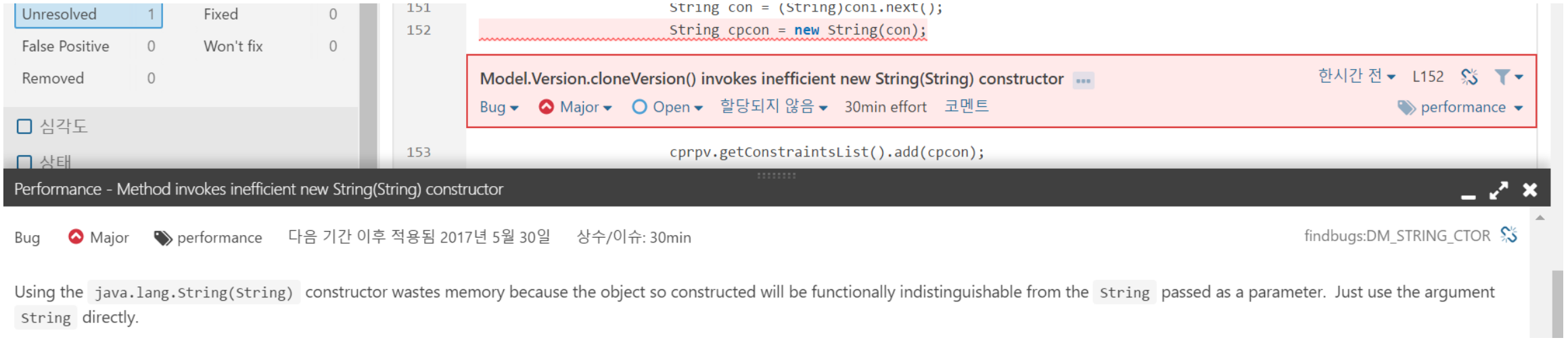
2 SonarQube

T3 Result_Bugs



2 SonarQube

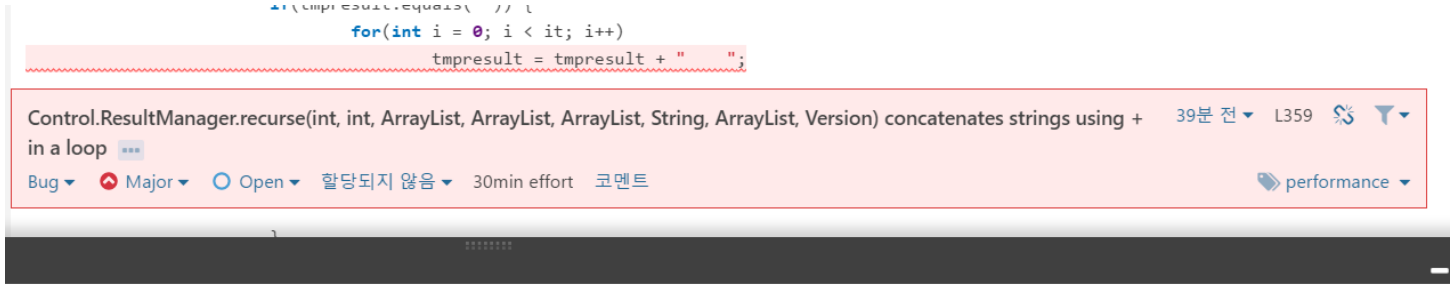
T3 Result_Bugs



String 사용 방식 수정 제안.

2 SonarQube

T3 Result_Bugs



루프에서 연결을 사용하여 String을 만드는 것-> 복잡도 증가

SonarQube 제안 ->

For example:

```
// This is bad
String s = "";
for (int i = 0; i < field.length; ++i) {
  s = s + field[i];
}

// This is better
StringBuffer buf = new StringBuffer();
for (int i = 0; i < field.length; ++i) {
  buf.append(field[i]);
}
String s = buf.toString();
```

2 SonarQube

T3 Result_Bugs

```
13  public class NetworkManager {
14          private Socket socket;
15          private String name = "";
```

Unread field: Control.NetworkManager.name ...

한시간 전 ▾ L15

Bug ▾ Major ▾ Open ▾ 할당되지 않음 ▾ 30min effort 코멘트

performance ▾

2 Find Bugs

Eclipse Plugin_T3 Result

GUIManager.java: 244

Navigation

Dead store to fc in Control.GUIManager.openFileChooser()
Local variable named fc

Bug: Dead store to fc in Control.GUIManager.openFileChooser()

This instruction assigns a value to a local variable, but the value is not read or used in any subsequent instruction. Often, this indicates an error, because the value computed is never used.

Note that Sun's javac compiler often generates dead stores for final local variables. Because FindBugs is a bytecode-based tool, there is no easy way to eliminate these false positives.

Rank: Of Concern (15), **confidence**: High
Pattern: DLS_DEAD_LOCAL_STORE
Type: DLS, **Category**: STYLE (Dodgy code)

XML output:

```
<BugInstance type="DLS_DEAD_LOCAL_STORE" priority="1" rank="15" abbrev="DLS" category="STYLE" first="1">
  <Class classname="Control.GUIManager">
    <SourceLine classname="Control.GUIManager" sourcefile="GUIManager.java" sourcepath="Control/GUIManager.java"/>
  </Class>
  <Method classname="Control.GUIManager" name="openFileChooser" signature="()V" isStatic="false">
    <SourceLine classname="Control.GUIManager" start="244" end="246" startBytecode="0" endBytecode="8" sourcefile="GUIManager.java" sourcepath="Control/GUIManager.java"/>
  </Method>
  <LocalVariable name="fc" register="1" pc="9" role="LOCAL_VARIABLE_NAMED"/>
  <SourceLine classname="Control.GUIManager" start="244" end="244" startBytecode="8" endBytecode="8" sourcefile="GUIManager.java" sourcepath="Control/GUIManager.java"/>
  <SourceLine classname="Control.GUIManager" start="244" end="244" startBytecode="8" endBytecode="8" sourcefile="GUIManager.java" sourcepath="Control/GUIManager.java"/>
  <Property name="edu.umd.cs.findbugs.detect.DeadLocalStoreProperty.DEAD_OBJECT_STORE" value="true"/>
  <Property name="edu.umd.cs.findbugs.detect.DeadLocalStoreProperty.LOCAL_NAME" value="fc"/>
  <Property name="edu.umd.cs.findbugs.detect.DeadLocalStoreProperty.METHOD_RESULT" value="true"/>
</BugInstance>
```

---

2 Find Bugs

Eclipse Plugin_T3 Result

MainSystem.java: 22

Navigation

Write to static field Control.MainSystem.gm from instance method new Control.MainSystem()
Field Control.MainSystem.gm

Bug: Write to static field Control.MainSystem.gm from instance method new Control.MainSystem()

This instance method writes to a static field. This is tricky to get correct if multiple instances are being manipulated, and generally bad practice.

Rank: Of Concern (15), **confidence**: High
Pattern: ST_WRITE_TO_STATIC_FROM_INSTANCE_METHOD
Type: ST, **Category**: STYLE (Dodgy code)

XML output:

```
<BugInstance type="ST_WRITE_TO_STATIC_FROM_INSTANCE_METHOD" priority="1" rank="15" abbrev="ST" category="STYLE" first="1">
  <Class classname="Control.MainSystem">
    <SourceLine classname="Control.MainSystem" sourcefile="MainSystem.java" sourcepath="Control/MainSystem.java"/>
  </Class>
  <Method classname="Control.MainSystem" name="<init>" signature="()V" isStatic="false">
    <SourceLine classname="Control.MainSystem" start="20" end="25" startBytecode="0" endBytecode="106" sourcefile="MainSystem.java" sourcepath="Control/MainSystem.java"/>
  </Method>
  <Field classname="Control.MainSystem" name="gm" signature="LControl/GUIManager;" isStatic="true">
    <SourceLine classname="Control.MainSystem" sourcefile="MainSystem.java" sourcepath="Control/MainSystem.java"/>
  </Field>
  <SourceLine classname="Control.MainSystem" start="22" end="22" startBytecode="21" endBytecode="21" sourcefile="MainSystem.java" sourcepath="Control/MainSystem.java"/>
  <SourceLine classname="Control.MainSystem" start="22" end="22" startBytecode="21" endBytecode="21" sourcefile="MainSystem.java" sourcepath="Control/MainSystem.java"/>
</BugInstance>
```

(static) gm, rm, nm, pm 모두 해당. 여러 인스턴스가 조작 될 경우 오류 가능성 존재.

2 Metrics

Eclipse Plugin_T3 Result

Cyclomatic Complexity	또 다른오류가생길확률
1~10	5%
20~30	20%
50 이상	40%
거의 100	60%

복잡도 v(G) = 분기문 + 1

Control package : 42

GUI package : 11

Server package : 9

Model package : 4

Metric	Total	Mean	Std. Dev.	Maximum
McCabe Cyclomatic Complexity (avg/max per method)		2.152	3.83	42
(default package)		2.152	3.83	42
Control		2.387	5.936	42
GUI		2.704	2.258	11
Server		3	2.598	9
Model		1.204	0.649	4

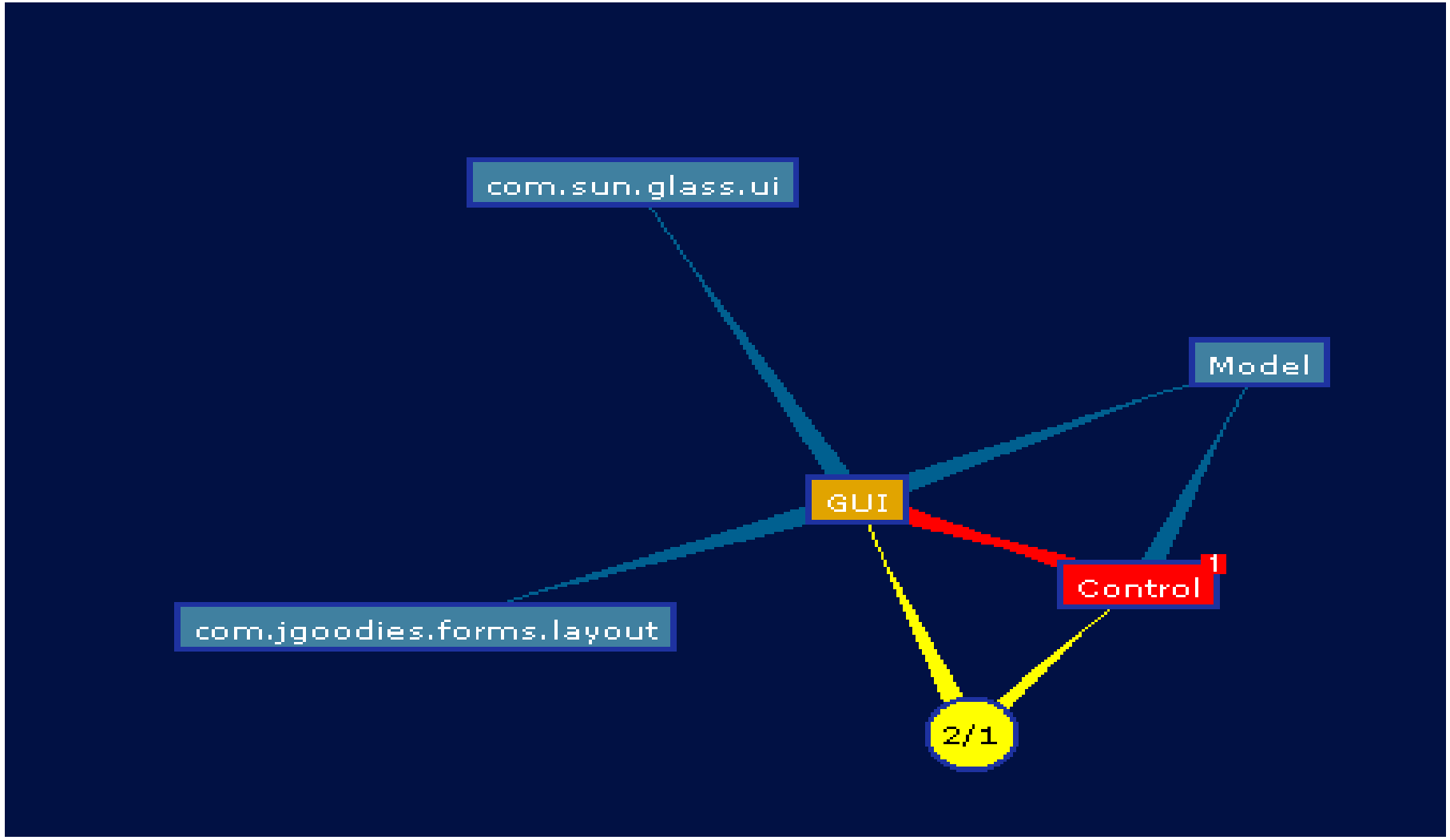
2 Metrics

Eclipse Plugin_T3 Result

Metric	Total	Mean	Std. Dev.	Maxim...	Resource causing Maximum	Method
McCabe Cyclomatic Complexity (avg/max per method)		2.152	3.83	42	/T3_source/Control/ResultManager.java	calculateTestCaseNum
Number of Parameters (avg/max per method)		0.865	0.87	8	/T3_source/Control/ResultManager.java	recurse
Nested Block Depth (avg/max per method)		1.68	1.148	8	/T3_source/Control/ResultManager.java	recurse
Afferent Coupling (avg/max per packageFragment)		6.5	6.801	17	/T3_source/Control	
Efferent Coupling (avg/max per packageFragment)		5.75	6.942	17	/T3_source/GUI	
Instability (avg/max per packageFragment)		0.551	0.431	1	/T3_source/Server	
Abstractness (avg/max per packageFragment)		0	0	0	/T3_source/Control	
Normalized Distance (avg/max per packageFragment)		0.449	0.431	1	/T3_source/Model	
Depth of Inheritance Tree (avg/max per type)		3.833	2.368	6	/T3_source/GUI/NewProjectView2.java	
Weighted methods per Class (avg/max per type)	383	12.767	13.431	78	/T3_source/Control/ResultManager.java	
Number of Children (avg/max per type)	0	0	0	0	/T3_source/Control/GUIManager.java	
Number of Overridden Methods (avg/max per type)	2	0.067	0.249	1	/T3_source/Control/NetworkManager.java	
Lack of Cohesion of Methods (avg/max per type)		0.623	0.372	1.333	/T3_source/GUI/MemberVersionPanel.java	
Number of Attributes (avg/max per type)	189	6.3	4.212	14	/T3_source/Control/GUIManager.java	
Number of Static Attributes (avg/max per type)	4	0.133	0.718	4	/T3_source/Control/MainSystem.java	
Number of Methods (avg/max per type)	161	5.367	5.504	24	/T3_source/Control/GUIManager.java	
Number of Static Methods (avg/max per type)	17	0.567	2.872	16	/T3_source/Control/MainSystem.java	
Specialization Index (avg/max per type)		0.056	0.212	1	/T3_source/Control/NetworkManager.java	
Number of Classes (avg/max per packageFragment)	30	7.5	6.225	18	/T3_source/GUI	
Number of Interfaces (avg/max per packageFragment)	0	0	0	0	/T3_source/Control	
Number of Packages	4					
Total Lines of Code	2920					
Method Lines of Code (avg/max per method)	1936	10.876	21.151	173	/T3_source/Control/ResultManager.java	calculateTestCaseNum

2 Metric

Eclipse Plugin_T3 Result



3 SonarQube

Sonar Qube_T4 Result

Bugs & 취약점

7 C	0 A
버그	취약점

코드 악취

1.9k D	24일
코드 악취	부채

5일 전에 시작됨

Code Smell

규칙	
Indentation	1,578
Line Length	335
I18n - Reliance on default encoding	8
Multiple Variable Declarations	4
Bad practice - Method may fail to close strea	3
Style - Write to static field from instance me	3
Variable Declaration Usage Distance	2
Method Name	2
Bad practice - Method invokes System.exit(..	2
Malicious code - May expose internal repres	2
Bad practice - Method names should start w	2
Bad practice - Method ignores exceptional r	1
Methods should not be empty	1

검색

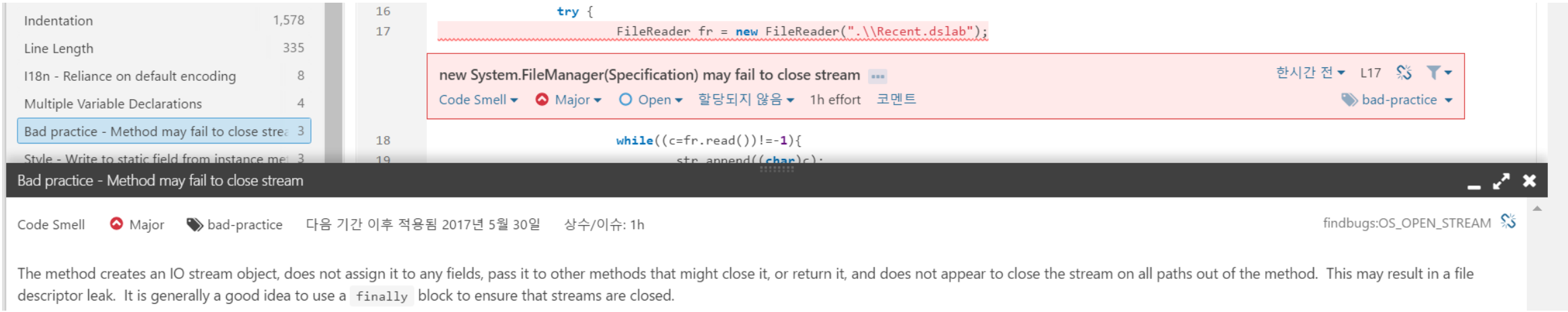
Bugs

규칙	
Performance - Method invokes inefficient ne	4
Performance - Method invokes inefficient ne	3

검색

3 SonarQube

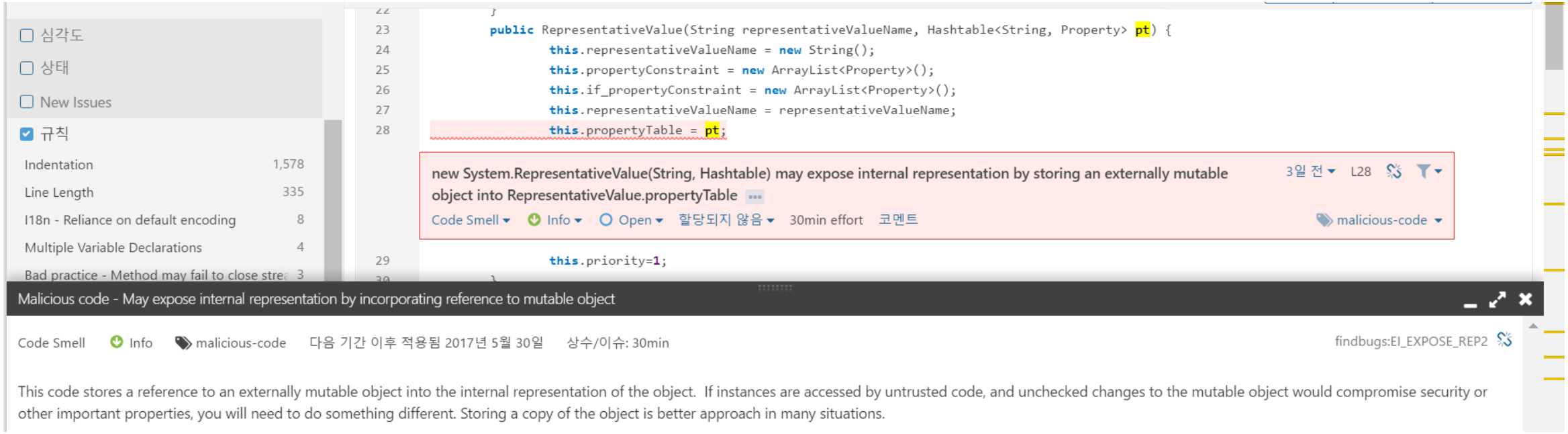
T4 Result_Code Smell



File stream Close (X).

3 SonarQube

T4 Result_Code Smell



외부에서 변경 가능한 객체에 대한 참조 -> 인스턴스 신뢰할 수 없을 경우 문제가 생기므로 '사본 ' 을 만들어 저장하는 것 을 추천하고 있음.

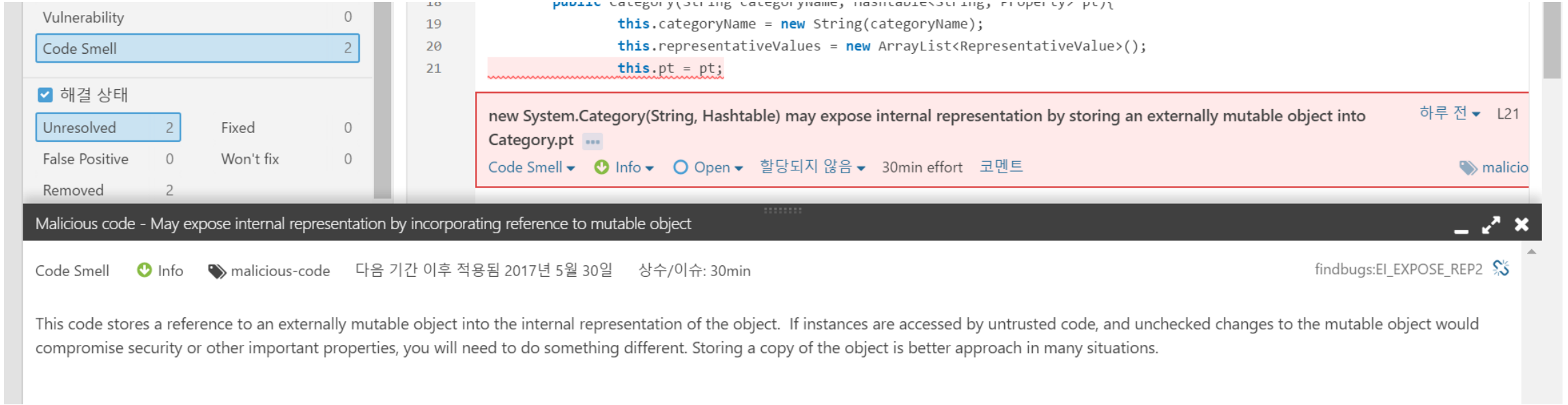
3 SonarQube

T4 Result_Code Smell

File.delete (): 파일을 성공적으로 삭제할 수 없으면 예외를 throw하지 않고 false를 반환
-> return값 확인 추천.

3 SonarQube

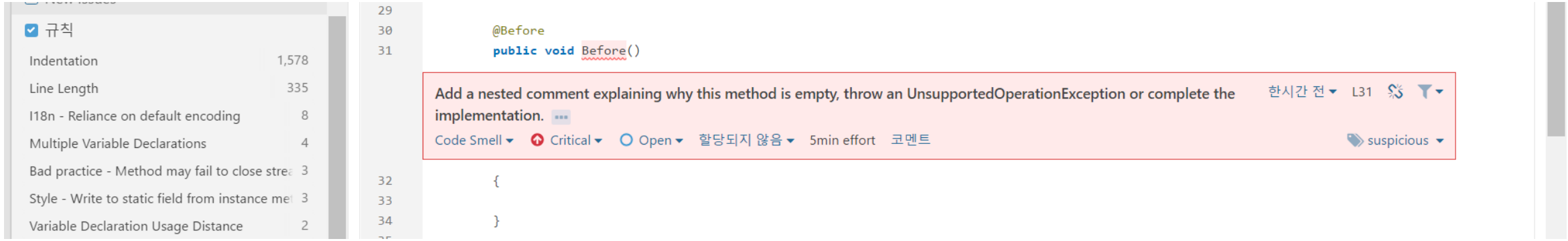
T4 Result_Code Smell



pt -> private Variable, 하지만 get set 사용하지 않고 Category.pt 로 접근.

3 SonarQube

T4 Result_Code Smell



빈 Method

3 SonarQube

T4 Result_Bug1

```
filePath = new String(filePath+".yzb");
```

GUI.Explorer.doit(int, FileManager, Specification) invokes inefficient new String(String) constructor

Bug Major Open 할당되지 않음 30min effort

java.lang.String (String) 생성자를 사용하면
생성 된 객체가 매개 변수로 전달 된 String과 기능적으로 구분되지 않으므로 메모리가 낭비됩니다.

->String 인자를 직접 사용하십시오.(뒷장에 같은 오류)

3 SonarQube

T4 Result_Bug2,3

T4_source

src/System/Category.java

```
1   package System;
2
3   import java.util.ArrayList;
4   import java.util.Hashtable;
5
6   import javax.swing.JOptionPane;
7
8   public class Category {
9           private String categoryName;
10          private ArrayList<RepresentativeValue> representativeValues;
11          private Hashtable<String, Property> pt;
12
13          //Constructor
14          public Category(){
15                  this.categoryName = new String();
```

new System.Category() invokes inefficient new String() constructor ...

Bug Major Open 할당되지 않음 30min effort

```
16                  this.representativeValues = new ArrayList<RepresentativeValue>();
17          }
18          public Category(String categoryName, Hashtable<String, Property> pt){
19                  this.categoryName = new String(categoryName);
```

new System.Category(String, Hashtable) invokes inefficient new String(String) constructor ...

Bug Major Open 할당되지 않음 30min effort

3 SonarQube

T4 Result_Bug4,5

T4_source

src/System/Property.java

```
1   package System;
2
3   import java.util.LinkedList;
4
5   public class Property {
6           private String name;
7           private LinkedList<String> valueNames;
8
9           public Property(){
10                  this.name = new String();
```

new System.Property() invokes inefficient new String() constructor ...

Bug Major Open 할당되지 않음 30min effort

```
11          }
12
13          public Property(String name){
14                  this.name = new String(name);
```

new System.Property(String) invokes inefficient new String(String) constructor ...

Bug Major Open 할당되지 않음 30min effort

3 SonarQube

T4 Result_Bug6,7

src/System/RepresentativeValue.java

```
1   package System;
2
3   import java.util.ArrayList;
4   import java.util.Hashtable;
5
6   import javax.swing.JOptionPane;
7
8   public class RepresentativeValue {
9           private String representativeValueName;
10          private ArrayList<Property> propertyConstraint;
11          private ArrayList<Property> if_propertyConstraint;
12          private int singleErrorConstraint;
13          private int priority;
14          private Hashtable<String, Property> propertyTable;
15
16          //Constructor
17          public RepresentativeValue() {
18                  this.representativeValueName = new String();
```

new System.RepresentativeValue() invokes inefficient new String() constructor ...

Bug Major Open 할당되지 않음 30min effort

```
19                  this.propertyConstraint = new ArrayList<Property>();
20                  this.if_propertyConstraint = new ArrayList<Property>();
21                  this.priority=1;
22          }
23          public RepresentativeValue(String representativeValueName, Hashtable<String, Property> pt) {
24                  this.representativeValueName = new String();
```

new System.RepresentativeValue(String, Hashtable) invokes inefficient new String() constructor ...

Bug Major Open 할당되지 않음 30min effort

3 Find Bugs

Sonar Qube_T4 Result_Code Smell

T4_source src/GUI/FirstFrame.java

GUI.FirstFrame$6.actionPerformed(ActionEvent) invokes System.exit(...), which shuts down the entire virtual machine ...

Code Smell Major Open 할당되지 않음 1h effort

T4_source src/GUI/MainFrame.java

GUI.MainFrame$18.actionPerformed(ActionEvent) invokes System.exit(...), which shuts down the entire virtual machine ...

Code Smell Major Open 할당되지 않음 1h effort

T4_source src/System/Category.java

new System.Category(String, Hashtable) may expose internal representation by storing an externally mutable object into Category.pt ...

Code Smell Info Open 할당되지 않음 30min effort

외부에서 변경 가능한 객체를 저장-> expose internal reprsentation

3 Find Bugs

Eclipse Plugin_T4 Result

FileManagerTest.java: 46

Navigation

Write to static field test.FileManagerTest.file from instance method test.FileManagerTest.testLoadSpecification1()
Field test.FileManagerTest.file

Bug: Write to static field test.FileManagerTest.file from instance method test.FileManagerTest.testLoadSpecification1()

This instance method writes to a static field. This is tricky to get correct if multiple instances are being manipulated, and generally bad practice.

Rank: Of Concern (15), **confidence**: High
Pattern: ST_WRITE_TO_STATIC_FROM_INSTANCE_METHOD
Type: ST, **Category**: STYLE (Dodgy code)

XML output:

```
<BugInstance type="ST_WRITE_TO_STATIC_FROM_INSTANCE_METHOD" priority="1" rank="15" abbrev="ST" category="STYLE" first="1">
  <Class classname="test.FileManagerTest">
    <SourceLine classname="test.FileManagerTest" sourcefile="FileManagerTest.java" sourcepath="test/FileManagerTest.java"/>
  </Class>
  <Method classname="test.FileManagerTest" name="testLoadSpecification1" signature="()V" isStatic="false">
    <SourceLine classname="test.FileManagerTest" start="46" end="54" startBytecode="0" endBytecode="137" sourcefile="FileManagerTest.java" sourcepath="test/FileManagerTest.java"/>
  </Method>
  <Field classname="test.FileManagerTest" name="file" signature="Ljava/io/File;" isStatic="true">
    <SourceLine classname="test.FileManagerTest" sourcefile="FileManagerTest.java" sourcepath="test/FileManagerTest.java"/>
  </Field>
  <SourceLine classname="test.FileManagerTest" start="46" end="46" startBytecode="9" endBytecode="9" sourcefile="FileManagerTest.java" sourcepath="test/FileManagerTest.java"/>
  <SourceLine classname="test.FileManagerTest" start="46" end="46" startBytecode="9" endBytecode="9" sourcefile="FileManagerTest.java" sourcepath="test/FileManagerTest.java"/>
</BugInstance>
```

LoadSpecification1, 2, new Specification1() 모두 해당.

3 Metrics

Eclipse Plugin_T4 Result

Cyclomatic Complexity	또 다른오류가생길확률
1~10	5%
20~30	20%
50 이상	40%
거의 100	60%

Metric	Total	Mean	Std. Dev.	Maximum
McCabe Cyclomatic Complexity (avg/max per method)		2.516	3.185	20
src		2.516	3.185	20
System		3.035	3.494	20
GUI		3.2	4.167	14
test		1.115	0.319	2

복잡도 v(G) = 분기문 + 1

System package : 20

GUI package : 14

test package : 4

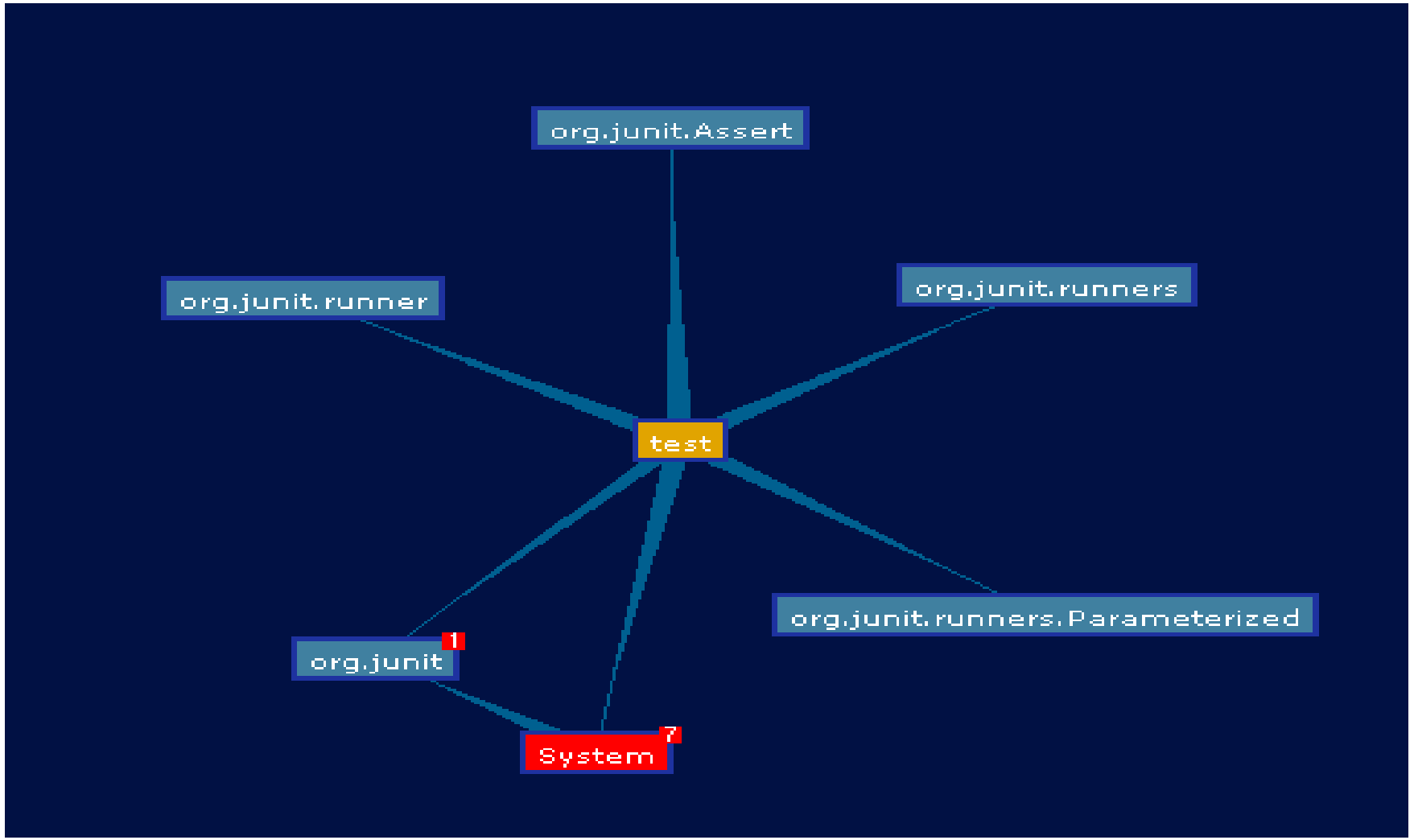
3 Metrics

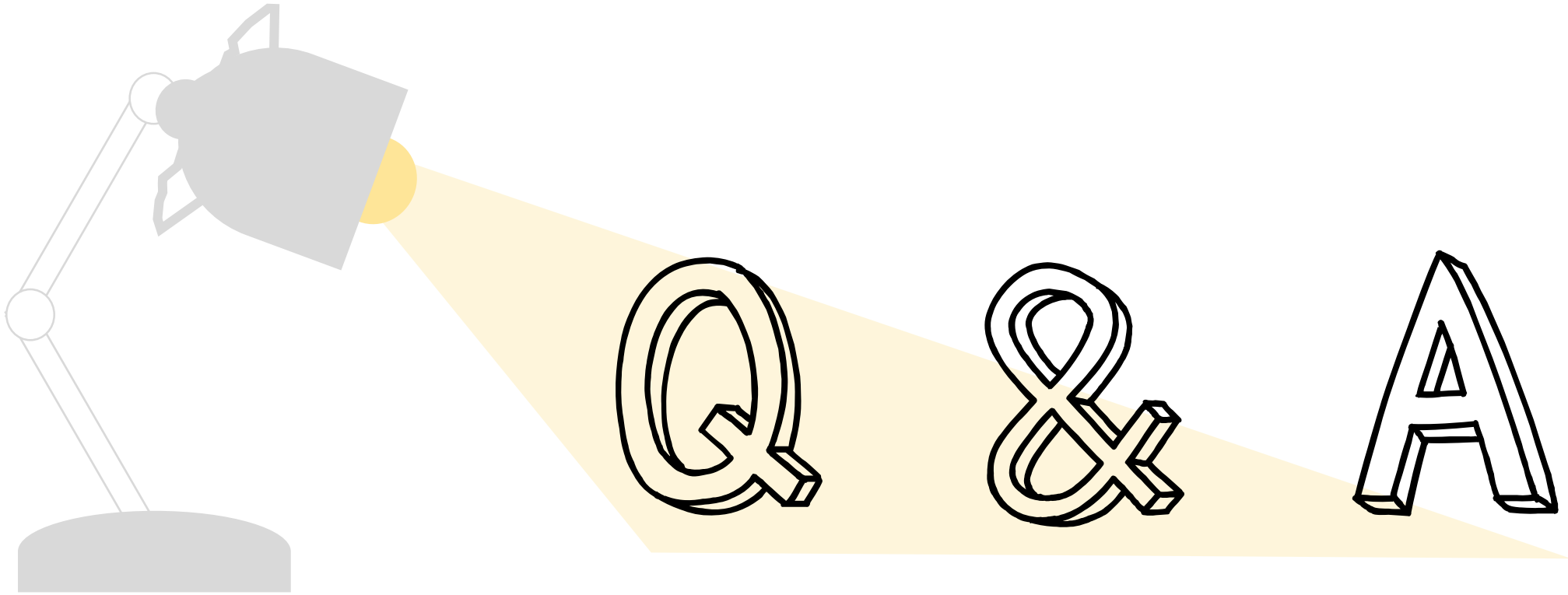
Eclipse Plugin_T4 Result

Metric	Total	Mean	Std. Dev.	Maxim...	Resource causing Maximum	Method
McCabe Cyclomatic Complexity (avg/max per method)		2.516	3.185	20	/T4_source/src/System/FileManager.java	loadSpecification
Number of Parameters (avg/max per method)		0.731	0.985	5	/T4_source/src/System/Specification.java	f
Nested Block Depth (avg/max per method)		1.946	1.498	8	/T4_source/src/System/FileManager.java	loadSpecification
Afferent Coupling (avg/max per packageFragment)		3	3.559	8	/T4_source/src/System	
Efferent Coupling (avg/max per packageFragment)		4.333	0.943	5	/T4_source/src/GUI	
Instability (avg/max per packageFragment)		0.702	0.311	1	/T4_source/src/test	
Abstractness (avg/max per packageFragment)		0	0	0	/T4_source/src/GUI	
Normalized Distance (avg/max per packageFragment)		0.298	0.311	0.727	/T4_source/src/System	
Depth of Inheritance Tree (avg/max per type)		2.071	2.052	6	/T4_source/src/GUI/NewSpecification.java	
Weighted methods per Class (avg/max per type)	234	16.714	18.223	58	/T4_source/src/System/FileManager.java	
Number of Children (avg/max per type)	0	0	0	0	/T4_source/src/GUI/NewSpecification.java	
Number of Overridden Methods (avg/max per type)	0	0	0	0	/T4_source/src/GUI/NewSpecification.java	
Lack of Cohesion of Methods (avg/max per type)		0.381	0.342	0.846	/T4_source/src/GUI/FirstFrame.java	
Number of Attributes (avg/max per type)	46	3.286	3.594	13	/T4_source/src/GUI/FirstFrame.java	
Number of Static Attributes (avg/max per type)	14	1	2	6	/T4_source/src/test/RepresentativeValueTest.java	
Number of Methods (avg/max per type)	89	6.357	4.922	18	/T4_source/src/System/RepresentativeValue.java	
Number of Static Methods (avg/max per type)	4	0.286	0.452	1	/T4_source/src/System/MainSystem.java	
Specialization Index (avg/max per type)		0	0	0	/T4_source/src/GUI/NewSpecification.java	
Number of Classes (avg/max per packageFragment)	14	4.667	0.943	6	/T4_source/src/System	
Number of Interfaces (avg/max per packageFragment)	0	0	0	0	/T4_source/src/GUI	
Number of Packages	3					
Total Lines of Code	1888					
Method Lines of Code (avg/max per method)	1481	15.925	53.513	498	/T4_source/src/GUI/MainFrame.java	MainFrame

3 Metrics

Eclipse Plugin_T4 Result_Dependency Graph View




Q & A