Jenkins plugin wiki page

Programming Research Static Analysis Plugin
This plugin enables the PRQA static analysis tools QA·C and QA·C++ to be easily integrated in Jenkins.
This plugin is maintained by Programming Research. It was developed and maintained by Praqma up until release 1.2.2. All service and feature requests should be sent directly to Programming Research.
Plugin version 2.1.0 supports PRQA Framework version 2.0.1
Contents

Features

This plugin allows source code to be analysed with QA·C or QA·C++, PRQA's static analysis tools. The plugin performs the following key tasks in the post-build stage automatically:

- Analyzes a PRQA project – optionally including dataflow and cross module analysis.
- Generates a compliance report
- Compares the total number of messages in the project against a configurable threshold and sets the build status to 'unstable' if the threshold is exceeded: this can be used as a gate to stop subsequent tasks from running.
- Optionally uploads the analysis results to QA·Verify, the PRQA web-based Quality Management System

This plugin is able to analyze configured PRQA projects.
The projects are configured using PRQA Framework. They can be configured using PRQA Tool to support the old analysis interface.
The plugin allows the automation of the creation and analysis of PRQA enabled projects. This enables the analysis to be performed as a part of a continuous integration strategy.
The plugin displays a graphical history depicting the number of messages, and overall compliance levels in the project.

Download

Download the latest version manually HERE or alternatively, use the Jenkins CI Update Center.

Prerequisites for "PRQA Framework"

⚠ **Supported versions of PRQA Framework** We currently support PRQA Framework 2.0.1. If you encounter any issues drop us a note.

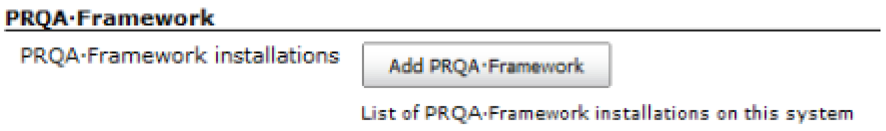
Installed Applications

Prior to installing and using this PRQA plugin, the user must ensure that the following PRQA applications are installed:

- PRQA Framework
- Reprise license manager
- QA·Verify Server (Optional)

PRQA Framework Setup

The plugin should be configured to use the installed version of PRQA Framework. This is done by going to the 'Manage Jenkins' -> 'Configure System'. There will be an option to add a PRQA Framework installation.

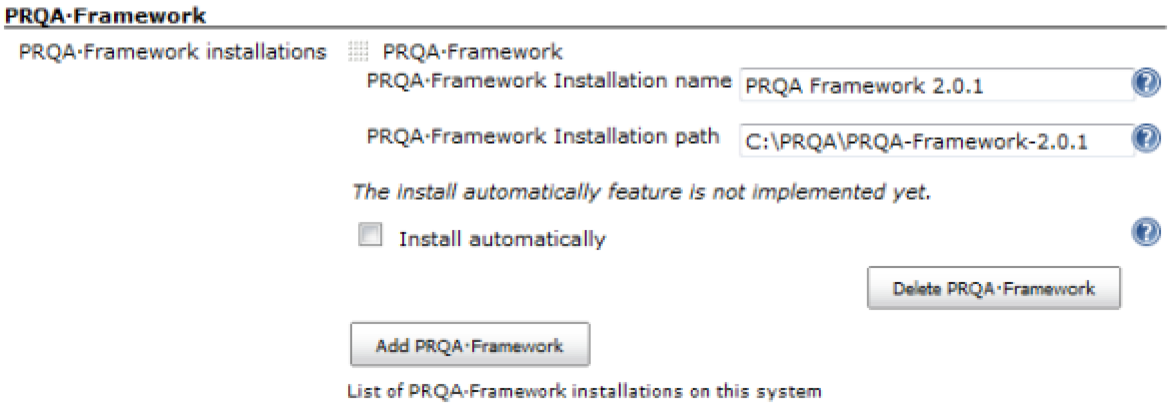


PRQA·Framework

PRQA·Framework installations

List of PRQA·Framework installations on this system

To add details of PRQA Framework, press the Add PRQA Framework button.



PRQA·Framework

PRQA·Framework installations — PRQA·Framework

PRQA·Framework Installation name: PRQA Framework 2.0.1

PRQA·Framework Installation path: C:\PRQA\PRQA-Framework-2.0.1

The install automatically feature is not implemented yet.

☐ Install automatically

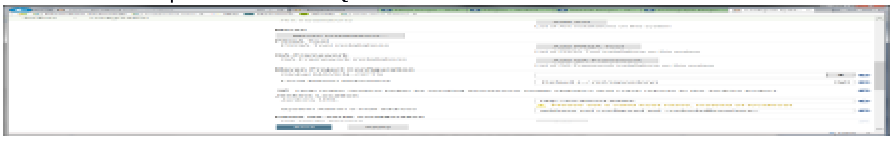
List of PRQA·Framework installations on this system

This is an example of a PRQA Framework configuration, where the default installation directories have been used. The plugin will automatically expand locations and add the necessary bin folders to the path. Please enter the correct details for the PRQA Framework installation.
As there might have multiple versions of PRQA Framework installed on the machine, it is best practice to include the PRQA Framework version number (or some other identification in the PRQA Framework Installation Name. The plugin allows for multiple versions of the PRQA Framework to be installed.

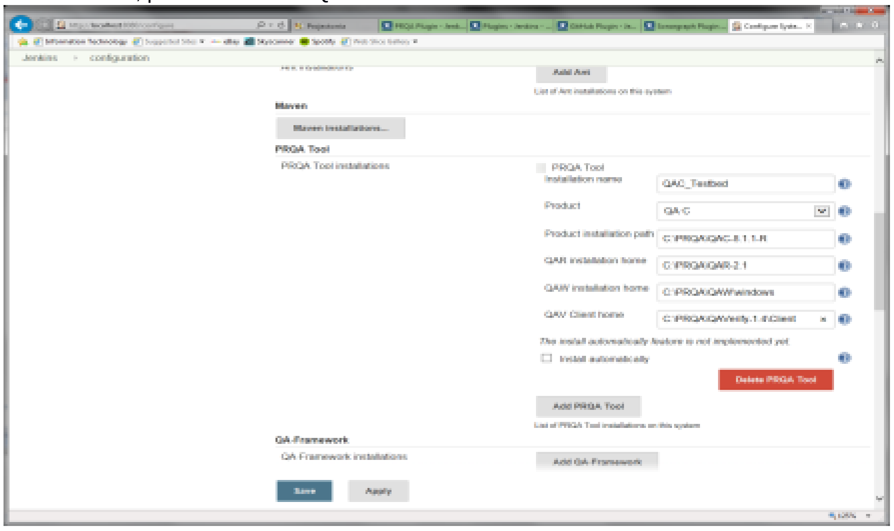
⚠ **Automatic install** This option lets Jenkins install PRQA Framework on demand, to the location configured above. If this option is checked, a silent installer for PRQA Framework will have to be configured.
Note: This feature is not implemented yet.

PRQA Tool Setup

The plugin can be configured to use the old interface using PRQA Tool. This is done by going to the 'Manage Jenkins' -> 'Configure System'. There will be an option to add a PRQA Tool installation.



To add details, press the Add PRQA Tool button.



Jenkins › configuration

Add Ant

List of Ant installations on this system

Maven

PRQA Tool

PRQA Tool installations — PRQA Tool

Installation name: QAC_Testbed

Product: QA·C

Product installation path: C:\PRQA\QAC-8.1.1-R

QAR installation home: C:\PRQA\QAR-2.1

QAW installation home: C:\PRQA\QAW\windows

QAV Client home: C:\PRQA\QAVerify.1.4\Client

The install automatically feature is not implemented yet

☐ Install automatically

List of PRQA Tool installations on this system

QA·Framework

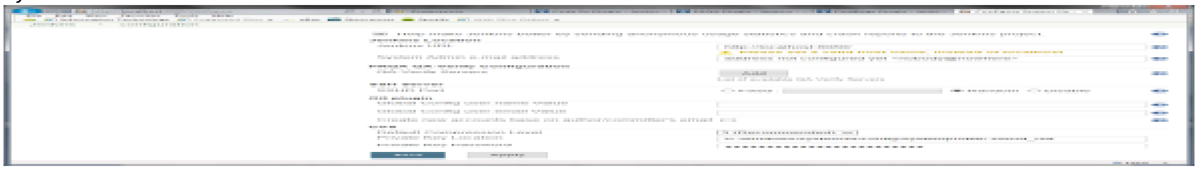
QA·Framework installations

This is an example of a PRQA Tool configuration, where the default installation directories have been used. The plugin will automatically expand locations and add the necessary bin folders to the path. Please enter the correct details for the PRQA Tool installation.
The plugin allows for multiple versions of the PRQA Tool to be installed.

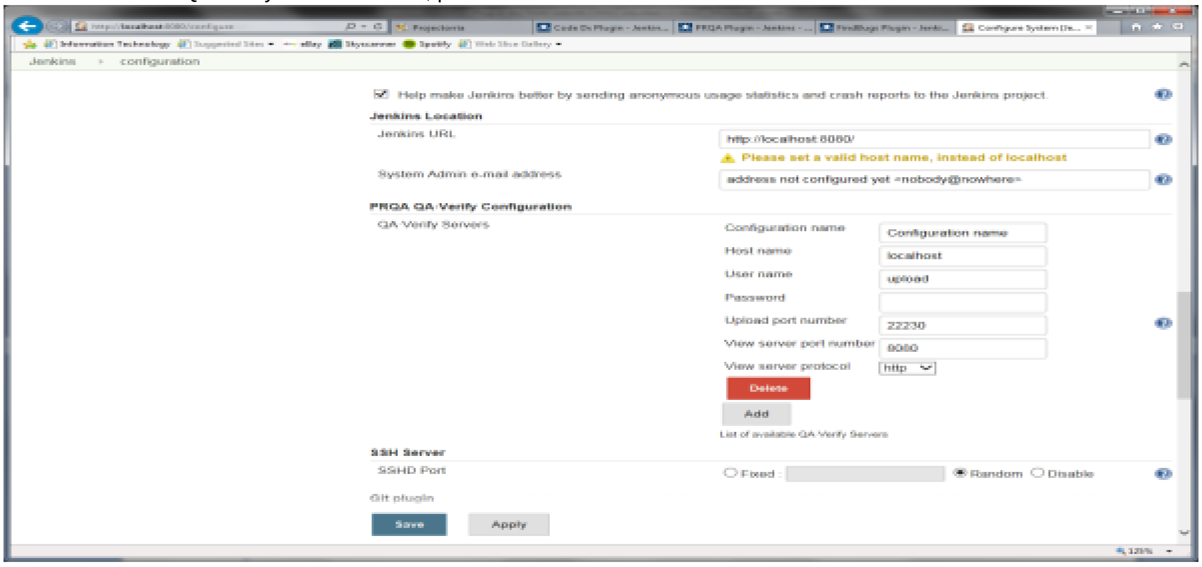
⚠ **Automatic install** This option lets Jenkins install PRQA Tool on demand, to the location configured above. If this option is checked, a silent installer for PRQA Tool will have to be configured.
Note: This feature is not implemented yet.

QA·Verify Setup

The plugin can be configured to use a QA·Verify server instance if required. This is done by going to the 'Manage Jenkins' -> 'Configure System'.



To add details of a QA·Verify server instance, press the Add button.



Jenkins » configuration

☑ Help make Jenkins better by sending anonymous usage statistics and crash reports to the Jenkins project.

Jenkins Location

Jenkins URL: http://localhost:8080/

⚠ Please set a valid host name, instead of localhost

System Admin e-mail address: address not configured yet <nobody@nowhere>

PRQA QA·Verify Configuration

QA·Verify Servers

Configuration name	Configuration name
Host name	localhost
User name	upload
Password	
Upload port number	22230
View server port number	8080
View server protocol	http

List of available QA·Verify Servers

SSH Server

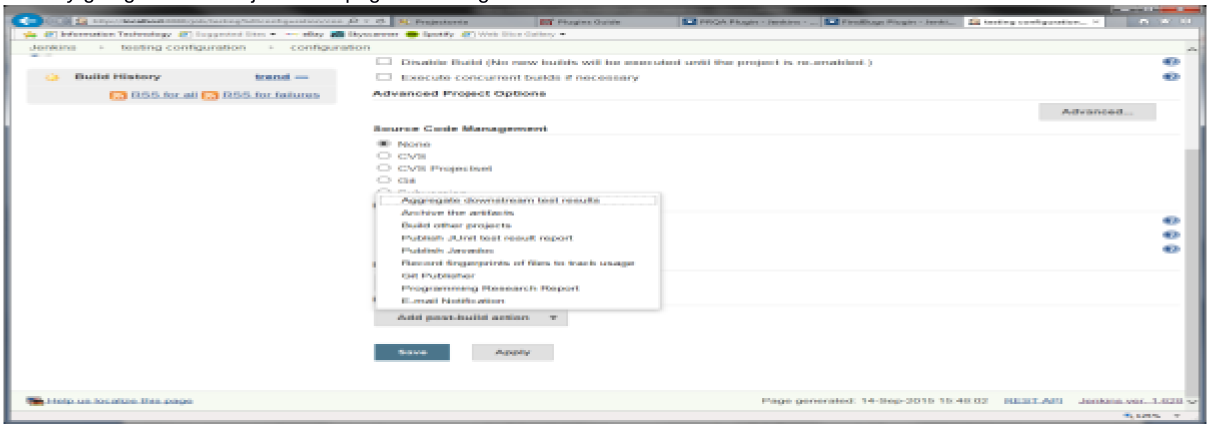
SSHD Port: ○ Fixed : [● Random] ○ Disable

Git plugin

This is an example of a QA·Verify configuration. Please add the correct credentials for the QA·Verify Server.

Job Configuration

The Jenkins job will have to be configured to perform PRQA static analysis. This is done by adding a post build action to the job. This is done by going to the build job home page -> 'Configure'.



Jenkins » testing configuration » configuration

☐ Disable Build (No new builds will be executed until the project is re-enabled.)

☐ Execute concurrent builds if necessary

Advanced Project Options

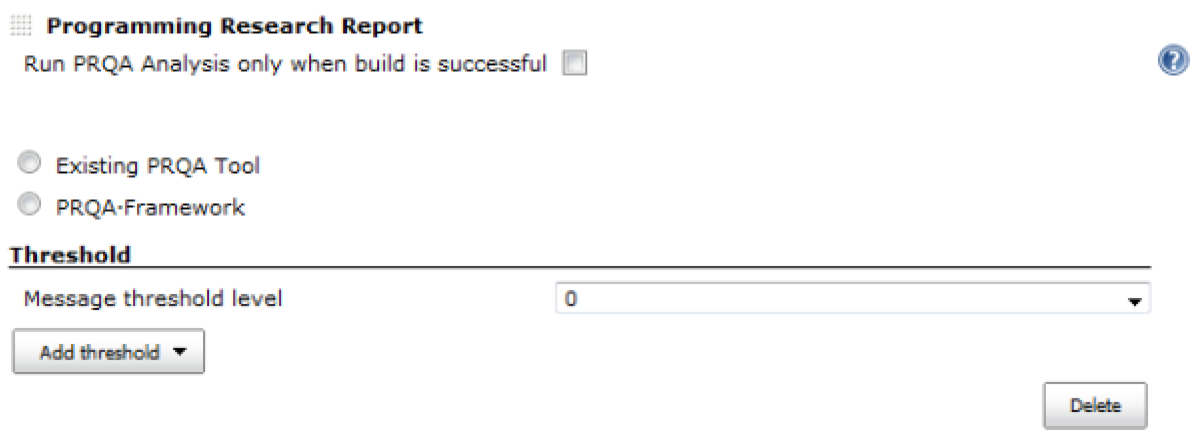
Source Code Management

[● None] ○ CVS ○ CVS Projectset ○ Git

Add post-build action:
- Aggregate downstream test results
- Archive the artifacts
- Build other projects
- Publish JUnit test result report
- Publish Javadoc
- Record fingerprints of files to track usage
- Git Publisher
- Programming Research Report
- E-mail Notification

Page generated: 14-Sep-2015 15:48:02 REST API Jenkins ver. 1.628

Click on the Add post-build action button and select Programming Research Report.


Programming Research Report

Run PRQA Analysis only when build is successful ☐

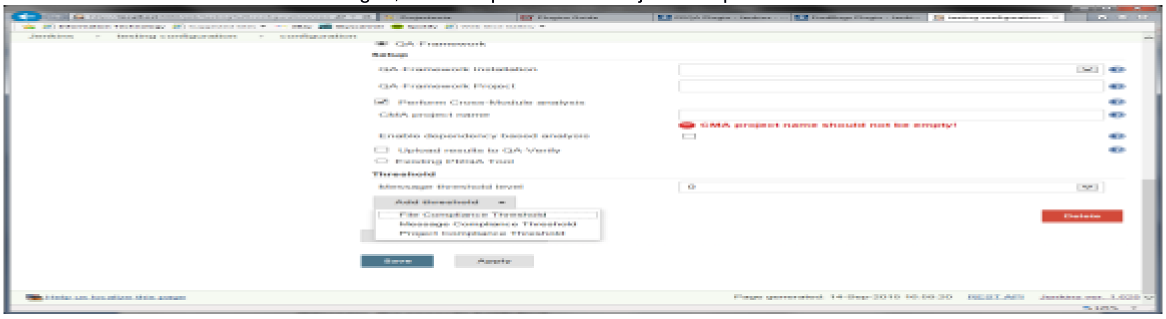
○ Existing PRQA Tool

○ PRQA-Framework

Threshold

Message threshold level: 0

By default the PRQA analysis is always performed, whether project build steps pass or fail.
If Run PRQA Analysis only when build is successful is selected, the analysis will only be performed if the build steps pass.
The set up of the PRQA analysis depends on whether PRQA Framework is used or the existing PRQA tool is used.
The set up for these is described later in Setup - PRQA Framework and Setup - PRQA Tool.
Threshold:
The number of messages generated by the PRQA static analysis can be compared against thresholds for build stability. If a threshold is exceeded the build status is set to unstable. This can be used as a gate to stop subsequent tasks from running.
The messages are organised into message levels according to the severity of the message with Level 0 being the lowest.
The thresholds can be set to operate at a message level allowing the severity of the messages to be taken into account. Code that contains low-severity maintenance and style issues may pass but code which contains critical issues would fail.
There are 3 kinds of threshold: Messages, File Compliance and Project Compliance.


Jenkins › testing configuration › configuration

QA Framework

Setup

QA Framework Installation

QA Framework Project

☑ Perform Cross-Module analysis

CMA project name

CMA project name should not be empty!

Enable dependency based analysis ☐

☐ Upload results to QA Verify

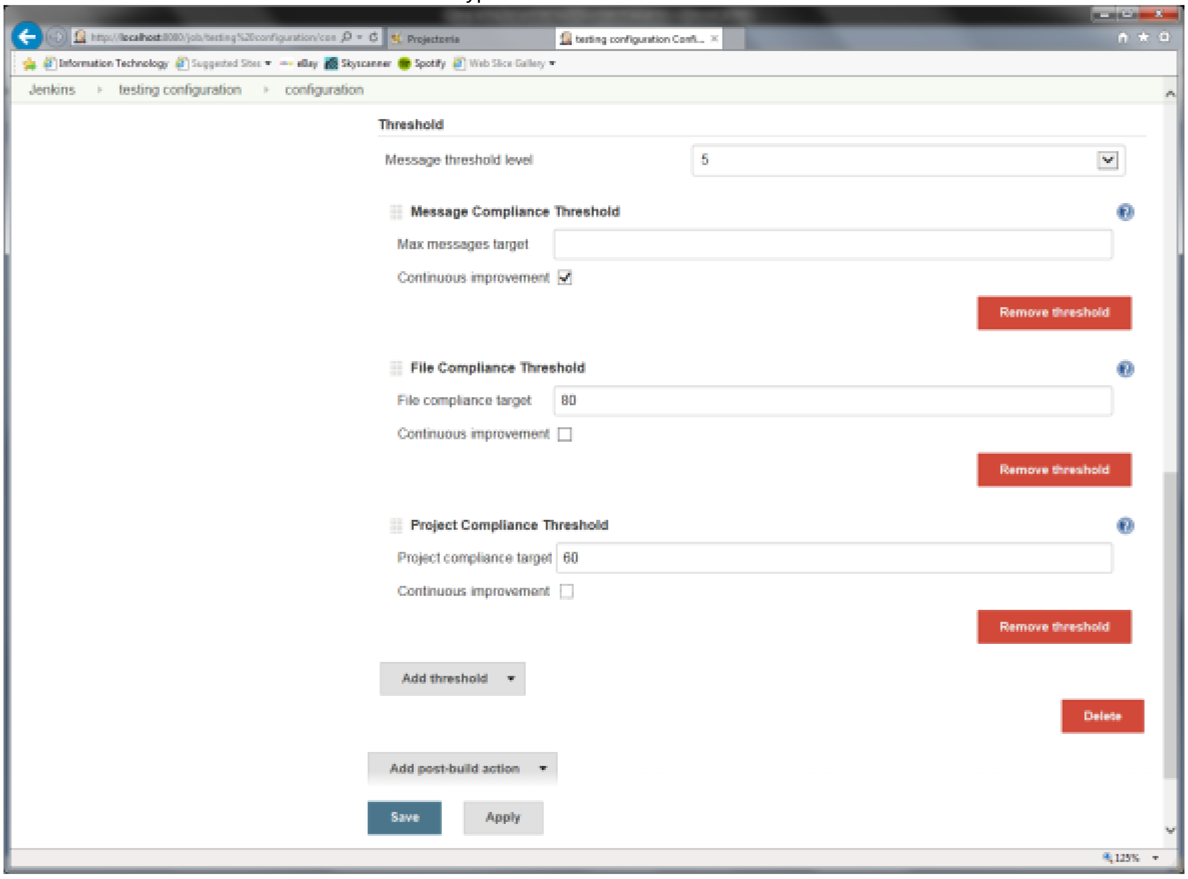
○ Existing PRQA Tool

Threshold

Message threshold level: 0

Add threshold
File Compliance Threshold
Message Compliance Threshold
Project Compliance Threshold
Delete
Save
Apply

Click on the Add threshold button and select the type of threshold.


http://localhost:8080/job/testing%20configuration/con

Jenkins › testing configuration › configuration

Threshold

Message threshold level: 5

Message Compliance Threshold

Max messages target:

Continuous improvement ☑

File Compliance Threshold

File compliance target: 80

Continuous improvement ☐

Project Compliance Threshold

Project compliance target: 60

Continuous improvement ☐

Message Threshold Level

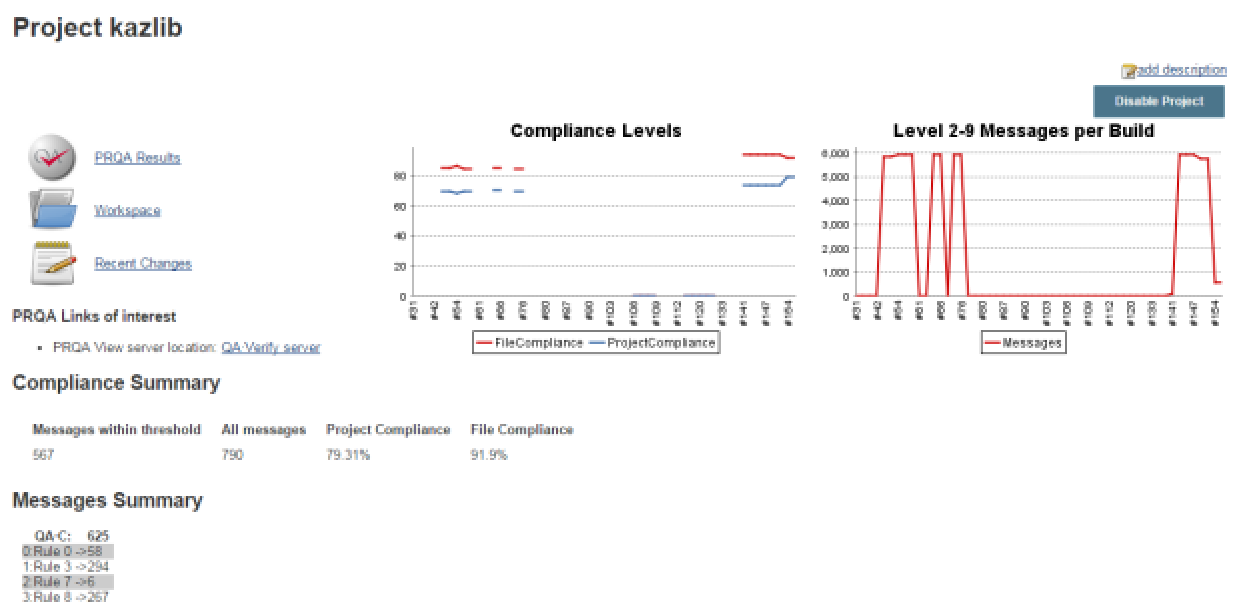
This sets the message level from which the message total is calculated. Only messages from this level and above are summed to give the message total which is used for the Messages Threshold comparison. Note that File and Project Compliance thresholds are not affected by this setting.
Message Compliance Threshold
Either enter the maximum messages target or select continuous improvement.
The maximum messages target is the total number of messages that are allowed on all levels for all the files in the project. Messages in header files are de-duplicated (they are only counted once and not for each source file the header is included into).
The Message Compliance value is the total number of messages for all the files in the project which are on the Message Threshold Level or above.
If the Message Compliance value for the build is higher than the maximum messages target, the build is marked as unstable.
Continuous improvement states the Message Compliance value for the build will be less than or equal to the Message Compliance value found in the previous build. If the Message Compliance value for the build is higher, the build is marked as unstable.
Project Compliance Threshold
Either enter the project compliance target or select continuous improvement.
The project compliance target is the minimum percentage of message groups (a coding standard 'rule') that have no messages in the project.

The Project Compliance Level is the percentage of message groups that have no messages in the project.
If the Project Compliance Level for the build is lower than the project compliance target, the build is marked as unstable.
Continuous improvement states the Project Compliance Level for this build will be greater than or equal to the Project Compliance Level for the previous build. If the Project Compliance Level for the build is lower, the build is marked as unstable.
File Compliance Threshold
Either enter the file compliance target or select continuous improvement.
The file compliance target is the minimum mean across all files of the percentage of message groups (a coding standard 'rule') that have no messages in each file.
The File Compliance Level is the mean across all files of the percentage of message groups that have no messages in each file.
If the File Compliance Level for the build is lower than the file compliance target, the build is marked as unstable.
Continuous improvement states the File Compliance Level for this build will be greater than or equal to the File Compliance Level for the previous build. If the File Compliance Level is lower, the build is marked as unstable.
A high File Compliance level and low Project Compliance level indicate that each file violates only a small number of rules but each file violates a different rule.
If the File and Project Compliance levels are close then each file is violating more or less the same rules.
If any of these thresholds are not met then the build will be marked as unstable. Note only configuration errors or analysis errors will mark the build as failed.
The plugin will default to no thresholds.

Plugin output

The plugin will create graphs showing the current number of messages and the current compliance levels. The Job project page

- Will show historical depiction of the overall compliance history
- Will create a link to the QA·Verify server that was used in upload.
- Will have relevant build artifacts in artifacts list, for easy access to generated reports and logs



Project kazlib

PRQA Links of interest

- PRQA View server location: QA·Verify server

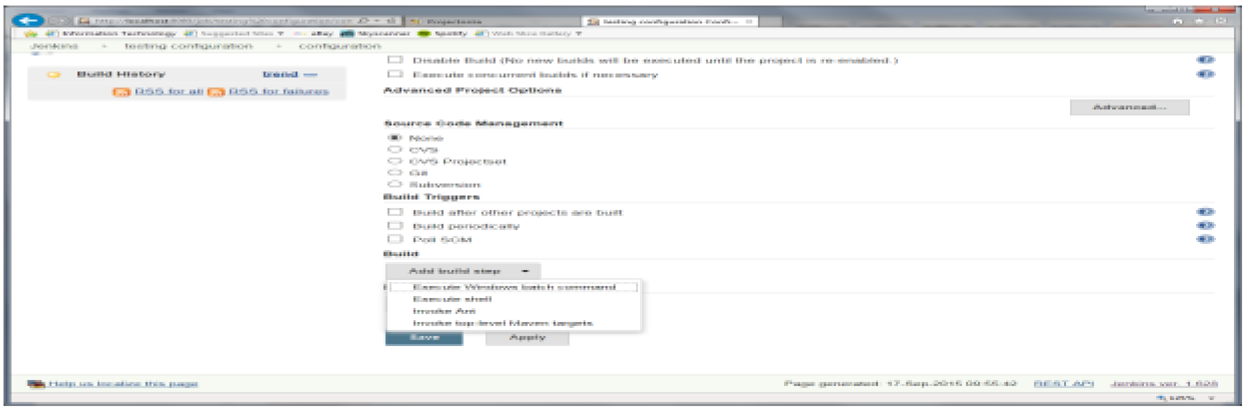
Compliance Summary

Messages within threshold	All messages	Project Compliance	File Compliance
567	790	79.31%	91.9%

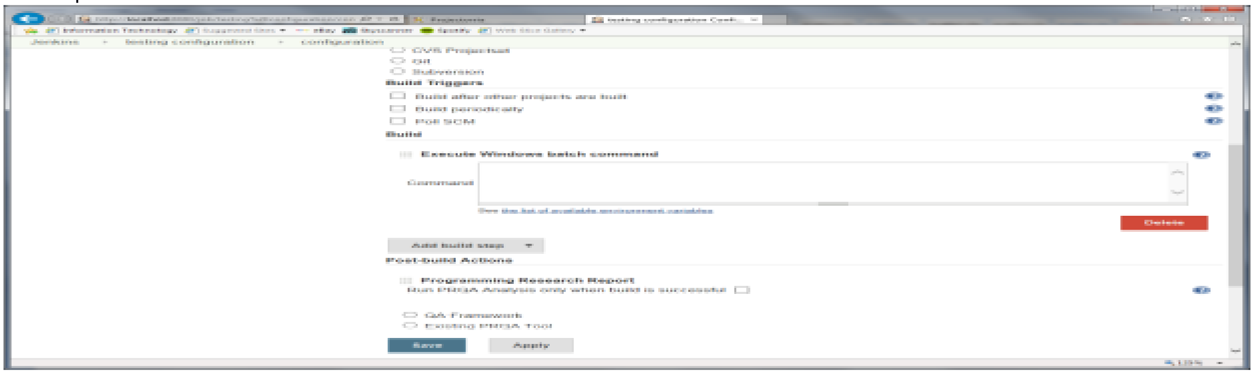
Messages Summary

QA·C: 625
0:Rule 0 ->58
1:Rule 3 ->294
2:Rule 7 ->6
3:Rule 8 ->267

PRQA Framework Project creation A prerequisite for PRQA Jenkins plugin is that the source project has PRQA Project file, prqaproject.xml.
It is also possible to create a PRQA Project file as a build step prior to the PRQA static analysis. This step determines the location of the project file.



To do this, press the Add build step. If the build machine is a windows machine then select the Execute Windows batch command option otherwise select the Execute shell option.
It is possible that one of these steps is already set up to run the make or some other build script. This step can be used instead of adding a new step.



Enter into the command box the command line entry options to create and configure the PRQA project.
The QACLI tool is command line interface to PRQA Framework and PRQA Tools. QACLI allows these to be integrated with builds on build servers. It features a command line interface of the form:
qacli <subcommand> [options...]
where related features are grouped under a subcommand.
The address of the PRQA license server should be set where the system can retrieve a license. The following command can be used to accomplish this:
qacli admin --set-license-server <portip>
where the argument refers to an application layer address, for example, 5055@192.168.1.10 or 5055@myhost.
A PRQA project file contains the names of all configuration files which contain related settings. Creating a new PRQA project file is a case of specifying the directory where the project should be created and specifying the configuration files that it should contain. A PRQA project consists of:

- at least one Compiler Compatibility Template (CCT)
- one Rule Configuration File (RCF)
- one Analysis Configuration File (ACF)

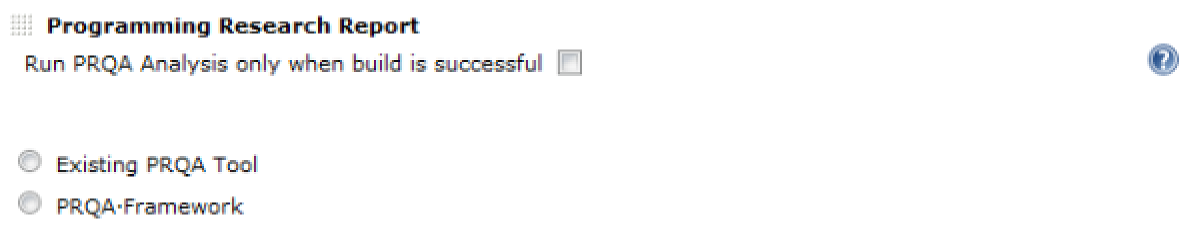
The PRQA project can also contain:

- a Naming Convention File (NCF)
- a Version Control Compatibility File (VCF)
- a QA·Verify Connection File (QCF)

The following command creates a new PRQA project file:
qacli admin --qaf-project-config --qaf-project <directory> --cct <path>
--rcf <path> --acf <path>
For example:
qacli admin –qaf-project-config –P . –C MS_VC++_CL_16_x86_C.cct
–C MS_VC+_CL_16_x86_C+.cct –A default.acf -R default-1.0.rcf

After creating the PRQA project file, the next thing to be done is to populate it with the source files and analysis data (i.e. the include paths and macro definitions used to compile each source file) from the build. This data can be extracted using build process monitoring. PRQA will monitor the build process, extract the relevant data and add it to the specified project.
The following command can be used to accomplish this:
qacli admin -P <project-path> --build-command <command>
where project-path is a path to a valid PRQA project file and build-command is a command that will set the build in motion and compile the files.
If the build command contains more than one word, it should be wrapped in quotes. If the build command is complex (e.g. has quotes within it), the command should be placed in a script. The path of this script should be used as the argument.
The above command can be reused to replace the old data with the data gathered from the build. This is useful for keeping PRQA projects synchronized with the build projects.
For example:
qacli admin -P . –build make
It is also possible to create a CMA Project file as a build step prior to PRQA static analysis. This is done in a similar way to create the PRQA project file in a build step using the command line interface

Setup of PRQA analysis using PRQA Framework

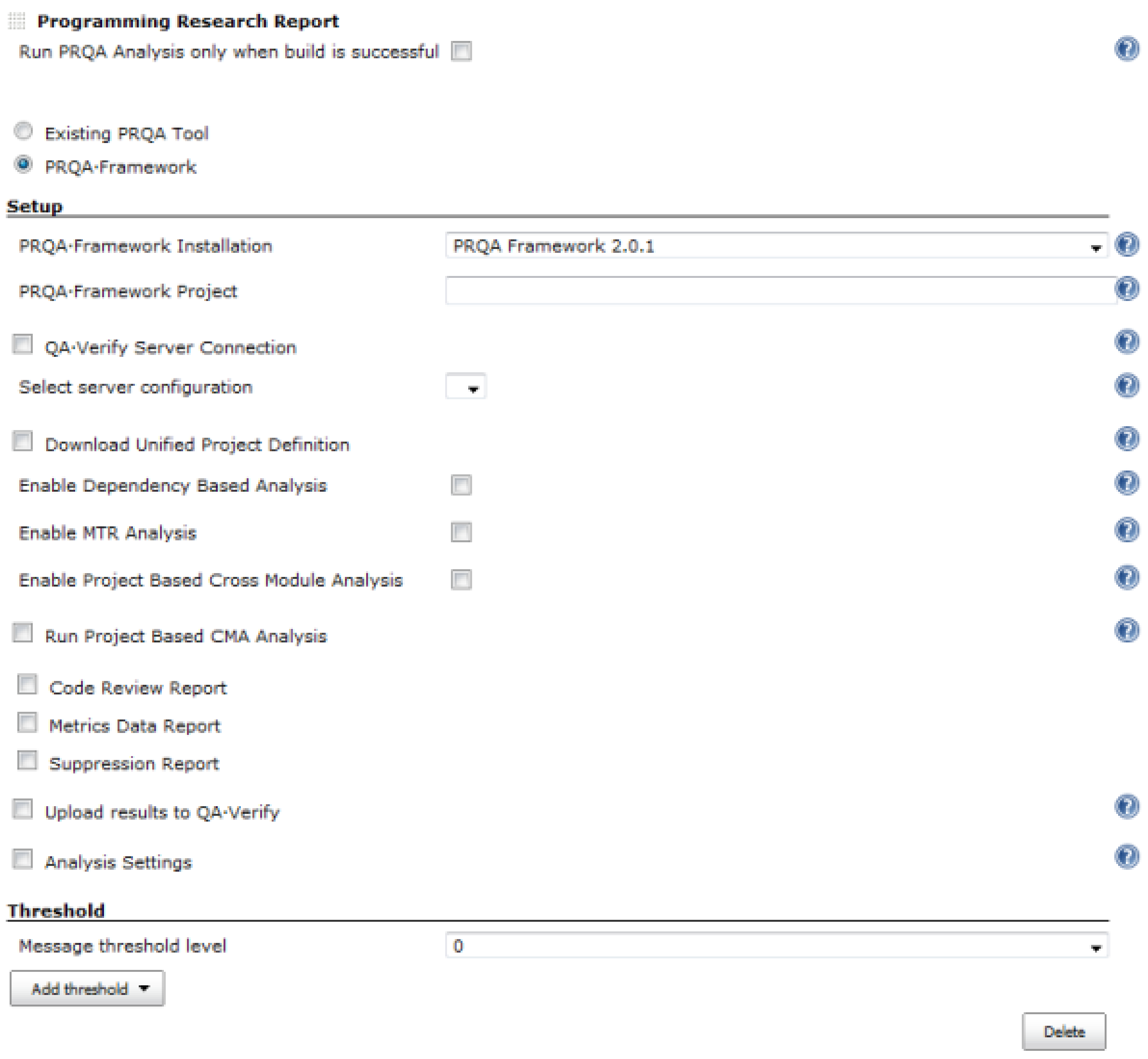


Programming Research Report

Run PRQA Analysis only when build is successful ☐

○ Existing PRQA Tool
○ PRQA·Framework

Select PRQA·Framework option by clicking on radio button.



Programming Research Report

Run PRQA Analysis only when build is successful ☐

○ Existing PRQA Tool
● PRQA·Framework

Setup

PRQA·Framework Installation	PRQA Framework 2.0.1
PRQA·Framework Project	
☐ QA·Verify Server Connection	
Select server configuration	
☐ Download Unified Project Definition	
Enable Dependency Based Analysis	☐
Enable MTR Analysis	☐
Enable Project Based Cross Module Analysis	☐
☐ Run Project Based CMA Analysis	
☐ Code Review Report	
☐ Metrics Data Report	
☐ Suppression Report	
☐ Upload results to QA·Verify	
☐ Analysis Settings	

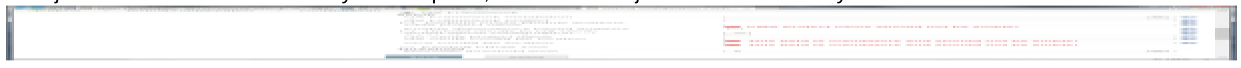
Threshold

Message threshold level	0

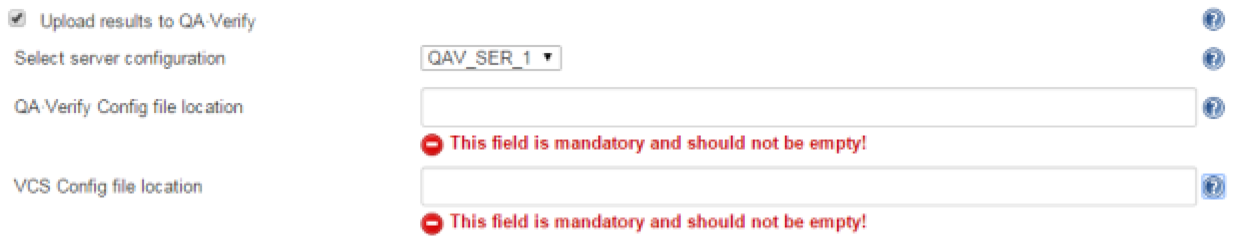
PRQA Framework Installation:
Select one of the PRQA Framework installations that was setup in the global Jenkins configuration.
PRQA Framework Project:
Enter the path to the directory containing the PRQA project file, prqaproject.xml for the project to be analyzed.
If the project file is in the top level directory of this module in the repository, then this can be left blank.
It is also possible to create a PRQA project file as a prior build step: that step will determine the location of the project file.
If the project file is inside the Jenkins workspace, then can just supply the relative path to the directory from the project root directory.
The plugin will automatically run static analysis on this project and produce the report.
Project Based Cross-Module Analysis:
Project Based Cross-Module Analysis (CMA) is link time checking and is performed once all of the source files have been analyzed. CMA must be enabled to fully enforce a coding standard.
Note that CMA may take a long time to complete. If enabled, it will always be run regardless of the dependency based analysis setting.

☑ Run Project Based CMA Analysis

If Project Based Cross-Module Analysis is required, select Run Project Based CMA Analysis.



The plugin will by default analyse all the source files. The amount of time to analyze the project can be decreased by only analyzing the source files that need analysis.
Select Enable dependency based analysis if this condensed analysis is required. Only source files that have changed or have no previous analysis output will be analyzed. Files that have up to date analysis output will not be analyzed.
Upload result to QA·Verify:
One of the most powerful features is the ability to upload the results of the analysis to QA·Verify. This enables developers to see the in-depth results of the analysis including annotated source code via a web browser showing the exact location of the coding standard violations. The non-compliances can then be fixed before re-committing the code.
It also allows deviations from the coding standard to be added, managed and reported providing the proof required to comply with coding standards such as MISRA C.
QA·Verify also allows other stakeholders such as managers and even customers to view the quality information. They are able to see how many defects there are in the code – and whether this is increasing or decreasing. This visibility of project level information equips managers with the data needed to make decisions on where to deploy resources if required.
If the results are wanted to be put in QA·Verify, select Upload results to QA·Verify. This will enable uploading the project analysis as a snapshot to QA·Verify.



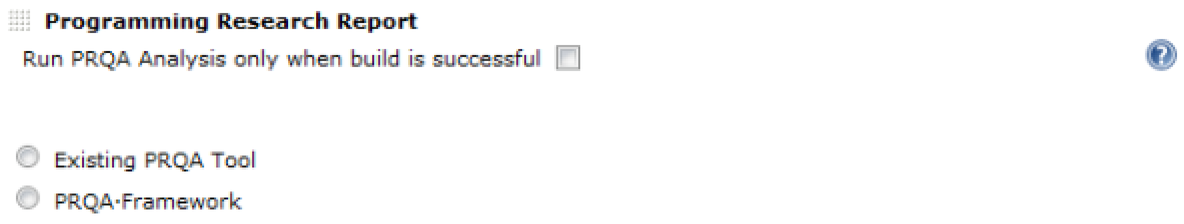
☑ Upload results to QA·Verify

Select server configuration	QAV_SER_1 ▾
QA·Verify Config file location	This field is mandatory and should not be empty!
VCS Config file location	This field is mandatory and should not be empty!

Select a server configuration to be used when uploading to QA·Verify that was setup in the global Jenkins configuration.
Enter the name of the QA·Verify project to be uploaded to. Once a project has been uploaded to QA·Verify the project name must stay the same, or the snapshot will not be attached to the correct project. It is recommended to create the project first in QA·Verify so can check the project configuration is correct before uploading snapshots.
Enter the location of the QA·Verify Config file and VCS Config file to be used. Use the versions that are configured for the PRQA project if they have been configured otherwise use the default files located under the config directory of product install directory.

- By default performing Cross Module Analysis and uploading results to QA·Verify are not selected. But the text boxes linked to these options still have an error message associated with the text boxes because of a known limitation to Jenkins plugin. The error message is "This field is mandatory and should not be empty!"
- A workaround for this is to select and deselect the relevant option.

Setup of PRQA analysis using existing PRQA Tool

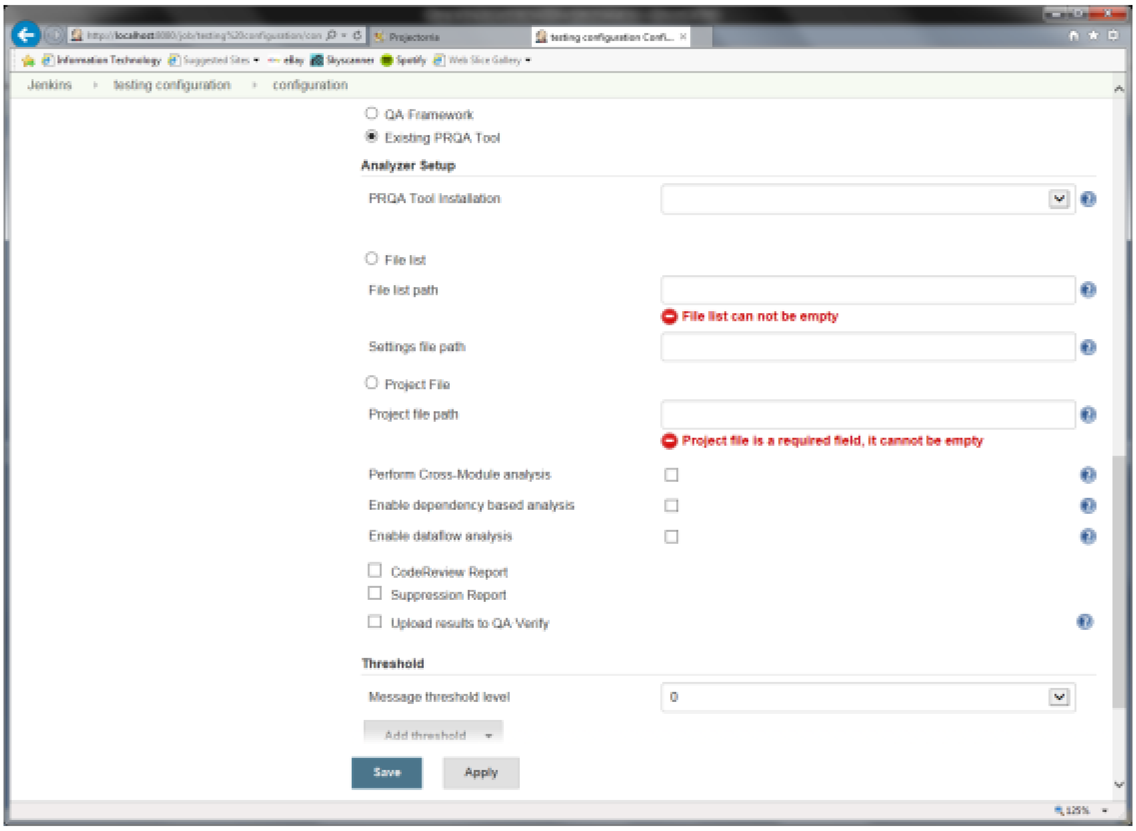


Programming Research Report

Run PRQA Analysis only when build is successful ☐

○ Existing PRQA Tool
○ PRQA·Framework

Select Existing PRQA Tool option by clicking on radio button.



Jenkins › testing configuration › configuration

( ) QA Framework
(●) Existing PRQA Tool

Analyzer Setup

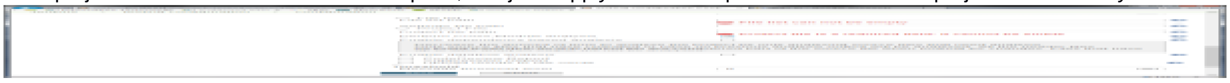
PRQA Tool Installation	
( ) File list	
File list path	File list can not be empty
Settings file path	
( ) Project File	
Project file path	Project file is a required field, it cannot be empty
Perform Cross-Module analysis	☐
Enable dependency based analysis	☐
Enable dataflow analysis	☐

☐ CodeReview Report
☐ Suppression Report
☐ Upload results to QA Verify

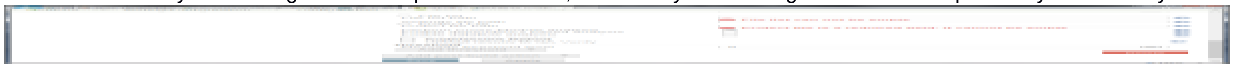
Threshold

Message threshold level	0

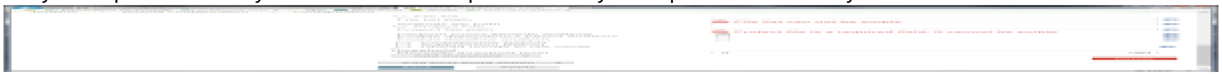
PRQA Tool Installation:
Select one of the PRQA Products that was setup in the global Jenkins configuration. The list has two default values, QA·C and QA·C++: these are the default installations and only used when the machine has be setup manually.
File List:
Select File List if the source files have been analyzed as part of the build process. This could be for example using Wrapper as a Makefile integration process.
Enter a path to a PRQA file list containing the output paths and source file names for the files that have been analyzed.
The Settings file should contain all of the analysis settings used: this can be created by simply concatenating the Message, Analyzer (if used) and Compiler personalities together into a single file.
If the files are within the Jenkins workspace, can just supply the relative path to them from the project root directory.
Project File:
Select Project File to analyze the project.
Enter the full path to the PRQA project file to be analyzed.
If the project file is part of the project in the repository, then it will be checked out in the project structure into the Jenkins workspace.
It is also possible to create a PRQA project file as a prior build step: that step will determine the location of the project file.
If the project file is inside the Jenkins workspace, can just supply the relative path to them from the project root directory.



Cross-Module Analysis:
Cross-Module Analysis (CMA) is link time checking and is performed once all of the source files have been analyzed. CMA must be enabled to fully enforce a coding standard. The CMA project must have been created previously.
Note that CMA may take a long time to complete. If enabled, it will always be run regardless of the dependency based analysis setting.

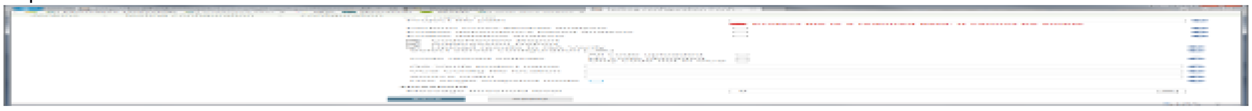


The plugin will by default analyse all the source files. The amount of time to analyze the project can be decreased by only analyzing the source files that need analysis.
Select Enable dependency based analysis if this condensed analysis is required. Only source files that have changed or have no previous analysis output will be analyzed. Files that have up to date analysis output will not be analyzed.



Dataflow analysis:
If dataflow is already enabled in the PRQA project, this option has no effect.
If dataflow is not enabled in the PRQA project, then enabling it here will make it use the default timeouts.
A PRQA project must be set up to use a User Defined dataflow personality if different timeouts and dataflow options are required.
This file should contain just the dataflow settings and **not** the -EnableDataflow+ or -ed+ option to turn on dataflow (or it will be always enabled).
For example:
*Dataflow is enabled when analysis launched from Jenkins
*Use 10 seconds timeout
-po df::query_timeout=100001
-po df::function_timeout=100000
*Maximum interfunction depth
-po df::inter=5

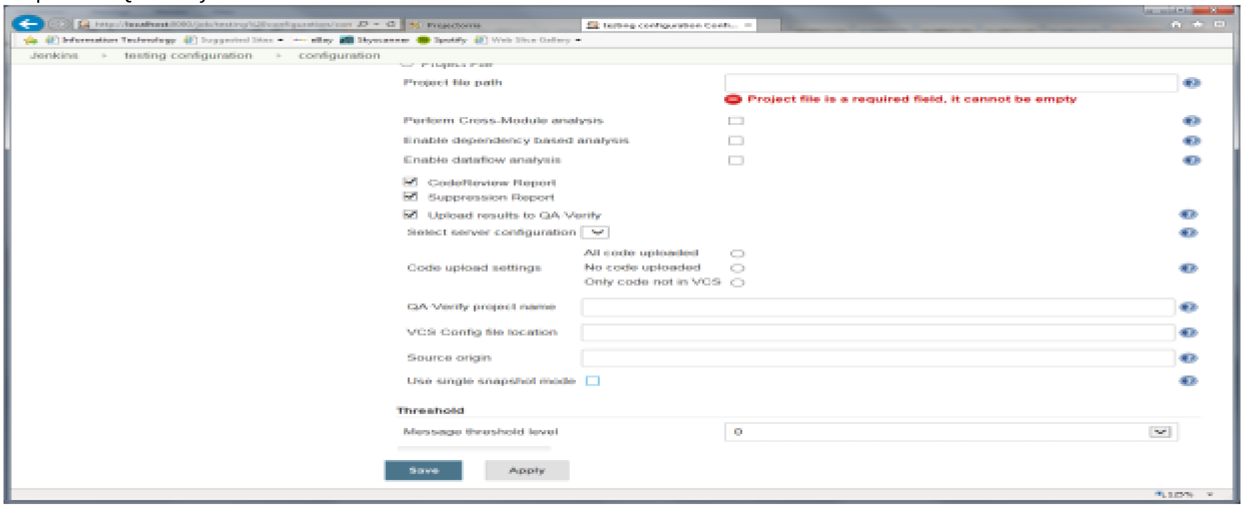
Reports:



Select Code Review Report if this report is required.
Select Suppression Report if this report is required.

Upload result to QA·Verify:

If the results are wanted to be put in QA·Verify, select Upload results to QA·Verify. This will enable uploading the project analysis as a snapshot to QA·Verify.



Jenkins » testing configuration » configuration

Project file path

Project file is a required field, it cannot be empty

Perform Cross-Module analysis ☐
Enable dependency based analysis ☐
Enable dataflow analysis ☐

☑ CodeReview Report
☑ Suppression Report
☑ Upload results to QA Verify

Select server configuration

Code upload settings: All code uploaded ○ / No code uploaded ○ / Only code not in VCS ○

QA Verify project name
VCS Config file location
Source origin
Use single snapshot mode ☐

Threshold

Message threshold level: 0

Select a server configuration to be used when uploading to QA·Verify that was setup in the global Jenkins configuration.
Code upload settings controls if the source code is uploaded to QA·Verify.

- *All code uploaded* will unconditionally upload all source and header files to QA·Verify so it will not need to access the repository. The VCS can still be used during upload to get the file versions and authors - specify a VCS configuration file below.
- *No code uploaded* will not upload any code. QA·Verify will retrieve all required code from the repository. A VCS configuration file must be specified below.
- *Only code not in VCS* will only upload files that are not in the Version Control System (e.g. generated files). Files that are in the repository will not be uploaded.

Enter the name of the QA·Verify project to be uploaded to. Once a project has been uploaded to QA·Verify the project name must stay the same, or the snapshot will not be attached to the correct project. It is recommended to create the project first in QA·Verify so can check the project configuration is correct before uploading snapshots.
Enter the location of the QA·Verify Config file and VCS Config file to be used. Use the versions that are configured for the PRQA project if they have been configured otherwise use the default files located under the config directory of product install directory.
Specify the full path to the top level of the source directory structure as the source origin. The source origin will default to the current workspace if nothing is specified
This value is only used when source code is uploaded to QA·Verify (i.e. using *All code uploaded* or *Only code not in VCS* settings) and is used to remove the leading parts of pathnames in the Web Message Browser.
If left blank, the plugin assumes that the top level of the source code directory is the job's workspace: this is usually the correct setting.
Select Use Single Snapshot to enable Single Snapshot upload to QA·Verify. Each snapshot will overwrite the previous snapshot. The project will only consist of a single snapshot and there will be no trending or baselining.