

# Judy Mutation Testing Tool for Java - User Guide

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## Overview

This document describes the installation instructions and configuration process of Judy.

## Judy Installation

Judy is delivered to users as a single \*.zip file. In order to install Judy this file needs to be extracted to one of the directories on the local hard drive.

As a prerequisite Judy requires installed Java Runtime Environment (in version 6 or later), which can be obtained from <http://www.java.com/en/download/index.jsp>.

## Judy Configuration

### Overview

This section describes Judy configuration parameters, which can be used to adjust the tool to user needs and in order to achieve the best results and have been divided into 4 sections:

- **Judy configuration properties** - describe core Judy properties defining the mutation testing process performance and effectiveness.
- **Local configuration properties** – describe paths to the local directories used for storing reports, logs and temporary files used for Judy internal processing.
- **System under test configuration properties** – describe paths and characteristics of the system under test.
- **Mutation operators setup** – describe mutation operators that can be applied in the mutation testing process.

### Judy configuration properties

Property Name	Description
judy.mutations.max	Determines number of mutations to be processed at once for a given class. Relates to MAXMUT described in Section 5.1 of the article.
judy.testingtime.factor and judy.testingtime.minimal	Determines the maximal time for which unit tests will be executed (after that time test will be killed and interpreted as failed). The execution time in milliseconds is obtained from following equation: $\text{maximal execution time} = \text{minimal} + \text{factor} * \text{current execution time},$ where current execution time (depending on the judy.testing.level) is equal either time of the test execution for the sample class (for the CLASS level) or for the whole system under test (for the PROJECT level).
judy.project.debug	When this parameter is set to true only the mutants generation and compilation are run. This can be used for debugging generated mutants and checking their compilation validity.
judy.testing.level	Determines the scope of tests to be run for every mutant. At the moment the supported values are: CLASS – For the given mutant only the unit tests for the affected class are executed (see judy.mapping.type for more details how test class is obtained).

	PROJECT – For the given mutant all system unit tests are executed. Choosing this option can however for the relatively big systems under tests cause severe performance issues.
judy.mapping.type	For the judy.testing.level = CLASS determines the way the test class name is obtained from the SUT class name. At the moment the following values are supported: SIMPLE – option that enables user to define the test classes pattern for system under test classes. Pattern can be defined by specifying prefix/postfix to be added to class and package name of the existing class. This information can be defined in the conf/mapping/simple-mapping.xml file. COMPLEX – option that will enable user to define more advanced rules using regular expressions, however this option is still under development and therefore not fully supported by Judy.

## Local configuration properties

Property Name	Description
output.dir	Defines root directory for Judy output directories (this is not used for further processing, but very convenient for other local configuration properties definition as a reusable root element).
output.generated.dir	Temporary output directory into which Judy stores generated mutants.
output.log.dir	Output directory into which Judy stores logs from the last mutation testing process.
output.java.dir	Temporary input/output directory (used by Judy to store SUT code files).
output.test.dir	Temporary input/output directory (used by Judy to store SUT test files).
output.reports.dir	Output directory used for storing mutation testing reports.
output.bin.dir	Temporary input/output directory (used by Judy to store SUT binary files).
output.temp.dir	Temporary input/output directory (used by Judy to store internal text files).
output.status.dir	Temporary input/output directory (used by Judy to store internal binary files).

## System under test configuration properties

Property Name	Description
sut.name	System under test name
sut.root.dir	Root directory
sut.bin.dir	Directory containing SUT compiled binary (*.class) files
sut.lib.dir	Directory containing SUT referenced library (*.jar) files
sut.java.dir	Directory containing SUT source code (*.java) files
sut.test.dir	Directory containing SUT JUnit test code (*.java) files
sut.tested.dir	File/directory of the SUT which will be tested in mutation testing process
sut.ignored.classes	Comma-separated list of the classes (within {sut.tested.dir}) that should be excluded from the test for some reason
sut.java.version	Java Runtime Environment version which should be used for compiling/running SUT

## Mutation operators setup

Property Name	Description	Values
mutations.jester	Set of mutation operators offered by default in Jester	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.jumble	Set of mutation operators offered by default in Jumble	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.abs	ABS mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.aor	AOR mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.lcr	LCR mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.ror	ROR mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.uoi	UOI mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.eoa	EOA mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.eoc	EOC mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.eam	EAM mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.emm	EMM mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.uod	UOD mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.sor	SOR mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.lor	LOR mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.cor	COR mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.asr	ASR mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.jtd	JTD mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator
mutations.jti	JTI mutation operator	<b>true</b> – switches on mutation operator <b>false</b> – switches off mutation operator