

The Polarsys Maturity Model

Unconference workshop – session 3.

Proof of concept

https://polarsys.org/wiki/Maturity_Assessment_WG

Polarsys Meeting
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Structure of the presentation

- 1 A single platform to rule them all
- 2 Architecture
- 3 Demonstration
- 4 Next Steps
- 5 Discussion

A single platform to rule them all

A single platform to rule them all

Objectives:

- Have all information available in a single place.
- Self-documented: all information is put within its context.
- Customisation available: add your own entries, set your own weight..
- Link to other data repositories: Eclipse Dashboard, PMI, project information.
- Publish all data for further usage.

Proof of concept

A prototype has been developed as a proof of concept:

- Includes all documentation: quality model, attributes, goals, metrics, rules.
- Includes results of all analysed projects and help to exploit the results.
- Automatically generated from the git repository.
- Check it out: <http://castalia.camp/dl/dashboard>

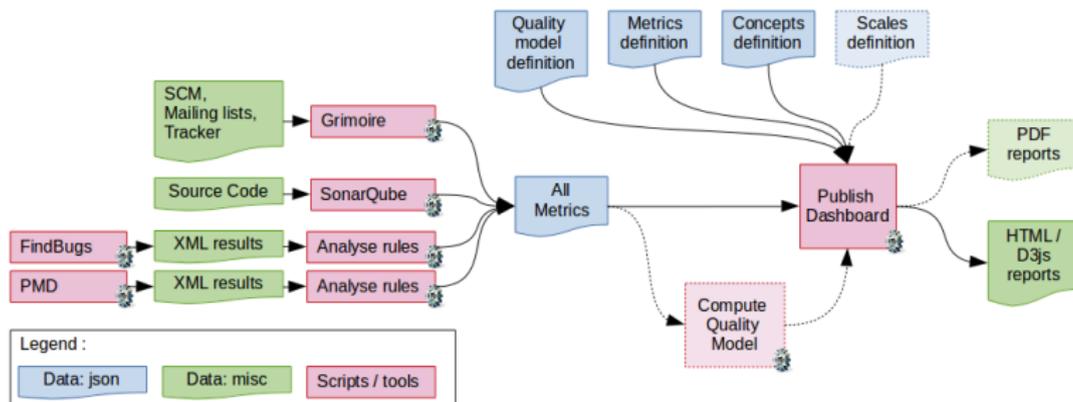
Architecture

Architecture of the platform

Main principles

- The generation process is designed around data.
 - ▶ Easier to understand.
 - ▶ Enables quick forking: ability to rewrite only specific parts.
 - ▶ Open & transparent: data files can be downloaded.
- Process can be stopped and resumed at any point.
- Automate as much as possible.

Architecture of the platform



Demonstration



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Welcome to the Maturity Assessment dashboard!

Home

Documentation

Quality Model
Concepts
Metrics
Rules

Example project

List of projects

CDT
EASE
Gendoc
Kitalpha
Papyrus
Sirius

Maturity Assessment

PolarSys is an Eclipse Industry Working Group created by large industry players and by tools providers to collaborate on the creation and support of Open Source tools for the development of embedded systems. Members of PolarSys started working on a Maturity Assessment task force back in 2013, to assess and help improve quality of projects entering the PolarSys umbrella.

This page is automatically generated from the definition files stored in a git repository, so they can not be modified directly. Instead, please send your remarks to the PolarSys mailing list or contact me (Boris Baldassar).

Projects

List of projects analysed.

- CDT.
- Papyrus.
- Sirius.

We also setup an example project to demonstrate what it should look like when all information is available for the analysed projects. Most of its information is borrowed from CDT, and missing parts have been manually filled.

Documentation

This process is self-documented: this documentation is automatically generated from the definition files themselves.

- The Quality Model defines how quality attributes are organised, and mapped to measurements concepts and metrics.
- Measurement concepts are generic measurement units, that can be potentially applied to all types of languages or software development processes. From these measurement concepts, the quality model defines metrics targeted to a specific context: language, forge, etc.
- Metrics are measures retrieved all along the project environment: process, source code, wiki, etc. They are thoroughly described in this section with their description, source, and impact.
- Rules are computed by well-known rule-checking tools PMD and FindBugs. They are software development practices known to be good.

More information

Want to know more about this work?

- The Eclipse foundation: www.eclipse.org
- The PolarSys working group: polarSYS.org
- The Maturity Assessment task force: polarSYS.org/wiki/Maturity_Assessment_WG



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Example project: Home

Lists all information available in the PMI file.

- Complete description of the project.
- Access to all repositories: source, issue tracking, mailing lists.
- Links to all resources: download, getting started, build, wiki, web site.
- All releases, milestones, with dates and result (ongoing/fail/success).

Example project: Home

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Welcome to the Maturity Assessment dashboard!

Home

- About this project
 - Quality Model
 - Attributes
 - Measures
 - Practices
 - Actions
- Documentation
 - Quality Model
 - Concepts
 - Metrics
 - Rules
- Example project
- List of projects
 - CDT
 - Papyrus
 - Sirius

Project [example]: C/C++ Development Tooling (CDT)

General information

ID: tools.cdt
Web site: <http://www.eclipse.org/cdt>
Wiki: <http://wiki.eclipse.org/index.php/CDT>
Download URL: <http://www.eclipse.org/cdt/downloads.php>
Documentation: <http://wiki.eclipse.org/index.php/CDT>
Getting Started URL: <http://dev.eclipse.org/viewcvs/indextools.cgi/%7E%7Echeckout%7E/cdt-home/user/Tutorials.html>

Bugzilla

Product: CDT
Query URL: <https://bugs.eclipse.org/bugs/buglist.cgi?product=CDT>
Create URL: https://bugs.eclipse.org/bugs/enter_bug.cgi?product=CDT

Source repositories

cdt

Type: git
URL: <http://git.eclipse.org/c/cdt/org.eclipse.cdt.git>

cdt.edc

Type: git
URL: <http://git.eclipse.org/c/cdt/org.eclipse.cdt.edc.git>

cdt.master

Type: git
URL: <http://git.eclipse.org/c/cdt/org.eclipse.cdt.master.git>

More info

Most of the information displayed in this page comes from the PMI web site: projects.eclipse.org

Download data for this project

- Metrics [JSON]
- Concepts [JSON]
- Attributes [JSON]

Example project: Quality Model

- Provides a complete tree visualisation of the quality model:
 - ▶ Presents the full hierarchy and organisation of the model.
 - ▶ From quality attributes to measurement goals and base metrics.
 - ▶ With the values gathered or computed for the project.
- Includes in-context documentation: click on a node to get more details, links, references.
- Demonstrates the top-down and bottom-up sequences.

Example project: Measures & Practices

- Shows a list of measures and rules checked, with mnemo, name and description.
- Direct link to the metric or rule detailed description.

Example project: Measures



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Measures for [example]

Name	Mnemo	Value
Comment rate	COMR	16.4
Number of downloads on the web site	DL_REPO_1M	572801
Number of downloads on update site	DL_UPDATE_SITE_1M	3359
Function cloning	FU_CLONE	115314
ITS authors	ITS_AUTH_1M	55
Defect density	ITS_BUGS_DENSITY	0.08530612869851283
Median time to fix bug	ITS_FIX_MED_1M	14.95
ITS updates	ITS_UPDATES_1M	237
Number of favourites on the Marketplace	MKT_FAV	7
Number of failed install on the Marketplace	MKT_INSTALL_FAILED_1M	301
Number of successful installs on the Marketplace	MKT_INSTALL_SUCCESS_1M	3058
Developer ML authors	MLS_DEV_AUTH_1M	32
Developer ML response ratio	MLS_DEV_RESP_RATIO_1M	2.71875
Developer ML subjects	MLS_DEV_SUBJ_1M	32
Developer ML posts	MLS_DEV_VOL_1M	119

More info

You can get more information by clicking on the metric name or mnemo.

Download data for this project

- Metrics [JSON]
- Concepts [JSON]
- Attributes [JSON]



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Example project: Practices



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Practices (rule violations) for [example]

This rules have been extracted from PMD 5.1.2 and FindBugs 3.0.0.

Name	Mnemonic	Priority	Category	Value
Abstract Class Without Abstract Method	AbstractClassWithoutAbstractMethod	3	ANA	28
Abstract Class Without Any Method	AbstractClassWithoutAnyMethod	3	CHA	7
Accessor Class Generation	AccessorClassGeneration	3		112
Assignment To Non Final Static	AssignmentToNonFinalStatic	3	REL	69
Avoid Branching Statement As Last In Loop	AvoidBranchingStatementAsLastInLoop	2	ANA	42
Avoid Constants Interface	AvoidConstantsInterface	3	ANA	509
Avoid Deeply Nested If Statements	AvoidDeeplyNestedIfStmts	3	ANA CHA	1102
Avoid InstanceOf Checks In Catch Clause	AvoidInstanceOfChecksInCatchClause	3	CHA	11
Avoid Protected Field In Final Class	AvoidProtectedFieldInFinalClass	3	ANA	5
Avoid Protected Method In Final Class Not Extending	AvoidProtectedMethodInFinalClassNotExtending	3	ANA	24
Avoid Reassigning Parameters	AvoidReassigningParameters	3	CHA	1877
Avoid Synchronized At Method Level	AvoidSynchronizedAtMethodLevel	3	EFF CHA	631
Avoid ThreadGroup	AvoidThreadGroup	3	REL	3
Avoid Using Hard Coded IP	AvoidUsingHardCodedIP	3	CHA REU	19
Avoid Using Orta Values	AvoidUsingOrtaValues	3	RF1 ANA	4

More info

Rule violations are retrieved from well-known rule-checking tools like PMD and FindBugs. Rules can be assimilated to good and bad practices. They are all attached to a category (quality attribute, check the quality model for more information) and have a priority.

Download data for this project

- Metrics [JSON]
- Concepts [JSON]
- Attributes [JSON]

Plot it!



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Example project: Actions

- Propose advice to help improve some quality characteristics.
- Spans all areas: code, process, publications, mailing lists, etc.
- Help find the right next action that would significantly improve the project quality.
- Share best practices and experience of gurus to help new-comers.

Example project: Actions



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Actions

Process

Process actions impact the **organisational** maturity of the project: predictability of outputs, traceability, best management practices.. and more generally any of the key process areas defined in the **CMMI**.

Action	Mnemo	Priority	Category	Where?
The source repository is not provided in the Project Management Infrastructure. Filling this field helps people easily find your sources, which is good for collaboration and good-citizenship behaviour.	PMI_SRC_REPO	1	Process — PMI	See PMI page
The bugzilla entry is not provided in the Project Management Infrastructure. Filling this field helps people easily find your issue tracking system, which is good for getting feedback (testing) and good-citizenship behaviour.	PMI_SRC_BUGS	1	Process — PMI	See PMI page
The developer mailing list entry is not provided in the Project Management Infrastructure. Filling this field helps people easily find your mailing list, which is good for collaboration and good-citizenship behaviour.	PMI_SRC_ML_DEV1		Process — PMI	See PMI page

Product

These practices have a level 1 criticality and are considered important stuff. You should take corrective action.

Action	Mnemo	Priority	Category	How often?
BC: Impossible cast	BC_IMPOSSIBLE_CAST	1	COR REL	1.
Avoid Branching Statement As Last In Loop	AvoidBranchingStatementAsLastInLoop	2	ANA	42
Boolean Instantiation	BooleanInstantiation	2	ANA	127
Broken NullCheck	BrokenNullCheck	2	REL	11
DML: Invocation of hashCode on an array	DML_INVOKING_HASHCODE_ON_ARRAY	2	COR	1

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Next Steps

Next steps: thresholds

- To help people understand numbers – not everybody knows if 238 commits a month is high, low, or average.
- Define thresholds for metrics: what is low, medium, high?
- Use a simple 5-level scale, to instantly get an idea of what the numbers mean.
- Use a set of projects as a reference – Not only from Eclipse forges.
- Use statistical methods, rely on experts' advice, mix both?

Next steps

- Improve presentation of results: visualisation, ergonomomy.
- Add more content:
 - ▶ metrics: from new areas, to increase the measurement accuracy of quality attributes
 - ▶ rules: check more practices, sort them to get only the most important, add new tools.
 - ▶ actions and advice: how to run a project the Eclipse way, communicate, attract people.
- Improve automation, ease the adoption setup for new-coming projects.
- Add more projects. What about yours?

Discussion

We would like some feedback on:

- Scales: what would define a good scale?
- Scales: how to choose the thresholds? Expert-based? Statistical methods?
- What useful results would you like to have in the dashboard?
- How would you like results to be presented?