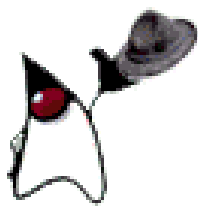


**Jugat**



**it2one**

# The Stairway to Maven

## The JAKARTA Project Build And Comprehension Tool

DI Siegfried GÖSCHL  
siegfried.goeschl@it2one.at

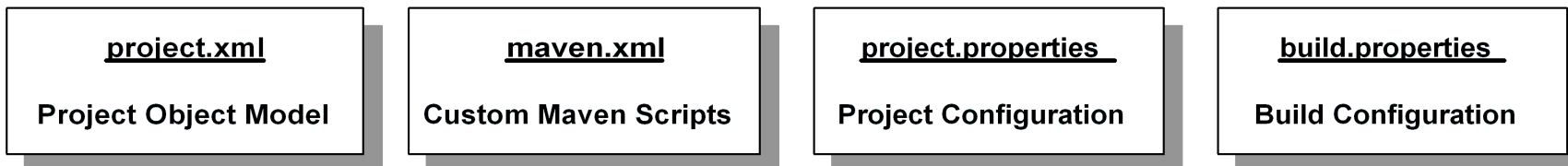
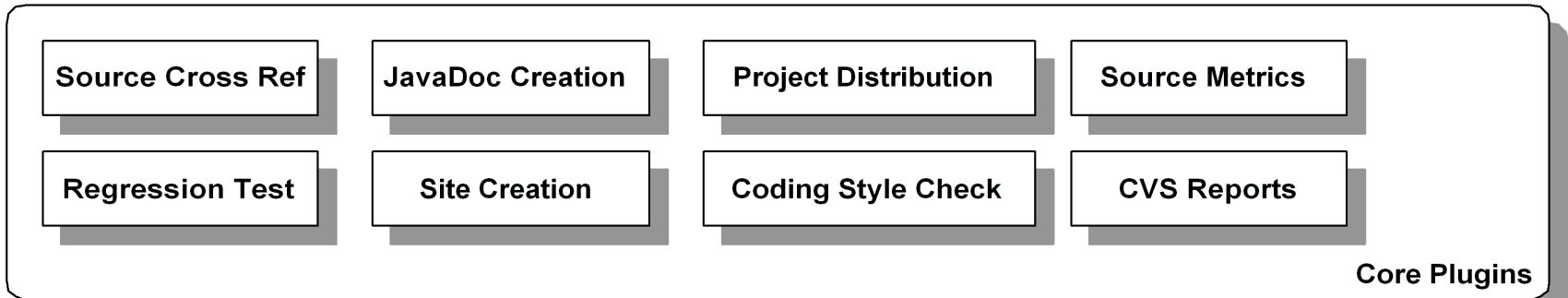
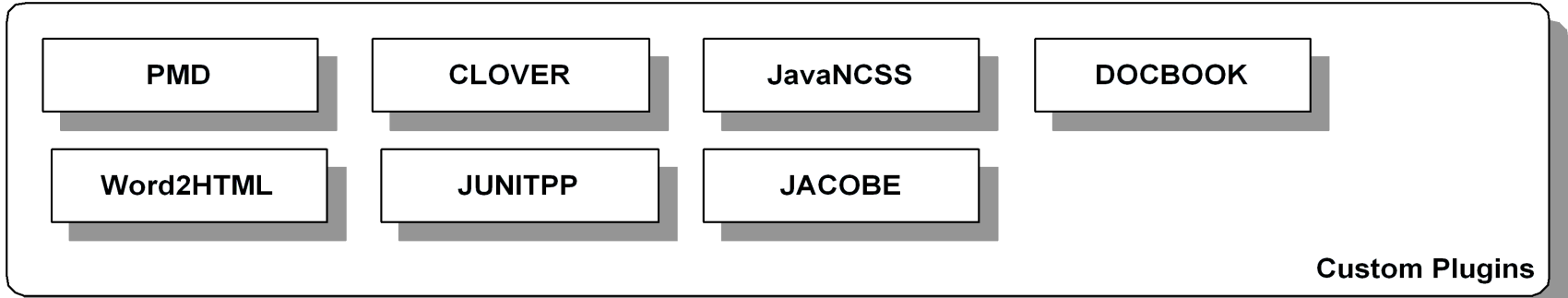
How do you build and maintain complex software projects written in Java?!

- The Chinese Approach ...
  - You can always find a student or two for the build
- Make or better not to Make – that's the question ...
  - Ever tried to run a UNIX makefile on Windows?!
- All ANTs are equal and some are even more equal ...
  - Tired of copy/pasting ANT scripts?!
  - Need something like ANT with more bells and whistles?!

**The intent of Maven is to make intra-project development highly manageable in the hopes of providing more time for cross-project development. You might call it cross-project pollination or the sharing of project development knowledge, this is what Maven attempts to encourage.**

**Jason van Zyl**

- **Maven was initially developed for buiding Turbine**
- **Maven matured into an open source software engineering platform**
- **The core functionality is automated project building, distribution and website creation**
- **A project is described with a XML Project Object Model (POM)**
- **The POM defines how to build a project and the external dependencies**
- **The Maven functionality is implemented in terms of plugins**
- **The plugins are written in Jelly**
- **JARs are downloaded from a remote repository and stored into a local repository**



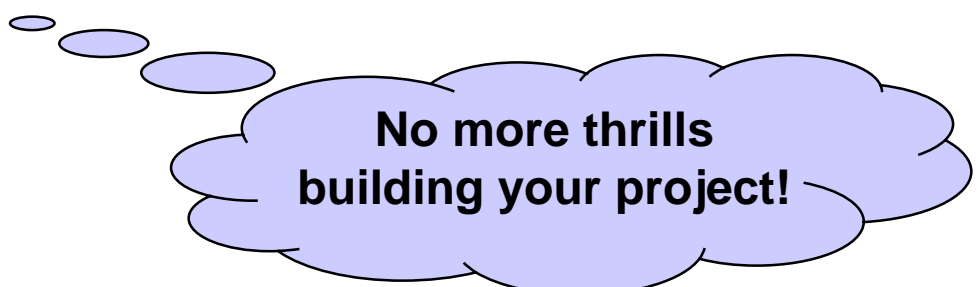
## Project Object Model (POM)

- Verbose project description
- Company information
- List of developer and their roles
- Mailing list support
- CVS server access
- Source code and unit test code path
- JAR dependencies
  - Versioning
  - How to download



## Build Plugins

- The distribution plugin allows building a binary or a source distribution from the command line
- An **ANT** build file can be generated and distributed to allow **ANT** users to build the distribution
- Other plugins allows
  - Creating a WAR file
  - Creating a JAR file
  - Deploying the distribution automatically



No more thrills  
building your project!

## Site Plugin

- Site creation based on Project Object Model
- Site generation uses XDOC
  - Maven generated XDOC
  - Manually written documentation
- DVSL transforms XDOC into HTML
- Site layout is defined through *xdoc/navigation.xml*
- Site appearance is customizable through properties defined in *project.properties*



## Site Plugin

The screenshot shows a Microsoft Internet Explorer browser window displaying the 'PartyCodeIdTypes' page. The browser title is 'The Invoice20one Site - XML-RPC Datatypes - Microsoft Internet Explorer'. The page has a left sidebar with navigation links and a main content area with a table of PartyCodeIdTypes.

**Home**

- [Front Page](#)
- [IT20one Team](#)
- [Progress](#)
- [Todo](#)

**Design**

- [Goals](#)
- [Overview](#)

**ESD**

- [Overview](#)
- [Properties](#)
- [Metadata](#)

**XML-RPC**

- [Overview](#)
- [Functions](#)
- [Datatypes](#)

**Services**

**PartyCodeIdTypes**

A PartyCodeIdType classifies an identifier for looking a party

PartyCodeIdType	Description
internal	The internally used UUID for a party
external	A unique external id, usually the customer id of the target system
duns	A DUNS code of the party
iln	An ILN code of the party
goverment_id	A unique goverment id such as "Firmenbuchnummer"

**Language Codes**

The [ISO 639-1 Codes](#) are used

## Site Plugin

Opera - [ The JUNITPP Project - Project Reports ]

File Edit View Navigation Bookmarks E-mail News Window Help

file:///localhost/W:/work/junitpp/target/docs/maven-reports.html Go Google search Search 100%

### Project Reports

- PMD Report

### Project Documentation

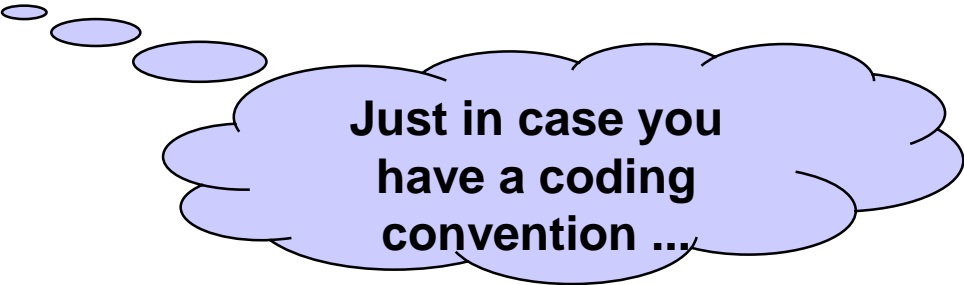
- Front Page
- Project Info
- Project Reports
  - Change Log
  - Developer Activity
  - File Activity
  - Unit Tests
  - Metric Results
  - Checkstyle Report
- JavaDocs
- Source XReference
- Development Process

Overview	
Document	Description
<a href="#">Change Log</a>	This document provides a history of the most recent changes made to the project.
<a href="#">Developer Activity</a>	This document provides a report of activity in terms of CVS commits and breaks it out by developer.
<a href="#">File Activity</a>	This document provides a report of activity in terms of CVS commits and breaks it out by file.
<a href="#">Unit Tests</a>	This document provides the results of the unit tests that are part of this project. Successes and failures are noted.
<a href="#">Metric Results</a>	This document provides information on various source code metrics that have been computed. These metrics can provide useful information regarding the abstractness and total number of classes.
<a href="#">Checkstyle Report</a>	This document provides the results of the Checkstyle report. This report provides an indication of how well this project complies with its coding conventions.

Transfers Maven - Checkstyle Results The JUNITPP Project - ...

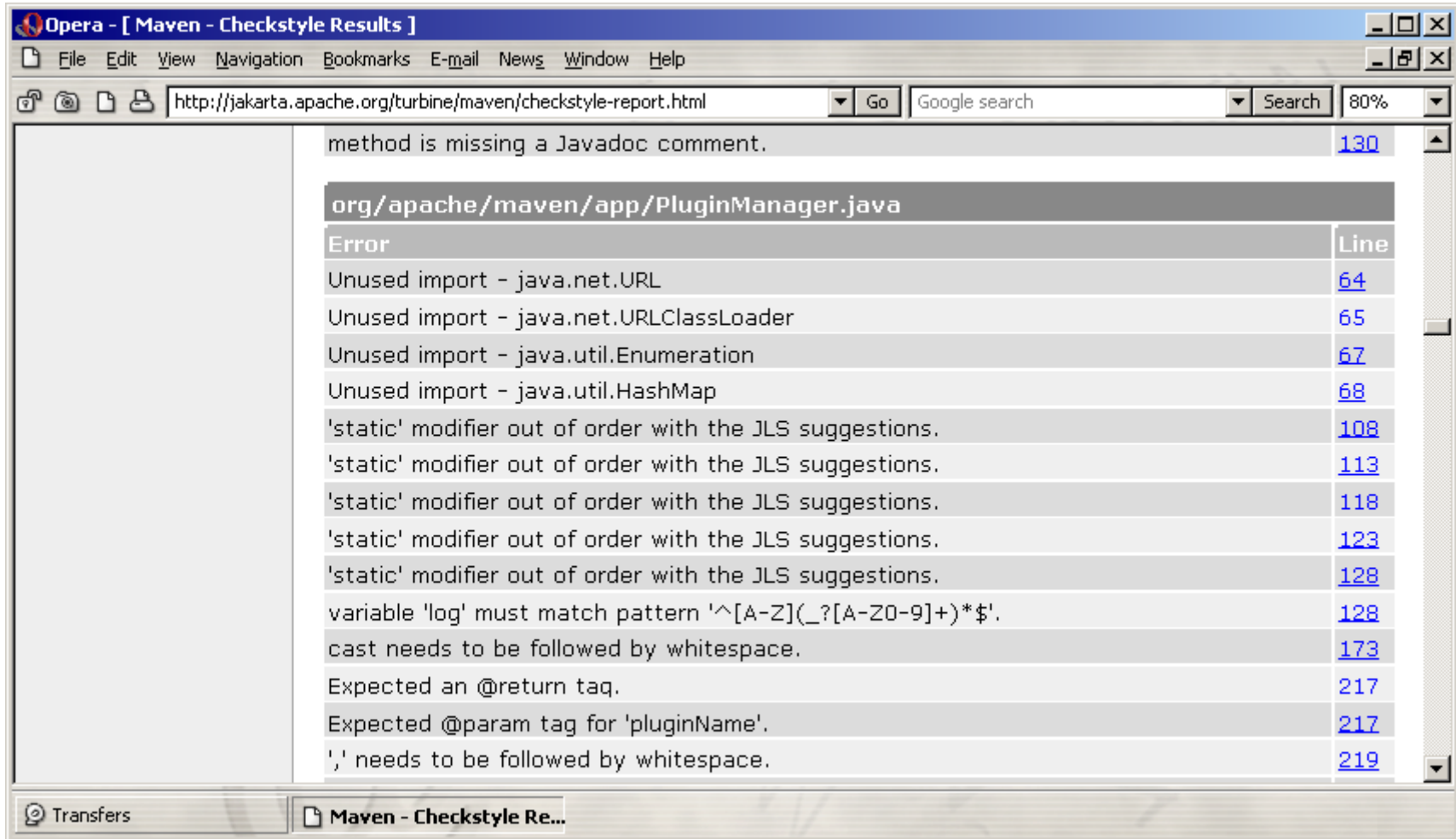
## CheckStyle Plugin

- Various coding styles can be defined
  - Sun coding convention
  - Turbine coding convention
  - Roll your own coding convention (if you really have to)
- Rules are customizable through *project.properties*
  - Maximum line length of 100 instead of 80 characters
  - Patterns for constants and variables
  - Setting a different tab width



**Just in case you  
have a coding  
convention ...**

## CheckStyle Plugin



The screenshot shows a web browser window titled "Opera - [ Maven - Checkstyle Results ]". The address bar displays the URL `http://jakarta.apache.org/turbine/maven/checkstyle-report.html`. The main content area shows a list of Checkstyle errors for the file `org/apache/maven/app/PluginManager.java`. The errors are listed in a table with a "Line" column on the right.

Error	Line
method is missing a Javadoc comment.	<a href="#">130</a>
<b>org/apache/maven/app/PluginManager.java</b>	
<b>Error</b>	<b>Line</b>
Unused import - java.net.URL	<a href="#">64</a>
Unused import - java.net.URLClassLoader	<a href="#">65</a>
Unused import - java.util.Enumeration	<a href="#">67</a>
Unused import - java.util.HashMap	<a href="#">68</a>
'static' modifier out of order with the JLS suggestions.	<a href="#">108</a>
'static' modifier out of order with the JLS suggestions.	<a href="#">113</a>
'static' modifier out of order with the JLS suggestions.	<a href="#">118</a>
'static' modifier out of order with the JLS suggestions.	<a href="#">123</a>
'static' modifier out of order with the JLS suggestions.	<a href="#">128</a>
variable 'log' must match pattern <code>^[A-Z](_[A-Z0-9]+)*\$</code> .	<a href="#">128</a>
cast needs to be followed by whitespace.	<a href="#">173</a>
Expected an @return tag.	<a href="#">217</a>
Expected @param tag for 'pluginName'.	<a href="#">217</a>
',' needs to be followed by whitespace.	<a href="#">219</a>

The browser's taskbar at the bottom shows a "Transfers" window and the active window "Maven - Checkstyle Re..."

## Activity Plugin

- Plugin accesses CVS directly to extract development activity information
- Extracts information about
  - Changes and commits
  - Number of commits per developer
  - Number of changes for a file
- Ongoing work to support VSS and ClearCase



**No more digging  
through CVS  
changelog**

## Activity Plugin

The JUNITPP Project - Change Log - Microsoft Internet Explorer

File Edit View Favorites Tools Help

**Home**

- Home
- Documentation
- Command Line
- Changes

**Project Reports**

- PMD Report

**Project Documentation**

- Front Page
- Project Info
- Project Reports
  - Change Log
  - Developer Activity
  - File Activity
  - Unit Tests
  - Metric Results

Change Log		
Date	Author	Files/Message
2002-09-04 09:37:12	Siegfried Goeschl	<a href="#">junitpp.jpr.local</a> - <a href="#">v1.3</a> <a href="#">maven.xml</a> - <a href="#">v1.4</a> <a href="#">project.properties</a> - <a href="#">v1.3</a> <a href="#">project.xml</a> - <a href="#">v1.3</a> <a href="#">xdocs/commandline.xml</a> - <a href="#">v1.1</a> <a href="#">xdocs/index.xml</a> - <a href="#">v1.2</a> <a href="#">xdocs/stylesheets/project.xml</a> - <a href="#">v1.2</a>  Cleaned up site and added documentation
2002-09-03 20:18:20	Siegfried Goeschl	<a href="#">maven.xml</a> - <a href="#">v1.3</a>  Commented out the PMD target
2002-09-03 20:11:09	Siegfried Goeschl	<a href="#">JUNIT.library</a> - <a href="#">v1.2</a> <a href="#">junitpp.jpr</a> - <a href="#">v1.2</a> <a href="#">junitpp.jpr.local</a> - <a href="#">v1.2</a>

## Test Plugin

- Runs **JUNIT** test case
- The plugin creates a **XDOC** report
- The **XDOC** report is then transformed to HTML
- The **JUNIT** test report is then integrated within the generated project site



I hope you  
have some tests?!

## Test Plugin

Opera - [ The JUNITPP Project - JUnit Test Results ]

File Edit View Navigation Bookmarks E-mail News Window Help

file:///localhost/W:/work/junitpp/target/docs/junit-report.html Go Google search Search 100%

Enter Internet addresses here (press arrow for previously typed addresses)

Name	Tests	Errors	Failures	Time(s)
<a href="#">AllTests</a>	15	0	0	32,000

**Test Cases**

[\[summary\]](#) [\[package list\]](#) [\[test cases\]](#)

**AllTests**

Name	Status	Type	Time(s)
testGetKeyWithBaseNameKey	Success		0,000
testGetKeyWithBaseKey	Success		0,000
testGetKeyWithClassNameKey	Success		0,000
testGetKeyWithKey	Success		0,000
testGetInteger	Success		0,000
testGetUndefinedKey	Success		0,000

Transfers Maven - Checkstyle Results The JUNITPP Project - ...



## JDepend Plugin

- Is using **JDepend** from ClarkWare
- Reports package dependencies
- Finds cyclic dependencies
- Generates a HTML report to be included into project website

## JDepend Plugin

The screenshot shows a web browser displaying the JDepend report for the JUNITPP Project. The browser window title is "The JUNITPP Project - JDepend Source Code Analysis - Microsoft Internet Explorer". The address bar shows the URL "http://junitpp.sourceforge.net/jdepend-report.html".

The main content area features a dark blue header with the text "Packages" and several navigation links: [\[summary\]](#), [\[packages\]](#), [\[cycles\]](#), and [\[explanations\]](#).

Below the header, there is a section for the package "junit.extensions". This section contains a table with the following data:

Afferent Couplings	Efferent Couplings	Abstractness
2	3	17%

Below the table, there are three columns of information:

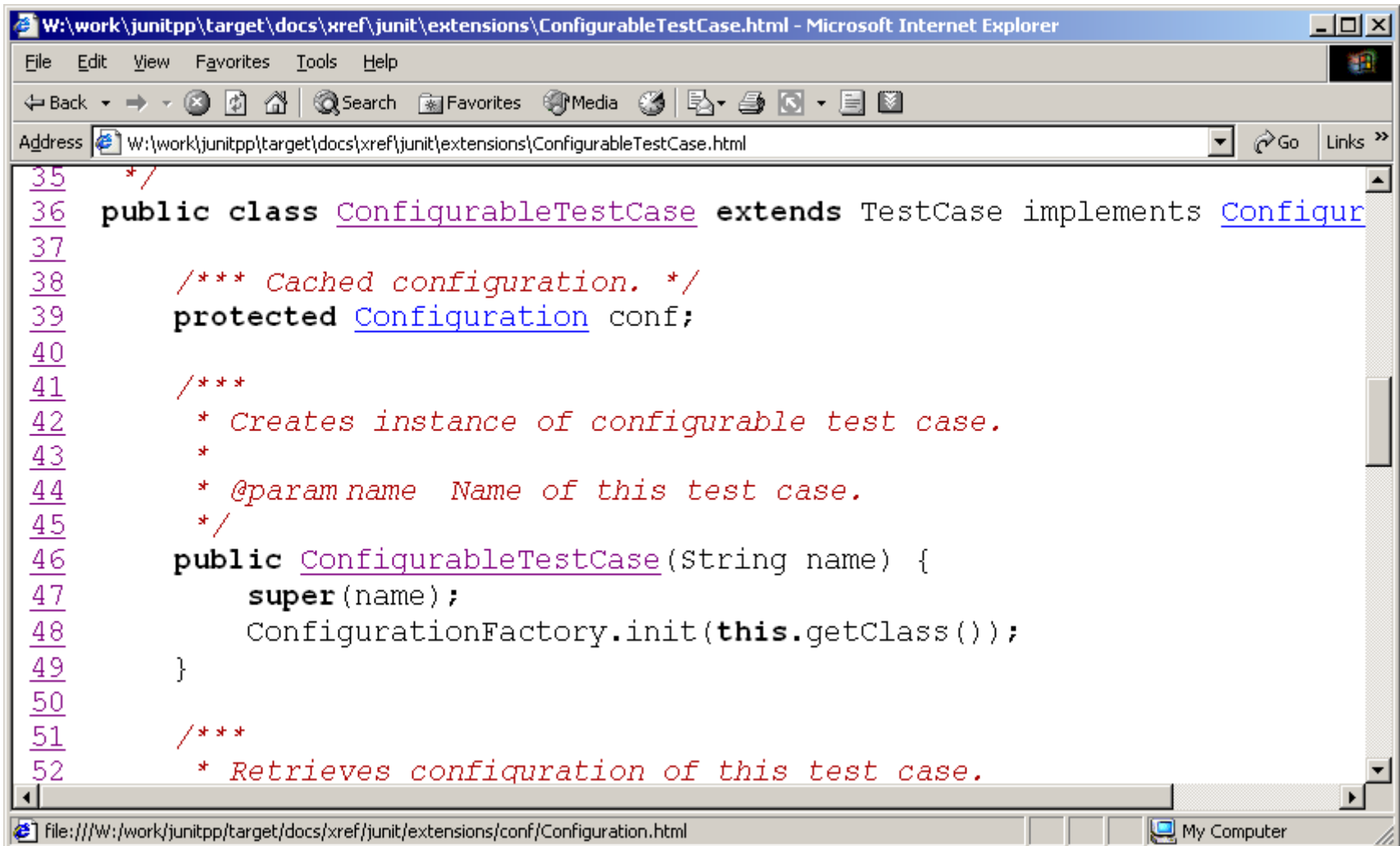
- Abstract Classes:** [ConfigurableTest](#)
- Concrete Classes:** [ActiveTest](#), [ConfigurableTestCase](#), [ConfigurableTestSetup](#), [PPTestResult](#), [PPTestRunner](#)
- Used by Packages:** [test.junit.extensions](#), [test.junit.extensions.util](#)

At the bottom of the browser window, the status bar shows "Internet".

## Java Cross Reference Plugin

- Transforms source files into HTML files
- Provides syntax coloring and hypertext linking
- Allows linking between reports and actual source code as done with
  - CheckStyle plugin
  - PMD plugin

## Java Cross Reference Plugin



```
35  */
36  public class ConfigurableTestCase extends TestCase implements Configur
37
38      /** Cached configuration. */
39      protected Configuration conf;
40
41      /**
42       * Creates instance of configurable test case.
43       *
44       * @param name Name of this test case.
45       */
46      public ConfigurableTestCase(String name) {
47          super(name);
48          ConfigurationFactory.init(this.getClass());
49      }
50
51      /**
52       * Retrieves configuration of this test case.
```

## JavaDoc Plugin

JUNITPP Library 3.8.1 API - Microsoft Internet Explorer

File Edit View Favorites Tools Help Links >>

[junit.extensions](#)  
[junit.extensions.conf](#)  
[junit.extensions.util](#)

### Package junit.extensions

#### Interface Summary

<a href="#">ConfigurableTest</a>	Test that provides access to configuration parameters.
----------------------------------	--

#### Class Summary

<a href="#">ActiveTest</a>	A Decorator that runs a test in a separate thread.
<a href="#">ConfigurableTestCase</a>	Base class for test cases which are configured using a configuration file instead of hardcoding test data in the fixture.
<a href="#">ConfigurableTestSetup</a>	A Decorator to set up and tear down additional fixture state using configuration.
<a href="#">PPTestResult</a>	A <code>PPTestResult</code> collects the results of executing a test case and implements verbose output and delaying.

[ActiveTest](#)  
[ConfigurableTest](#)  
[ConfigurableTestCase](#)  
[ConfigurableTestSetup](#)  
[Configuration](#)  
[ConfigurationFactory](#)  
[EnhancedProperties](#)  
[FileConfiguration](#)  
[FileUtils](#)  
[LoadableConfiguration](#)  
[Parameters](#)  
[PPTestResult](#)  
[PPTestRunner](#)  
[TestDecorator](#)



- Everything in **Maven** is a plugin
- Feel free to roll and contribute your own plugins
- Deployment of plugins as JAR files being dropped into the maven plugin directory
- There are many plugins available
  - **CLOVER** Code Coverage Analyzer
  - **PMD** Static Source Code Analyzer
  - **JavaNCSS** Java Source Code Metric Analyzer
  - **Word2HTML**
  - ...

## Clover Test Coverage Plugin

- Commercial software from ***The Cortex***
- Instruments the **JUNIT** test case code
- Generates a HTML test coverage report
  - Conditional Coverage
  - Statement Coverage
  - Method Coverage
- Integrated into generated project site through Maven



Another good reason  
for unit tests !!



## Clover Test Coverage Plugin

<http://www.thecortex.net/clover/eg/checkstyle/report/index.html> - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://www.thecortex.net/clover/eg/checkstyle/report/index.html> Go Links >>

**Checkstyle 2.1 unit tests**  
Clover coverage report

[Overview](#)

**All Classes**

- [AuditEvent \(88.9%\)](#)
- [CheckStyleTask \(0%\)](#)
- [CheckStyleTask.Forr](#)
- [CheckStyleTask.Forr](#)
- [Checker \(84.1%\)](#)
- [Configuration \(61%\)](#)
- [DefaultLogger \(47.6%\)](#)
- [JavadocTag \(83.3%\)](#)
- [LeftCurlyOption \(42.5%\)](#)
- [LineText \(91.7%\)](#)
- [Main \(0%\)](#)
- [MethodSignature \(91.7%\)](#)
- [MyCommonAST \(100%\)](#)
- [MyModifierSet \(85%\)](#)
- [MyToken \(100%\)](#)
- [MyVariable \(100%\)](#)

**Clover coverage report - Checkstyle 2.1 unit tests**

Coverage timestamp: Fri Aug 30 2002 15:20:24 EST

[Overview](#) Package File

**project stats:** LOC: 5,162    **Methods:** 290

NCLOC: 2,796    **Classes:** 26

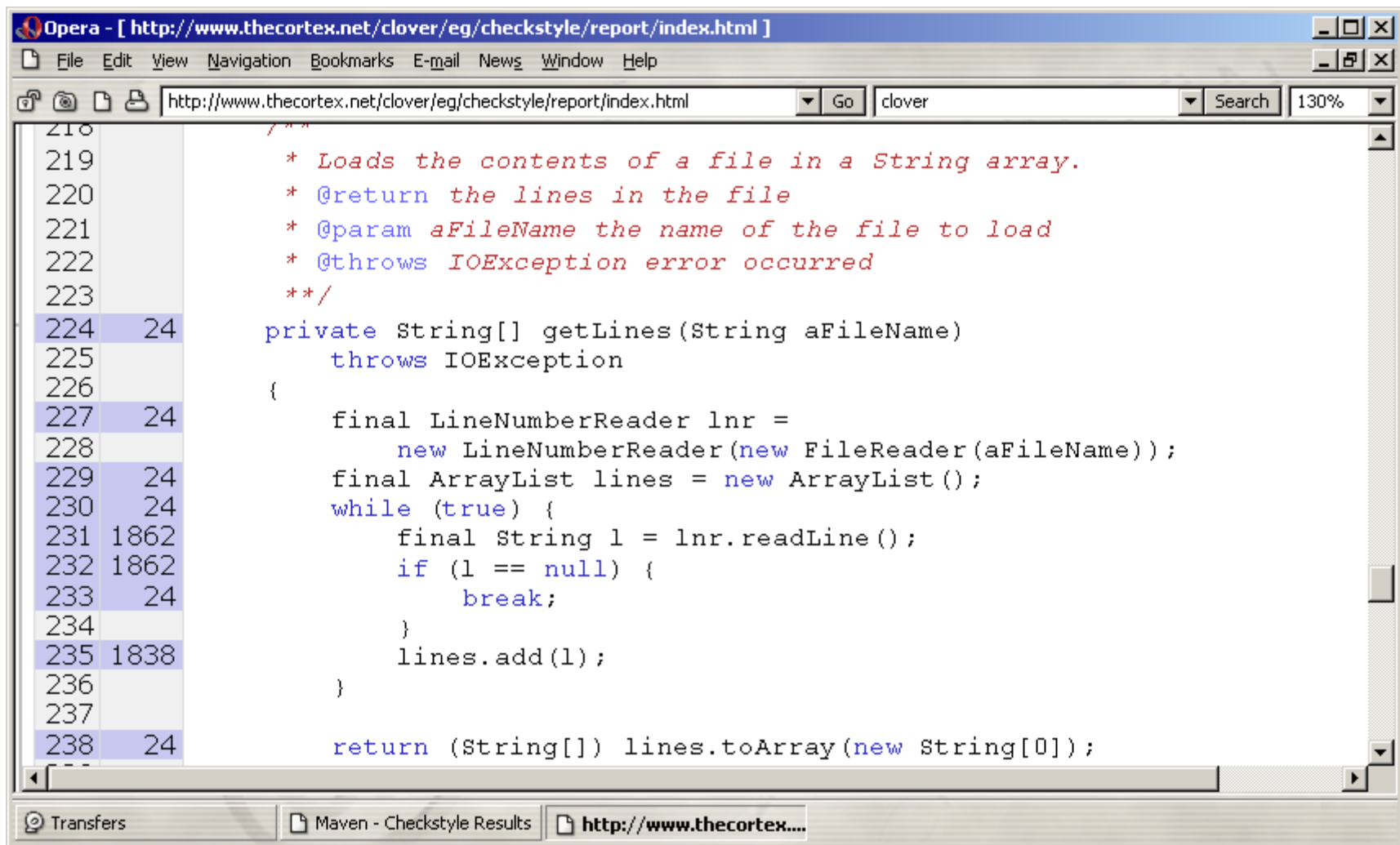
Files: 24    **Packages:** 1

	Conditionals	Statements	Methods	TOTAL	
<b>Project</b>	69.3%	63.3%	66.6%	<b>65.2%</b>	<div style="width: 65.2%; height: 15px; background: linear-gradient(to right, green 65.2%, red 65.2%);"></div>

	Conditionals	Statements	Methods	TOTAL	
<b>Packages</b>					
<a href="#">com.puppycrawl.tools.checkstyle</a>	69.3%	63.3%	66.6%	<b>65.2%</b>	<div style="width: 65.2%; height: 15px; background: linear-gradient(to right, green 65.2%, red 65.2%);"></div>

Report generated by [Clover v1.0](#) | *Continuous Integration License*  
Fri Aug 30 2002 15:23:55 EST.

## Clover Test Coverage Plugin



```
Opera - [ http://www.thecortex.net/clover/eg/checkstyle/report/index.html ]
File Edit View Navigation Bookmarks E-mail News Window Help
http://www.thecortex.net/clover/eg/checkstyle/report/index.html Go clover Search 130%
218
219      * Loads the contents of a file in a String array.
220      * @return the lines in the file
221      * @param aFileName the name of the file to load
222      * @throws IOException error occurred
223      **/
224 24 private String[] getLines(String aFileName)
225      throws IOException
226  {
227 24      final LineNumberReader lnr =
228          new LineNumberReader(new FileReader(aFileName));
229 24      final ArrayList lines = new ArrayList();
230 24      while (true) {
231 1862          final String l = lnr.readLine();
232 1862          if (l == null) {
233 24              break;
234          }
235 1838          lines.add(l);
236      }
237
238 24      return (String[]) lines.toArray(new String[0]);
```

Transfers | Maven - Checkstyle Results | http://www.thecortex....

## PMD Plugin

- **PMD** is a static source code analyzer
- **PMD** is rule driven
  - Basic rules
  - Import rules
  - Unused code rules
  - Naming rules
  - Design rules
- The plugin creates an HTML report with linking to the Source Cross Reference

## PMD Plugin

The screenshot shows a web browser window titled "The JUNITPP Project - PMD Results - Microsoft Internet Explorer". The address bar shows the URL "http://junitpp.sourceforge.net/pmd-report.html". The page content is organized into a sidebar and a main content area.

**Sidebar:**

- Project Info
- Project Reports
- JavaDocs
- Source XReference
- Development Process

**Main Content Area:**

**Avoid empty catch blocks** 74

**junit\extensions\PPTestRunner.java**

Violation	Line
<a href="#">Avoid unused local variables such as 'result'</a>	103
<a href="#">Avoid using 'if...else' statements without curly braces</a>	137
<a href="#">Avoid using 'if...else' statements without curly braces</a>	139
<a href="#">Avoid using 'if...else' statements without curly braces</a>	141
<a href="#">Avoid using 'if...else' statements without curly braces</a>	143

**test\junit\extensions\ConfigurableTestCaseTest.java**

Violation	Line
<a href="#">Avoid unused local variables such as 'result'</a>	112

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## JavaNCSS Plugin

- **JavaNCSS** is a source code metric analyzer
- Determines simple metrics
  - Number of packages
  - Number of classes
  - Number of functions
  - Number of non-commented lines of code
  - Number of JavaDoc lines
- Generates an XML report which is transformed to HTML using a XSL stylesheet

## JavaNCSS Plugin

JavaNCSS Analysis - Microsoft Internet Explorer

File Edit View Favorites Tools Help

### Packages

Nr.	Classes	Functions	NCSS	Javadocs	Package
1	1	2	7	3	javax.mail.internet
2	3	29	307	32	org.webdocwf.util.smime.activation
3	30	75	591	105	org.webdocwf.util.smime.cms
4	4	22	173	26	org.webdocwf.util.smime.crypto
5	17	50	658	67	org.webdocwf.util.smime.der
6	3	15	318	18	org.webdocwf.util.smime.exception
7	1	2	66	3	org.webdocwf.util.smime.mail
8	3	59	857	62	org.webdocwf.util.smime.smime
9	13	17	931	18	org.webdocwf.util.smime.test
10	7	41	622	48	org.webdocwf.util.smime.util
	82	312	4530	382	Total

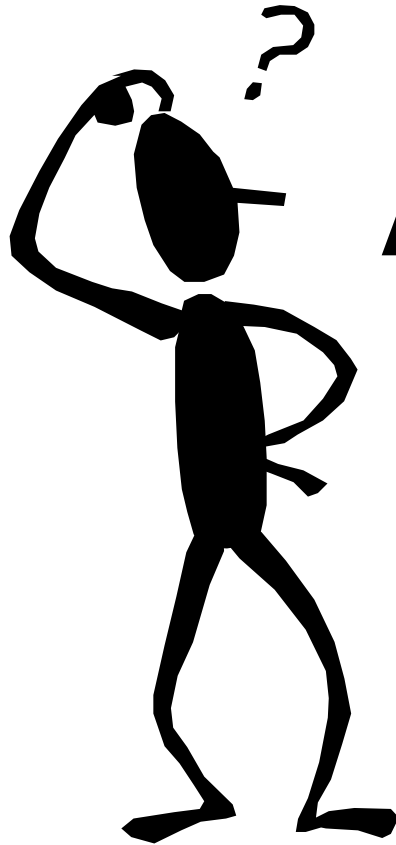
Packages	Classes	Functions	NCSS	Javadocs	per
10,00	82,00	312,00	4.530,00	382,00	Project
	8,20	31,20	453,00	38,20	Package
		3,80	55,24	4,66	Class
			14,52	14,52	Function

- Support of other version control systems for generating the activity report
  - Microsoft's Visual Source Safe
  - Rational's ClearCase
  - Perforce
- POM Inheritance Mechanism to simplify **mavenizing** multiple projects
- **Quilt** intergration as Open Source alternative to **Clover**
- There is a Source Forge Maven Plugin-in project

- **Maven** is an Open Source project build and comprehension tool developed by the **JAKARTA** community
- **Maven** is an integration platform for software engineering tools using a plug-in mechanism
- **Maven** provides a remote and local JAR repository to simplify upgrading of JARs
- **Maven** could be the answer to a lot of your software engineering problems
- And last but not least

**Maven rocks !!!**





Any questions !?

<b>Maven</b>	<a href="http://jakarta.apache.org/turbine/maven/">http://jakarta.apache.org/turbine/maven/</a>
<b>JavaNCSS</b>	<a href="http://www.kclee.com/clemens/java/javancss/">http://www.kclee.com/clemens/java/javancss/</a>
<b>PMD</b>	<a href="http://pmd.sourceforge.net/">http://pmd.sourceforge.net/</a>
<b>Turbine</b>	<a href="http://jakarta.apache.org/turbine/index.html">http://jakarta.apache.org/turbine/index.html</a>
<b>Clover</b>	<a href="http://www.thecortex.net/clover/">http://www.thecortex.net/clover/</a>
<b>JDepend</b>	<a href="http://www.clarkware.com/software/JDepend.html">http://www.clarkware.com/software/JDepend.html</a>
<b>Jelly</b>	<a href="http://jakarta.apache.org/commons/sandbox/jelly/">http://jakarta.apache.org/commons/sandbox/jelly/</a>
<b>Maven Plug-ins</b>	<a href="http://maven-plugins.sourceforge.net/">http://maven-plugins.sourceforge.net/</a>
<b>ANT</b>	<a href="http://jakarta.apache.org/ant/index.html">http://jakarta.apache.org/ant/index.html</a>
<b>QUILT</b>	<a href="http://quilt.sourceforge.net/">http://quilt.sourceforge.net/</a>
<b>DVSL</b>	<a href="http://jakarta.apache.org/velocity/dvsl/index.html">http://jakarta.apache.org/velocity/dvsl/index.html</a>

## Plugin Development

- The plugins are implemented in Jelly
  - Jelly is a XML scripting language similar to ANT
  - Allows conditionals and loops
  - Compatible to ANT scrips
- A plugin exports goals which are invoked
  - Directly by a script
  - As pregoal or postgoal within Maven
- A plugin can
  - Start external application
  - Fork a JVM to execute Java code
  - Execute a Java code in-process