

Create new Kiuwan Rules

This guide shows you how to create new rules for your Kiuwan Analysis without any coding.

If you are a developer, please visit [Rule development](#)

Contents:

Two ways of extending the models with new rules without coding:

- [Split the behavior](#)
 - [Example 1. CBO in java.](#)
 - [Example 2. Ccn at function scope.](#)
 - [Grammar for expressions](#)

Split the behavior

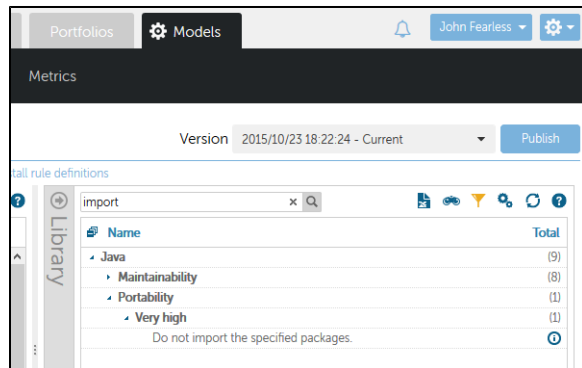
The first method is basically to create a new rule based on an existing one in your library. Let me go directly to an example.

You can find the following rule definition in your Kiuwan library (Models management – Rules – Library):

Do not import the specified packages.

Do not use the classes included in the specified packages, so you will prevent the use of dependent classes of the virtual machine or other private classes. The comma-separated list of patterns of packages is parameterized.

This rule is classified under 'Portability' and priority 'Very High'.



This is a very general rule. You can create new rules to not allow to import specific packages like:

- 'com.sun.*' or 'com.ibm.*' packages may be defined as a portability issue (<http://stackoverflow.com/questions/8565708/what-is-inside-com-sun-package>).
- Use java concurrent collections instead java collections as a reliability issue (<https://docs.oracle.com/javase/tutorial/essential/concurrency/collections.html>).
- Replace java.util.Random with the more secure java.security.SecureRandom. (<http://docs.oracle.com/javase/7/docs/api/java/util/Random.html>, <http://stackoverflow.com/questions/11051205/difference-between-java-util-random-and-java-security-securerandom>).

Based on this rule, you can write new rules simply by changing the **packages** parameter of the rule. Let see the details of this rule:



RULE INFORMATION

Definition Code examples **Details** Classification

Internal name OPT.JAVA.RGP.AvoidPackages

Firmware 0

Version tag

Release date 2015/04/24 23:44:15

Java class com.als.classes.port.rgp.AvoidPackages

Java version 1.5

Internal parameters

Parameter	Value
No internal parameters defined	

The first step is to open the **Rule Developer** distributed with Kiuwan Local Analyzer, and create a **New** rule:

Rule-devel

Definition Code examples

Rule information

Identifier * CUS.JAVA.SecureRandom

Name * Using java.util.Random it is not recommended

Message

Description Instances of java.util.Random are not cryptographically secure. Consider instead using SecureRandom to get a cryptographically secure pseudo-random number generator for use by security-sensitive applications.

Reference http://docs.oracle.com/javase/7/docs/api/java/util/Random.html

Benefits

Drawbacks

Rule classification

Category * Security

Language * Java

Priority * Very high

Repair difficulty * Easy

Execution information

Class * com.als.classes.port.rgp.AvoidPackages

Parameters

ID	Identifier	Name	Value
1	packages	packages	java.util.Random

☐ Save rule source code in

☒ Save rule definition in ☐ Blog rule development with zero code

Rule detail

Definition Code examples

Violation example

```
import java.util.Random;
```

Reparation example

```
import java.security.SecureRandom;
```

A couple of things to remember:

1. Rule identifiers must begin with CUS.
2. The class name has to be the same as the original Kiuwan rule.
3. Parameters are the same as the original rule. Update only the parameter value to the required value.
4. It is advisable to change the name and description of the rule to match the new rule behavior.

Once you save the rule, the Rule Developer will automatically create an XML file with the new rule definition. The second step is to import this XML file definition in your library and model (Models management > Rules > Install rule definitions):

kiuwan Applications Deliveries Portfolios Models

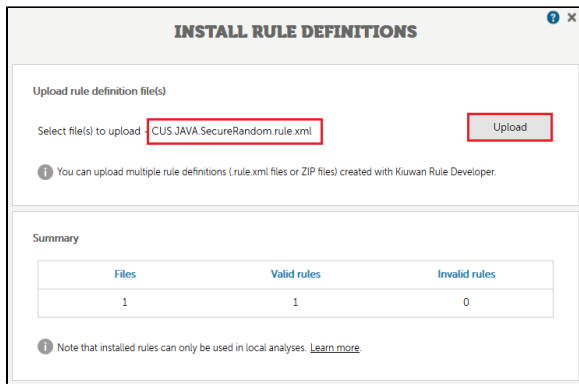
New model Open model Overview **Rules** Metrics

RULES Version

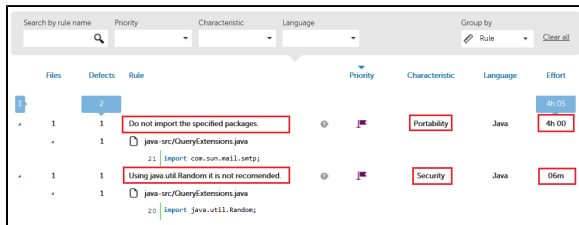
Rules Compare PDF ZIP Import rulesets **Install rule definitions**

Enter a text to search...

Name	P	R	Total
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And finally, assign this model to your application and run an analysis on it. You can see the new defects found by the rule in the defects screen:



Rule to have violations based on metric values

When you analyze your code, Kiuwan returns three types of information:

1. Indicators. These are complex metrics calculated from the defects and simple metrics found in your code. Some examples: Risk Index, Global Indicator, Effort, etc.
2. Defects. These are all breaches of the rules in your model.
3. Metrics. These are measurements of some characteristics of the source code. Examples are lines of code (LOC), Cyclomatic Complexity (https://en.wikipedia.org/wiki/Cyclomatic_complexity), Fan-out, etc.

Not all metrics provided by Kiuwan are taken into account for the indicators. For example, you can get the CBO for your java classes, but their values do not modify the Global Indicator.

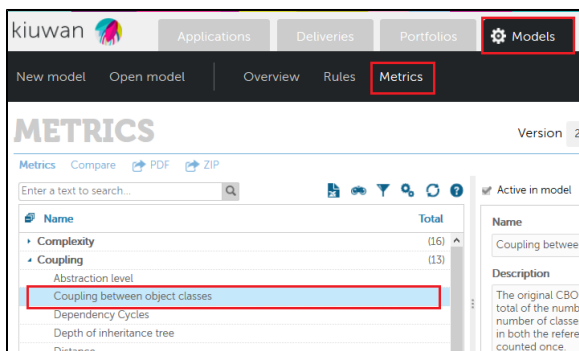
To achieve this, it would be interesting to create a new defect each time the metric threshold is breached.

Kiuwan uses this idea in several of its rules, like the duplicated code, the cyclomatic complexity, etc.

Now we are going to explain how to extend this mechanism to any metric calculated by Kiuwan.

Example 1. CBO in java.

In Kiuwan's metrics library (Models management – Metrics – Library) you can find the following definition for the CBO metric:



METRIC INFORMATION

Definition Code examples Details Classification

Optimyth library / 5 languages implementations

Coupling between object classes

Description

The original CBO definition by Chidamber & Kemerer was a total of the number of classes that a class referenced plus the number of classes that referenced the class. If a class appeared in both the referenced and the referred classes it was only counted once.

There have been a number of interpretations of CBO in recent years (including some generated by the original authors) - the most

Intrinsic properties

Better is: ☐ higher ☐ lower ☐ N/A

Scope: ☐ Lang... ☐ Pack... ☐ File ☐ Class ☐ Function...

Languages: ☐ C# ☐ C++ ☐ Java ☐ PHP ☐ VB.NET

METRIC INFORMATION

Definition Code examples Details Classification

Available languages:

Internal name: OPT.CBO - OPT.CPP.COUPLING.CBO

Firmware: 0

Version tag: v272-qmm5625

Release date: 2015/10/16 21:05:00

Java class: com.als.cpp.metrics.CboCppMetricRule

Internal parameters

Parameter	Value
No internal parameters defined	

You can now create a new rule definition with the Rule Developer that will check the value of the CBO metric against a threshold:

Rule detail

Definition Code examples

Rule information

Identifier*: CUS_JAVA_CBO

Name*: High coupling between object classes

Message:

Description: CBO definition by Chidamber & Kemerer was a total of the number of classes that a class referenced plus the number of classes that referenced the class

Reference:

Benefits:

Drawbacks:

Rule classification

Category*: Maintainability

Language*: Java

Priority*: High

Repair difficulty*: Hard

Execution information

Class*: com.als.core.rule.MetricThresholdRule

Parameters

Identifier	Name	Value
1	definition	program.CBO > 2

Remember:

1. Rule identifiers must begin with CUS.
2. Class name has to always be: *com.als.core.rule.MetricThresholdRule*.
3. You need to add a parameter, called definition, with the expression to check.
4. It is advisable to define a name and a description for the rule that explains the rule behavior for the specific metric, i.e. High

In this example, the expression is:

program: CBO > 2

IMPORTANT: white space is mandatory between all operators and operands in the expression.

Once the rule is installed in your model, and a new analysis is run, you will get defects like the following:

Search by rule name		Priority	Characteristic	Language	Group by	
<input type="text"/>		<input type="text"/>	Maintainability		Rule	Clear all
Files	Defects	Rule	Priority	Characteristic	Language	Effort
1	1	High coupling between object classes		Maintainability	Java	4h 00
	1	java-src/HighCBO.java				

Notice the first word in the expression, **program**. It indicates the scope for the values of the metric to use. Different metrics may have different scopes to calculate the metrics, as we will see in the next example.

Example 2. Ccn at function scope.

Let's see how to create a new rule-based in a metric with function scope.

Cyclomatic complexity: The formula for calculating the metric corresponds to the sum of the number of conditions and the number of returns or exits, where the number of exits is never lower than 1.

For the cyclomatic complexity you can define the following expression:

function: ccn > 5

So, the definition of the new rule will be:

Parameter	Value
Threshold	5
Metric	cyclomaticComplexity
Scope	function

Import this new rule in your model (as explained in the case above), run a new analysis, and you will get this type of defect when the Cyclomatic Complexity of a method (in C, for example) is greater than 5:

Files	Defects	Rule	Priority	Characteristic	Language	Effort
	0					Side 21
1	4	Functions with High C/C++	High	Maintainability	C	15h 00
	4	7zMain.c				
		52 static size_t Utf16_To_Utf8_Calc(const UInt16 *src, const UInt16 *srcLim)				
		[code: 8]				
		88 static Byte *Utf16_To_Utf8(Byte *dest, const UInt16 *src, const UInt16 *srcLim)				
		[code: 8]				
		229 static void ConvertFileNameToString(const GHFileTime *nt, char *o)				
		[code: 2]				
		351 int MY_CHECK main(int numargs, char *args[])				
		[code: 24]				

Grammar for expressions

In the above examples, we saw that the **definition** parameter value for 'com.als.core.rule.MetricThresholdRule' class defines the expression to check. The expected format is:

*scope: expression (;scope: expression)**

'Scope' has to be one of these values:

- **program** (a.k.a. file)
- **type** (depends on the language. Valid values are: class, interface, struct, enum)
- **function** (functions or methods)

The expression also support the following operators:

- "+", "-", "*", "/" (arithmetic operators)
- "and" and "or" (logical operators)
- ">", "<", ">=", "<=", "==", "!=" (comparison operators)

The metric name you use in the expression is the metric short name. For example, for the metric internal name: OPT.cbo, the metric short name is:.cbo.

You can find the metric internal name in the details tab of the metric information window (see above captures).

This type of rules will report a violation when the defined expression evaluates to true.