

Ways of performing analysis

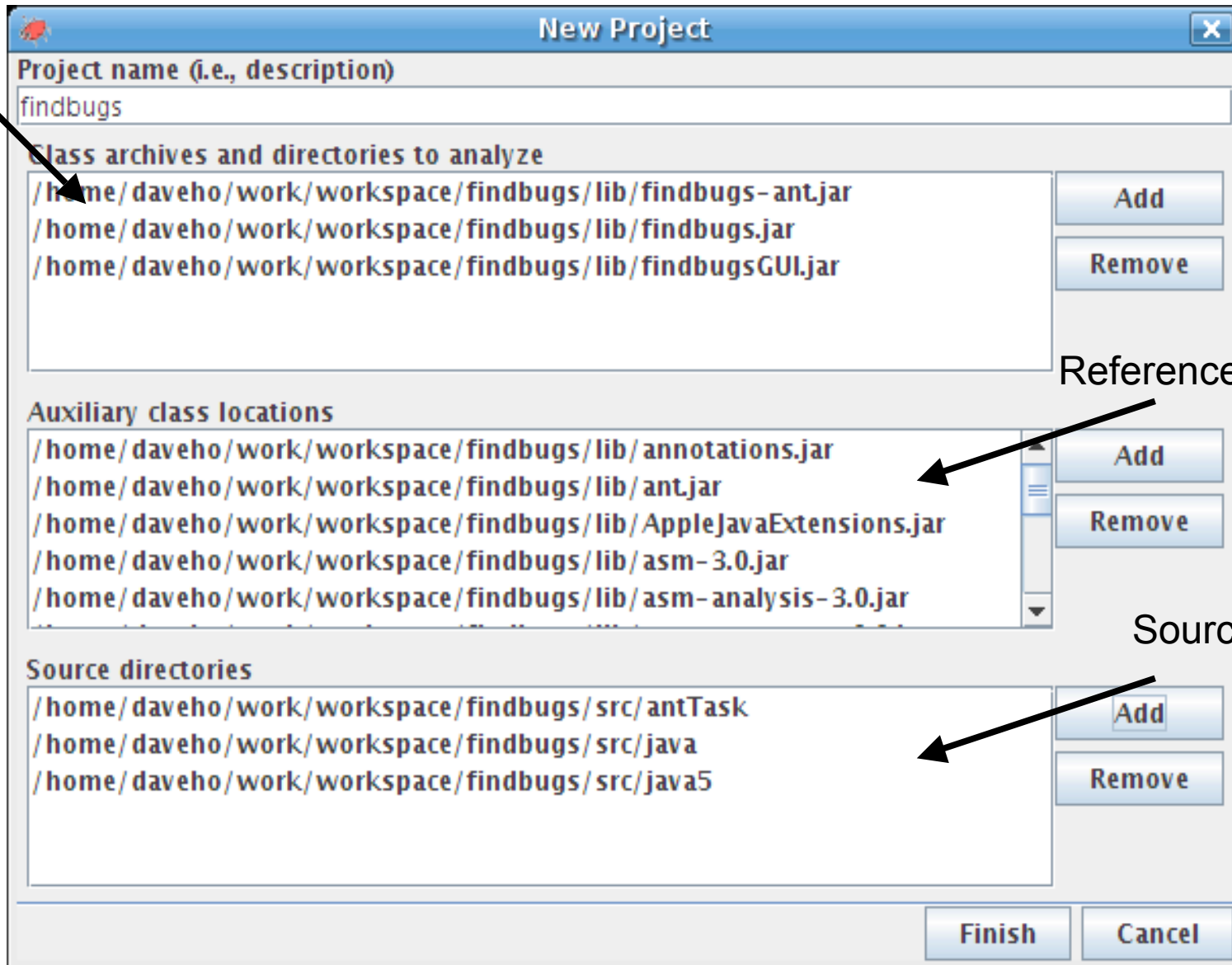
- Swing GUI
- Command line
- Eclipse IDE
- Netbeans IDE
- Ant
- Maven
- Hudson / Cruise Control

Swing GUI

- Good way to get started
- Run the findbugs (or findbugs.bat) script with n arguments
- File->New Project
 - Project = code + libraries + source dirs
 - Project file contains all info needed to analyze a software artifact

New project dialog

Code to analyze



The image shows a 'New Project' dialog box with a blue title bar and a close button. It contains three main sections: 'Project name (i.e., description)', 'Class archives and directories to analyze', and 'Auxiliary class locations'. The 'Project name' field contains 'findbugs'. The 'Class archives and directories to analyze' section has a list of three jar files and 'Add' and 'Remove' buttons. The 'Auxiliary class locations' section has a list of five jar files and 'Add' and 'Remove' buttons. The 'Source directories' section has a list of three directories and 'Add' and 'Remove' buttons. At the bottom are 'Finish' and 'Cancel' buttons. Three arrows point to specific parts: one to the first jar file in the 'Class archives' list, one to the first jar file in the 'Auxiliary class locations' list, and one to the first directory in the 'Source directories' list.

Project name (i.e., description)
findbugs

Class archives and directories to analyze

- /home/daveho/work/workspace/findbugs/lib/findbugs-ant.jar
- /home/daveho/work/workspace/findbugs/lib/findbugs.jar
- /home/daveho/work/workspace/findbugs/lib/findbugsGUI.jar

Add Remove

Auxiliary class locations

- /home/daveho/work/workspace/findbugs/lib/annotations.jar
- /home/daveho/work/workspace/findbugs/lib/ant.jar
- /home/daveho/work/workspace/findbugs/lib/AppleJavaExtensions.jar
- /home/daveho/work/workspace/findbugs/lib/asm-3.0.jar
- /home/daveho/work/workspace/findbugs/lib/asm-analysis-3.0.jar

Add Remove

Source directories

- /home/daveho/work/workspace/findbugs/src/antTask
- /home/daveho/work/workspace/findbugs/src/java
- /home/daveho/work/workspace/findbugs/src/java5

Add Remove

Finish Cancel

Referenced libraries

Source code

Navigator pane

Main window

Source pane

The screenshot shows the FindBugs application window. The top menu bar includes File, Edit, Navigation, Designation, and Help. Below the menu is a toolbar with buttons for Category, Bug Kind, Bug Pattern, and Priority. The left pane (Navigator pane) displays a tree view of project files, with 'edu.umd.cs.findbugs.gui.RunAnalysisDialog.java' selected. The right pane (Source pane) shows the source code of 'RunAnalysisDialog.java' in 'edu.umd.cs.findbugs.gui'. The code includes a constructor and a 'run()' method. Line 144, 'this.analysisThread = new Thread() {', is highlighted in yellow. Below the source code is a search bar and buttons for 'Find', 'Find Next', and 'Find Previous'. The bottom pane displays a bug detection result. The bug is titled 'Non-serializable value stored into instance field of a serializable class' and is described as 'A non-serializable value is stored into a non-transient field of a serializable class.' The bug is identified as 'edu.umd.cs.findbugs.gui.RunAnalysisDialog\$1 stored into non-transient field RunAnalysisDialog.analysisThread' at line 144. The bottom of the window features a footer with the URL 'http://findbugs.sourceforge.net/' and the University of Maryland logo.

FindBugs: findbugs

File Edit Navigation Designation Help

Category Bug Kind Bug Pattern Priority

Bad practice (52)

- Confusing method name (4)
- Dubious method used (2)
- Incorrect definition of Serializable class (41)
 - Non-transient non-serializable instance field
 - Non-serializable value stored into instance field
 - edu.umd.cs.findbugs.gui.RunAnalysisDialog\$1
 - edu.umd.cs.findbugs.gui.ConsoleLogger\$1
 - edu.umd.cs.findbugs.gui.ConsoleLogger\$2
 - edu.umd.cs.findbugs.gui2.NewProjectWizard\$1

unclassified

RunAnalysisDialog.java in edu.umd.cs.findbugs.gui

```
131 * Creates new form RunAnalysisDialog
132 */
133 public RunAnalysisDialog(java.awt.Frame parent, Ana
134     super(parent, true);
135     initComponents();
136     this.analysisRun = analysisRun_;
137     this.completed = false;
138
139     // Create a progress callback to give the user
140     // about how far along we are.
141     final FindBugsProgress progress = new RunAnalysis
142
143     // This is the thread that will actually run th
144     this.analysisThread = new Thread() {
145         @Override
146         public void run() {
147             try {
148                 analysisRun.execute(progress);
149                 setCompleted(true);
150             } catch (java.io.IOException e) {
```

Find Find Next Find Previous

edu.umd.cs.findbugs.gui.RunAnalysisDialog\$1 stored into non-transient field RunAnalysisDialog.analysisThread
At RunAnalysisDialog.java:[line 144]
Field edu.umd.cs.findbugs.gui.RunAnalysisDialog.analysisThread
Actual type edu.umd.cs.findbugs.gui.RunAnalysisDialog\$1

Non-serializable value stored into instance field of a serializable class
A non-serializable value is stored into a non-transient field of a serializable class.

<http://findbugs.sourceforge.net/>

UNIVERSITY OF MARYLAND

Bug det

Bug description

Saving project, analysis results

- Once the project has been created, save it to a project file (.fbp)
 - Makes it easy to re-analyze the code later
 - File->Save As->FindBugs project file
- Also, save the initial analysis results (.fba)
 - Serves as a baseline
 - File->Save As->FindBugs analysis results
 - XML-based format
 - Based on internal object model

Command line

- In the beginning was the command line...

```
findbugs -textui -project myProj.fbp \  
-xml -outputFile myProj-analysis.fba
```

or

```
findbugs -textui -project myProj.fbp \  
-xml:withMessages -outputFile myProj-analysis.fba
```

- Using `-xml:withMessages` writes human-readable message strings in the XML output

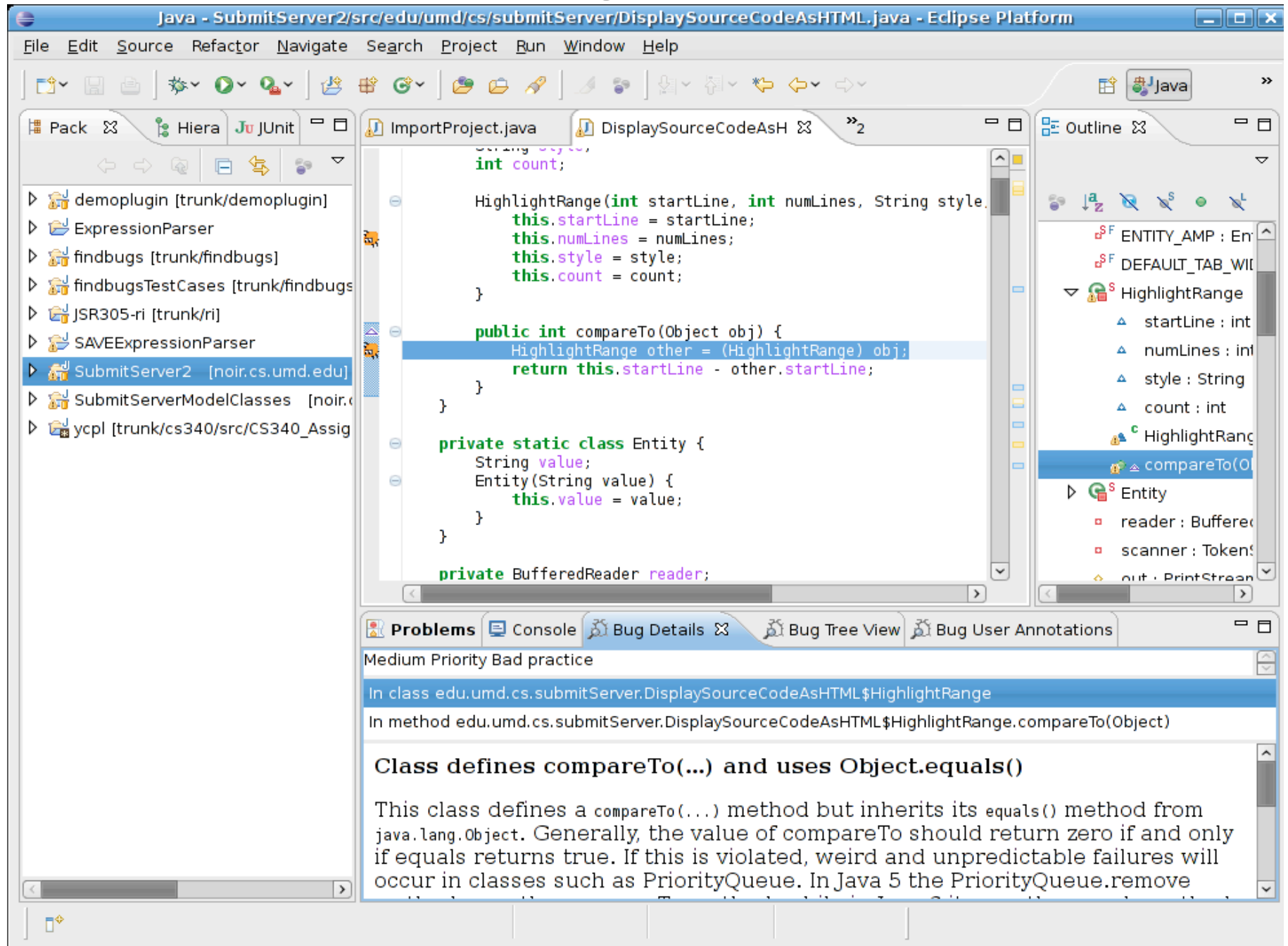
-xml vs. -xml:withMessages

- By default, XML output does not store human-readable descriptions of generated analysis warnings
 - Those descriptions can be generated at runtime
 - Using any supported language (en, de, fr, etc.)
- However
 - If you're going to transform the output to a human-readable format (e.g., to HTML using an XSL stylesheet), you want the messages

Eclipse IDE

- FindBugs Eclipse plugin
 - <http://findbugs.cs.umd.edu/eclipse/>
- Run FindBugs incrementally as you edit code

Eclipse plugin screenshot



Plugin for NetBeans

- FindBugs plugin is part of SQE suite, with CheckStyle, PMD, DependencyFinder
- Configurable filters and thresholds for warning priorities, categories, etc.
- Integrates with NetBeans Task List
- In-editor warning markers
- Work by Sven Reimers

Plugin for NetBeans

NetBeans 5.5 Beta 2 - JavaApplication5

Navigator - Main Projects Files Runtime

JavaApplication5

- Source Packages
 - javaapplication5
 - Main.java
- Test Packages
- Libraries
- Test Libraries

Main.java

```
import edu.umd.cs.findbugs.annotations.NonNull;
import edu.umd.cs.findbugs.annotations.Nullable;
import java.util.List;

/**
 * @author tor
 */
public class Main {

    /** Creates a new instance of Main */
    public Main() {
    }

    @CheckForNull
    private List foobar(@NonNull List foo, @Nullable List bar) {
        return null;
    }

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args) {
        // TODO code application logic here
        Main main = new Main();
        List foo = main.foobar(null, null);
        System.out.println("size = " + foo.size());
    }
}
```

31:5 INS

Usages FindBugs Output - JavaApplication5 (run) Versioning - jbd (4 days ago)

JavaApplication5

Bugs (2)

- NP: Method call passes null to a parameter declared @NonNull
- NP: Possible null pointer returned by method could be dereferenced

Method call passes null to a parameter declared @NonNull

^ This method passes a null value as the parameter of a method which has declared that parameter to be @NonNull. (Note that the method the @NonNull annotation may be in a subclass of the receiver object's class.)

Finished building JavaApplication5 (run).

Plugin for NetBeans

The screenshot shows the NetBeans 5.5 Beta 2 IDE interface. The top toolbar has a red box around the 'Find Bugs' icon. The left sidebar shows a project named 'JavaApplication5' with a source package 'javaapplication5' containing 'Main.java'. The main editor displays the code of 'Main.java'. The code includes imports for 'edu.umd.cs.findbugs.annotations.NonNull', 'edu.umd.cs.findbugs.annotations.Nullable', and 'java.util.List'. It defines a 'public class Main' with a 'public Main()' constructor and a '@CheckForNull' annotated 'private List foobar(@NonNull List foo, @Nullable List bar)' method. The 'main' method calls 'main.foobar(null, null)'. The bottom status bar shows '31:5 INS'. Below the editor, the 'FindBugs' tab is active, displaying two bugs:

- NP: Method call passes null to a parameter declared @NonNull
- NP: Possible null pointer returned by method could be dereferenced

The first bug is highlighted with a red box. The right pane of the FindBugs window shows the message: 'Method call passes null to a parameter declared @NonNull'. Below this, it explains: 'This method passes a null value as the parameter of a method which has declared that parameter to be @NonNull. (Note that the method the @NonNull annotation may be in a subclass of the receiver object's class.)'

Finished building JavaApplication5 (run).

Ant task

- findbugs-ant.jar
 - Ant tasks for FindBugs and FindBugs utilities
- FindBugsTask
 - Originally written by Mike Fagan
 - Perform analysis
 - Save analysis results to an XML file

Using FindBugsTask

- General approach:
 - Set the home attribute to location of FindBugs installation
 - Set output="xml" or output="xml:withMessages"
 - Set outputFile to name of file where analysis results should be saved
 - Set projectName attribute to name of project file

FindBugsTask example

```
<property name="findbugs.home" value="..."/>
```

```
...
```

```
<findbugs home="${findbugs.home}"
```

```
  project="myProject.fbp"
```

```
  output="xml"
```

```
  outputFile="myProject-results.fba"/>
```

FindBugsTask options

- Many options are supported as attributes
- Examples:
 - reportLevel="low|medium|high"
 - jvmArgs="*args*" (e.g., jvmArgs="-Xmx1024m")
 - excludeFilter="*filter filename*"
 - includeFilter="*filter filename*"

Plugin for Maven

- Add `<plugin>` to `<reporting>` section of `pom.xml`:
 - see next slide
- `'mvn findbugs:findbugs'` generates report
- `'mvn site'` generates site files including a FindBugs report
- Work by Cyrill Ruettimann, Garvin LeClaire:
 - <http://mojo.codehaus.org/findbugs-maven-plugin>
- Also a plugin by Eric Pugh, Jeff Jensen, Lukas Theussl:
 - <http://maven-plugins.sourceforge.net/maven-findbugs-plugin/>

Update for pom.xml

```
<plugin>
  <groupId>org.codehaus.mojo</groupId>
  <artifactId>findbugs-maven-plugin</artifactId>
  <version>1.1.1</version>
  <configuration>
    <xmlOutput>true|false</xmlOutput>
    <xmlOutputDirectory>directory location of xml findbug
report</xmlOutputDirectory>
    <threshold>High|Normal|Low</threshold>
    <effort>Min|Default|Max</effort>
  </configuration>
</plugin>
```

Plugin for Maven

Overview


[Introduction](#)

[Goals](#)

[Usage](#)

[FAQ](#)

built by:



Last Published: 11/04/2006

Mojo | Maven

FindBugs Bug Detector Report

The following document contains the results of [FindBugs Report](#)

FindBugs Version is 1.1.1

Threshold is Low

Effort is Default

Summary

Classes	Bugs	Errors	Missing Classes
156	26	19	18

Files

Class	Bugs
org.codehaus.mojo.findbugs.EffortParameter	1
org.codehaus.mojo.findbugs.FindBugsMojo	25

[org.codehaus.mojo.findbugs.EffortParameter](#)

Bug	Category	Details	Line
org.codehaus.mojo.findbugs.EffortParameter.getValue() may expose internal representation by returning org.codehaus.mojo.findbugs.EffortParameter.value	MALICIOUS_CODE	EI_EXPOSE_REP	105

[org.codehaus.mojo.findbugs.FindBugsMojo](#)

Bug	Category	Details
Read of unwritten field classFilesDirectory in org.codehaus.mojo.findbugs.FindBugsMojo.canGenerateReport()	CORRECTNESS	NP_UI
Read of unwritten field artifactResolver in org.codehaus.mojo.findbugs.FindBugsMojo.getCorePluginPath(java.util.Locale)	CORRECTNESS	NP_UI
Read of unwritten field pluginArtifacts in org.codehaus.mojo.findbugs.FindBugsMojo.getCorePluginPath(java.util.Locale)	CORRECTNESS	NP_UI
Read of unwritten field reportFormat in org.codehaus.mojo.findbugs.FindBugsMojo.initialiseFindBugs(java.util.Locale,java.util.List)	CORRECTNESS	NP_UI
Read of unwritten field debug in org.codehaus.mojo.findbugs.FindBugsMojo.setFindBugsDebug(edu.umd.cs.findbugs.FindBugs)	CORRECTNESS	NP_UI

FindBugs report in Maven site documentation

Integration with CruiseControl

- CC can be extended with .xsl and .jsp's to read and present FindBugs output
- Presents:
 - Warning summary
 - Trend graph
- Instructions and source at:
<http://confluence.public.thoughtworks.org/display/CC/CruiseControlWithFindBugs>
- Work by Jay Mehta, Nicholas Cull, Will Sargent

Integration with CruiseControl

Build Results	Test Results	XML Log File	Config	Control Panel
Metrics	PMD	FindBugs		

FindBugs Report

Metrics

25645 lines of code analysed, in 380 classes, in 20 packages.

Metric	Total	Density*
High Priority Warnings	6	0.23
Medium Priority Warnings	73	2.85
Total Warnings	79	3.08

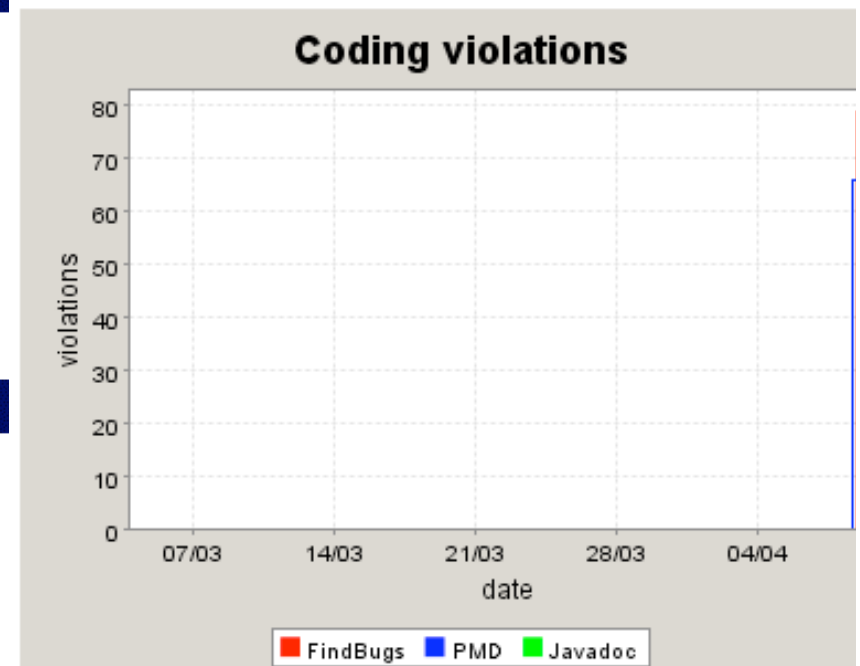
(* Defects per Thousand lines of non-commenting source statements)

Summary

Warning Type	Number
Bad practice Warnings	6
Correctness Warnings	1
Malicious code vulnerability Warnings	6
Performance Warnings	2
Dodgy Warnings	64
Total	79

Warnings

Click on a warning row to see full context information.



Plugin for Hudson

- Reads FindBugs xml output for each build
- Presents:
 - Warning trend graph
 - Warning deltas for each build
 - Per-package warning bar graphs
 - Links into source code
- Warnings may optionally affect project “health”
- Plugin by Ullrich Hafner
- Hudson by Kohsuke Kawaguchi

Plugin for Hudson

Hudson

?

[Hudson » FindBugs](#)

[ENABLE AUTO REF](#)

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[FindBugs Result](#)

[Subversion Polling Log](#)

Project FindBugs

[Workspace](#)

[Recent Changes](#)

[Latest Test Result \(no failures\)](#)

Build History [\(trend\)](#)

#171	Oct 15, 2007 3:51:42 PM
#170	Oct 15, 2007 3:01:40 PM
#169	Oct 15, 2007 2:16:39 PM
#168	Oct 15, 2007 1:16:39 PM
#167	Oct 15, 2007 11:51:20 AM
#166	Oct 15, 2007 11:43:56 AM
#165	Oct 15, 2007 11:36:39 AM
#164	Oct 15, 2007 11:26:39 AM
#163	Oct 13, 2007 8:51:39 PM
#162	Oct 13, 2007 7:34:12 PM

[More ...](#)

[for all](#) [for failures](#)

Permalinks

- ◆ [Last build \(#171\), 40 minutes ago](#)
- ◆ [Last stable build \(#171\), 40 minutes ago](#)
- ◆ [Last successful build \(#171\), 40 minutes ago](#)
- ◆ [Last failed build \(#138\), 8 days ago](#)

Test Result Trend

(just show failures) [enl](#)

FindBugs Trend: All Warnings

Plugin for Hudson

Hudson

Hudson » FindBugs

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[Workspace](#)
[FindBugs Result](#)
[Subversion Polling Log](#)

Build History

		(trend)
#171	Oct 15, 2007 3:51:42 PM	
#170	Oct 15, 2007 3:01:40 PM	
#169	Oct 15, 2007 2:16:39 PM	
#168	Oct 15, 2007 1:16:39 PM	
#167	Oct 15, 2007 11:51:20 AM	
#166	Oct 15, 2007 11:43:56 AM	
#165	Oct 15, 2007 11:36:39 AM	
#164	Oct 15, 2007 11:26:39 AM	
#163	Oct 13, 2007 8:51:39 PM	
#162	Oct 13, 2007 7:34:12 PM	

More ...
for all for failures

Project FindBugs

[Workspace](#)
[Recent Changes](#)
[Latest Test Result](#) (no failures)

Permalinks

- Last build (#171), 40 minutes ago
- Last stable build (#171), 40 minutes ago
- Last successful build (#171), 40 minutes ago
- Last failed build (#138), 8 days ago

Test Result Trend

(just show failures) enl

FindBugs Trend: All Warnings

Plugin for Hudson

Hudson

search ? login

Hudson » FindBugs » #39 » FindBugs Result

ENABLE AUTO REFRESH

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FindBugs Result

Summary

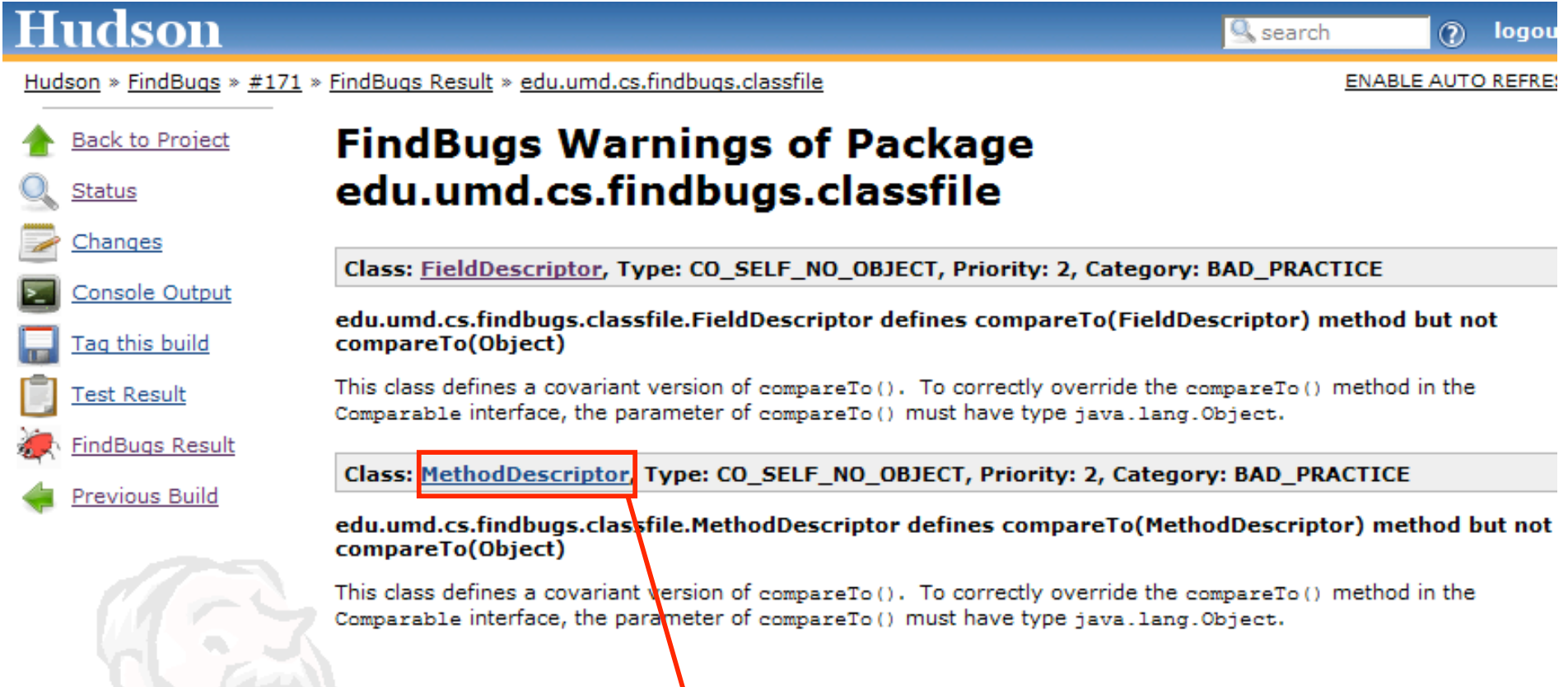
All Warnings	New Warnings	Fixed Warnings
47	0	1 (Details)

Package Statistics

Package	Total	Distribution
edu.umd.cs.findbugs.classfile.impl	4	<div></div>
edu.umd.cs.findbugs.classfile.analysis	1	<div></div>
edu.umd.cs.findbugs.asm	1	<div></div>
edu.umd.cs.findbugs.classfile.engine	3	<div></div>
edu.umd.cs.findbugs.classfile.engine.bcel	2	<div></div>
edu.umd.cs.findbugs.classfile	2	<div></div>
edu.umd.cs.findbugs.visitclass	1	<div></div>
edu.umd.cs.findbugs	3	<div></div>
edu.umd.cs.findbugs.ba.generic	2	<div></div>
edu.umd.cs.findbugs.ba.npe2	3	<div></div>
edu.umd.cs.findbugs.detect	7	<div></div>
edu.umd.cs.findbugs.ba	7	<div></div>
edu.umd.cs.findbugs.jaif	2	<div></div>
edu.umd.cs.findbugs.ba.ch	2	<div></div>
edu.umd.cs.findbugs.gui2	4	<div></div>
edu.umd.cs.findbugs.util	3	<div></div>



Plugin for Hudson



Hudson [?](#) [logou](#)

[Hudson](#) » [FindBugs](#) » [#171](#) » [FindBugs Result](#) » [edu.umd.cs.findbugs.classfile](#) [ENABLE AUTO REFRE](#)

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FindBugs Warnings of Package edu.umd.cs.findbugs.classfile

Class: [FieldDescriptor](#), Type: CO_SELF_NO_OBJECT, Priority: 2, Category: BAD_PRACTICE

edu.umd.cs.findbugs.classfile.FieldDescriptor defines compareTo(FieldDescriptor) method but not compareTo(Object)

This class defines a covariant version of `compareTo()`. To correctly override the `compareTo()` method in the `Comparable` interface, the parameter of `compareTo()` must have type `java.lang.Object`.

Class: [MethodDescriptor](#), Type: CO_SELF_NO_OBJECT, Priority: 2, Category: BAD_PRACTICE

edu.umd.cs.findbugs.classfile.MethodDescriptor defines compareTo(MethodDescriptor) method but not compareTo(Object)

This class defines a covariant version of `compareTo()`. To correctly override the `compareTo()` method in the `Comparable` interface, the parameter of `compareTo()` must have type `java.lang.Object`.

Link into
source