



Klocwork Checker Qualification Pack

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MTofinetti	3.2	Updated version to Klocwork 2018.2	2018-09-27
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LRobertson	5.0	Updated version to Klocwork 2020.1	2020-03-12
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JBritton	6.9	Updated for 2024.2 and add EN 50716	2024-07-24

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Referenced Standards

Standards referenced in this document refer to the following versions:

Standard	Version
ISO 26262	ISO 26262:2018
IEC 61508	IEC 61508:2010
IEC 62304	IEC 62304:2006/AMD1:2015
EN 50716	EN 50716:2023

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Related Documents

Document ID	Title
KW2024_2_007	Klocwork_Test_Process

Purpose

Klocwork provides a qualification pack for customers wishing to ensure the integrity of their deployment. This document describes how to run the Klocwork Checker Qualification pack and provides a document template that you can use to qualify your own software project. The document template provides Klocwork tool classification information, a description of the prescribed Klocwork use case, and a table in which you can store the results of your tests.

Deployment verification

The qualification pack contains a suite of compiling sample code snippets and a framework that you can use to run the checkers against each sample code snippet. Contact a Klocwork Customer Support representative to obtain the Klocwork Checker Qualification Pack and for more information.

The software tests included in this qualification pack are intended to validate checker requirements under normal operating conditions. Each procedure involves executing the tool with provided code snippets to generate a validated pass/fail report for each checker. The tool is deterministic in its execution and will consistently generate the same output results for a given set of input data parameters.

The process of verifying the tool will use a series of test cases, each designed to validate a single checker. In each test case, Klocwork analysis is performed and the tool's output is compared against a known set of results. The canonical file contains the output the tool must produce when presented with the prepared inputs to demonstrate it correctly satisfies its requirements.

Instructions for running the Qualification Pack

Prerequisites

The Klocwork Checker Qualification Pack is run by using the Klocwork Server. You should verify your installation using the server method to ensure that your system build is accurate.

To run using the Klocwork Server:

- Ensure that Python (version $\geq 2.7.9$) is installed and referenced in your path.
- Ensure that the Klocwork Server install /bin directory is referenced in your path.
- By default, the Klocwork Server operates in Open authentication mode. If your Server is running with authentication enabled, then you must run kwauth from the command prompt to log in to your Server. To run kwauth, enter the following command:

```
kwauth --url <server-host>:<server-port>
```

where *<server-host>* is the hostname of your Server, and *<server-port>* is the port number. Then, log in using a valid user ID and password.

- On Windows, run the test suite from a Visual Studio command prompt. Ensure that the Cl.exe command runs as expected from the command prompt.
- On Linux, ensure that gcc is referenced in your path.

Note: When run, this qualification pack creates a project called QDP in your projects root folder. It will overwrite any existing project with that name.

Run the test suite

Contact a Klocwork representative to obtain the Klocwork Checker Qualification Pack. Once you have installed Klocwork and performed the prerequisite steps listed above, complete the following steps to run the test suite:

Run the test suite using the Server

1. Unzip the archive, then, from the command prompt run:

```
python qdp.py --run-server <options>
```

2. The test suite is set to the default Klocwork host/port of localhost:8080. To set your own host and port run:

```
python qdp.py --run-server --server-host <klocwork-host> --  
server-port <klocwork-port>
```

Note: You do not need to specify `--run-server` on the command line since this command is implied.

Run the test suite using the user package

1. Unzip the archive, then, from the command prompt run:

```
python qdp.py --run-user <options>
```

2. The test suite is set to the default license host/port of `localhost:27000`. To set your own host and port run:

```
python qdp.py --run-user --license-host <license-host> --license-port <license-port>
```

Options for running the test pack

To see the list of available options, enter:

```
qdp.py --help
```

Option	Description
<code>--version</code>	Prints version information
<code>--license-host</code>	Specify the host of the Klocwork License Server (default localhost)
<code>--license-port</code>	Specify the port of the Klocwork License Server (default 27000)
<code>--run-server</code>	Run server analysis with the Server installation (requires running Klocwork Server)
<code>--run-user</code>	Run desktop analysis with the User installation
<code>--server-host</code>	Specify the Klocwork Server web host when running with server analysis (default localhost)
<code>--server-port</code>	Specify the Klocwork Server web port when running with server analysis (default 8080)
<code>--server-user</code>	Specify the Klocwork User who is authorized to run server commands
<code>--compiler</code>	Specify compiler used for compiling C/C++ files (default cl on Windows, gcc on Unix)
<code>--compiler-options</code>	Specify additional compiler options used with your compiler
<code>--classic</code>	Run QDP against classic engine
<code>--ssl</code>	Use secure Klocwork Server connection
<code>userInstall</code>	Optional user-specified KW installation directory

Note: While `--run-user` is an available option for the QDP script, desktop analysis is not supported for functional safety. See the “Klocwork: recommended use cases” section below for more information.

If successful, the tests will execute and output a message to the console for each checker in the following format:

```
<Checker type>__<MISRA rule number>__<checker name>__<test file name>__
```

The following example shows the output from a passed test (Note the 'ok' indicating that this test passed):

```
MISRA-C++__2-3-1__MISRA.CHAR.TRIGRAPH__MISRA.CHAR.TRIGRAPH__
(defectdetection.defectframework.DefectDetectionTest) ... Setting up log
files for MISRA-C++__2-3-1__MISRA.CHAR.TRIGRAPH__MISRA.CHAR.TRIGRAPH__.

/space/workplace/qdp2/defectdetection/logs/MISRA-C++__2-3-
1__MISRA.CHAR.TRIGRAPH__MISRA.CHAR.TRIGRAPH__.log

ok

TEST_EXECUTION_TIME: MISRA-C++__2-3-
1__MISRA.CHAR.TRIGRAPH__MISRA.CHAR.TRIGRAPH__
(defectdetection.defectframework.DefectDetectionTest) 0.910
```

Note: Contact Klocwork Customer Support if you are unable to run the test and generate the expected results.

Example output

The test suite will generate a report in the console that lists the simple pass/fail results for each checker as well as a summary that shows the overall list of passes and fails.

The output of the test suite can be seen in KW2024_2_007_Klocwork_Test Process

Interpreting the test results

When completed, the script will output a message to the console describing the results of the tests.

Summary data for Klocwork 2024.2 for Linux (clang):

```
Summary:
361 tests were run on 161 unique MISRA-C checker types:
    361 total passes, 0 total failure
477 tests were run on 245 unique MISRA-C++ checker types:
    477 total passes, 0 total failure
350 tests were run on 191 unique MISRA-C++-2023 checker types:
    350 total passes, 0 total failure
409 tests were run on 245 unique MISRA-C-2012 checker types:
    409 total passes, 0 total failure
415 tests were run on 249 unique MISRA-C-2023 checker types:
    415 total passes, 0 total failure
82 tests were run on 70 unique Severity-1 checker types:
    82 total passes, 0 total failure
71 tests were run on 54 unique Severity-2 checker types:
    71 total passes, 0 total failure
```

Summary data for Klocwork 2024.2 for Linux (gcc):

```
Summary:
361 tests were run on 161 unique MISRA-C checker types:
    361 total passes, 0 total failure
477 tests were run on 245 unique MISRA-C++ checker types:
    477 total passes, 0 total failure
351 tests were run on 192 unique MISRA-C++-2023 checker types:
    351 total passes, 0 total failure
409 tests were run on 245 unique MISRA-C-2012 checker types:
    409 total passes, 0 total failure
415 tests were run on 249 unique MISRA-C-2023 checker types:
    415 total passes, 0 total failure
82 tests were run on 70 unique Severity-1 checker types:
    82 total passes, 0 total failure
71 tests were run on 54 unique Severity-2 checker types:
    71 total passes, 0 total failure
```

Summary data for Klocwork 2024.2 for Windows:

```
Summary:
361 tests were run on 161 unique MISRA-C checker types:
    361 total passes, 0 total failure
477 tests were run on 244 unique MISRA-C++ checker types:
    477 total passes, 0 total failure
```

```
350 tests were run on 190 unique MISRA-C++-2023 checker types:
    350 total passes, 0 total failure
404 tests were run on 244 unique MISRA-C-2012 checker types:
    404 total passes, 0 total failure
410 tests were run on 248 unique MISRA-C-2023 checker types:
    410 total passes, 0 total failure
83 tests were run on 71 unique Severity-1 checker types:
    83 total passes, 0 total failure
68 tests were run on 57 unique Severity-2 checker types:
    68 total passes, 0 total failure
```

In addition to a summary, the qualification pack will output an overall pass or fail score that indicates the validity of the Klocwork Checker deployment. A score of 100% indicates that the Klocwork Checkers are functioning as expected and that the Klocwork deployment is functionally safe.

If the qualification pack does not produce a score of 100%, the following message is displayed in the console:

Final Verdict:

491 out of 492 (99.8%) unique checkers passed

This message indicates that your Klocwork Checker Qualification Pack did not execute with a 100 percent success rate. While the qualification pack produces a 100% success rate in a controlled Klocwork environment, your success rate may vary depending on a number of key factors, including, but not limited to, the local environment on which the test pack was executed.

If you were able to successfully execute the tests, the qualification pack will produce a success rate on completion. See the success rate listing below for more information:

Success rate: 0-89%

If your Klocwork Checker Qualification Pack produced a success rate between 0% and 90%, the chances are likely that your test suffered a catastrophic failure during execution. This means that your Klocwork deployment cannot be validated from a functional safety perspective. Consult the Qualification Pack documentation for instructions on how to run the tests. If, after running the tests again, the success rate does not improve, contact Klocwork Support.

Success rate: 90-99%

If your Klocwork Checker Qualification Pack produced a success rate between 90% and 99%, then it is likely that your local environment influenced the expected test results. Klocwork ensures that these tests will execute with 100% accuracy on the documented prerequisite environment. Because we cannot test all possible operating environments, we cannot completely guarantee that your Klocwork Checker deployment is 100% functionally safe. If you experience test results within this range, contact Klocwork Customer support.

If the test does not produce a score of 100%, Klocwork cannot guarantee with certainty that the Checker deployment is valid, or functionally safe. While the results of the test may vary slightly depending on the environment on which it is run, you are strongly encouraged to contact Klocwork Support to identify the cause of the failure.



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