

Faculdade de Ciências e Tecnologia  
Departamento de Matemática e Computação  
Bacharelado em Ciência da Computação

unesp UNIVERSIDADE ESTADUAL PAULISTA  
"JULIO DE MESQUITA FILHO"

# Engenharia de Software II

## Aula 04

Prof. Dr. Rogério Eduardo Garcia  
(rogerio.garcia@unesp.br)

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18/08/2025

● Prof. Dr. Rogério Eduardo Garcia

## Contextualizando... ISO 12207: Estrutura

O diagrama estrutural da ISO 12207 é organizado em três seções principais:

- Processos Fundamentais:** Inclui Aquisição, Fornecimento, Desenvolvimento, Operação, Manutenção e uma seção central que abrange Fornecimento, Desenvolvimento, Operação e Manutenção.
- Processos de Apoio:** Documentação, Gerenciamento de Configuração, Garantia de Qualidade, Verificação, Validação, Revisão Conjunta, Auditoria e Resolução de Problemas.
- Processos Organizacionais:** Gerência, Melhoria, Infra-estrutura e Treinamento.

Adaptação

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## SonarQube™ - O que é?

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**sonarQube**

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## SonarQube™ - O que é?

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*Ferramenta para análise da  
qualidade de código;*

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[http://www.telesintese.com.br/wp-content/uploads/2014/03/shutterstock\\_Stuart-Miles\\_operadoras\\_anatel\\_qualidade.jpg](http://www.telesintese.com.br/wp-content/uploads/2014/03/shutterstock_Stuart-Miles_operadoras_anatel_qualidade.jpg)

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## SonarQube™ - O que é?

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- Ferramenta open-source;
- Desenvolvida pela SonarSource S.A.;
- Realiza a inspeção continua (*continuous inspection*) no código-fonte;

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## SonarQube™ - O que é?

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- Tem como principal objetivo, a partir da análise de código-fonte, identificar *violações* e *faltas* cometidas pelo programador;
- Foi baseado em um conjunto de ferramentas já conhecidas do mundo Java

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## SonarQube™ - Como funciona



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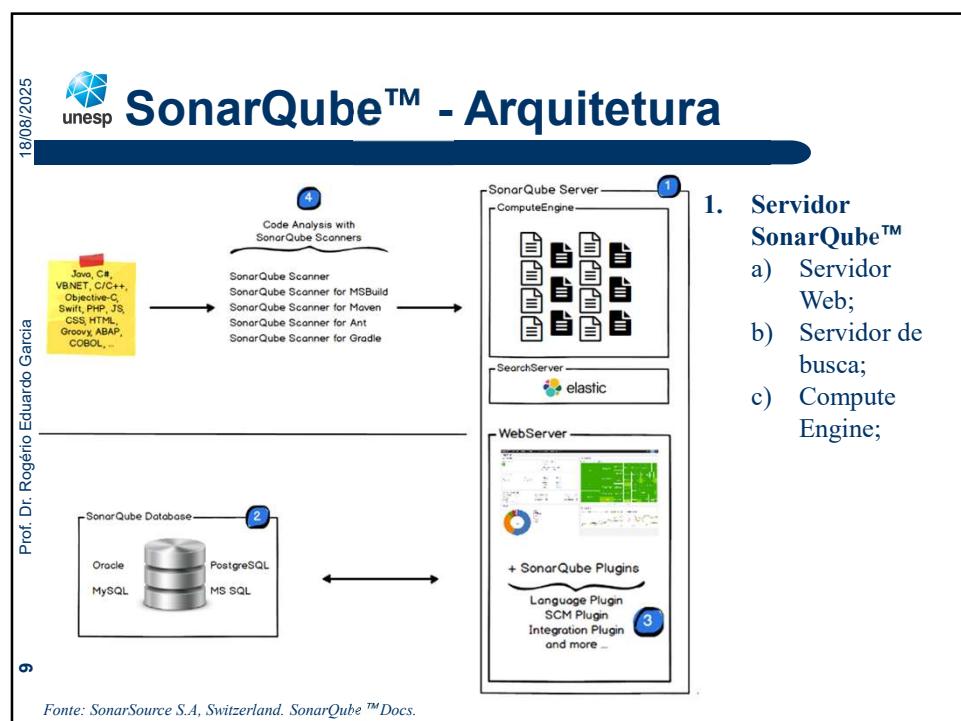
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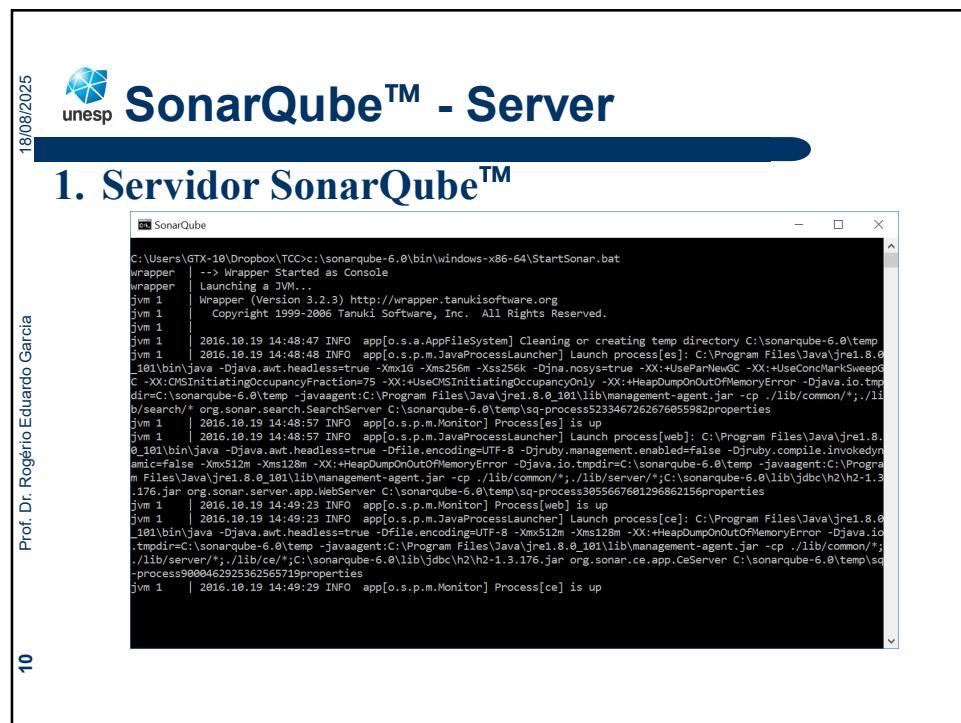
## Plataforma SonarQube™

## ARQUITETURA do Sonarqube

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# SonarQube™ - Server

## 1. Servidor SonarQube™ → Web server;

The screenshot shows the SonarQube dashboard. On the left, there's a sidebar with the date and the professor's name. The main area has a header with the SonarQube logo and a search bar. Below the header, there's a section titled "1. Servidor SonarQube™ → Web server;". The dashboard includes a "UNRESOLVED ISSUES" table and a "PROJECTS" section with a pie chart and a bar chart. A search bar at the bottom is partially filled with "controle".

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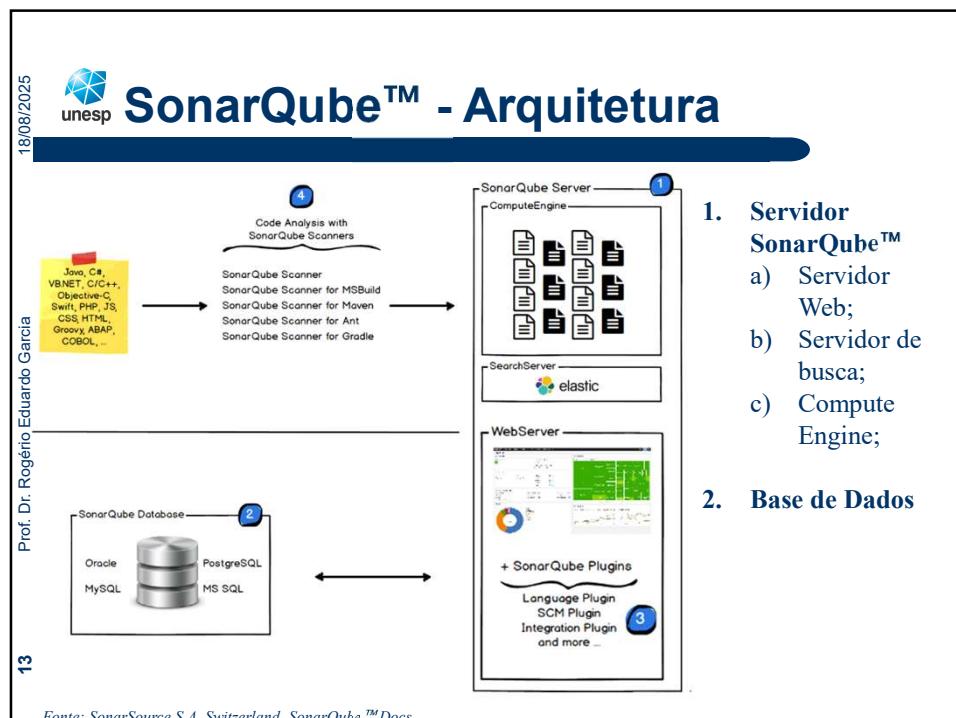
# SonarQube™ - Server

## 1. Servidor SonarQube™ → Search server;

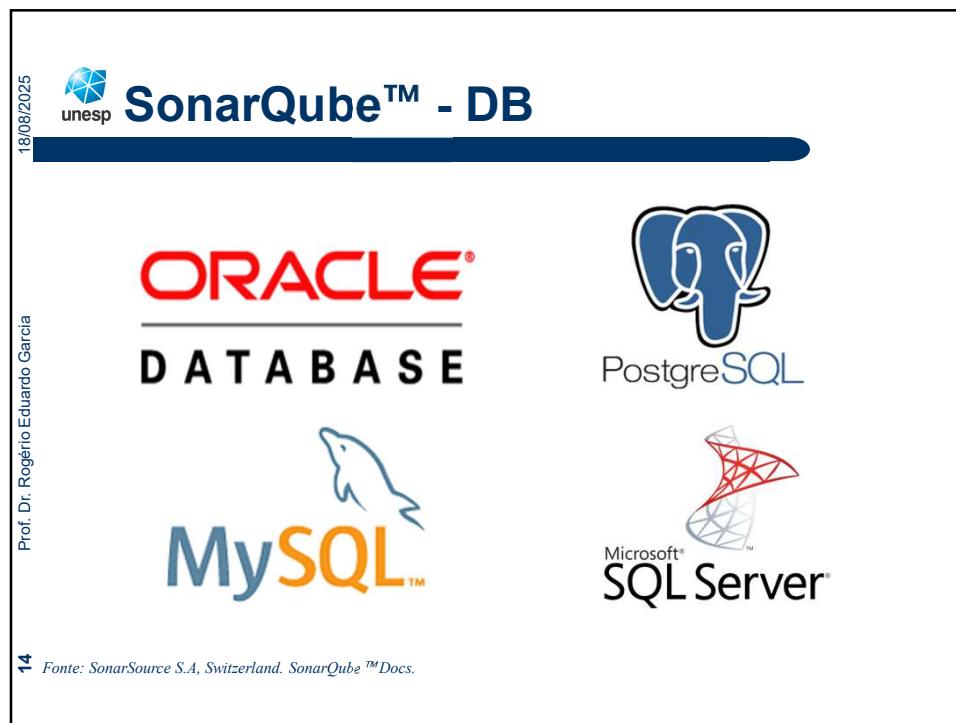
The screenshot shows the SonarQube dashboard. On the left, there's a sidebar with the date and the professor's name. The main area has a header with the SonarQube logo and a search bar. Below the header, there's a section titled "1. Servidor SonarQube™ → Search server;". The dashboard includes a "Files" list and an "elasticsearch" logo. A search bar at the bottom is partially filled with "controle".

Fonte: SonarSource S.A., Switzerland. SonarQube™ Docs.

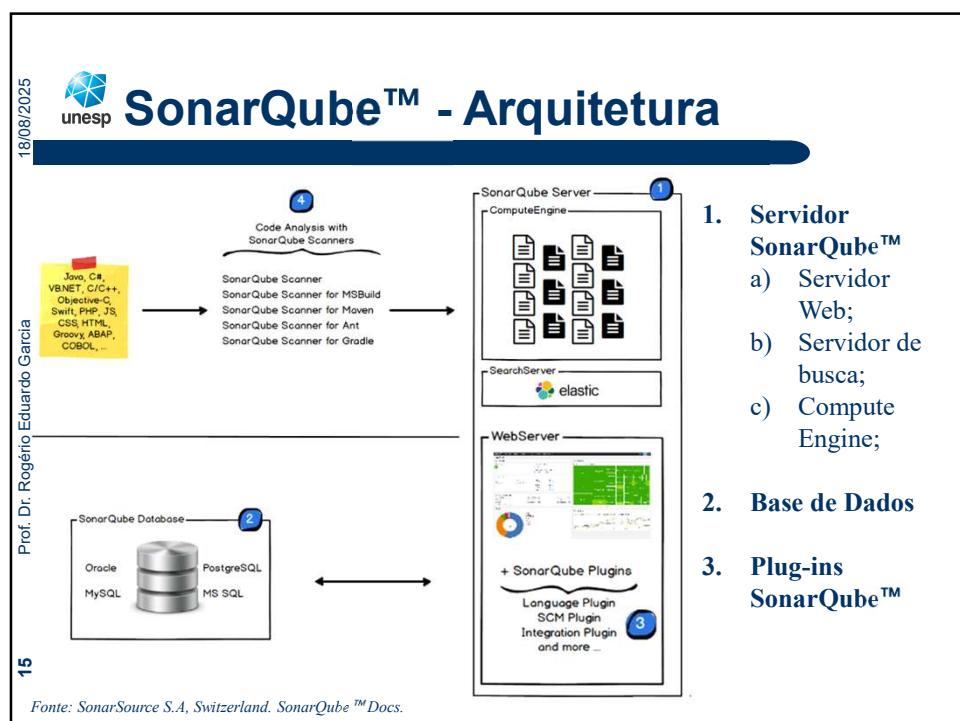
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## SonarQube™ - Plug-ins

Plugins / Plugin Library / SonarSource Plugins  
SonarSource Plugins

Created by Fabrice Bellingard, last modified by Dinesh Bolkensteyn on Jul 22, 2015

<ul style="list-style-type: none"> <li>• ABAP Plugin</li> <li>• C/C++/Objective-C</li> <li>• C# Plugin</li> <li>• COBOL Plugin</li> <li>• CVS Plugin</li> <li>• Developer Cockpit Plugin</li> <li>• Flex Plugin</li> <li>• Generic Test Coverage</li> <li>• GitHub Authentication Plugin</li> <li>• GitHub Plugin</li> <li>• Git Plugin</li> <li>• Governance Plugin</li> <li>• Java Plugin</li> </ul>	<ul style="list-style-type: none"> <li>• JavaScript Plugin</li> <li>• LDAP Plugin</li> <li>• PHP Plugin</li> <li>• PL/I Plugin</li> <li>• PL/SQL Plugin</li> <li>• Python Plugin</li> <li>• RPG Plugin</li> <li>• SVN Plugin</li> <li>• Swift Plugin</li> <li>• Visual Basic 6 Plugin</li> <li>• Visual Basic .NET Plugin</li> <li>• Web Plugin</li> <li>• XML Plugin</li> </ul>
--	--

Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs. - <https://docs.sonarqube.org/display/PLUG/SonarSource+Plugins>

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## SonarQube™ - Plug-ins

The screenshot shows the SonarQube Plugins documentation page. It features a sidebar with the date and author's name. The main content is organized into several sections:

- Developer Tools**: Includes Developer Cockpit, GitHub Plugin, Google Analytics, Pitest, Sonargraph, and SVG Badges.
- Integration**: Includes ClearCase, CVS, Git, Jazz RTC, Mercurial, Perforce, SVN, and TFVC.
- SCM Engines**: Includes ClearCase, CVS, Git, Jazz RTC, Mercurial, Perforce, SVN, and TFVC.
- Visualization / Reporting**: Includes 3D Code Metrics, Motion Chart, Timeline, and Widget Lab.
- Governance**: Provides features for enterprise-grade deployment, organization, and management.
- Authentication & Authorization**: Includes Azure Active Directory Authentication, Bitbucket Authentication, Crowd, GitHub Authentication, LDAP, and PAM.
- Coverage**: Includes Clover, Cobertura, and Generic Test Coverage.
- External Analyzers**: Includes AEM Rules, Android Lint, Checkstyle, Findbugs, PMD, and Xanitizer.

Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs. - <https://docs.sonarqube.org/display/PLUG/Plugin+Library>

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## SonarQube™ - Arquitetura

The diagram illustrates the SonarQube architecture. It shows the following components and their interactions:

- Servidor SonarQube™** (1): Contains the ComputeEngine (with SonarQube Scanners for Java, C, VB.NET, C/C++, Objective-C, Swift, PHP, JS, CSS, HTML, Groovy, ABAP, COBOL, etc.), SearchServer (using elastic), and WebServer (displaying a dashboard).
- Base de Dados** (2): Stores data in Oracle, MySQL, or MS SQL databases.
- Plug-ins SonarQube™** (3): Includes Language Plugin, SCM Plugin, Integration Plugin, and more.
- Analizador** (4): Conducts Code Analysis with SonarQube Scanners (SonarQube Scanner, SonarQube Scanner for MSBuild, SonarQube Scanner for Maven, SonarQube Scanner for Ant, SonarQube Scanner for Gradle).

The diagram shows arrows indicating the flow of data from the code analysis step through the server and database layers to the final analysis results displayed on the web interface.

Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.

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## SonarQube™ - Scanner

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- SonarQube Scanner
- SonarQube Scanner for MSBuild
- SonarQube Scanner for Maven
- SonarQube Scanner for Gradle
- SonarQube Scanner for Ant
- SonarQube Scanner for Jenkins
- SonarQube Scanner for TFS and Team Services

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Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.

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## SonarQube™ - Scanner

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- SonarQube Scanner 
- SonarQube Scanner for MSBuild
- SonarQube Scanner for Maven
- SonarQube Scanner for Gradle
- SonarQube Scanner for Ant
- SonarQube Scanner for Jenkins
- SonarQube Scanner for TFS and Team Services

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Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.

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## SonarQube™ - Scanner

```
c:\Windows\system32\cmd.exe
c:\Users\GTX-10\Dropbox\TCC\workspace\Samples>c:\sonar-scanner-2.8\bin\sonar-scanner.bat
INFO: Scanner configuration file: c:\sonar-scanner-2.8\bin\..\conf\sonar-scanner.properties
INFO: Project root configuration file: c:\Users\GTX-10\Dropbox\TCC\workspace\Samples\sonar-project.properties
INFO: SonarQube Scanner 2.8
INFO: Java 1.8.0_101 Oracle Corporation (64-bit)
INFO: Windows 10 10.0 amd64
INFO: User cache: C:\Users\GTX-10\.sonar\cache
INFO: Load global repositories
INFO: Load global repositories (done) | time=125ms
INFO: User cache: C:\Users\GTX-10\.sonar\cache
INFO: Load plugins index
INFO: Load plugins index (done) | time=17ms
INFO: SonarQube server 6.0
INFO: Default locale: "pt_BR", source code encoding: "UTF-8"
INFO: Process project properties
INFO: Load project repositories
INFO: Load project repositories (done) | time=124ms
INFO: Load quality profiles
INFO: Load quality profiles (done) | time=28ms
INFO: Load active rules
INFO: Load active rules (done) | time=353ms
WARN: SCM provider autodetection failed. No SCM provider claims to support this project. Please use sonar.scm.provider to define SCM of your project.
INFO: Publish mode
INFO: ----- Scan PG Java project analyzed with the SonarQube Runner
INFO: Language is forced to java
INFO: Load server rules
INFO: Load server rules (done) | time=140ms
```

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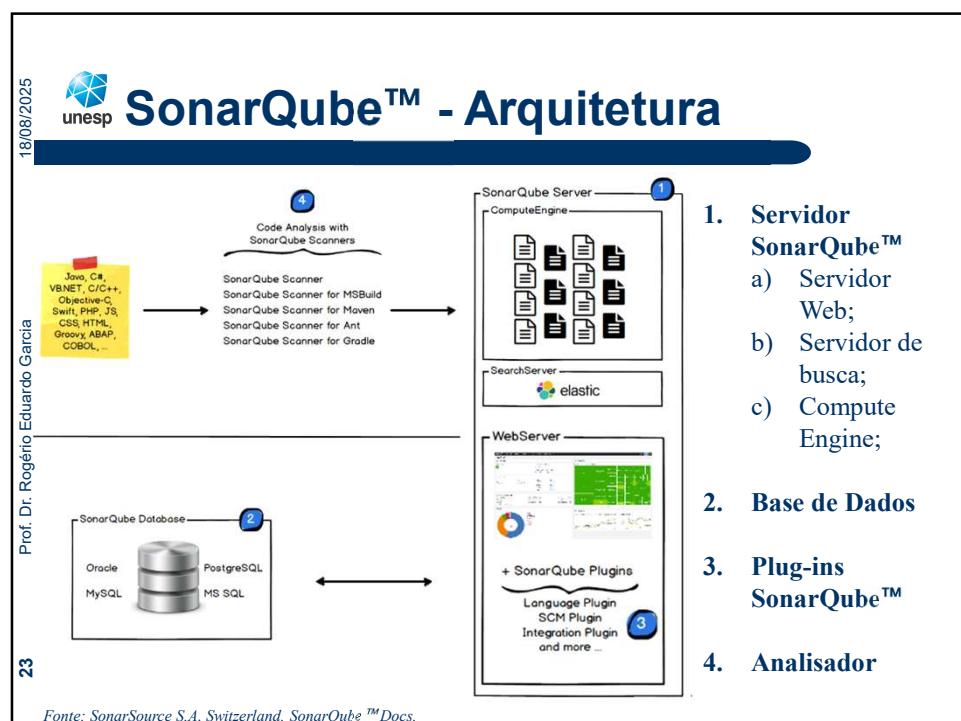
## SonarQube™ - Scanner

```
c:\Windows\system32\cmd.exe
INFO: Sensor JaCoCoOverallSensor
INFO: Sensor JaCoCoOverallSensor (done) | time=2ms
INFO: Sensor XmlFileSensor
INFO: Sensor XmlFileSensor (done) | time=2ms
INFO: Sensor Zero Coverage Sensor
INFO: Sensor Zero Coverage Sensor (done) | time=27ms
INFO: Sensor Code Colorizer Sensor
INFO: Sensor Code Colorizer Sensor (done) | time=4ms
INFO: Sensor CPD Block Indexer
INFO: JavaCpdBlockIndexer is used for java
INFO: Sensor CPD Block Indexer (done) | time=36ms
INFO: Calculating CPD for 3 files
INFO: CPD calculation finished
INFO: Analysis report generated in 136ms, dir size=35 KB
INFO: Analysis reports compressed in 73ms, zip size=22 KB
INFO: Analysis report uploaded in 48ms
INFO: ANALYSIS SUCCESSFUL, you can browse http://localhost:9000/dashboard/index/Samples
INFO: Note that you will be able to access the updated dashboard once the server has processed the submitted analysis report
INFO: More about the report processing at http://localhost:9000/api/ce/task?id=AVfd32lHiqo508pqOKC3
INFO: Task total time: 4.948 s
INFO: -----
INFO: EXECUTION SUCCESS
INFO: -----
INFO: Total time: 6.490s
INFO: Final Memory: 47M/312M
INFO: -----
```

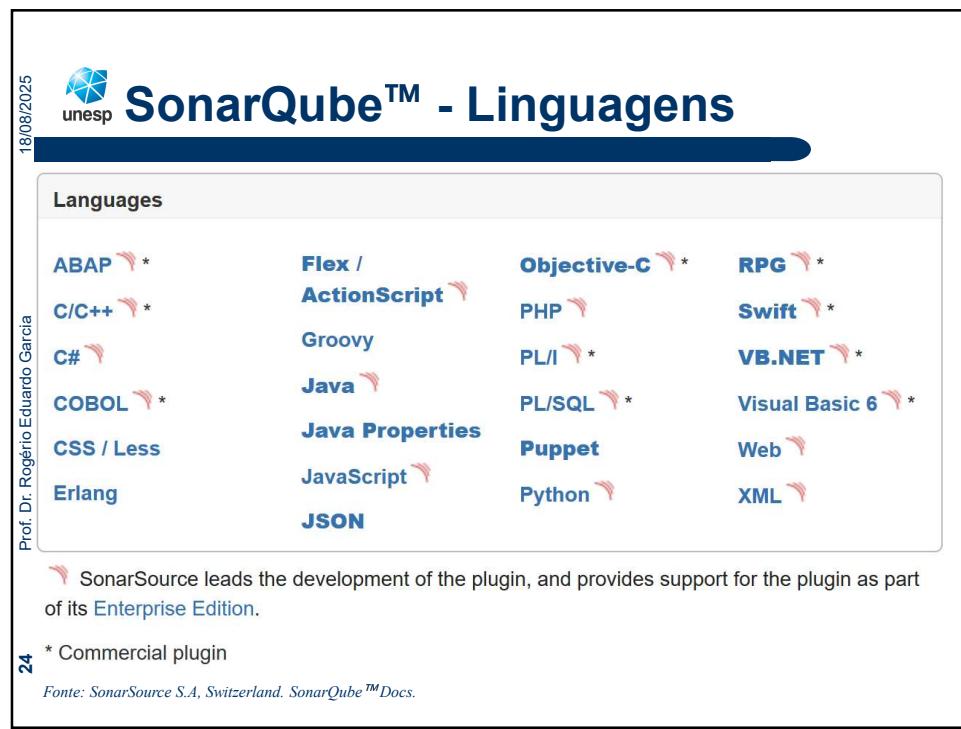
c:\Users\GTX-10\Dropbox\TCC\workspace\Samples>=

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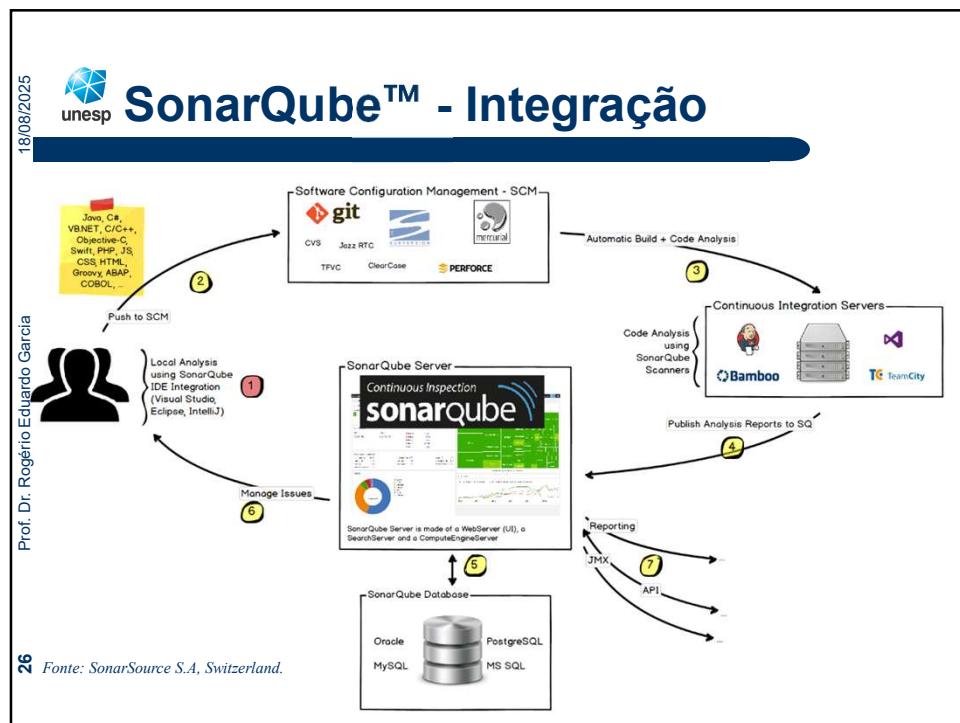
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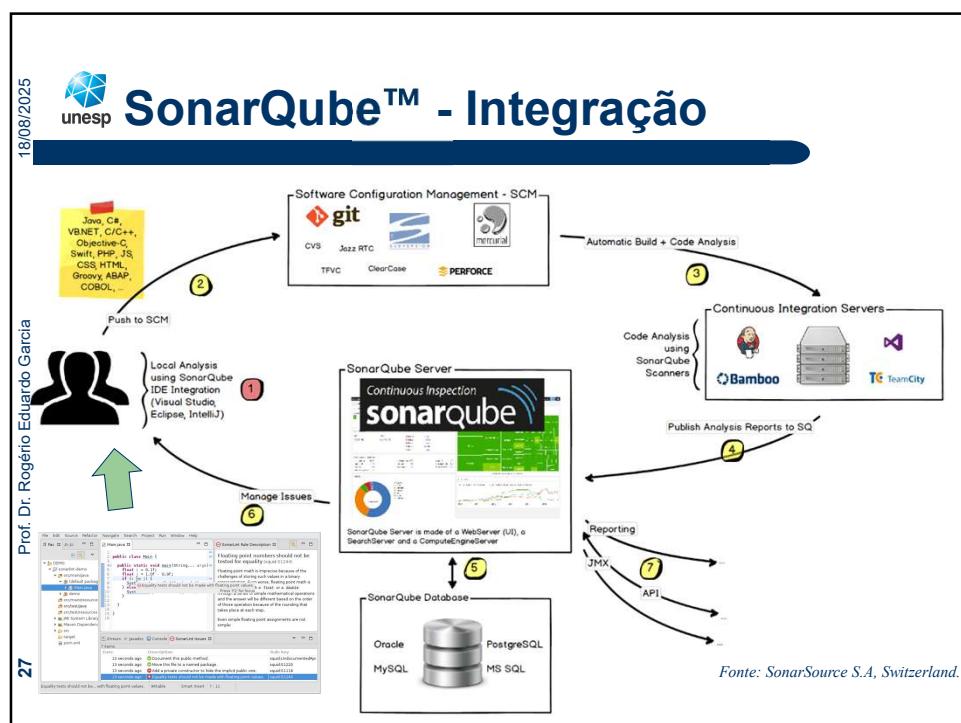
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# INTEGRAÇÃO

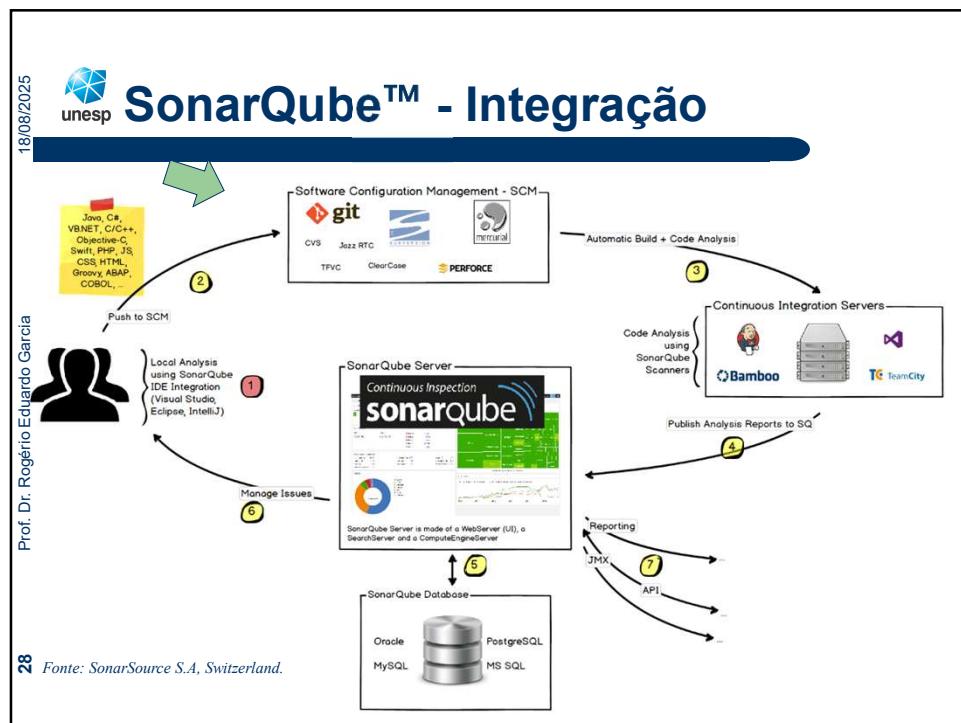
25



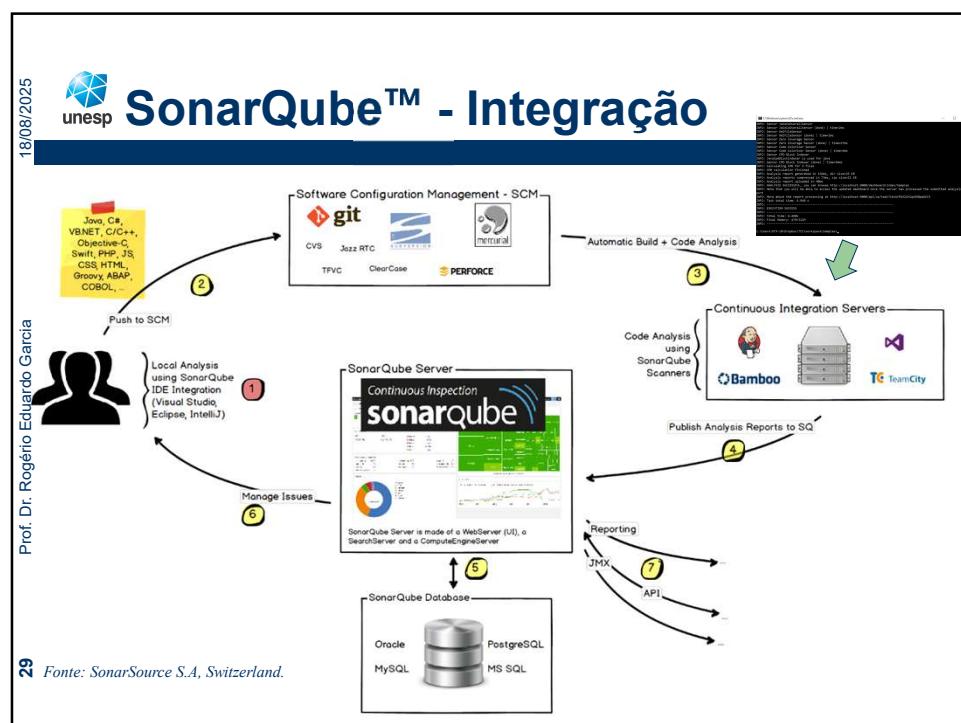
26



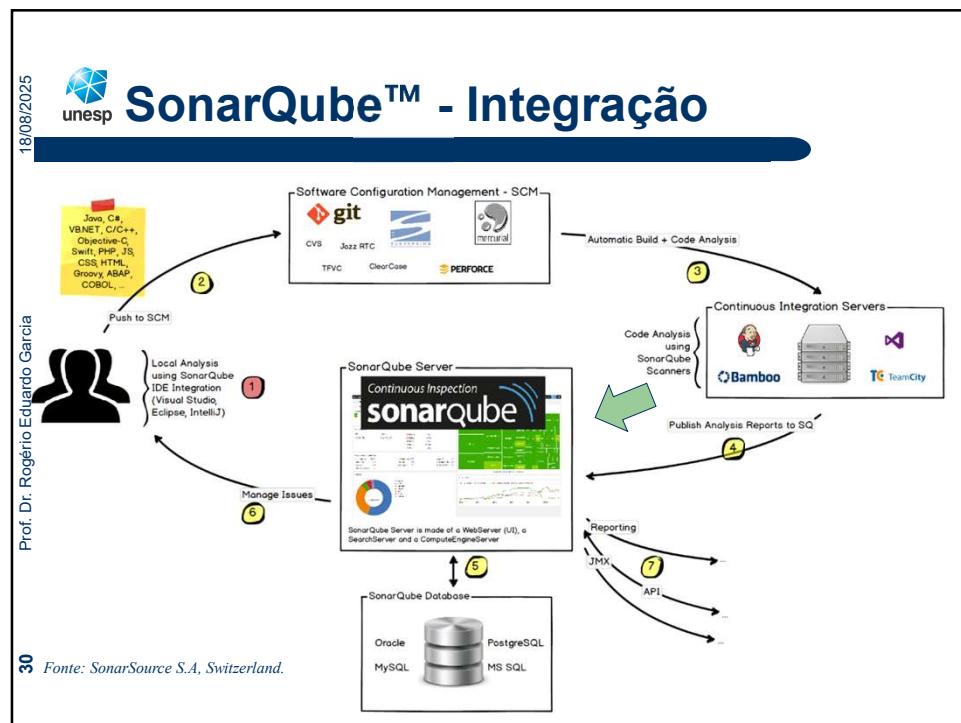
27



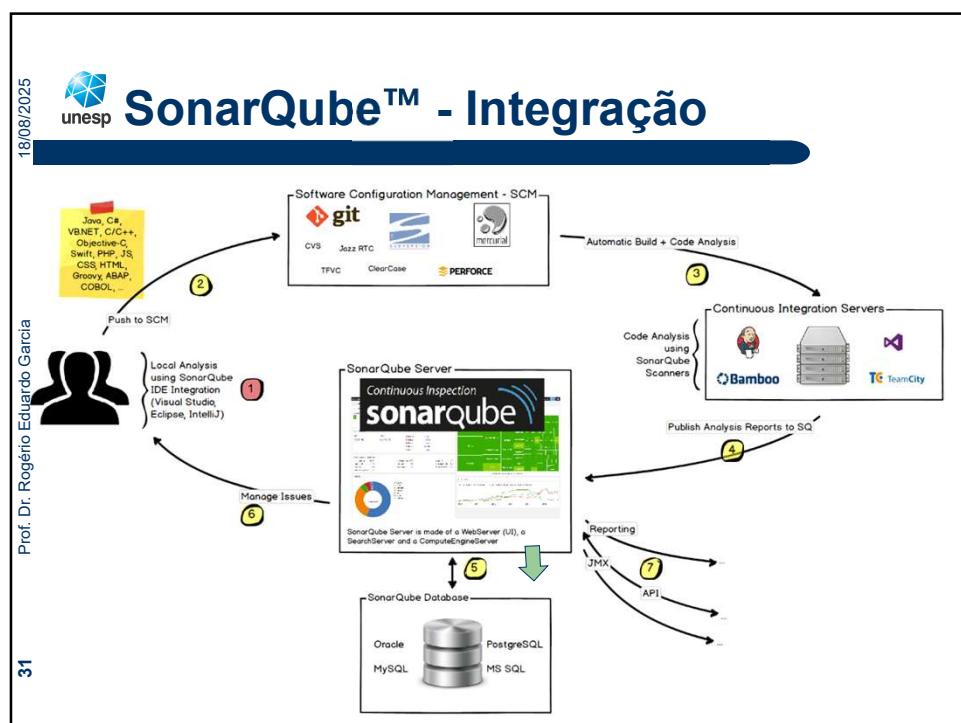
28



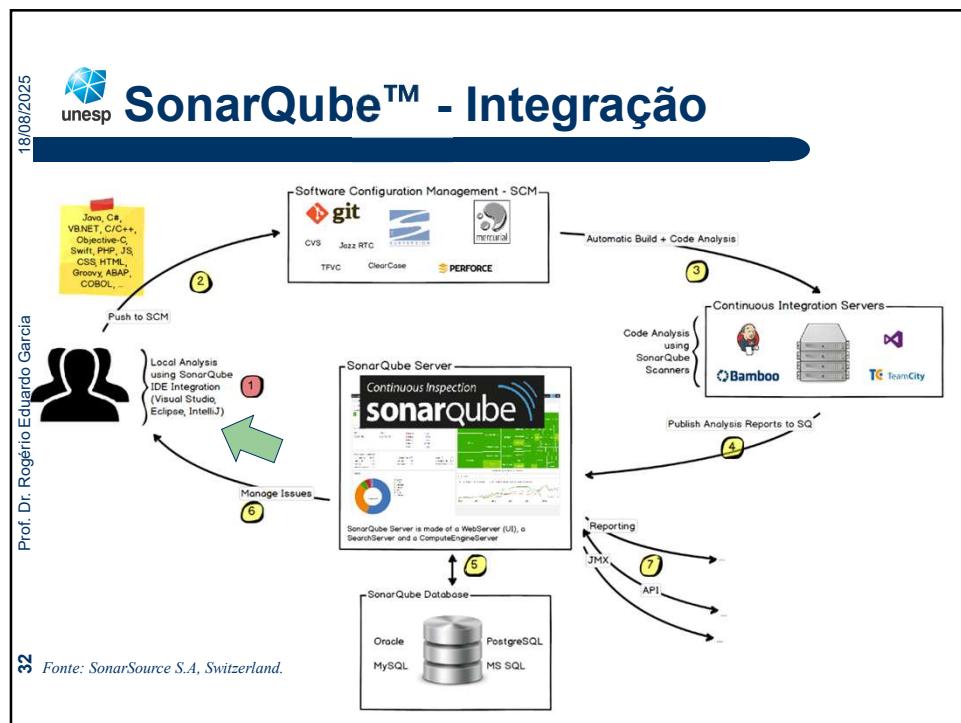
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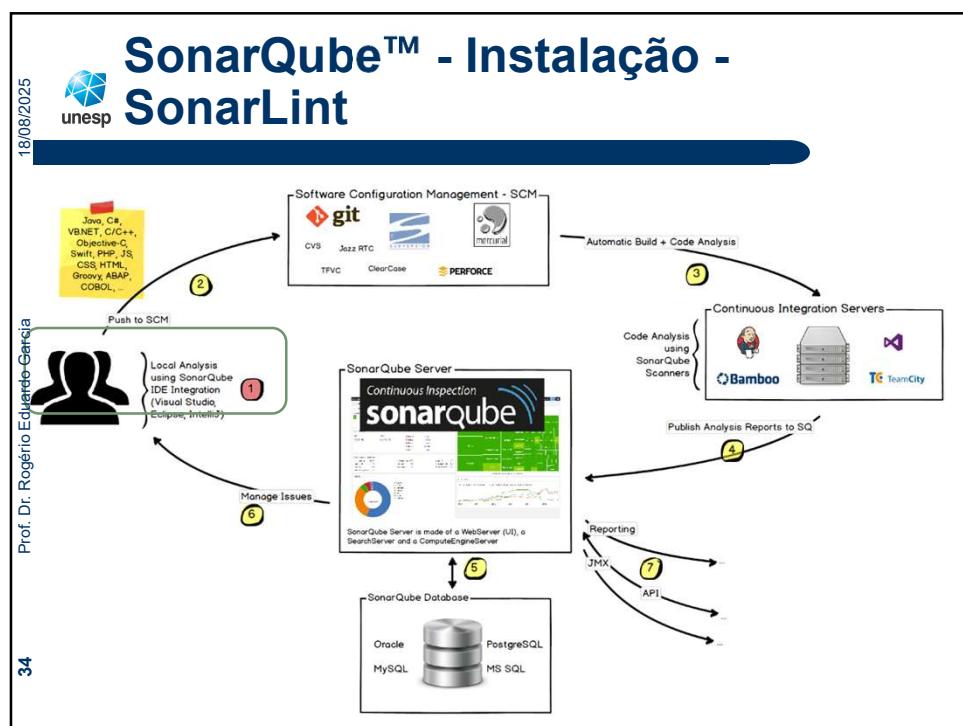
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## INSTALAÇÃO – SONARLINT

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## SonarQube™ - Instalação - SonarLint



### sonarlint

SonarLint is an extension to your favorite IDE that provides on-the-fly feedback to developers on new bugs and quality issues injected into their code.



Eclipse



IntelliJ IDEA



Visual Studio

What if I'm not using those IDE's?

<http://www.sonarlint.org/eclipse/index.html>

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## SonarQube™ - Instalação - SonarLint

- SonarLint é um plug-in Eclipse que provê um *feedback* aos desenvolvedores sobre (novos) *bugs* e problemas de qualidade presentes no Java, JavaScript e PHP.

<http://www.sonarlint.org/>

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## SonarQube™ - Instalação - SonarLint

- Requisitos:
  - Eclipse Mars (ou superior) -

<http://www.eclipse.org/downloads/>

37 <http://www.sonarlint.org/>

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## SonarQube™ - Instalação - SonarLint

- Help -> Eclipse Marketplace

The screenshot shows the Eclipse IDE interface. The title bar reads "workspace - Java - HW/src/HelloWorld.java - Eclipse". The menu bar has "Help" selected. A context menu is open over a Java code editor window containing the following code:

```

public class HelloWorld {
    public static void main() {
        System.out.println("Hello, World!");
    }
}

```

The context menu under "Help" includes options like "Welcome", "Help Contents", "Search", "Show Contextual Help", "Show Active Keybindings...", "Tips and Tricks...", "Report Bug or Enhancement...", "Cheat Sheets...", "Perform Setup Tasks...", "Check for Updates", "Install New Software...", "Installation Details", "Eclipse Marketplace...", and "About Eclipse". The "Eclipse Marketplace..." option is highlighted with a blue selection bar.

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## SonarQube™ - Instalação - SonarLint

- Pesquisar “sonarlint”

Eclipse Marketplace

Eclipse Marketplace

Select solutions to install. Press Install Now to proceed with installation.  
Press the "more info" link to learn more about a solution.

Search: Recent Popular Favorites Installed December Newsletter (Ready, Set... 2017...) Find: sonarlint <- digitar o nome da ferramenta

**Featured**

**JRebel for Eclipse 7.0.2**  
Promoted - JRebel is a productivity tool that allows developers to reload code changes instantly. It skips the rebuild, restart, and redeploy cycle common in... [more info](#)  
by ZeroTurnaround Commercial [JRebel eclipse java es tools productivity](#)  
★ 126 installs: 250K (3.936 last month) [Install](#)

**Angular IDE 2017 CI 1a**  
Promoted - NEW - Angular 2 plugin with: content assist, TypeScript 2.0 support, real-time validation, formatting, debugging, and more. Standalone version at... [more info](#)  
by Genutize LLC Commercial - Free [Angular2 AngularJS TypeScript fileExtension ts fileExtension tsx](#)

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## SonarQube™ - Instalação - SonarLint

- Clicar em “Install” na versão atual (2.5.1)

Eclipse Marketplace

Eclipse Marketplace

Select solutions to install. Press Install Now to proceed with installation.  
Press the "more info" link to learn more about a solution.

Search: Recent Popular Favorites Installed December Newsletter (Ready, Set... 2017...) Find: sonarlint

**SonarLint 2.5.1**  
SonarLint is an Eclipse plugin that provides on-the-fly feedback to developers on new bugs and quality issues injected into Java, JavaScript and PHP code. [more info](#)  
sonarlint by SonarSource S.A. LGPL [java PHP javascript Python static analysis](#)  
★ 68 installs: 90.4K (7.225 last month) [Install](#)

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## SonarQube™ - Instalação - SonarLint

- Manter apenas os “packages” requeridos e Confirmar

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## SonarQube™ - Instalação - SonarLint

- Ler e Concordar com os termos da Licença

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## SonarQube™ - Instalação - SonarLint

- Ao terminar o download se iniciará

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## SonarQube™ - Instalação - SonarLint

- Aguarde a conclusão

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## SonarQube™ - Instalação - SonarLint

- Reinicie a IDE

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## SonarQube™ - Instalação - SonarLint

Trechos de código sublinhados em azul são marcações (*markers*) do plug-in

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## SonarQube™ - Instalação - SonarLint

Ao posicionar o cursor sobre, uma sugestão será fornecida

The screenshot shows a Java code editor with the following code:

```

1 public class HelloWorld {
2     public static void main(String args[])
3     {
4         System.out.println("Your first issue!");
5     }
6 }

```

A tooltip appears over the line `System.out.println("Your first issue!");` with the text: "Replace this usage of System.out or System.err by a logger." This illustrates how SonarLint provides real-time code analysis and suggestions directly within the developer's workflow.

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## SonarQube™ - Instalação - SonarLint

É possível adicionar uma nova View

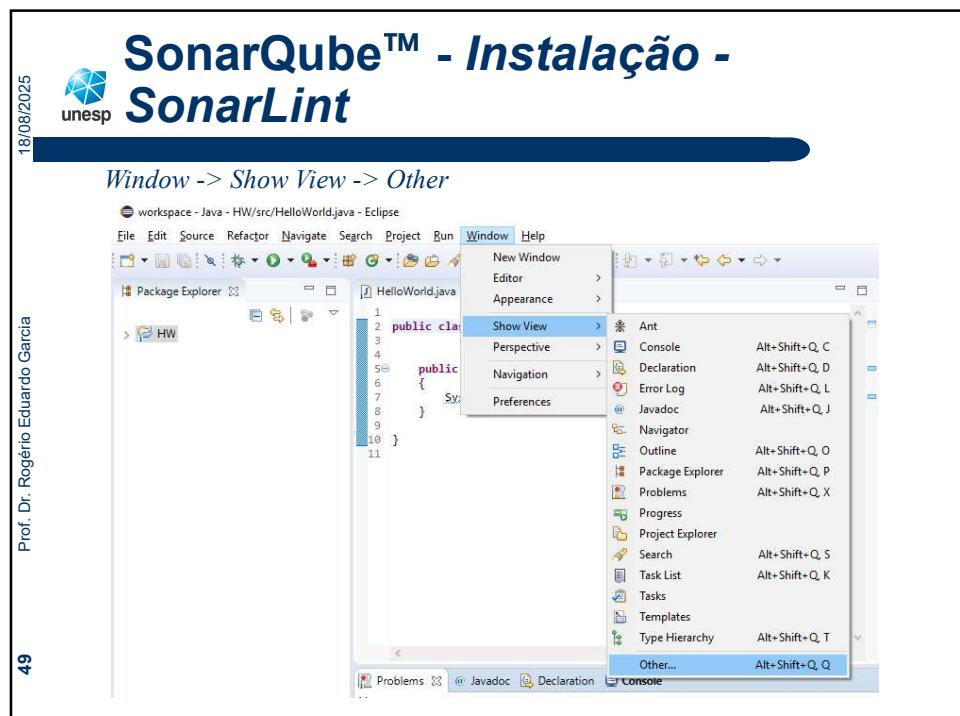
The screenshot displays the Eclipse IDE interface with the following details:

- Project:** workspace - Java - HW/src/HelloWorld.java - Eclipse
- Code Editor:** Shows the Java code for `HelloWorld.java` with a SonarLint inspection open at line 7.
- Task List:** Shows a list of inspections, including one for the line `System.out.println("Your first issue!");` which suggests replacing it with a logger.
- Problems View:** Shows a table of SonarLint issues found in the project, including the following entries:

Description	Resource	Path	Location	Type
Info (4 items)				
i Add a private constructor to hide the implicit	HelloWorld.java...	/HW/src	line 2	SonarLint Issue
i Move the array designator from the variable	HelloWorld.java...	/HW/src	line 5	SonarLint Issue
i Move this file to a named package.	HelloWorld.java...	/HW/src	line 1	SonarLint Issue
i Replace this usage of System.out or System.e	HelloWorld.java...	/HW/src	line 7	SonarLint Issue

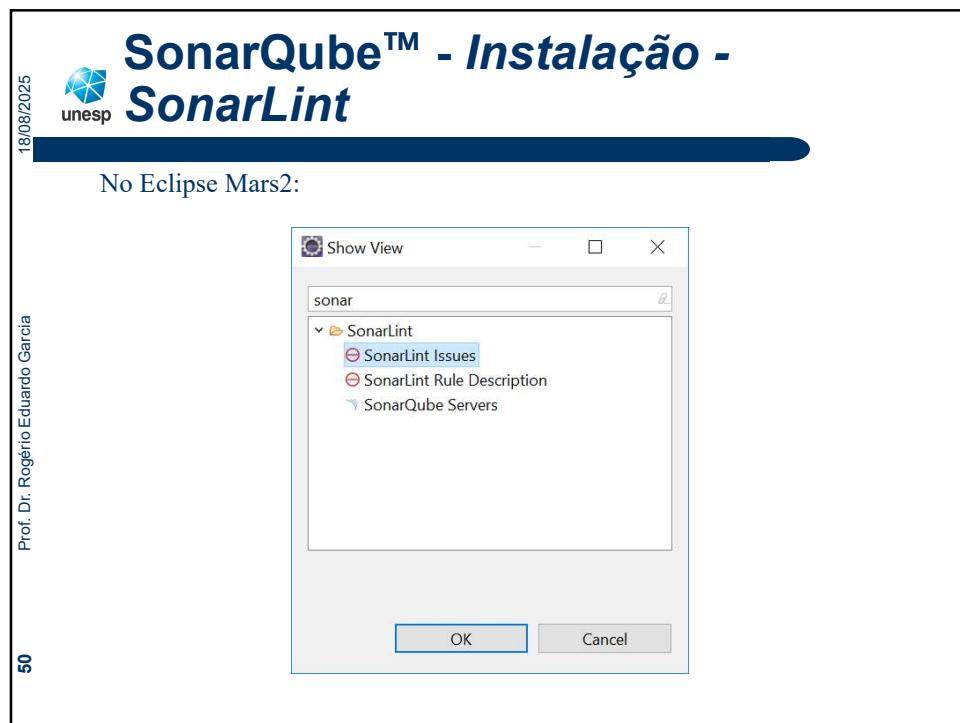
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## SonarQube™ - Instalação - SonarLint

- Eclipse Mars2

workspace - Java - sonarlint-demo/src/main/java/Main.java - Eclipse

```

1 public class Main {
2     public static void main(String... args) {
3         float i = 0.1f;
4         float j = 1.0f - 0.9f;
5         if (i == j) {
6             System.out.println("Equal");
7         } else {
8             System.out.println("Not Equal");
9         }
10    }
11 }
12 }
```

Floating point numbers should not be tested for equality (squid:S1244)

Floating point math is imprecise because of the challenges of storing such values in a binary representation. Even worse, floating point math is through a series of simple mathematical operations and the answer will be different based on the order of those operation because of the rounding that takes place at each step.

Even simple floating point assignments are not simple:

Date	Description	Rule key
13 seconds ago	Document this public method.	squid:UndocumentedApi
13 seconds ago	Move this file to a named package.	squid:S1220
13 seconds ago	Add a private constructor to hide the implicit public one.	squid:S1118
13 seconds ago	Equality tests should not be made with floating point values. (squid:S1244)	

7 items

http://www.sonarlint.org/eclipse/index.html

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## SonarQube™ - Instalação - SonarLint

No Eclipse Neon

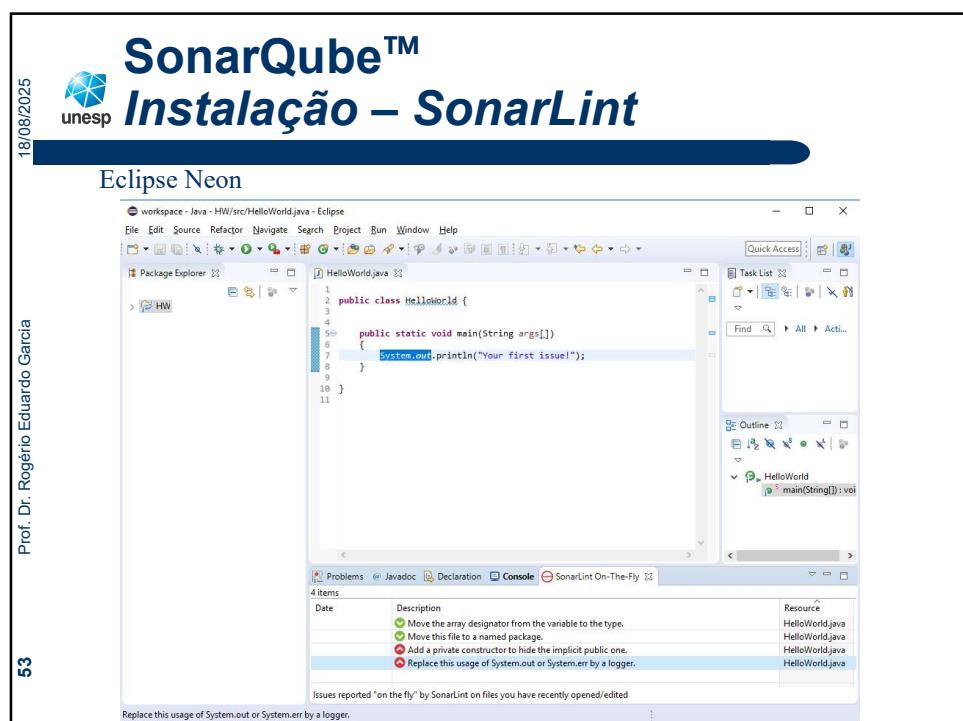
Show View

sonar

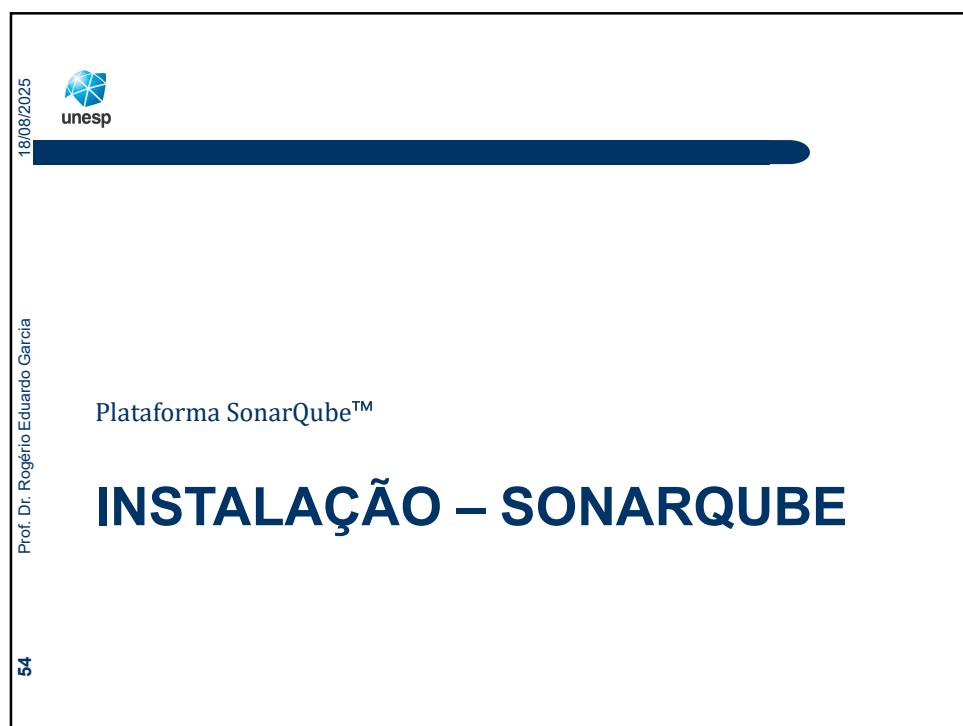
- SonarLint
  - SonarLint On-The-Fly
  - SonarLint Report
  - SonarLint Rule Description
  - SonarQube Servers

OK Cancel

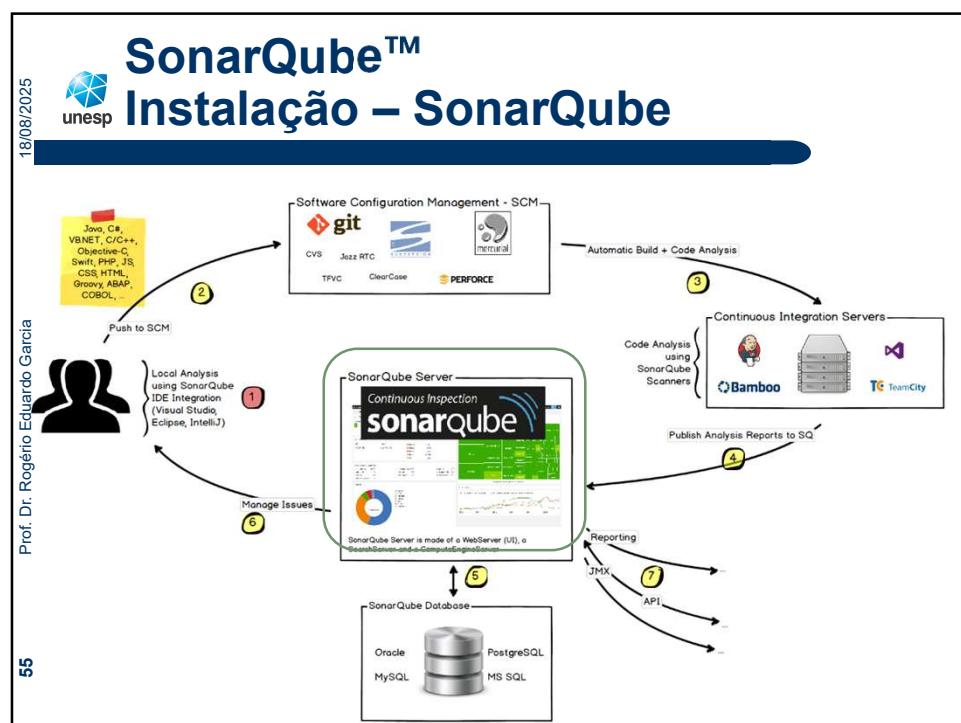
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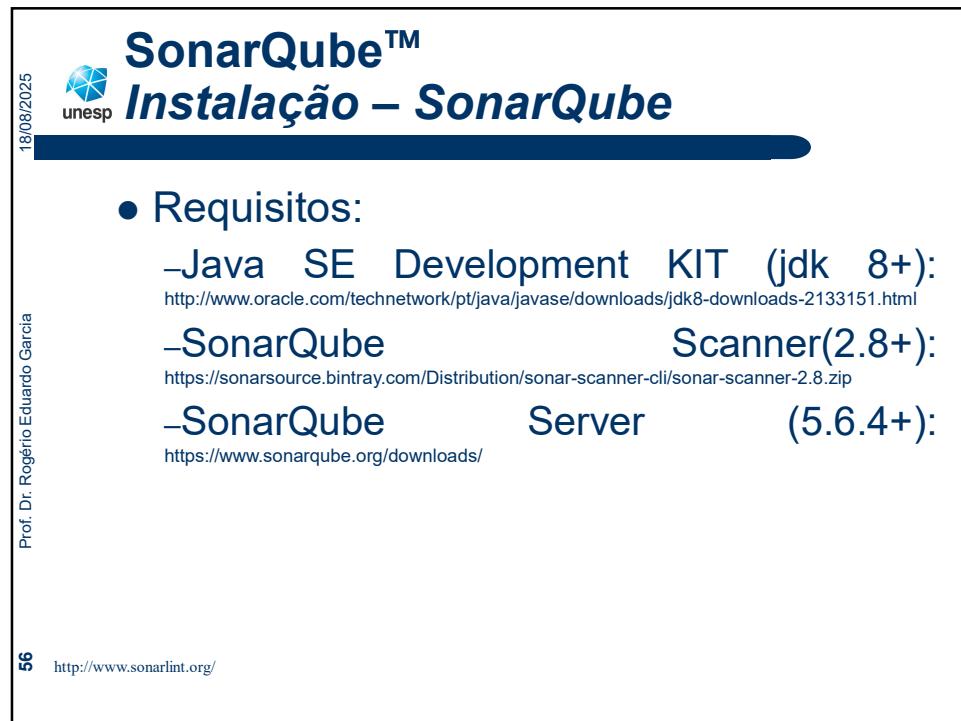
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## SonarQube™ Instalação – SonarQube

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- SonarQube-Server
  - Fazer o Download do Servidor;
  - Extrair o arquivo sonarqube-X.zip;

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<http://www.sonarlint.org/>

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## SonarQube™ Execução – SonarQube – Server

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- No Windows
  - Localizar a pasta onde o arquivo foi extraído;
  - Abrir a pasta “bin”;
  - Abrir a pasta windows-x86-VER;
    - VER = versão, 32 ou 64 bits
  - Executar “StartSonar.bat”
- No Linux
  - Localizar pelo terminal a pasta onde o arquivo foi extraído.
  - Executar : “sh PASTA/bin/linux-x86-VER/sonar.sh”;
    - VER = versão, 32 ou 64 bits

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## SonarQube™ Execução – SonarQube – Server

A screenshot of a Linux desktop environment. On the left, there is a file explorer window showing a directory structure: 'sonarqube-6.1 > bin > windows-x86-64'. Inside this folder, several files are listed: 'lib', 'InstallNTService.bat', 'StartNTService.bat', 'StartSonar.bat' (which is highlighted with a blue selection bar), 'StopNTService.bat', 'UninstallNTService.bat', and 'wrapper.exe'. To the right of the file explorer is a terminal window titled 'linuxx86-64'. The terminal shows the command 'sh ./sonar.sh start' being executed, followed by output indicating the service is starting.

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## SonarQube™ Instalação – SonarQube

- SonarQube-Scanner
  - Fazer o Download do Scanner;
  - Extrair o arquivo sonar-scanner-X.zip;
  - Localizar a pasta extraída (sonar-scanner-X);

60 <http://www.sonarlint.org/>

60

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## SonarQube™ Configuração – SonarQube

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- SonarQube-Scanner

- Localizar o arquivo “sonar-scanner.properties” na pasta “conf”;
- Retirar comentário da linha “sonar.host.url=..”;
- Alterar localhost pelo endereço de IP:

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<http://www.sonarlint.org/>

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## SonarQube™ Configuração – SonarQube

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- SonarQube-Scanner

- Localizar a pasta do PROJETO;
- Criar o arquivo “sonar-project.properties” na raiz do projeto.

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<http://www.sonarlint.org/>

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## SonarQube™ Configuração – SonarQube

```

1 ######
2 # Place this file on project folder
3 # Coloque esse arquivo na pasta do projeto
4 # EX: \workspace\MyProject
5 #####
6
7 # Required metadata
8 sonar.projectKey=SqSK
9 sonar.projectName=SonarQube Starter Kit
10 sonar.projectVersion=0.4
11
12 # Comma-separated paths to directories with sources (required)
13 sonar.sources=src
14
15 # Language
16 sonar.language=java
17
18 # Encoding of the source files
19 sonar.sourceEncoding=UTF-8
20
21 # Developed by Pedro Gomes

```

<http://www.sonarlint.org/>

sonar-project.properties

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## SonarQube™ Configuração – SonarQube

```

# Required metadata
sonar.projectKey=Project_KEY
sonar.projectName=Project Name
sonar.projectVersion=0.1

# Comma-separated paths to directories with sources (required)
sonar.sources=src

# Language
sonar.language=java

# Encoding of the source files
sonar.sourceEncoding=UTF-8

```

64 <http://www.sonarlint.org/>

sonar-project.properties

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**SonarQube™**  
**Execução – SonarQube – Server**

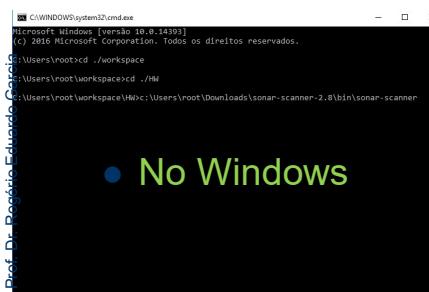
- No Windows
  - Abrir a pasta do PROJETO pelo *prompt*;
  - Executar no *prompt*: “PASTA\_Extraída/bin/sonar-scanner.bat”
- No Linux
  - Abrir a pasta do PROJETO pelo terminal;
  - Executar no terminal: “sh PASTA\_Extraída/bin/sonar-scanner.sh”

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**SonarQube™**  
**Execução – SonarQube – Server**



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [versão 10.0.14393]
© 2016 Microsoft Corporation. Todos os direitos reservados.
C:\Users\root>cd ./workspace
C:\Users\root\workspace>cd ./Downloads/sonar-scanner-2.8\bin\sonar-scanner
C:\Users\root\workspace>cd ./Downloads/sonar-scanner-2.8\bin\sonar-scanner
```

● No Windows



```
cc1295403@MX11-06-LAB-DMC: ~/workspace2/HW
Arquivo Editar Ver Pesquisar Terminal Ajuda
cc1295403@MX11-06-LAB-DMC: ~/workspace2/HW$ ./home/cc1295403/Downloads/sonar-scanner-2.8/bin/sonar-scanner
```

● No Linux

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Plataforma SonarQube™

## ANÁLISE

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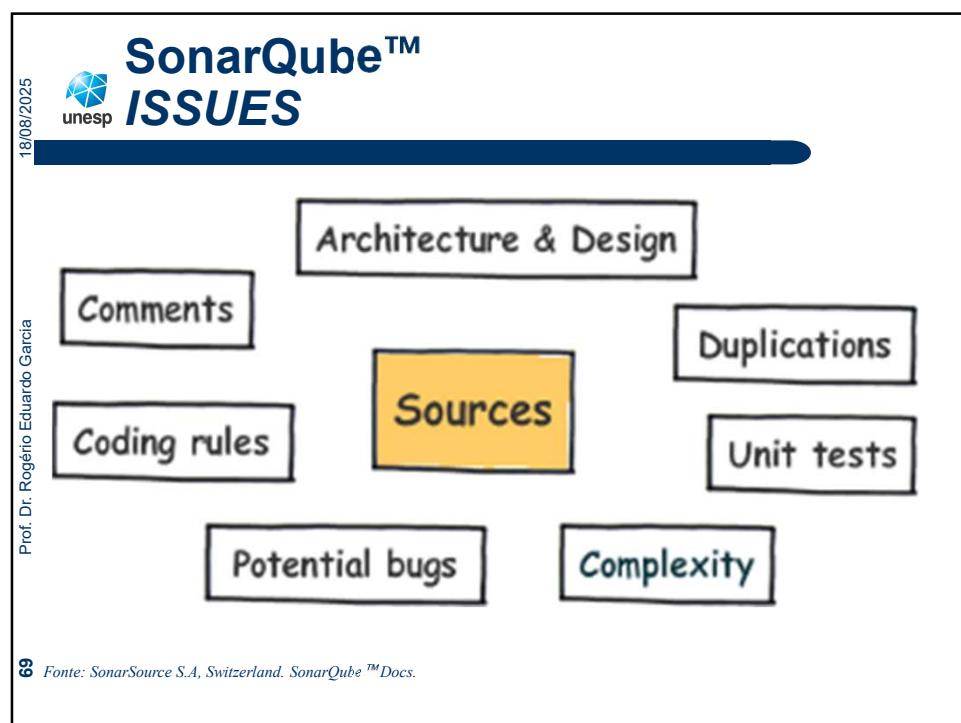
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SonarQube™  
**ISSUES**

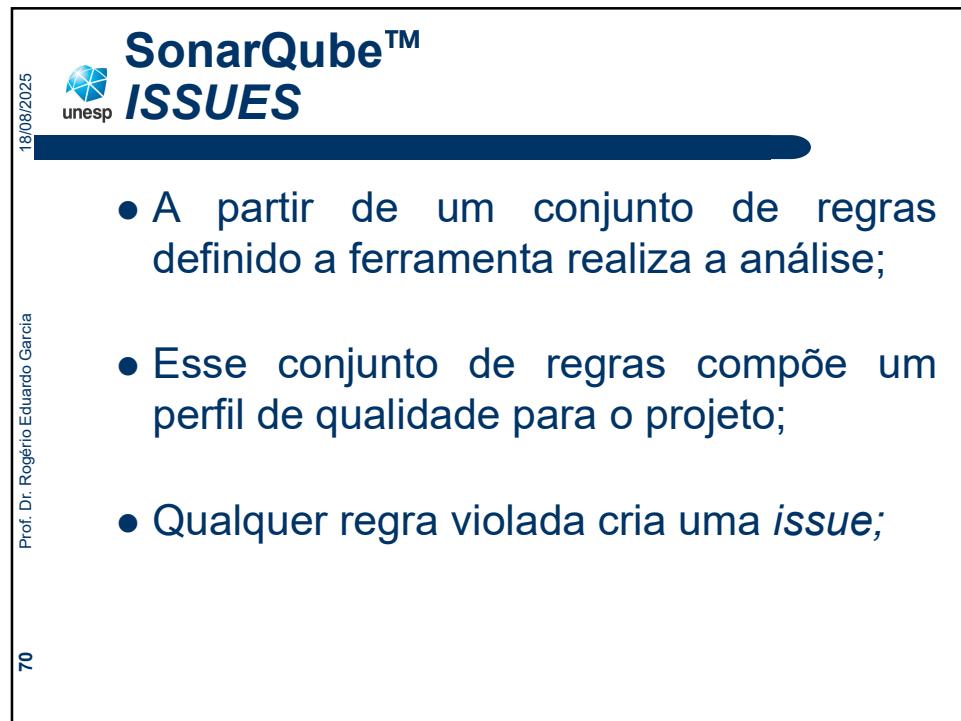
- 7 eixos da qualidade de código
- 7 pecados capitais do desenvolvimento de software

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# SonarQube™ ISSUES

 sonarsource

## SonarAnalyzer for Java

384 Rules

Offering a set of powerful rules, the SonarAnalyzer for Java's is all you need for finding bugs, vulnerabilities, and code smells in your code. With the SonarAnalyzer for Java, monitoring your code quality is no longer a daunting task.

Bug	Vulnerability	Code Smell
82	37	265

Quality Profiles / Java  
Sonar way

Rules	Active	Inactive
Total	268	111
Bugs	89	13
Vulnerabilities	18	13
Code Smells	161	85

Inheritance  
Sonar way 268 active rules  
Projects

Fonte: SonarSource S.A., Switzerland. SonarQube™ Docs.

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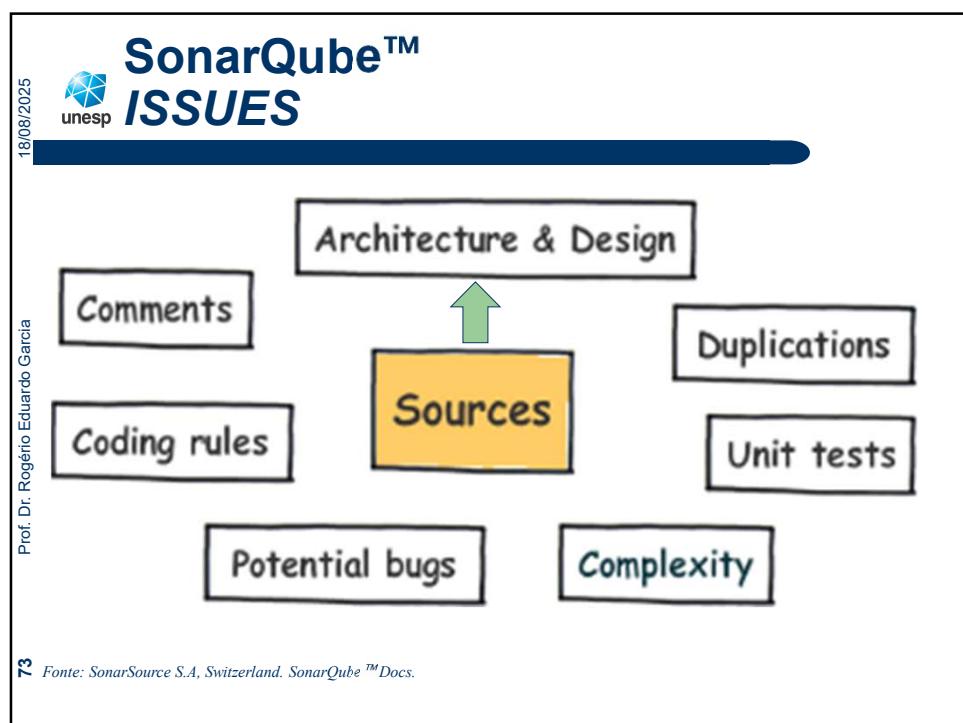
# SonarQube™ ISSUES

 sonarsource

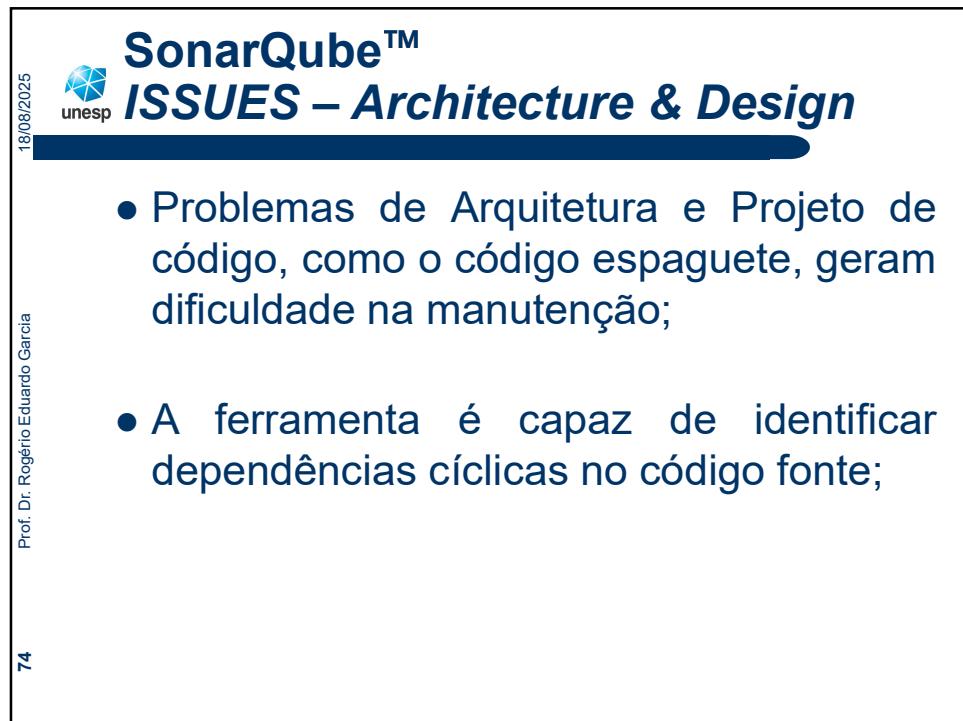
	Size & Complexity	Unit Tests	Duplication	Coding Rules	Potential Bugs	Architecture	Comments
<u>Cobol</u> (Commercial)	✓	✗	✓	✓	✗	✗	⚠
<u>Flex</u> (LGPL v3)	⚠	✗	✓	✓	✗	✗	⚠
<u>Groovy</u> (LGPL v3)	⚠	✗	✓	✓	✗	✗	⚠
<u>Java</u> (Built-in)	✓	✓	✓	✓	✓	✓	✓
<u>PHP</u> (LGPL v3)	✓	✓	✓	✓	✗	✗	⚠
<u>PL/SQL</u> (Commercial)	⚠	✗	✓	✓	✗	✗	⚠
<u>VB6</u> (Commercial)	✓	✗	✓	✓	✗	✗	⚠
<u>Web</u> (Apache 2.0)	✓	✗	✓	✓	✗	✗	⚠
<u>.Net</u> (LGPL v3)	✓	✗	✓	✓	✗	✗	⚠

Fonte: SonarSource S.A., Switzerland. SonarQube™ Docs.

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# SonarQube™ ISSUES – Architecture & Design

```
1 public class A {  
2     public A() {  
3         System.out.println("Creating instance of A");  
4     }  
5     private B b;  
6  
7  
8  
9  
10  
  
1 public class B {  
2     public B() {  
3         System.out.println("Creating instance of B");  
4     }  
5     private A a;  
6  
7  
8  
9  
10
```

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Package tangle index  
**11.9%**  
> 55 cycles ▼

Dependencies to cut  
35 between packages  
58 between files ▲

75

75



**SonarQube™**

# **ISSUES – Architecture & Design**

• A ferramenta também é capaz de verificar se as camadas de um padrão de projeto de software estão sendo corretamente utilizadas.

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**SonarQube™**  
ISSUES – Architecture & Design

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Fonte: Best Practice Software Engineering - <http://best-practice-software-engineering.ifs.tuwien.ac.at/patterns/facade.html>

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**SonarQube™**  
ISSUES – Architecture & Design

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**Classes from Web layer should not access DB classes**  
squid:Classes\_from\_Web\_Layer\_should\_not\_access\_DB\_classes

● Critical   ● No tags   Available Since July 24 2014   SonarQube (Java)

The Web layer should only make calls to the Business facades.

[Edit](#) [Delete](#)

**PARAMETERS**

```
fromClasses **.web.**
toClasses **.dao.**
```

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## SonarQube™ ISSUES

79 Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.

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## SonarQube™ ISSUES – Duplications

- Análise de linha, blocos e classes duplicadas;
- Duplicações comprometem a manutenção;
- A análise feita é a mesma do *plugin* CPD, da ferramenta PMD.

80 Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.

80

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## SonarQube™ ISSUES – Duplications

Duplications

17.7%	Duplicated Lines (%)
60	Duplicated Blocks
1,014	Duplicated Lines
11	Duplicated Files

Size

4,278	Lines of Code
5,716	Lines
1,862	Statements
284	Functions
35	Classes
26	Files
5	Directories

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## SonarQube™ ISSUES – Duplications

Duplicated Lines (%)

17.7%

List Tree Treemap History

	Duplicated Lines (%)	Duplicated Lines
src/Funcionario/UiAlterarDadosGerente.java	77.8%	133
src/Funcionario/UiFuncionario.java	77.3%	133
src/Doador/UIUltimaDoacao.java	38.9%	202
src/Doacao/UIExame.java	36.5%	199
src/Doacao/UiDoacao.java	27.3%	93
src/Bolsa/ControleBolsa.java	22.5%	36
src/Bolsa/UIBolsa.java	21.4%	66

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## SonarQube™ ISSUES – Duplications

The screenshot shows a Java code editor with the following code:

```

16     if(l1==l2)
17     {
18         if(l2==l3) System.out.println("\n Triangulo Equilatero\n");
19     }
20     else{
21         if(l1==l2) {
22             if(l1==l3) System.out.println("\n Triangulo Isoceles");
23             else if(l2==l3) System.out.println("\n Triangulo Isoceles");
24         }
25     }

```

Below the code, a SonarLint issue is highlighted:

- Problems @ Javadoc Declaration Console SonarLint Issues SonarLint Rule Description
- 39 items
- Date Description
- 1 day ago This branch's code block is the same as the block for the branch on line 22.

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## SonarQube™ ISSUES

The diagram illustrates various types of SonarQube issues:

- Architecture & Design
- Comments
- Coding rules
- Sources
- Potential bugs
- Complexity
- Duplications
- Unit tests

A green arrow points from the 'Sources' box to the 'Duplications' box, indicating a relationship between these two types of issues.

84 Fonte: SonarSource S.A, Switzerland. SonarQube™Docs.

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## SonarQube™ ISSUES – Unit tests

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- O SonarQube™ não possibilita a criação nem a execução de testes unitários e de integração;
- A ferramenta utiliza o resultado de testes de outras ferramentas para realizar a análise de cobertura;

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## SonarQube™ ISSUES – Unit tests

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jUnit 5

JACOCO  
Java Code Coverage

Clover

Cobertura

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## SonarQube™ ISSUES – Unit tests

Code coverage <b>70.6% (+0.6)</b> 71.2% line coverage (+0.5) 68.9% branch coverage (+0.7)	Unit test success <b>100.0% (+0.0)</b> 0 failures (+0) 0 errors (+0) 2,778 tests (+172) 0 skipped (-2) 12:34 min (+1:12 min)
On new code <b>78.8%</b> 1,481 lines to cover 80.1% line coverage 74.5% branch coverage	

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## SonarQube™ ISSUES

```

graph TD
    Sources[Sources] --> Architecture[Architecture & Design]
    Sources --> Duplications[Duplications]
    Sources --> UnitTests[Unit tests]
    Sources --> Complexity[Complexity]
    Sources --> PotentialBugs[Potential bugs]
    Sources --> CodingRules[Coding rules]
    Sources --> Comments[Comments]
  
```

Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.

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## SonarQube™ ISSUES – Complexity

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- A ferramenta SonarQube™ realiza o cálculo da complexidade baseado na Complexidade de McCabe (1976);
- No perfil padrão da ferramenta, um valor de complexidade até 10 é aceitável.

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*Fonte:* T. J. McCabe, "A Complexity Measure," *IEEE Trans. Softw. Eng.*, vol. SE-2, no. 4, pp. 308–320, Dec. 1976.

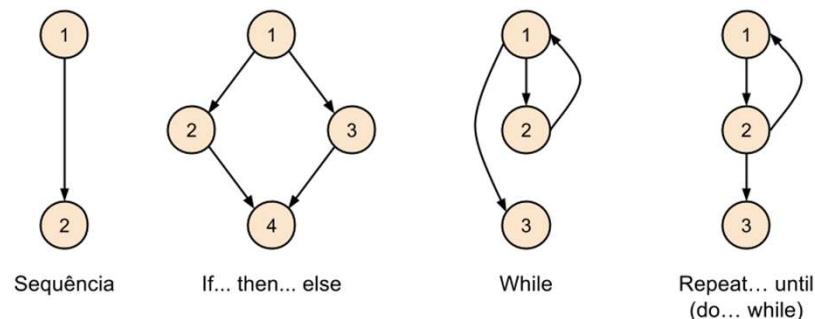
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## SonarQube™ ISSUES – Complexity

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## SonarQube™ ISSUES – Complexity

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```
+1 public static int buscaBinaria(int[] array, int valor){
  1   int inicio = 0;
  2   int fim = array.length-1;
  3   int retorno = -1;
  4   while(inicio <= fim){
  5     int meio = (inicio+fim)/2;
  6
  7     if(array[meio] == valor){
  8       retorno = meio;
  9       fim = -1;
 10    }else if(valor > array[meio]){
 11      inicio = meio+1;
 12    }else{
 13      fim = meio-1;
 14    }
 15  }
 16  return retorno;
}
```

$C = A - N + 2$   
 $12 - 10 + 2$   
 $2 + 2$   
 $\textcircled{4}$  Caminhos independentes

1.{1,2,10}
2.{1,2,3,4,5,9,2,10}
3.{1,2,3,4,6,7,9,2,10}
4.{1,2,3,4,6,8,9,2,10}

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## SonarQube™ ISSUES – Complexity

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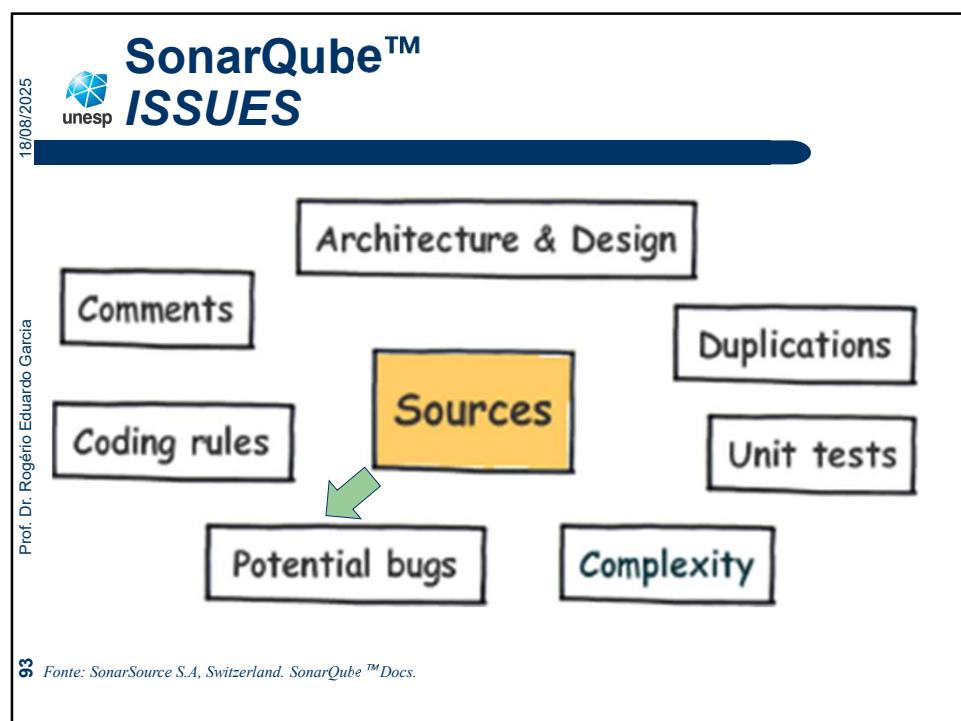
```
15*  public static void main(String[] args) {           //+/1
16
17  for(int a = 0 ; a < 10 ; a++){                   //+/1
18    if(a>5) break;                                //+/1
19    for(int b = 0 ; b < 10 ; b++){                  //+/1
20      if(a>b) break;                            //+/1
21      for(int c = 0 ; c < 10 ; c++){              //+/1
22        if(b>c) break;                          //+/1
23        for(int d = 0 ; d < 10 ; d++){          //+/1
24          if(c>d) break;                      //+/1
25          for(int e = 0 ; e < 10 ; e++){        //+/1
26            if(e>a) break;                    //+/1
27
```

Problems Javadoc Declaration Console SonarLint Issues SonarLint Rule Description

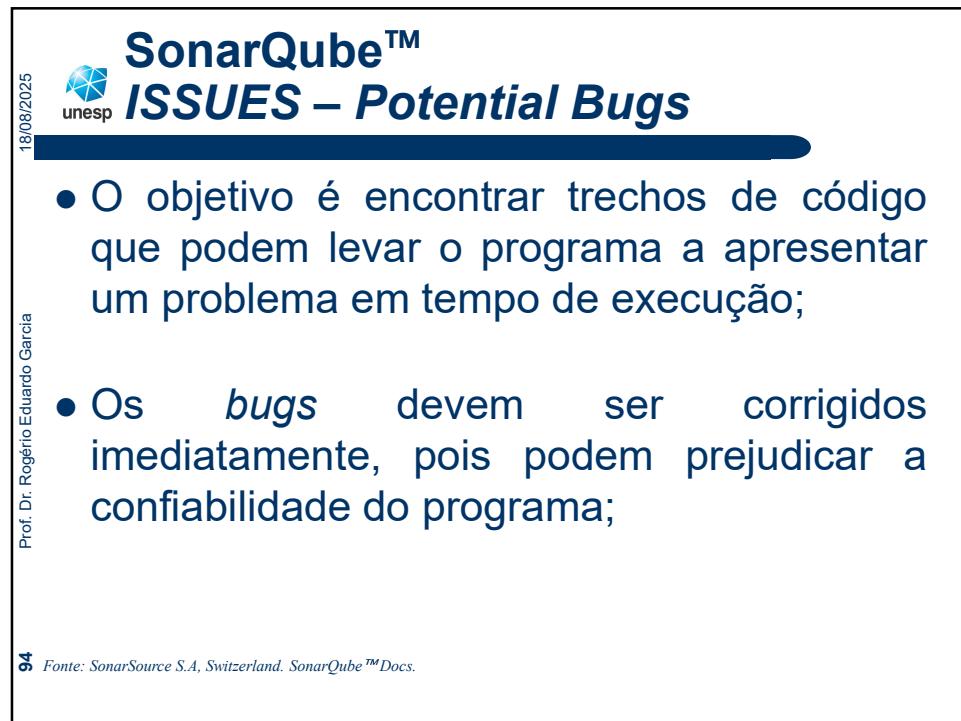
9 items

Date	Description
13 hours ago	The Cyclomatic Complexity of this method "main" is 11 which is greater than 10 authorized.

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## SonarQube™ ISSUES – Potential Bugs

- Até a versão 4.5, a ferramenta SonarQube™ realizava a busca por bugs e possíveis bugs utilizando o plugin FindBugs.
- A SonarSource reescreveu o plugin inteiro e o incorporou ao SonarQube™

95    Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.

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## SonarQube™ ISSUES – Potential Bugs

```
//...
if(a == a) { //self comparison -> detectável pelo FindBugs
    System.out.println("foo");
}
if( 2+1*12 == 2+1*12 ) { //selfcomparison -> não detectável pelo FindBugs
    System.out.println("foo");
}//...
```

PG Java project analyzed with the SonarQube Runner    src/exs/Self.java

Identical sub-expressions on both sides of operator "=="    2 horas atrás L12    cert

Bug    Critical    Open    Not assigned    2min effort

Change this condition so that it does not always evaluate to "true"    2 horas atrás L12    cert, cwe, misra

Bug    Critical    Open    Not assigned    15min effort

Identical sub-expressions on both sides of operator "=="    2 horas atrás L14    cert

Bug    Critical    Open    Not assigned    2min effort

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## SonarQube™ ISSUES

Architecture & Design  
Comments  
Duplications  
Unit tests  
Complexity  
Potential bugs  
Coding rules  
**Sources**

97 *Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.*

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## SonarQube™ ISSUES – Coding Rules

- Análise de padrões da linguagem;
- Violações aos padrões comprometem a manutenção;
- A análise se baseia em diversas convenções, como a CERT, CWE, OWASP.

98 *Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.*

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## SonarQube™ ISSUES – Coding Rules

The screenshot shows the SonarQube Issues interface for a Java project. At the top, there's a code editor window displaying a simple class A with methods setB and constructor A, and a private variable b. Below the code editor is a navigation bar with links for Problems, Javadoc, Declaration, Console, SonarLint Issues, and SonarLint Rule Description. Underneath the navigation bar is a table titled '6 items' showing three violations:

Date	Description
1 minute ago	Move this constructor to comply with Java Code Conventions.
1 minute ago	Replace this usage of System.out or System.err by a logger.
14 hours ago	Move this variable to comply with Java Code Conventions.

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## SonarQube™ ISSUES

The diagram illustrates the types of issues tracked by SonarQube. It features several boxes arranged in a cloud-like shape, each containing a different category of issue:

- Architecture & Design
- Duplications
- Unit tests
- Complexity
- Potential bugs
- Sources
- Coding rules
- Comments

A green arrow points from the 'Comments' box towards the central 'Sources' box.

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## SonarQube™ ISSUES – Comments

- Um código bem documentado facilita a manutenção;
- A ferramenta analisa as linhas de código comentadas e calcula quanto de comentário relevante está presente no projeto.

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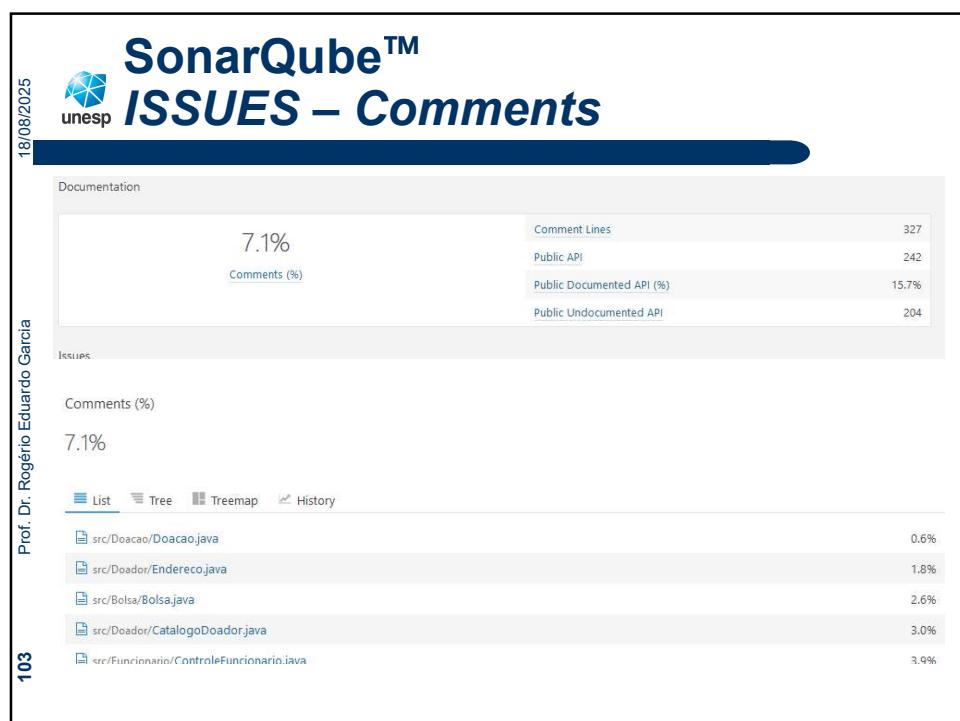
## SonarQube™ ISSUES – Comments

```
/*
 *
 * This is my documentation           +0 => empty comment line
 * although I don't                 +0 => empty comment line
 * have much                         +1 => significant comment
 * to say                            +1 => significant comment
 * *********************************** +1 => significant comment
 *                                +0 => empty comment line
 * blabla...                          +0 => non-significant comment
 */                                     +0 => empty comment line
                                         +1 => significant comment
                                         +0 => empty comment line

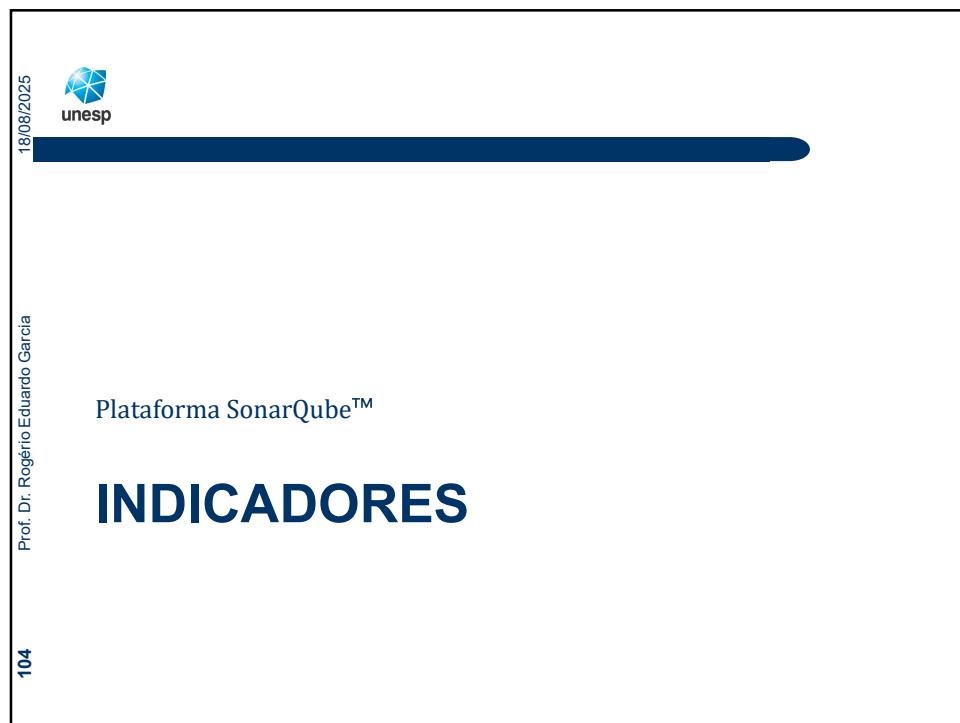
 /**
 * public String foo() {             +0 => empty comment line
 *   System.out.println(message);    +1 => commented-out code
 *   return message;                +1 => commented-out code
 * }                               +1 => commented-out code
 */                               +0 => empty comment line
```

*Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.*

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## SonarQube™ ISSUES – Classificação

Severidade	Descrição	Exemplo
<b>Blocker</b>	Bug com uma grande probabilidade de impacto no comportamento do programa	Erros de memória
<b>Critical</b>	Um bug com baixa probabilidade de impacto ou uma questão de segurança	SQL Injection
<b>Major</b>	Falha de qualidade que pode gerar um grande impacto na produtividade	Duplicação de código
<b>Minor</b>	Falha de qualidade que pode gerar um significativo impacto na produtividade	Linhas muito longas
<b>Info</b>	Nem um bug nem um problema de qualidade	Apenas uma dica

Fonte: SonarSource S.A, Switzerland. SonarQube™ Docs.

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## SonarQube™ ISSUES – Classificação

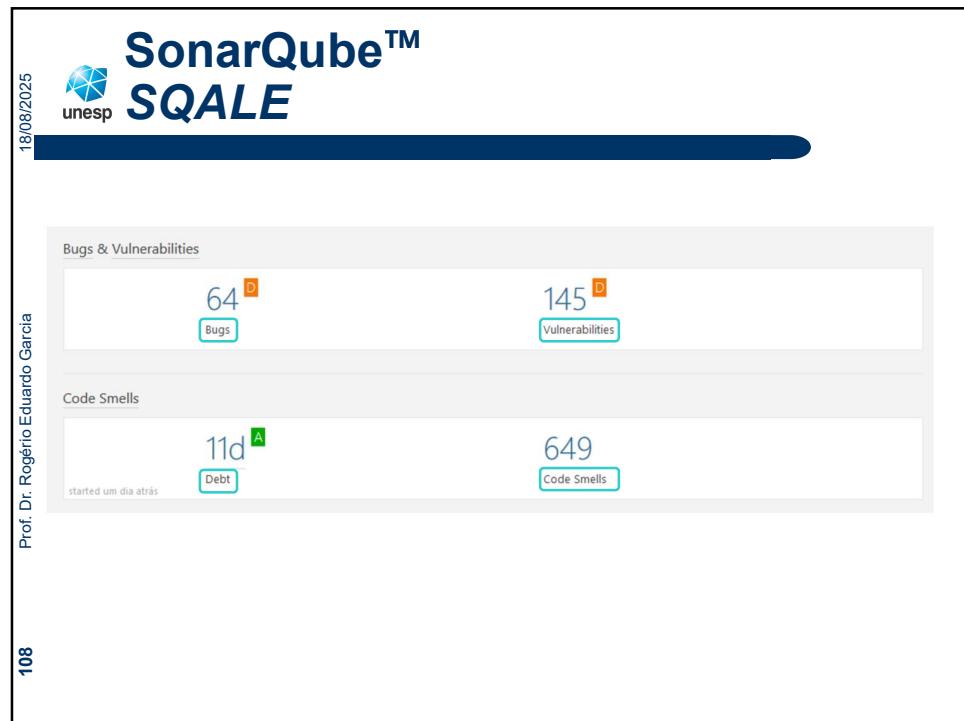
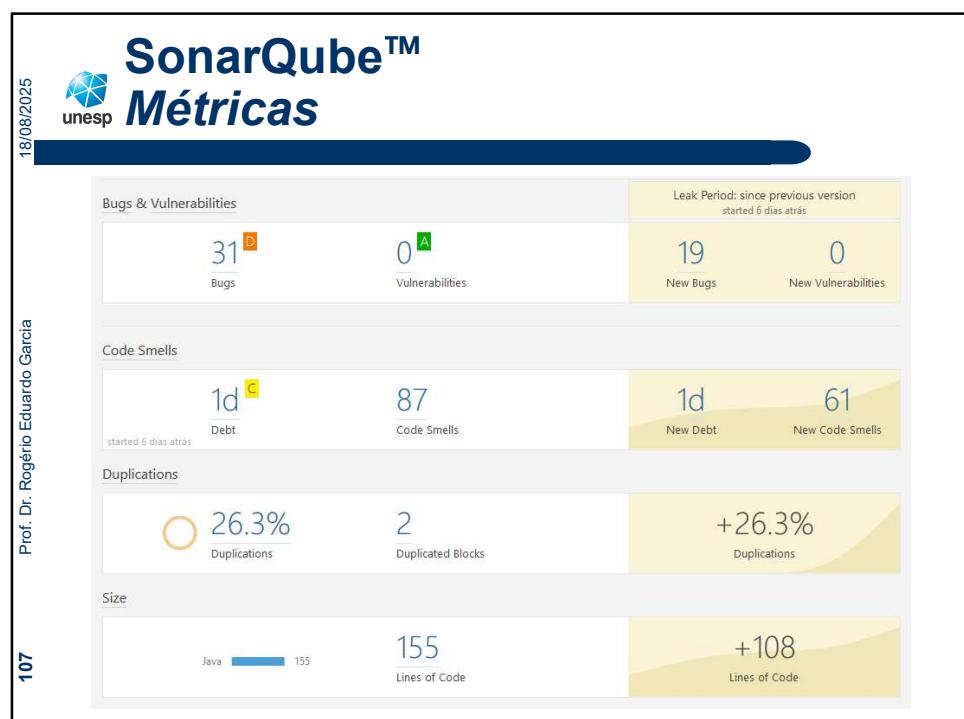
Análise Lexica src/analex/lalg/JanelaLALG.java

Close this "Scanner". 5 dias atrás L301 ⚡ 🔍 >

Bug Blocker Open Not assigned 5min effort Comment cert, cwe, denial-of-service, leak

Blocker  
 Critical  
 Major  
 Minor  
 Info

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## SonarQube™ SQALE

Bugs & Vulnerabilities

64	D
Bugs	

145	D
Vulnerabilities	

Code Smells

11d	A
Debt	

started um dia atrás

649	
Code Smells	

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Índice | Confiabilidade

A	0 bugs
B	Pelo menos 1 Minor Bug
C	Pelo menos 1 Major Bug
D	Pelo menos 1 Critical Bug
E	Pelo menos 1 Blocker Bug

Índice | Vulnerabilidades

A	0 vulnerabilidades
B	Pelo menos 1 vulnerabilidade Minor
C	Pelo menos 1 vulnerabilidade Major
D	Pelo menos 1 vulnerabilidade Critical
E	Pelo menos 1 vulnerabilidade Blocker

Índice | Ratio MIN | Ratio MAX

A	0,00	0,05
B	0,06	0,10
C	0,11	0,20
D	0,21	0,50
E	0,51	1,00

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## SonarQube™ Quality Gates

Quality Gate | Passed

Quality Gate | Failed

since previous version

3 New Bugs  
> 0

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## SonarQube™ Quality Gates

Conditions

Only project measures are checked against thresholds. Sub-projects, directories and files are ignored.

Metric	Over Leak Period	Operator	Warning	Error
Coverage on New Code	Always	is less than	80.0%	
New Bugs	Always	is greater than	0	
New Vulnerabilities	Always	is greater than	0	
Technical Debt Ratio on New Code	Always	is greater than	5.0%	

Projects

Every project not specifically associated to a quality gate will be associated to this one by default.

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## SonarQube™ - O que é?



Ferramenta para análise da  
qualidade de código;

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## SonarQube™ - O que é?

- Tem como principal objetivo, a partir da análise de código-fonte, identificar *violações* e *faltas* cometidas pelo programador;
- Baseado em um conjunto de ferramentas já conhecidas do mundo Java
- Engenharia de Software!

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