

Developer WorkBench

PMD - Code Review Tool

Lesson Objectives

- In this lesson, you will learn:
 - What is PMD
 - PMD Rulesets
 - PMD usage
 - PMD in Action

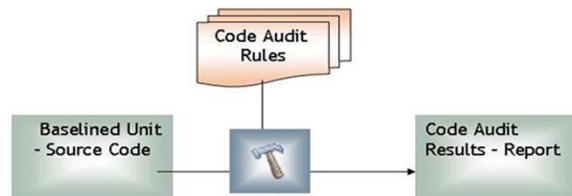


What is PMD?

- Automated code review utility for java
- Static code analyzer
- Automatically detects a wide range of potential defects and unsafe or non-optimized code
- Focuses on preemptive defect detection

What is PMD? (Contd...)

- Possible bugs: Empty try/catch/finally/switch statements
- Dead code: Unused local variables, parameters and private methods
- Suboptimal code: Wasteful String/String Buffer usage
- Overcomplicated expressions - Unnecessary if statements, for loops that could be while loops
- Duplicate code: Copied/pasted code means copied/pasted bugs



PMD Rule Sets

- Rules are grouped together and form a Rule Set
E.g. Basic Rules, Code Size Rules, Coupling Rules, Design Rules, JavaBeans Rules, Junit Rules, Migration Rules, Naming Rules, Optimization Rules, Security Code Guidelines, Unused Code Rules, etc.
- For more information visit:
<http://pmd.sourceforge.net/rules/index.html>

PMD Usage

- Installation:
 - Windows and UNIX
- Prerequisites:
 - JDK 1.4 or higher
 - WinZip for Windows or "zip" utility InfoZip for UNIX
- Download the latest binary distribution - i.e., pmd-bin-x.xx.zip from <http://pmd.sourceforge.net/index.html>. Unzip it into any directory
 - *Note: Please contact ITIMD Helpdesk to download the plug-in

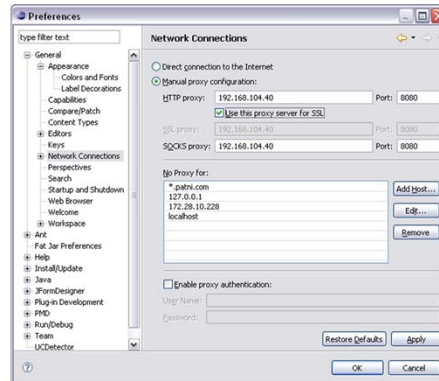
Integration with IDE's

- PMD can be integrated with following IDE's:

- Eclipse
- Jdeveloper
- Jedit
- Jbuilder
- BlueJ
- CodeGuide
- NetBeans/Sun Java Studio Enterprise/Creator
- IntelliJ IDEA
- TextPad
- Maven
- Ant
- Gel
- Jcreator
- Emacs

Integration with Eclipse IDE

- Configure Eclipse:
 - Setup the network connection in Eclipse preferences. Go to Windows -> Preferences -> General -> Network Connection
 - Set your preferences as per your Internet Browser Connections Settings

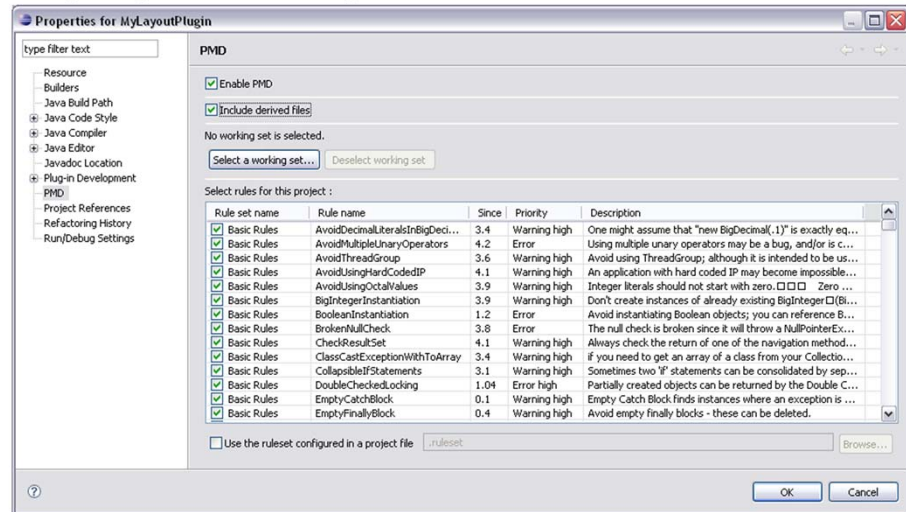


Integration with Eclipse IDE (Contd...)

- To install PMD plug-in,
 - Start Eclipse and open a project
 - Select "Help"->"Software Updates"->"Find and Install"
 - Click "Next", then click "New remote site"
 - Enter "PMD" into the Name field and "http://pmd.sf.net/eclipse" into the URL field (this downloads the plug in from the site)
 - Click through the rest of the dialog boxes to install the plug-in
- Alternatively, you can download the latest zip file and follow the above procedures except for using "New local site" and browsing to the downloaded zip file.

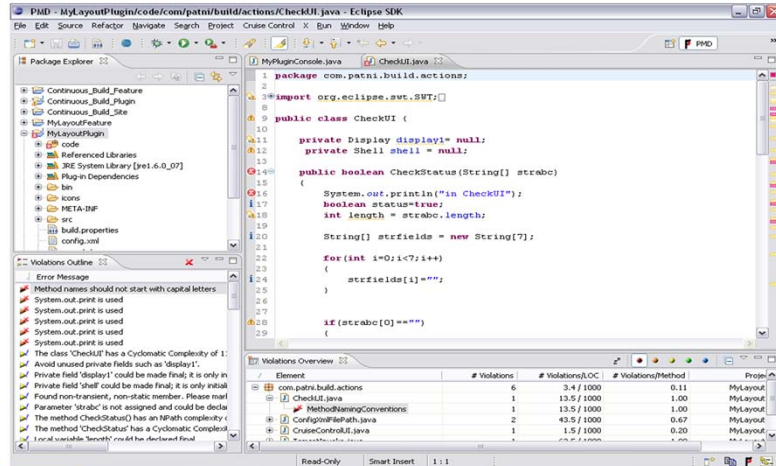
Integration with Eclipse IDE (Contd...)

■ Configuring PMD in a Project:



Integration with Eclipse IDE (Contd...)

- To run PMD with Eclipse – Right click on the project, select PMD – Check Code with PMD

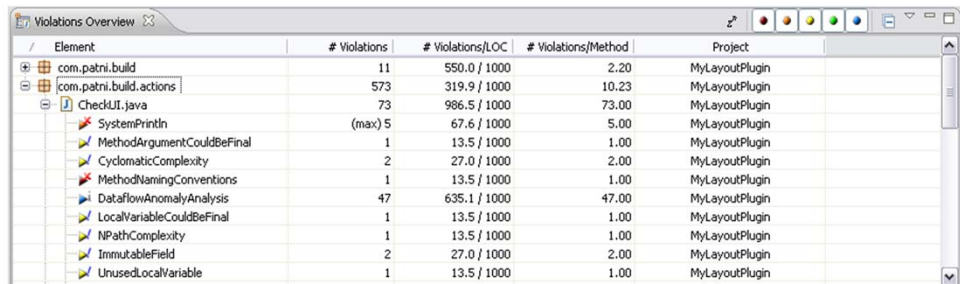


PMD In Action

- PMD is quite flexible. You can use it in two basic ways:
 - Wait for PMD to automatically analyze a file each time it is saved or added to the project
 - Manually execute it against selected files, folders, or projects

PMD In Action (Contd...)

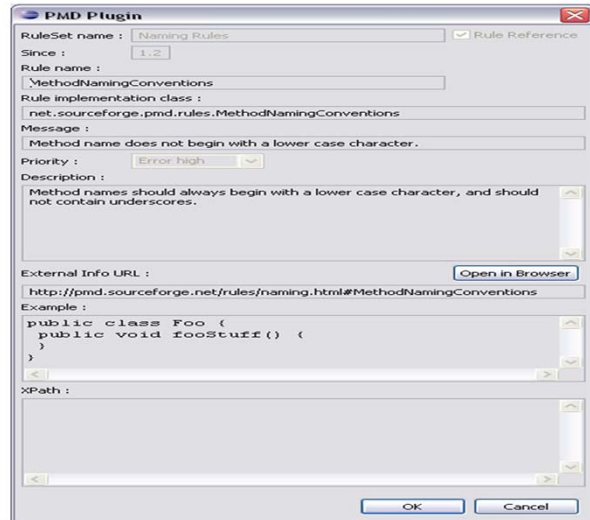
- PMD violations have the following five levels of severity:
 - Error (high)
 - Error
 - Warning (high)
 - Warning
 - Information



Element	# Violations	# Violations/LOC	# Violations/Method	Project
com.patni.build	11	550.0 / 1000	2.20	MyLayoutPlugin
com.patni.build.actions	573	319.9 / 1000	10.23	MyLayoutPlugin
CheckUIT.java	73	986.5 / 1000	73.00	MyLayoutPlugin
SystemPrintln	(max) 5	67.6 / 1000	5.00	MyLayoutPlugin
MethodArgumentCouldBeFinal	1	13.5 / 1000	1.00	MyLayoutPlugin
CyclomaticComplexity	2	27.0 / 1000	2.00	MyLayoutPlugin
MethodNamingConventions	1	13.5 / 1000	1.00	MyLayoutPlugin
DataflowAnomalyAnalysis	47	635.1 / 1000	47.00	MyLayoutPlugin
LocalVariableCouldBeFinal	1	13.5 / 1000	1.00	MyLayoutPlugin
NPathComplexity	1	13.5 / 1000	1.00	MyLayoutPlugin
ImmutableField	2	27.0 / 1000	2.00	MyLayoutPlugin
UnusedLocalVariable	1	13.5 / 1000	1.00	MyLayoutPlugin

PMD In Action (Contd...)

- Details of the Rule



The screenshot shows the 'PMD Plugin' configuration window. It contains the following fields and options:

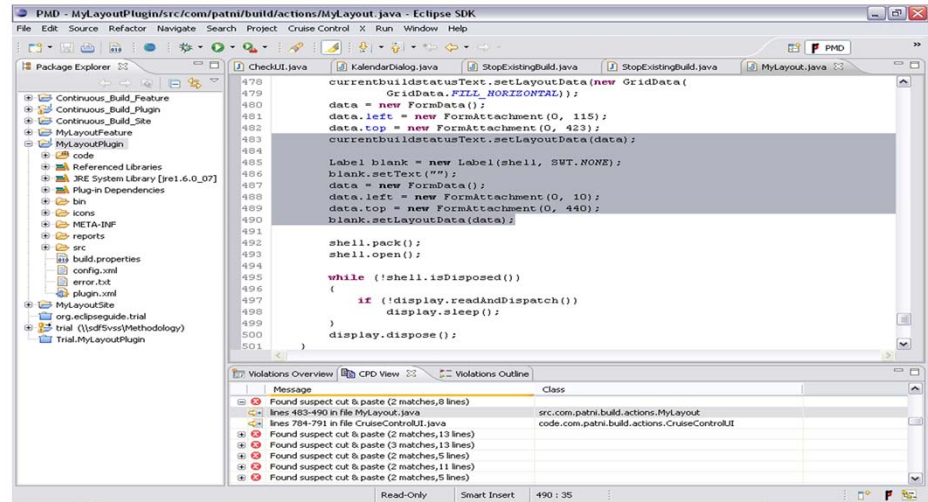
- RuleSet name :** Naming Rules
- Since :** 1.2
- Rule name :** MethodNamingConventions
- Rule implementation class :** net.sourceforge.pmd.rules.MethodNamingConventions
- Message :** Method name does not begin with a lower case character.
- Priority :** Error-high
- Description :** Method names should always begin with a lower case character, and should not contain underscores.
- External Info URL :** <http://pmd.sourceforge.net/rules/naming.html#MethodNamingConventions> (with an 'Open in Browser' button)
- Example :**

```
public class Foo {  
    public void fooStuff() {  
    }  
}
```
- XPath :** (empty)

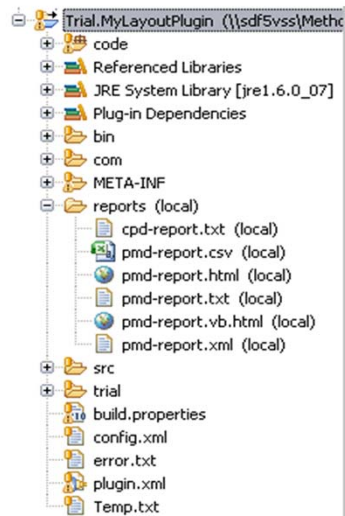
At the bottom are 'OK' and 'Cancel' buttons.

PMD In Action (Contd...)

■ Detecting Cut Pasted Code



PMD In Action (Contd...)



■ Reporting Feature: PMD generates reports in following formats:

- .txt
- .csv
- .html
- .vb.html
- .xml

PMD In Action (Contd...)

■ HTML Reporting Format:

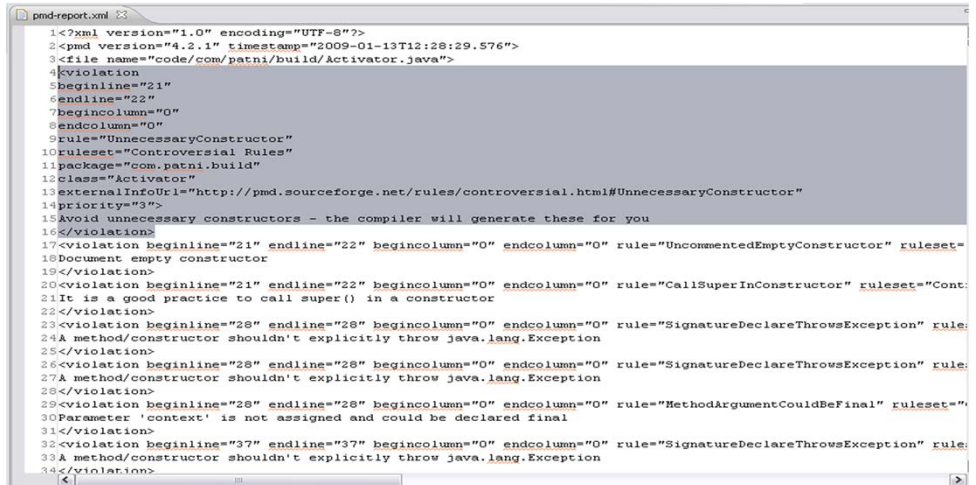
PMD report

Problems found

#	File	Line	Problem
1	code/com/patni/build/Activator.java	21	Avoid unnecessary constructors - the compiler will generate these for you
2	code/com/patni/build/Activator.java	21	Document empty constructor
3	code/com/patni/build/Activator.java	21	It is a good practice to call super() in a constructor
4	code/com/patni/build/Activator.java	28	A method/constructor shouldn't explicitly throw java.lang.Exception
5	code/com/patni/build/Activator.java	28	A method/constructor shouldn't explicitly throw java.lang.Exception
6	code/com/patni/build/Activator.java	28	Parameter 'context' is not assigned and could be declared final
7	code/com/patni/build/Activator.java	37	A method/constructor shouldn't explicitly throw java.lang.Exception
8	code/com/patni/build/Activator.java	37	A method/constructor shouldn't explicitly throw java.lang.Exception
9	code/com/patni/build/Activator.java	37	Parameter 'context' is not assigned and could be declared final
10	code/com/patni/build/Activator.java	38	Assigning an Object to null is a code smell. Consider refactoring.
11	code/com/patni/build/Activator.java	58	Parameter 'path' is not assigned and could be declared final
12	code/com/patni/build/actions/CheckUI1.java	7	The class 'CheckUI1' has a Cyclomatic Complexity of 11 (Highest = 10).
13	code/com/patni/build/actions/CheckUI1.java	9	Avoid unused private fields such as 'display1'.
14	code/com/patni/build/actions/CheckUI1.java	9	This final field could be made static
15	code/com/patni/build/actions/CheckUI1.java	10	This final field could be made static
16	code/com/patni/build/actions/CheckUI1.java	12	The method 'checkStatus' has a Cyclomatic Complexity of 10.
17	code/com/patni/build/actions/CheckUI1.java	12	The method checkStatus() has an NPath complexity of 512

PMD In Action (Contd...)

■ XML Reporting Format:



```

1<?xml version="1.0" encoding="UTF-8"?>
2<pmd version="4.2.1" timestamp="2009-01-13T12:28:29.576">
3<file name="code/com/patni/build/Activator.java">
4<violation
5beginline="21"
6endline="22"
7begincolumn="0"
8endcolumn="0"
9rules="UnnecessaryConstructor"
10ruleset="Controversial Rules"
11package="com.patni.build"
12class="Activator"
13externalInfoUrl="http://pmd.sourceforge.net/rules/controversial.html#UnnecessaryConstructor"
14priority="3">
15void unnecessary constructors - the compiler will generate these for you
16</violation>
17<violation beginline="21" endline="22" begincolumn="0" endcolumn="0" rule="UncommentedEmptyConstructor" ruleset="Controversial Rules">
18Document empty constructor
19</violation>
20<violation beginline="21" endline="22" begincolumn="0" endcolumn="0" rule="CallSuperInConstructor" ruleset="Controversial Rules">
21It is a good practice to call super() in a constructor
22</violation>
23<violation beginline="28" endline="28" begincolumn="0" endcolumn="0" rule="SignatureDeclareThrowsException" ruleset="Controversial Rules">
24A method/constructor shouldn't explicitly throw java.lang.Exception
25</violation>
26<violation beginline="28" endline="28" begincolumn="0" endcolumn="0" rule="SignatureDeclareThrowsException" ruleset="Controversial Rules">
27A method/constructor shouldn't explicitly throw java.lang.Exception
28</violation>
29<violation beginline="28" endline="28" begincolumn="0" endcolumn="0" rule="MethodArgumentCouldBeFinal" ruleset="Controversial Rules">
30Parameter 'context' is not assigned and could be declared final
31</violation>
32<violation beginline="37" endline="37" begincolumn="0" endcolumn="0" rule="SignatureDeclareThrowsException" ruleset="Controversial Rules">
33A method/constructor shouldn't explicitly throw java.lang.Exception
34</violation>

```

Customizing PMD

- It is possible to create your own rules and rule sets
- For additional information and detailed description on customizing PMD visit,
 - http://www.jacoozi.com/index.php?option=com_content&task=view&id=121&Itemid=134
 - <http://pmd.sourceforge.net/>

Lab: 3

- 2.1: Installing PMD
- 2.2 Using PMD with Eclipse



Summary

- Learned the usage of PMD
- Understood how to Integrate PMD with Eclipse IDE



Review Question

- Question 1: PMD is a
 - Review tool
 - Testing Tool
 - Design Tool

- Question 2: PMD violations has _____ level of severity
 - Error (high)
 - Fatal
 - Warning (high)
 - Information

