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# Welcome to Cybage

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# Sonar – Static code Analysis


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# Agenda

- Sonar - Continuous Code quality management
- 7 axes of code quality
- SonarQube platform overview
- Findbugs/ Checkstyle/ PMD
- Code coverage
- Security
- What is Continuous Integration
- Benefits of CI
- Benefits of Sonar In Continuous Integration
- Integration with other tools
- Demo



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# Sonar – Continuous Code Quality Management

- SonarQube is an **open platform** to manage code quality. It covers the 7 axes of code quality
- It is a **Continuous Inspection** process, raising code quality visibility for all stakeholders and making it an integral part of the software development lifecycle
- Covering new languages, adding rules engines, computing advanced metrics can be done through a **powerful extension mechanism**. **(50+ plugins)**
- It allows to combine metrics altogether with **historical data**.
- It provides **efficient dashboard** and can be navigated to the **defect management tools**



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# 7 issues identified by Sonar team

7 Deadly sins of developers identified by sonar team:

1. Non respect of coding standards & best practices
2. Lacking comments in source code, especially in public APIs
3. Having duplicated lines of code
4. Having complex component or/and a bad distribution of complexity amongst components
5. Having no or low code coverage by unit tests, especially in complex part of the program
6. Leaving potential bugs
7. Having a spaghetti design i.e. not following architecture and design



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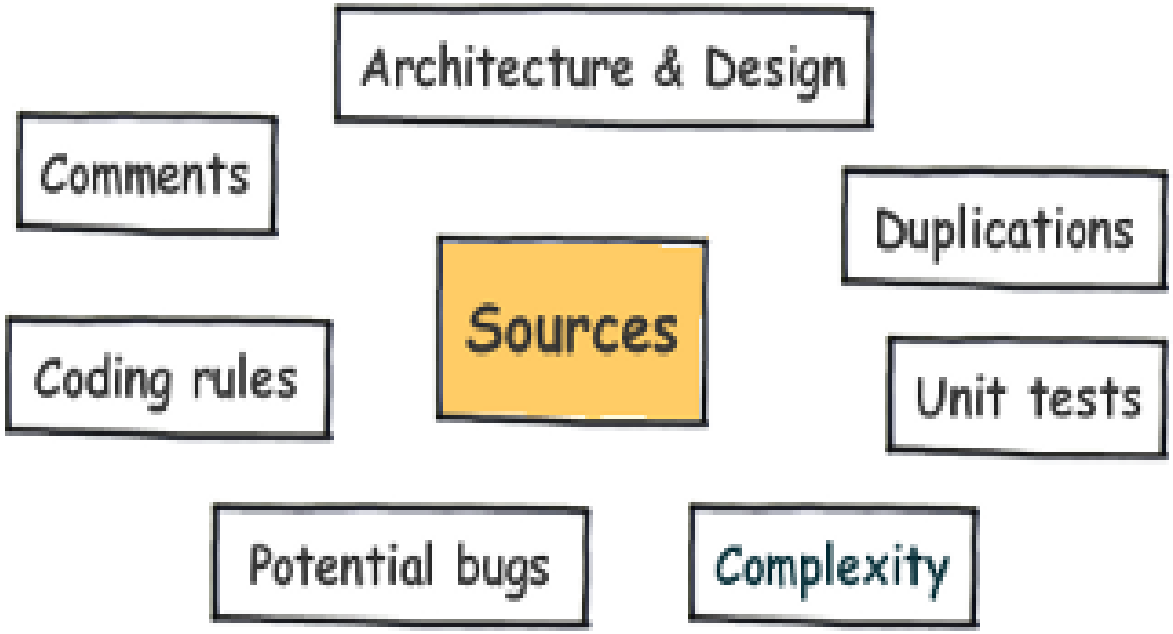
# 7 axes of code analysis



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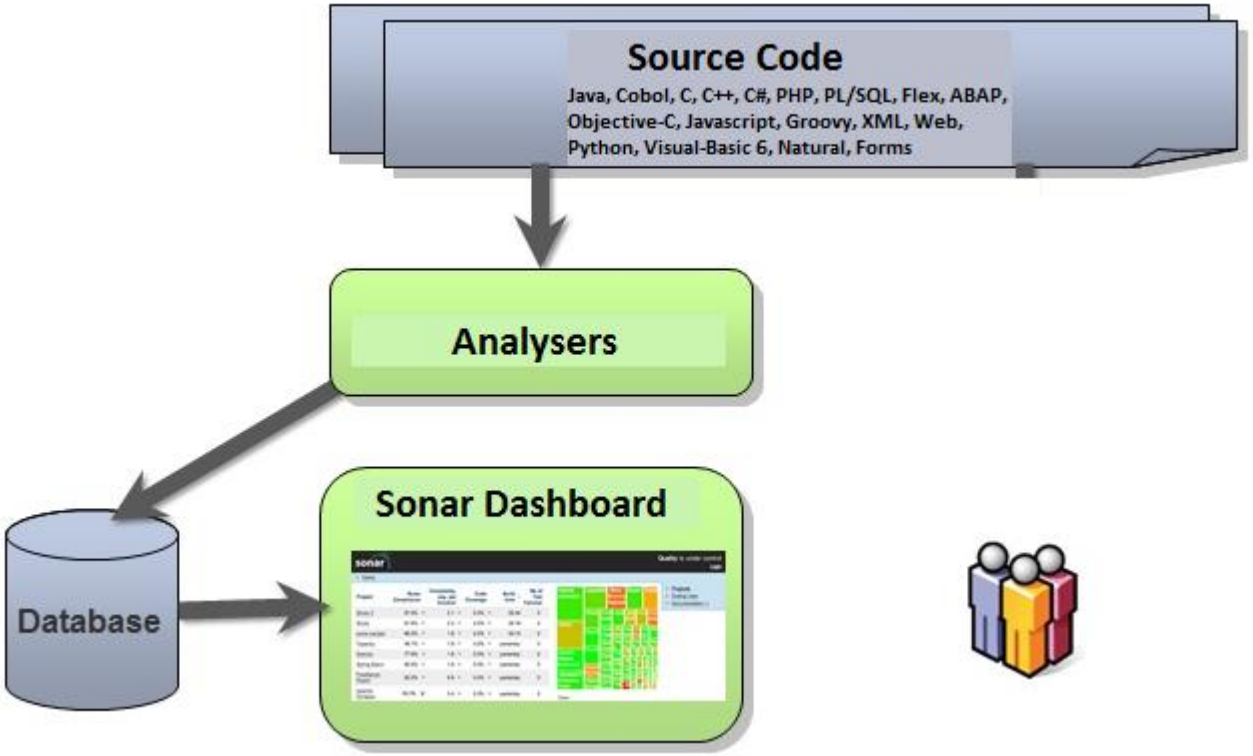
# SonarQube platform overview



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# 3 Components in SonarQube

- **Database** to store:
  - the configuration of the SonarQube instance (security, plugins settings, etc.), the quality snapshots of projects, views, etc.
  - Supported database : MySQL, Oracle, PostgreSQL, MocrosoftSQL server, Derby

- **Web Server** for users to browse quality snapshots & configure
  - Browse SonarQube at http://localhost:9000
  - Default System administrator credentials are admin/admin

- One or more **Analyzers** to analyze projects
  - Maven / Gradle / Ant analyzer
  - CI engine – Jenkins
  - Eclipse



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# Findbugs

- Findbugs identify potential bugs in the code

- Examples of potential bugs :-
  - Synchronization on Boolean could lead to deadlock
  - May expose internal representation by returning reference to mutable object
  - Method uses the same code for two branches



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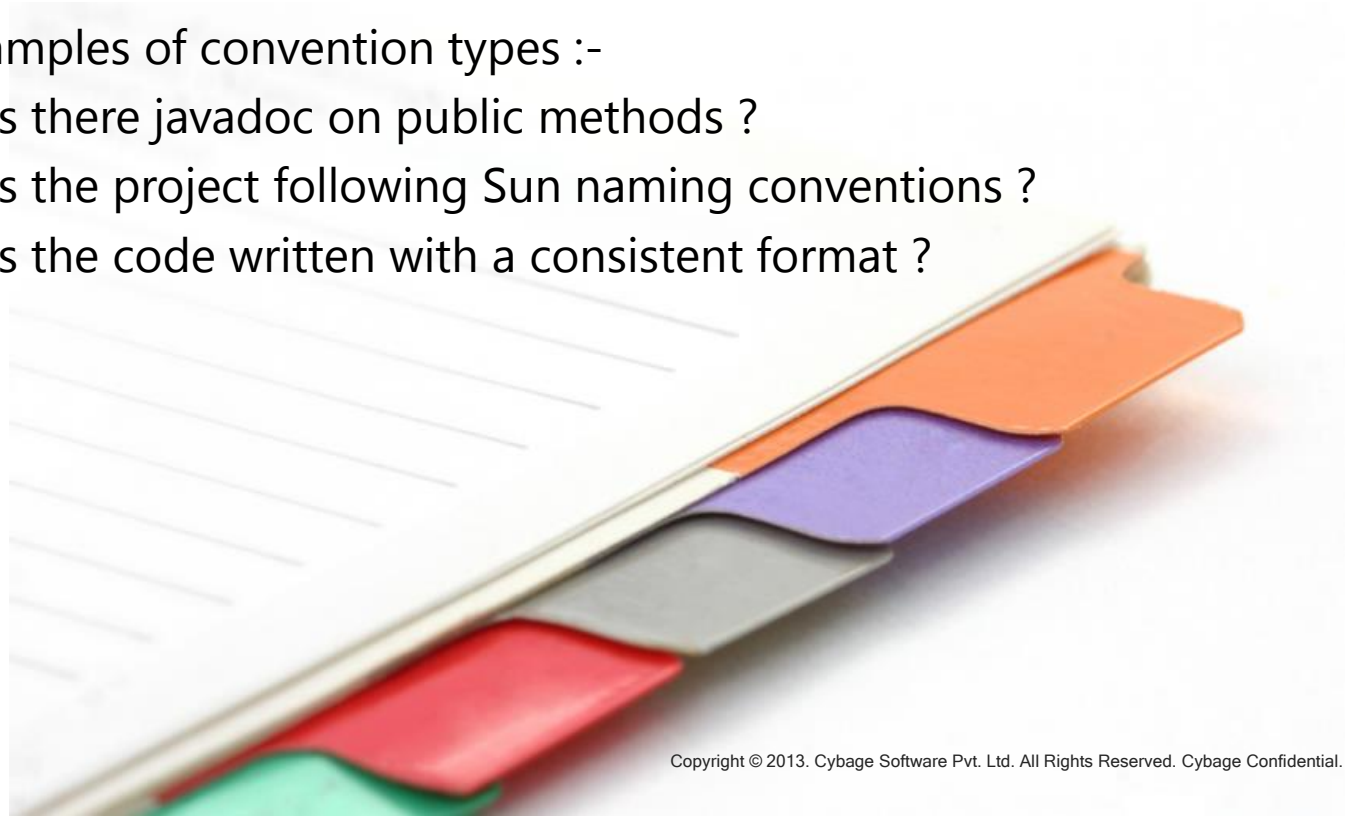
# Checkstyle

- Identify issues where convention type is not followed while coding
- Helps people to work together and understand consistent code

- Examples of convention types :-
  - Is there javadoc on public methods ?
  - Is the project following Sun naming conventions ?
  - Is the code written with a consistent format ?





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# PMD

- PMD plugin identifies issues caused by bad coding practices which leads to difficulties over time

Examples of bad practices :-

- Possible bugs—Empty try/catch/finally/switch blocks.
- Dead code—Unused local variables, parameters and private methods
- Empty if/while statements.
- Overcomplicated expressions—Unnecessary if statements, for loops that could be while loops.
- Suboptimal code—Wasteful String/StringBuffer usage.
- Classes with high Cyclomatic Complexity measurements.
- Duplicate code—Copied/pasted code can mean copied/pasted bugs, and decreases maintainability.



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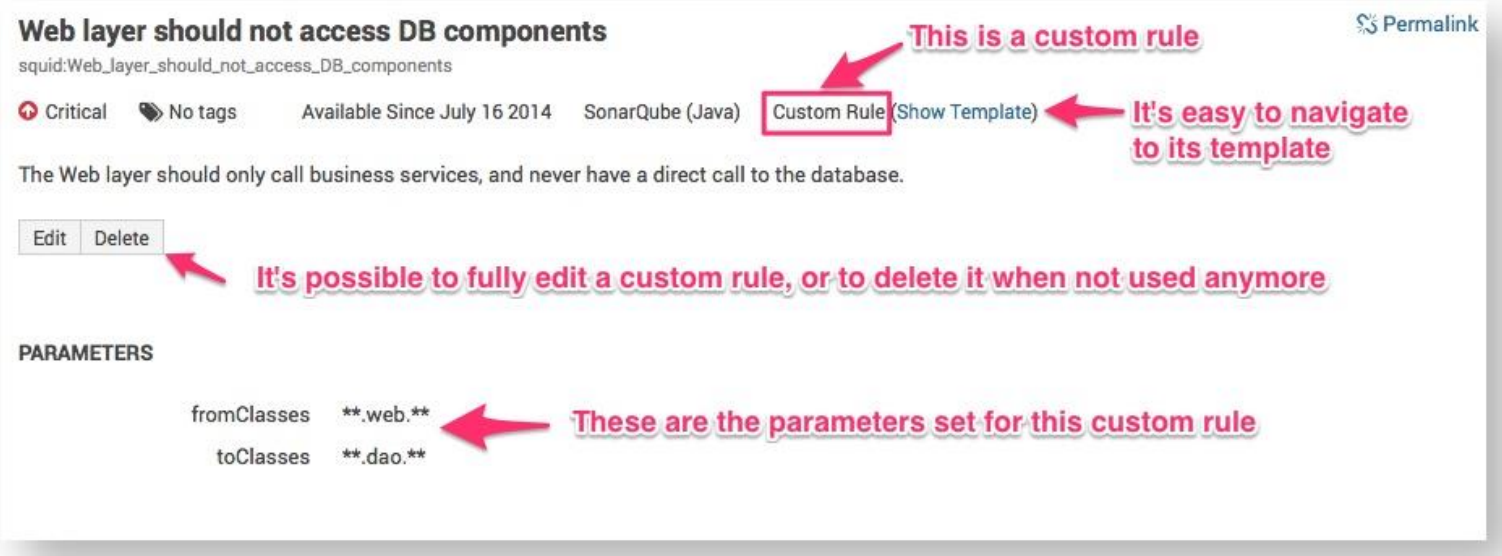
# Custom rule




There are two ways to extend coding rules:

- Writing custom rules in Java via a SonarQube plugin
- Adding XPath rules directly through SonarQube web interface



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# Code coverage

- It is possible to feed SonarQube with Unit tests execution and code coverage reports.
- Unit test Code coverage means lines of code covered by unit tests.
- Supported code coverage tools
  - JaCoCo
  - Cobertura
  - Clover



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# Security in SonarQube

- SonarQube comes with a complete mechanism to manage security

- Configuring security allows you to cover two main use cases:
  - Manage access rights to components, information, etc.
  - Enable customization (custom dashboards, notifications etc.) of SonarQube for users



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# Security

- Examples of Security restrictions you can enforce by configuring security in SonarQube:
  - Secure a SonarQube instance by forcing authentication prior to accessing any page
  - Make a given project invisible to anonymous users
  - Restrict access to a project to a given group of users
  - Restrict access to project's source code to given set of users
  - Define who can administer a project (setting exclusion patterns, tuning plugins configuration for that project, etc.)



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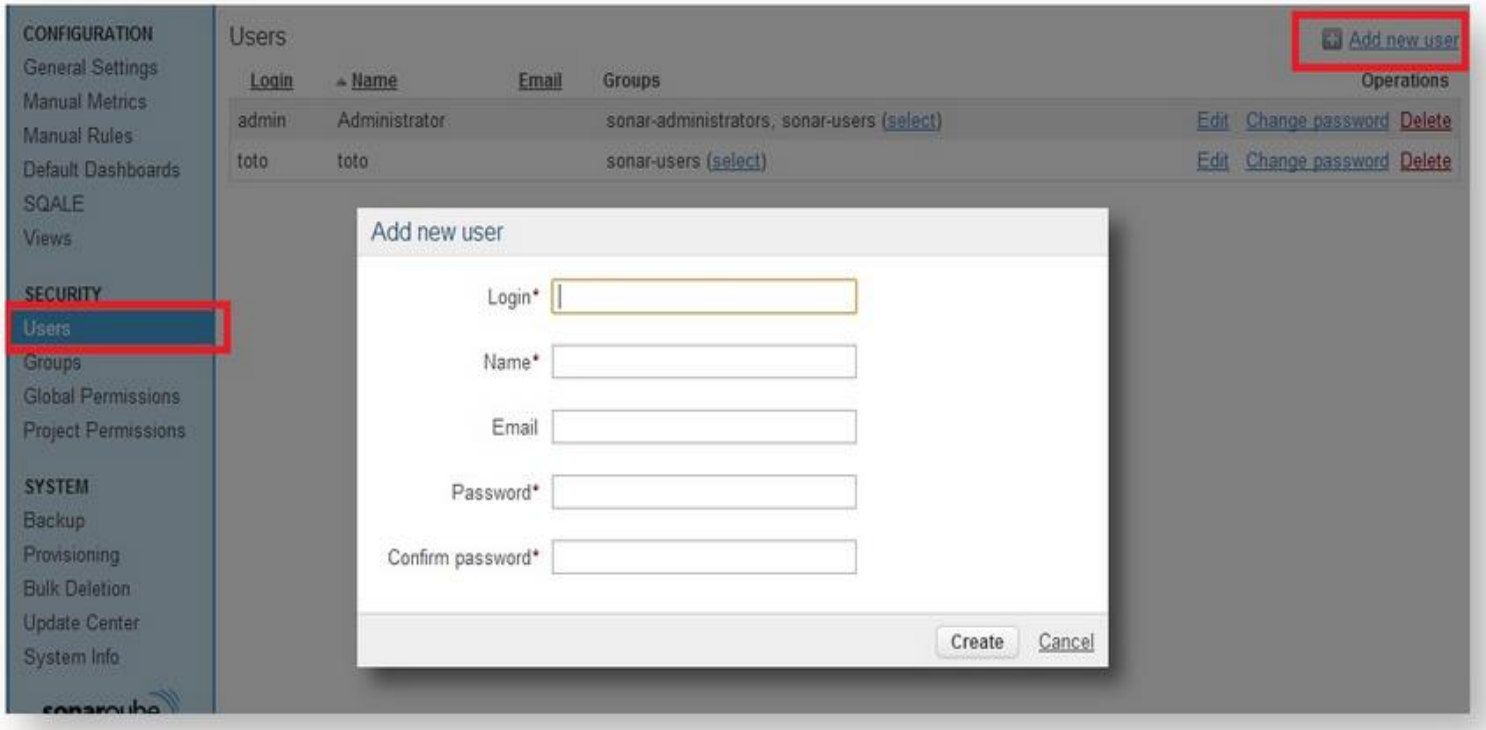
# Creating a User

## Creating a User

A user is a set of basic information: login, password, name and email.

To create a new user, go to **Setting > Users > Add new user**:



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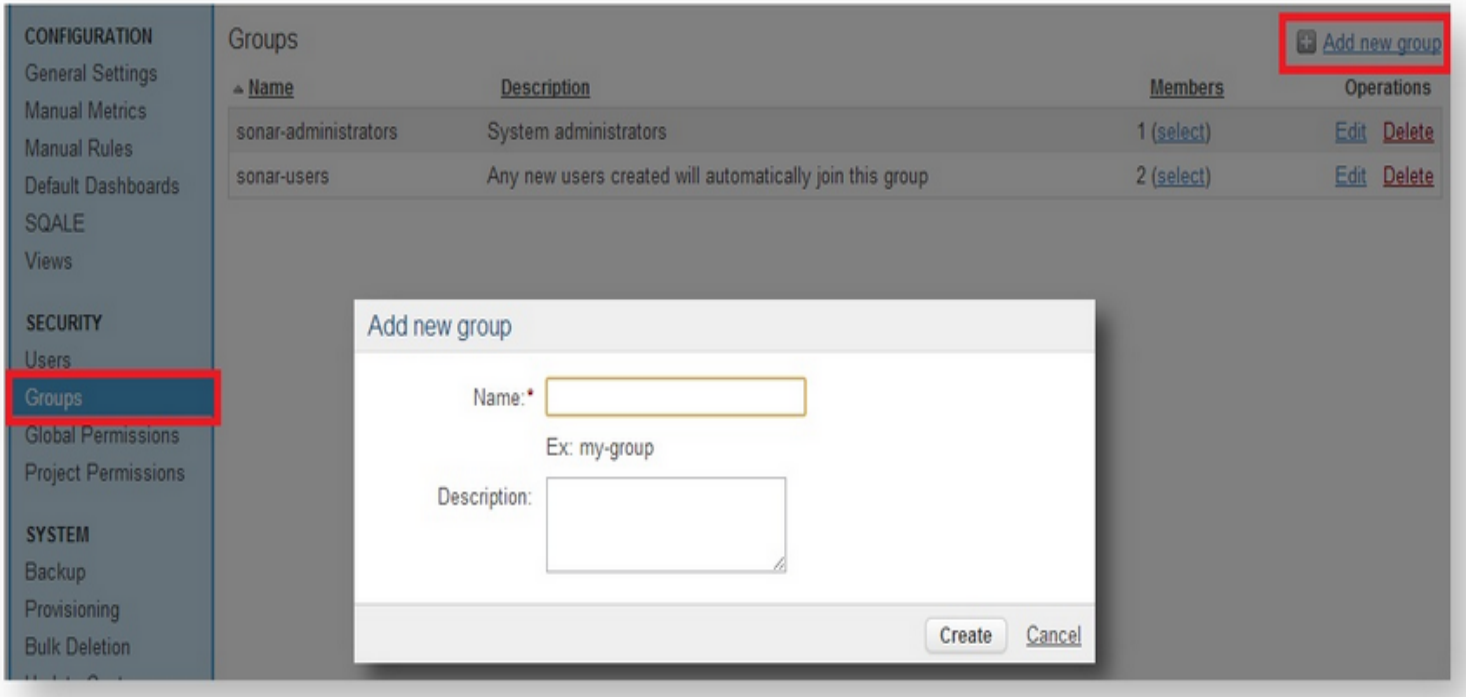
# Defining a Group

## Group

A group is a set of users.

To create a new group, go to **Settings > Groups > Add new group**:



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# Making a Group Default

Dashboards Projects ▾ Measures Issues Rules Quality Profiles Quality Gates Settin

CONFIGURATION
General Settings
Manual Metrics
Default Dashboards

SECURITY
Users
Groups
Global Permissions
Project Permissions

SYSTEM
Provisioning
Bulk Deletion
Update Center
System Info

## General Settings

Edit global settings for this SonarQube instance.

CATEGORY
Exclusions
General
Java
Licenses
Security
Technical Debt

Security Encryption

Allow users to sign up online: Default ▾
Default: false
Users can sign up online.
Key: sonar.allowUsersToSignUp

Default user group: sonar-users
Default: sonar-users
Any new users will automatically join this group.
Key: sonar.defaultGroup

Force user authentication: Default ▾
Default: false



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# Global Permissions

Dashboards | Projects ▾ | Measures | Issues | Rules | Quality Profiles | Quality Gates | Settings | Administrator ▾

**CONFIGURATION**
- General Settings
- Manual Metrics
- Default Dashboards

**SECURITY**
- Users
- Groups
- Global Permissions
- Project Permissions

**SYSTEM**
- Provisioning
- Bulk Deletion
- Update Center
- System Info

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## Global Permissions

Grant and revoke permissions to make changes at the global level. These permissions include editing quality profiles, sharing dashboards, and performing global system administration.

| PERMISSION | USERS | GROUPS |
|---|---|---|
| **Administer Quality Profiles and Gates**<br>Ability to perform any action on the quality profiles and gates. | (select) | sonar-administrators (select) |
| **Administer System**<br>Ability to perform all administration functions for the instance: global configuration and personalization of default dashboards. | (select) | sonar-administrators (select) |
| **Execute Analysis**<br>Ability to execute analyses, and to get all settings required to perform the analysis, even the secured ones like the scm account password, the jira account password, and so on. | (select) | Anyone (select) |
| **Execute Preview Analysis**<br>Ability to execute preview analysis (results are not pushed to the server). This permission does not include the ability to access secured settings such as the scm account password, the jira account password, and so on.<br>This permission is **required** to execute preview analysis in Eclipse or via the Issues Report plugin. | (select) | Anyone (select) |
| **Provision Projects**<br>Ability to initialize project structure before first analysis. | (select) | sonar-administrators (select) |
| **Share Dashboards And Filters**<br>Ability to share dashboards, issue filters and measure filters. | (select) | sonar-administrators (select) |

SonarQube™ technology is powered by SonarSource SA
Version 4.5.1 - LGPL v3 - Community - Documentation - Get Support - Plugins - Web Service API



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# Project Permissions

Dashboards | Projects ▾ | Measures | Issues | Rules | Quality Profiles | Quality Gates | Settings | Administrator ▾ | Search

CONFIGURATION
- General Settings
- Manual Metrics
- Default Dashboards

SECURITY
- Users
- Groups
- Global Permissions
- Project Permissions

SYSTEM
- Provisioning
- Bulk Deletion
- Update Center
- System Info

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## Project Permissions

Grant and revoke project-level permissions. Permissions can be granted to groups or individual users.

Projects | Permission Templates

Name contains | Key contains | Type: Projects | Search

Bulk Change

| | BROWSE<br>Ability to access a project, browse its measures, and create/edit issues for it. | ADMINISTER<br>Ability to access project settings and perform administration tasks. (Users will also need "Browse" permission) | ADMINISTER ISSUES<br>Grants the permission to perform advanced editing on issues: marking an issue False Positive or changing an Issue's severity. (Users will also need "Browse" permission) | SEE SOURCE CODE<br>Ability to view the project's source code. (Users will also need "Browse" permission) | |
|---|---|---|---|---|---|
| Squash Java<br>com.squareup:squash-java | (select users)<br>Anyone (select groups) | (select users)<br>sonar-administrators<br>(select groups) | (select users)<br>(select groups) | (select users)<br>Anyone (select groups) | Apply Permission Template |

1 results



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# What is Continuous Integration

- Continuous Integration (CI) is the process of building software with every change committed to a project's version control repository.
- CI is a practice of constantly merging source code and building/testing as often as possible.
- Continuous integration involves integrating early and often, so as to avoid the pitfalls of "integration problems".
- The practice aims to reduce rework and thus reduce “cost and time.”
- Development process automation technique.



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# How to achieve CI?

- Developers check out code into their private workspaces.
- When done, they commit changes to the repository.
- CI server monitors Repository & checks out changes when they occur.
- The CI server builds the system and run **Static code analysis to check code quality and coding rule violations**
- runs unit and integration tests.
- The CI server releases deployable artifacts for testing.
- CI server assigns a build label to the version of the code it just built.
- CI server informs the team of the successful build.
- If the build or tests fail, the CI server alerts the team.
- The team fix the issue at the earliest opportunity.
- Continue to continually integrate and test throughout the project.



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# Benefits of CI

- **Increase visibility** which enables greater communication
- **Spend less time** debugging and more time adding features
- **Reduce integration** problems allowing you to deliver software more rapidly
- Reverting to a **bug-free state** in case of build failures
- **Avoid** last minute chaos at release dates
- **Immediate unit** and **intégration testing** of all changes
- **Limit the risk** of regression
- ***Immediate feedback to stakeholders on the quality***, functionality, or system-wide impact of code they are writing
- **Metrics** generated from automated testing and CI focus developers on developing functional, quality code



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# Benefits of Sonar In Continuous Integration

- **Increase visibility to all the stakeholders on code quality and other metrics** which enables greater communication
- Maintains **historical data** to monitor **how code quality is improved** over the time
- **Continuous Inspection** on code quality
- Static checking process in the Continuous Integration environment, improves software code quality continuously and **reduce the risk of failure**



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# Integration with tools

- Eclipse plugin
- Maven
- Ant
- Gradle
- Jenkins , Bamboo (CI engine)



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# Demo

- Sonar as a web server
- Sonar integration with Eclipse
- Sonar integration with Maven
- Sonar integration with Jenkins



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# Any Questions?



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# Thank You!