

Inspection Customized Rule Usage

Summary

This guide discusses how to add customized rules other than the standard inspection rules provided by eGovFrame.

Creating Custom Rules

Users can create Inspection Rules by following two ways.

1. Using Java class
2. Using XPath

Creating Rules with Java Classes

PMD doesn't parse the source itself, it uses [JavaCC generated parser] instead. It refers to EBNF conforming AST([http://www.eclipse.org/articles/article.php?file=Article-JavaCodeManipulation_AST/index.html]) conforms to EBNF¹. In other words, it approaches to source via AST

It is recommended to avoid duplication between the names of Class member variable and Method local variable.

Let's created a rule with Java class to inspect it.

1. Extend AbstractRule.

```
public class DuplicateMemberLocalVariableNameRule extends AbstractRule {  
}
```

2. Override visit() Method to write Check Logic.

```
public class DuplicateMemberLocalVariableNameRule extends AbstractRule {  
    privateHashSetmVarName = new HashSet();  
  
    //Get the variable name of the class.  
    public Object visit(ASTFieldDeclaration node, Object data){  
        ASTVariableDeclaratorchildNodeName = (ASTVariableDeclarator)node.jjtGetChild(1);  
        ASTVariableDeclaratorIdchildNodeId = (ASTVariableDeclaratorId)childNodeName.jjtGetChild(0);  
        String varName = childNodeId.getImage();  
        mVarName.add(varName);  
  
        return data;  
    }  
  
    //if equals to the variable name of the method, invoke addViolation to notify it is against the rule.  
    //getVarName() is provided byAbstractRule.  
    public Object visit(ASTLocalVariableDeclaration node, Object data){  
        final String varName = getVarName(node);  
        if(mVarName.contains(varname)){  
            addViolation(data, node);  
        }  
  
        return data;  
    }  
}
```

The visit() method is invoked when specified AST Node exists in the source.(Visit PatternApplied)

*public Object visit(ASTFieldDeclaration node, Object data)*method has declaration of ASTNodeASTFieldDeclaration,the member variable of the class, it will be invoked by the number of times member variable counts in the source code..

*The public object visit(ASTLocalVariableDeclaration node, Object data)*method has declaration of ASTNode, ASTLocalVarilableDeclaration, the local variable of the method, it will be called when the local variable is being parsed.

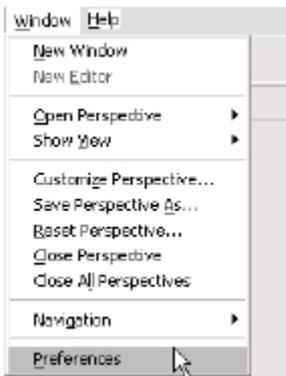
If any code exists in the visit() method that violates specified rule, and invoke theaddViolation() method.

- Refer to Eclipse Corner Articles:Abstract Syntax Tree [http://www.eclipse.org/articles/article.php?file=Article-JavaCodeManipulation_AST/index.html]and other web documents for detailed usage of AST.

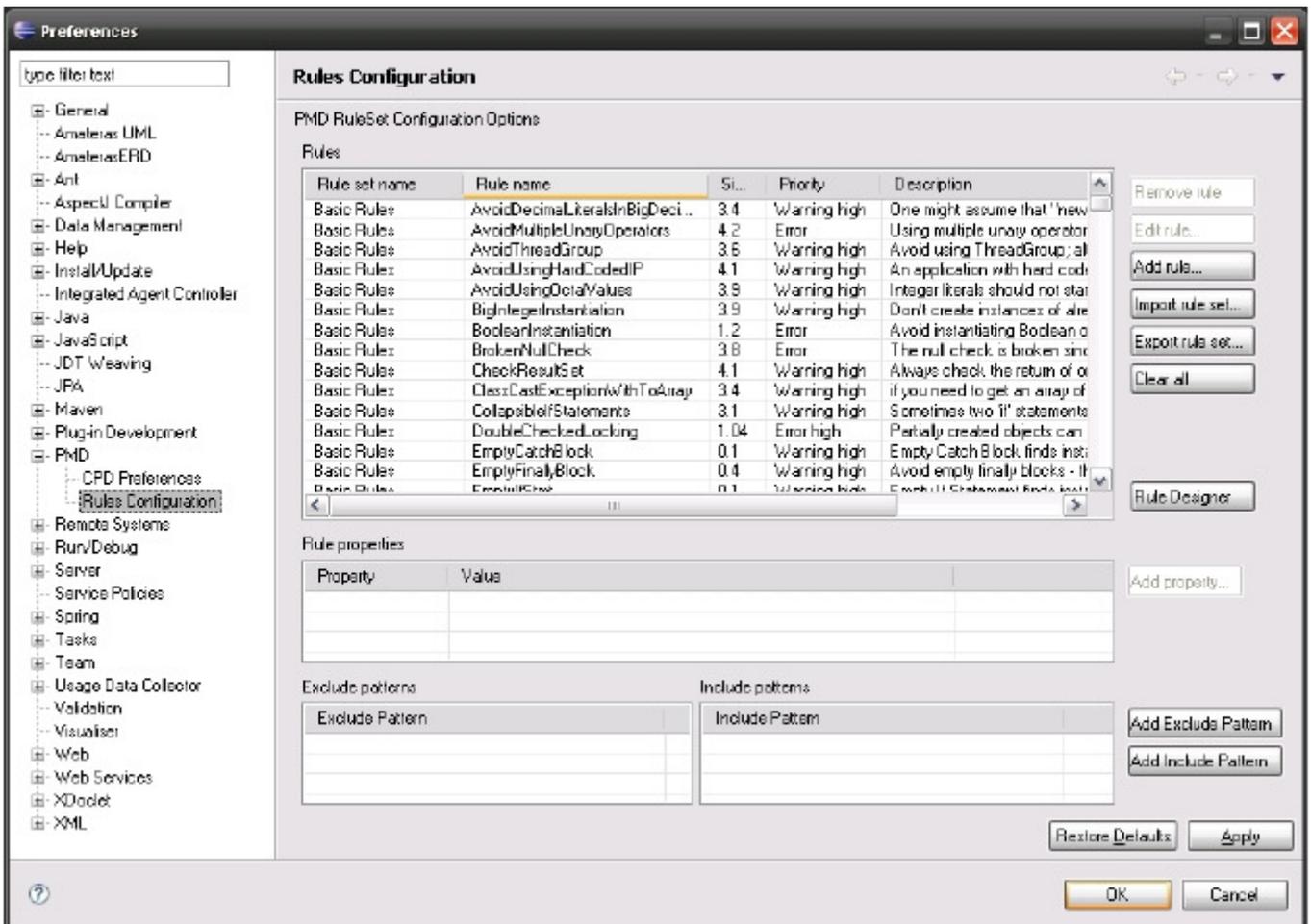
Create Rules with XPath

PMD provides the Rule Designer for support XPath rules. If PMD is separately installed, it's under bin/ directory. Launch Rule Designer as described below.

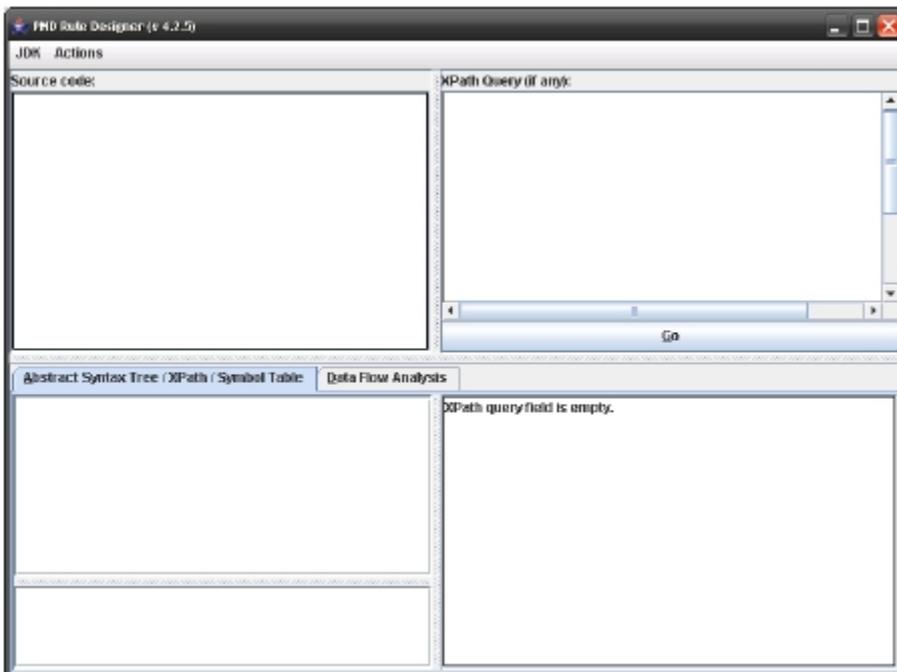
- Select Window > Preferencesfrom Eclipse IDE's Menu Bar.



- Select PMD > Rules Configuration at the left menu pane of Preferences window

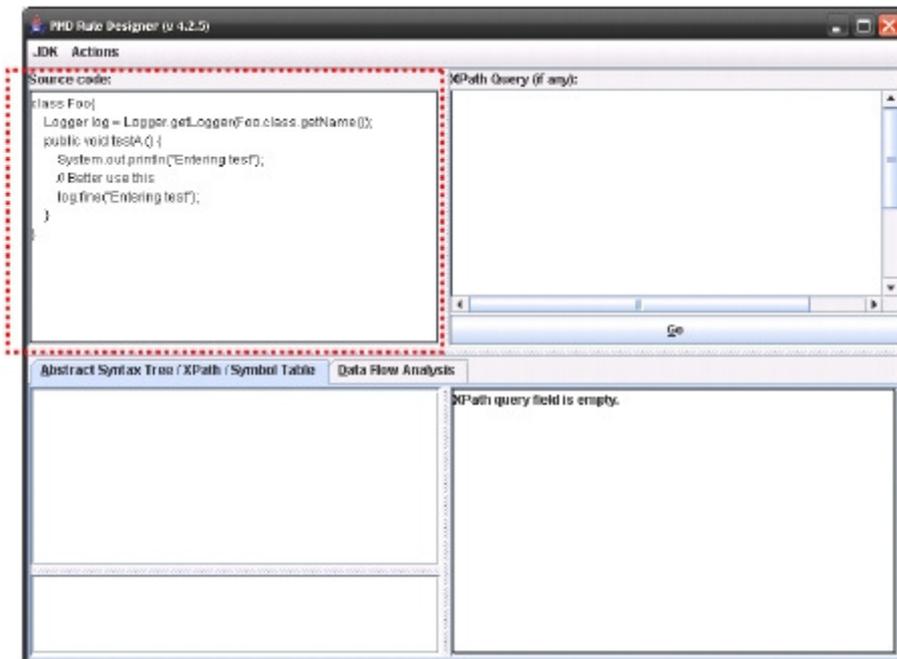


- Click the Rule Designer button at the right side of the Rules Configuration window
- The PMD Rule Designer opens in a new window.

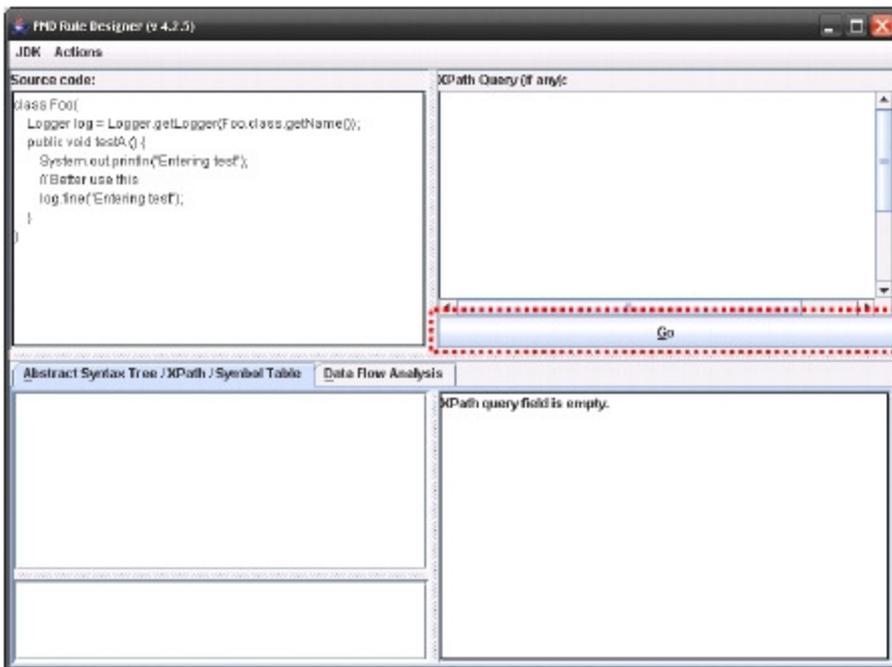


Follow below steps to create XPath rules in the PMD Rule Designer.

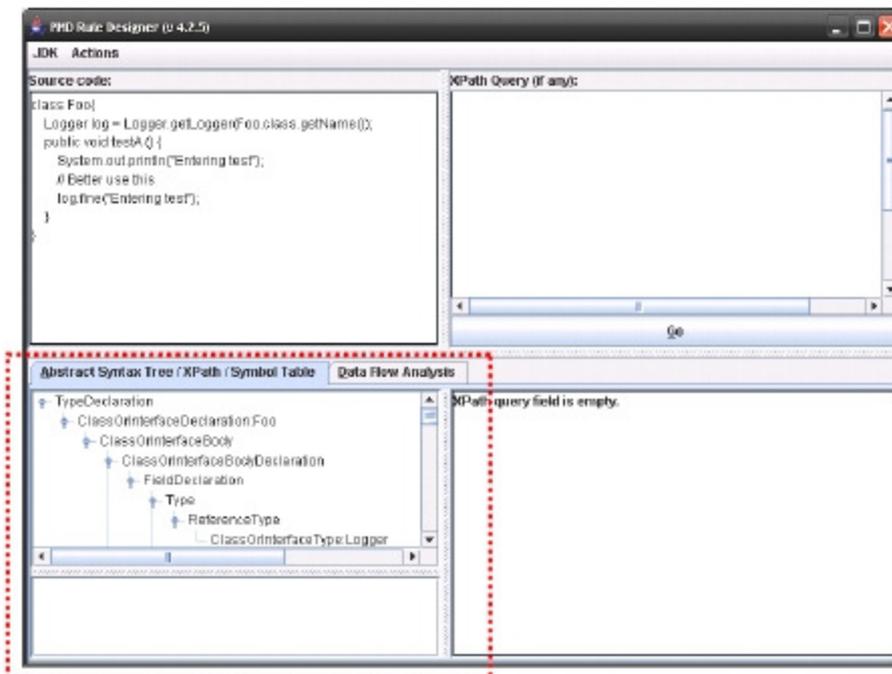
1. Enter a sample Java code in Source code: text input box at the left side of the window.



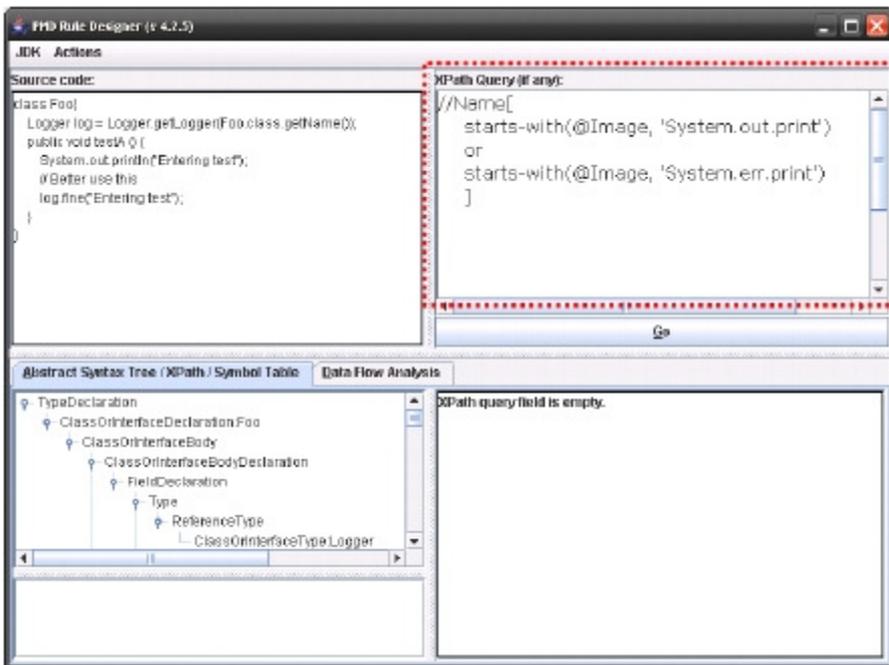
2. Click the Go button at the right side of the window.



3. Make sure contents of "AST/XPath/Symbol Table" tab and "Data Flow Analysis" tab are automatically created.



4. Input XPath query to search desired violation in an XPath Query (if any) text input box at the right side of the window.



Refer to following URL for detailed description of XPath

- <http://www.w3schools.com/xpath/default.asp> [<http://www.w3schools.com/xpath/default.asp>]

Creating a custom RuleSet file

Custom Rules created in Java class or XPath in RuleSet formatted XML file can be registered, modified, and deleted

Following section describes how to create a RuleSet file from custom Rule.

Creating aRuleSet file from Rules in Java classes

You can register Rules as <rule> element under <ruleset> element in a RuleSet XMLfile.

The following XMLRuleSet file is an example where a rule named AvoidReassigningParameters is added to eGov Standard Inspection RuleSet

Write XML code as following example, and save it something like 'eGovFrameworkRuleSet.xml' with XML as extension.

```
<ruleset name="eGovFrameworkRuleSet">
  <rule name="AvoidReassigningParameters" message="Do not directly change parameter values to something like "{0}" "
    class="net.sourceforge.pmd.rules.AvoidReassigningParameters">
    <description>Reassigning values to parameters is a questionable practice.
      Use a temporary local variable instead.</description>
    <example><![CDATA[
      public class Foo {
        private void foo(String bar) {
          bar = "something else";
        }
      }
    ]]>
    </example>
    <priority>2</priority>
  </rule>
</ruleset>
```

Following table lists description on XML elements to form <rule> element as shown in previous example.

Items	Type	Description
name	Attribute	Rule Name
message	Attribute	Display message when the source violates specified Rule
class	Attribute	Full name of user-created Java class
description	Element	Rule description
example	Element	Violation sample source to be displayed
priority	Element	Rule priority

Creating a RuleSet file in XPath

You can register Rules as <rule> element under a <ruleset> element in RuleSet XMLfile.

The following RuleSet file adds AvoidThrowingRawExceptionTypes rule to the eGov standard Inspection RuleSet.

```
<ruleset name="eGovFrameworkRuleSet">
  <rule name="AvoidThrowingRawExceptionTypes" message="Throwing Raw Exception is not recommended"
    class="net.sourceforge.pmd.rules.XPathRule">
    <description>Avoid throwing certain exception types. Rather than throw a raw RuntimeException,
      Throwable, Exception, or Error, use a subclassed exception or error instead.
    </description>
    <example><![CDATA[
      public class Foo {
        public void bar() throws Exception {
          throw new Exception();
        }
      }
    ]]>
  </rule>
</ruleset>
```

```

    }
  }]]>
</example>
<priority>2</priority>
<properties>
  <property name="xpath">
    <value><![CDATA[
      //AllocationExpression
      /ClassOrInterfaceType[
        @Image='Throwable' or
        @Image='Exception' or
        @Image='Error' or
        @Image='RuntimeException']]>
    </value>
  </property>
</properties>
</rule>
</ruleset>

```

Following table lists description on XML elements to form <rule> element as shown in previous example.

Items	Type	Description
name	Attribute	Rule name
message	Attribute	Display message when the source violates specified Rule
class	Attribute	Should be declared as net.sourceforge.pmd.rules.XPathRule when creating rules in XPath
description	Element	Rule description
example	Element	Violation sample source to be displayed
priority	Element	Rule priority
properties	Element	To register XPath, declare <property name="xpath"> as subnode, then set XPath to <value> //XPath

If you created Rules in XPath, you can directly type into an XML file as shown in previous example, or you can use the PMD Rule Designer. Note that it requires to observe all the steps mentioned above how to create rules in XPath.

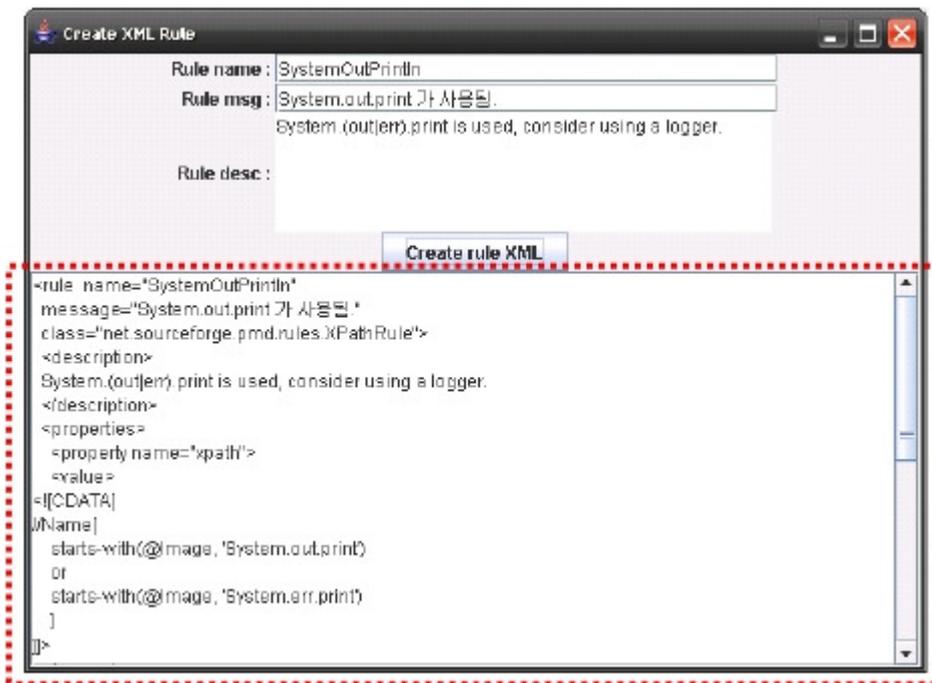
1. Select Actions > Create Rule XML, in thePMD Rule Designer Menu



2. Fill out Rule name:, Rule msg:, Rule desc: text input boxes in Create XML Rulewindow



3. Click theCreate rule XMLbutton in the Create XML Rulewindow
- 4.TheXML formatted rule will appear in the text input box at the bottom ofthe Create XML Rule window.Copy and use this.



Create RuleSet file content by using one of the two methods, then save it something like 'eGovFrameworkRuleSet.xml' with XML as extension.

Register and Apply custom Rules

Once custom RuleSet file is created, rules can be added by using Eclipse PMD plug-in. However, rules created in Java class requires following additional steps before register.

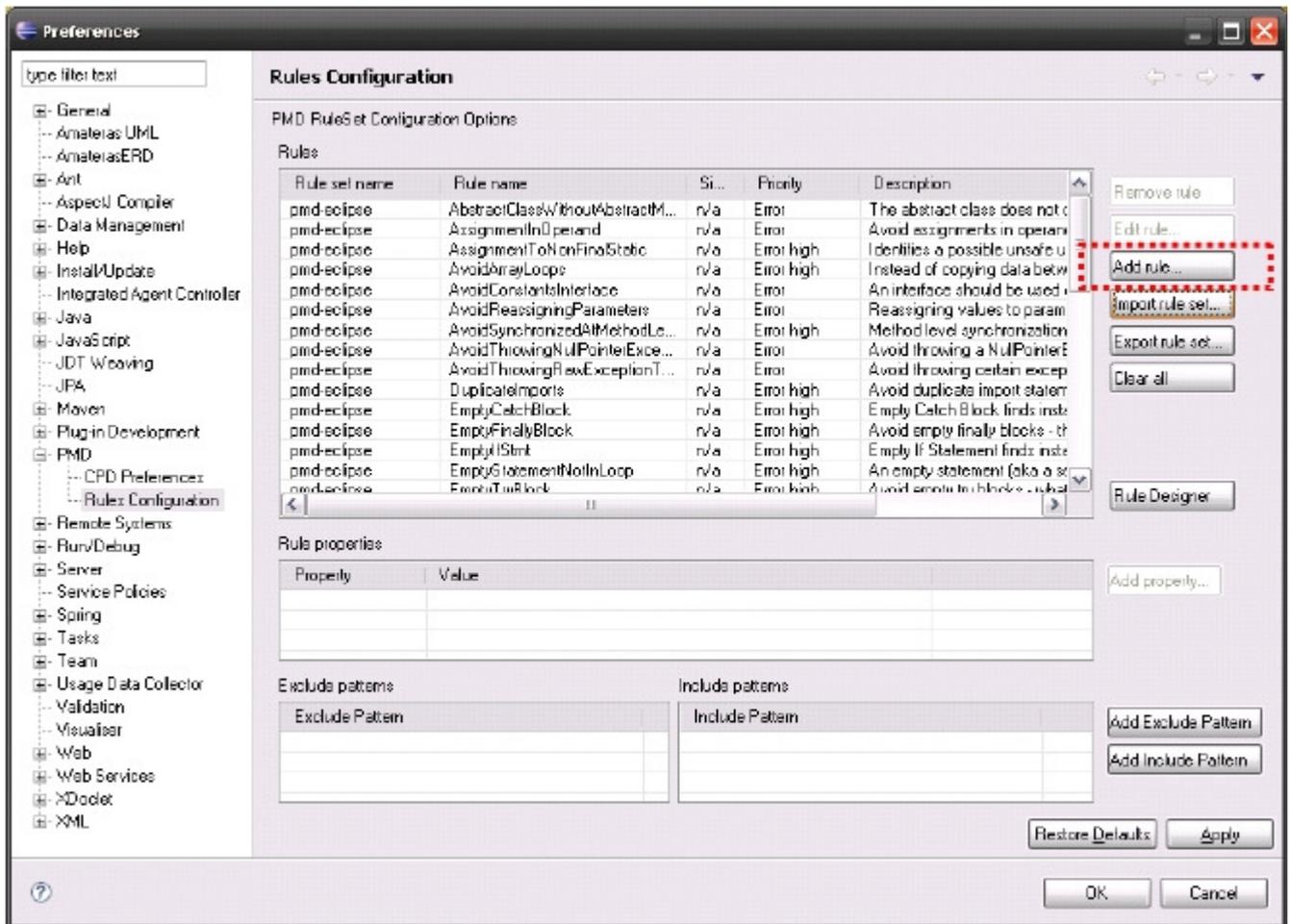
- Compile Rule defining Java class created in Creating RuleSet in Javaclass section.
- Repackage compiled binary file by adding to PMD Eclipse Pluginlibrary file as below.
 - File path: %Eclipse directory%\plugins\net.sourceforge.pmd.eclipse.plugin_xxx\lib\pmdxx-x.x.x.jar (x denote version)

You can register Rules by rules or by RuleSet files using Eclipse PMD plug-in.

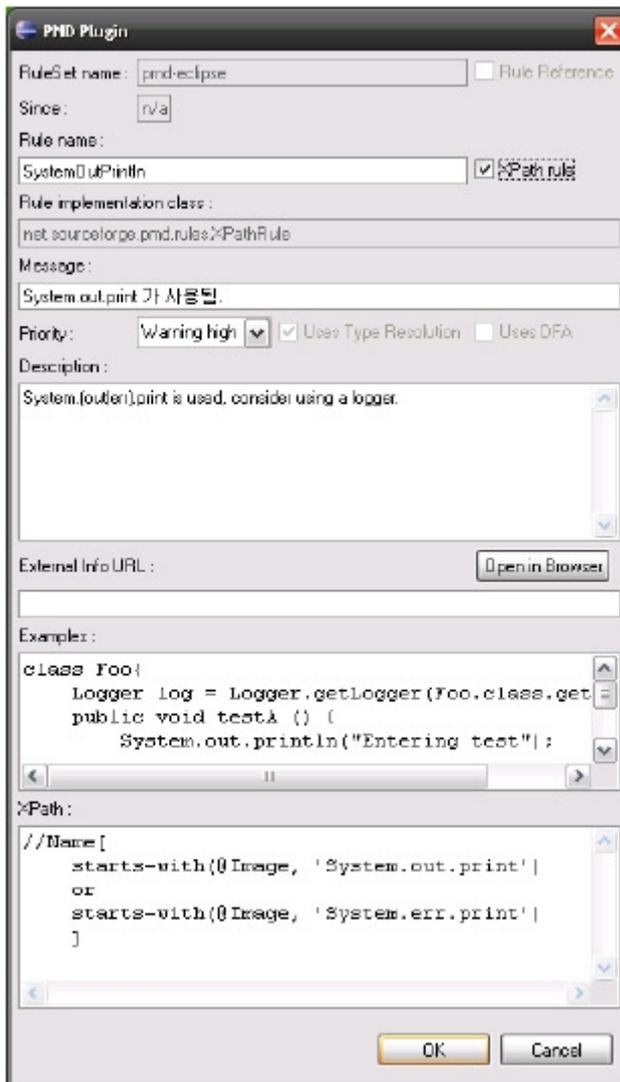
- Register and apply rules using Add rule... button in Rules Configuration
- Register and apply RuleSet files using Import rule set...button in Rules Configuration

Register and Apply Rules

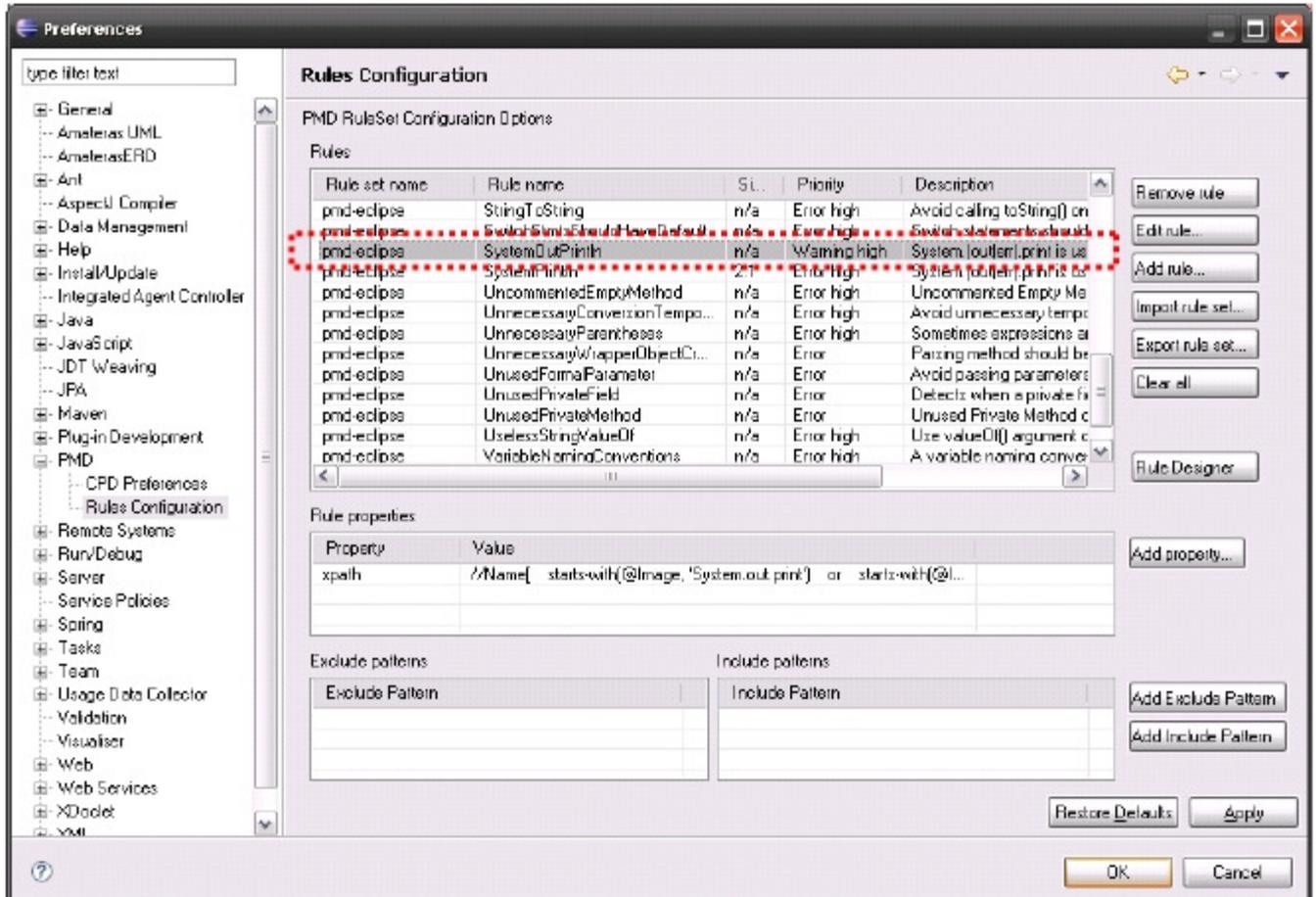
1. Select Window > Preferences in Eclipse IDE Menu
2. Select PMD > Rules Configuration in Menu list at the left pane of Preferences
3. Click the Add rule... button.



4. Fill out all required fields as shown below and click the OK button. Refer to XML items when created RuleSet files in PMD Plugin dialog for more information. (Uncheck XPath rule if the rule is created as JavaClass)



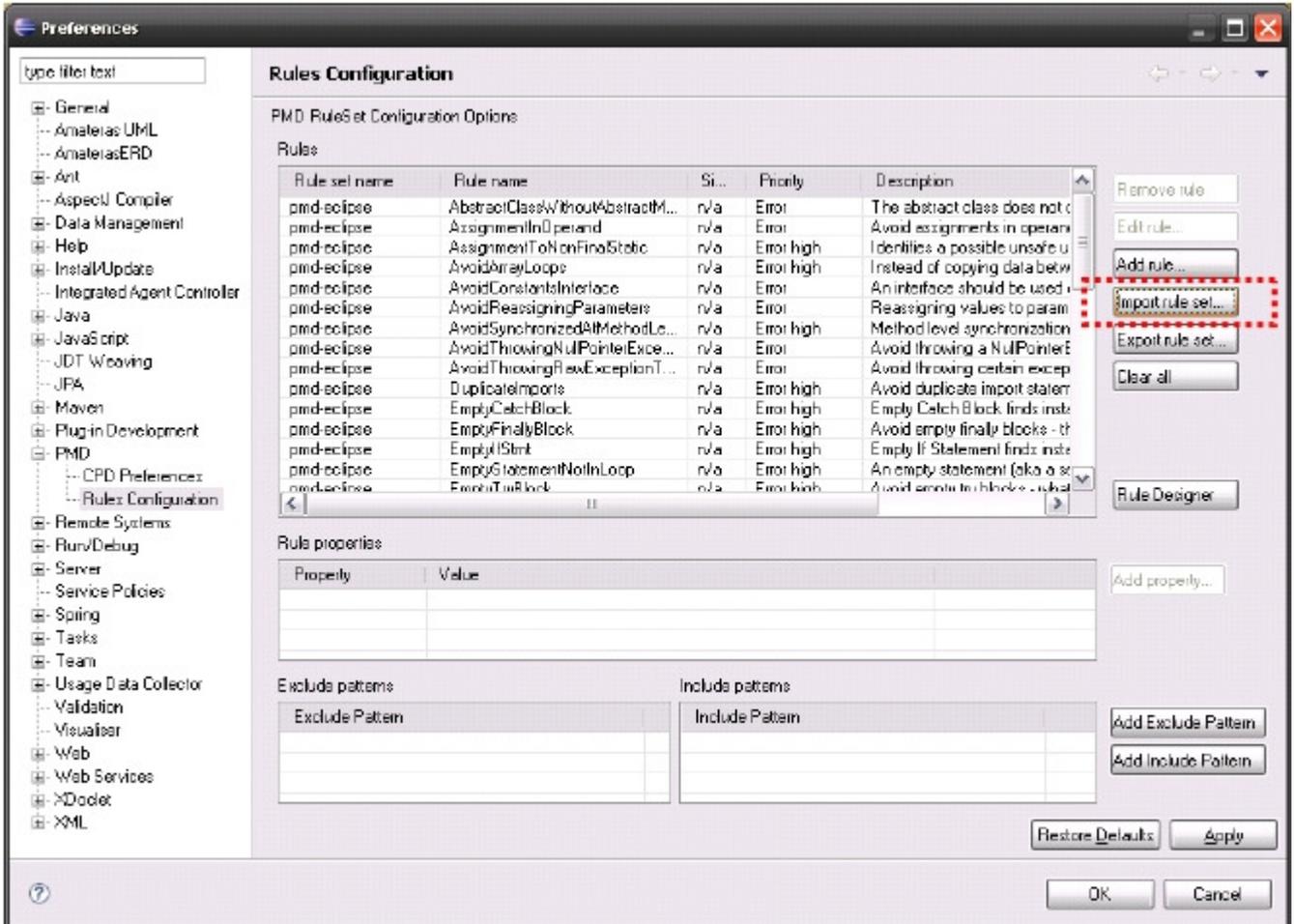
5. Check just added rule exists in Rules grid list in Preferenceswindow.



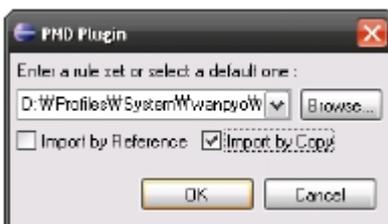
6. Click the OK button to apply imported rule to the Eclipse IDE

Register and apply RuleSet file

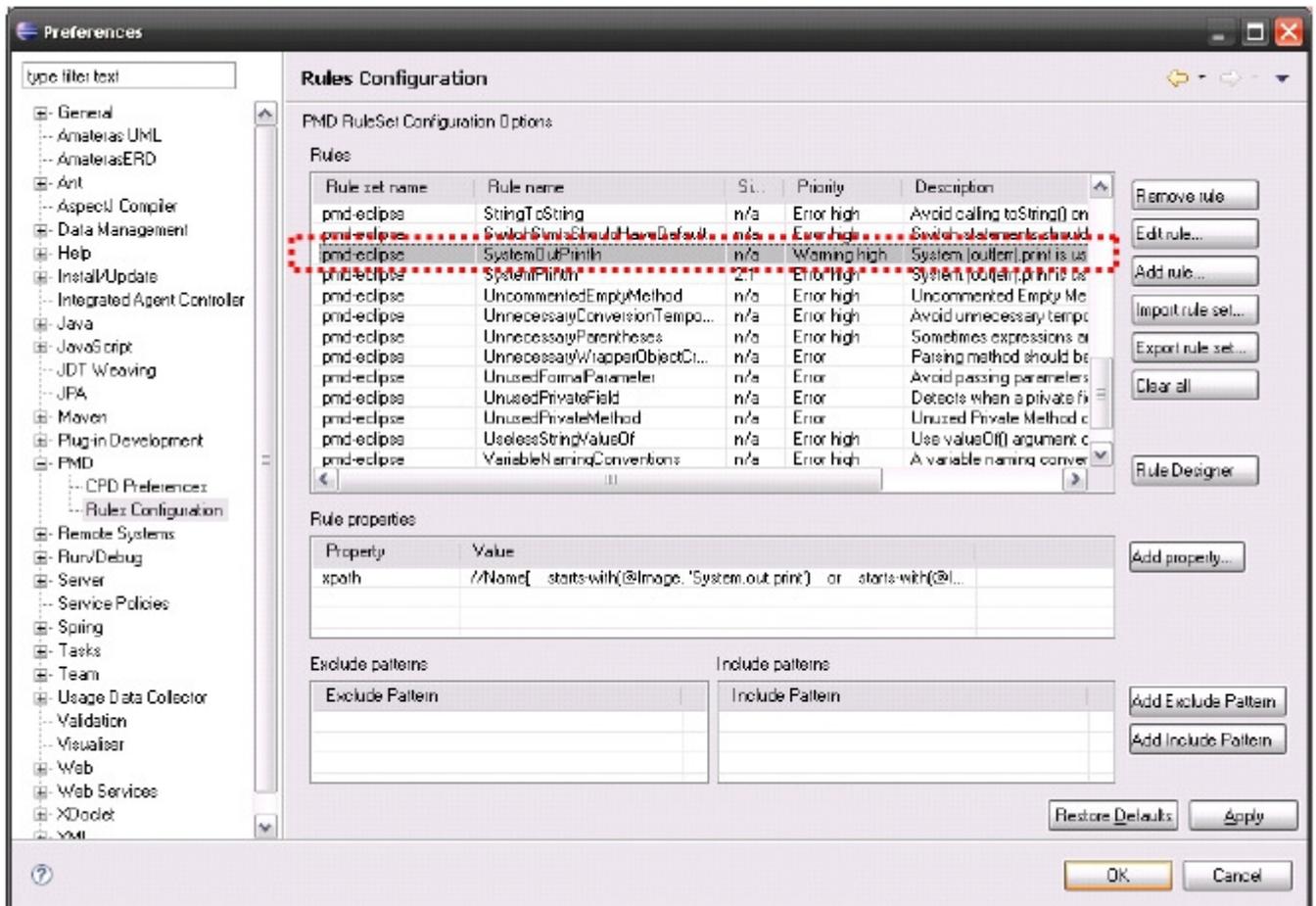
1. Select Window > Preferences in the Eclipse IDE menu.
2. Select PMD > Rules Configuration in the menu list of Preferences window
3. Click the Import rule set... button.



4. Click the Browse... button in the PMD Plugin window, and select the created RuleSet file.
5. Check the Import by Copy and click the OK button.



6. Check imported rules exist in the Rules grid list of the Preferences window.



7. Click the OK button in the Preferences window to apply imported Rules to the Eclipse IDE.

References

- <http://pmd.sourceforge.net> [<http://pmd.sourceforge.net>]
- <http://www.w3schools.com/xpath/default.asp> [<http://www.w3schools.com/xpath/default.asp>]

- 1) Extended Backus-Naur Form
- 2) Abstract Syntax Tree