SonarQube Tutorial -DevOps Tool

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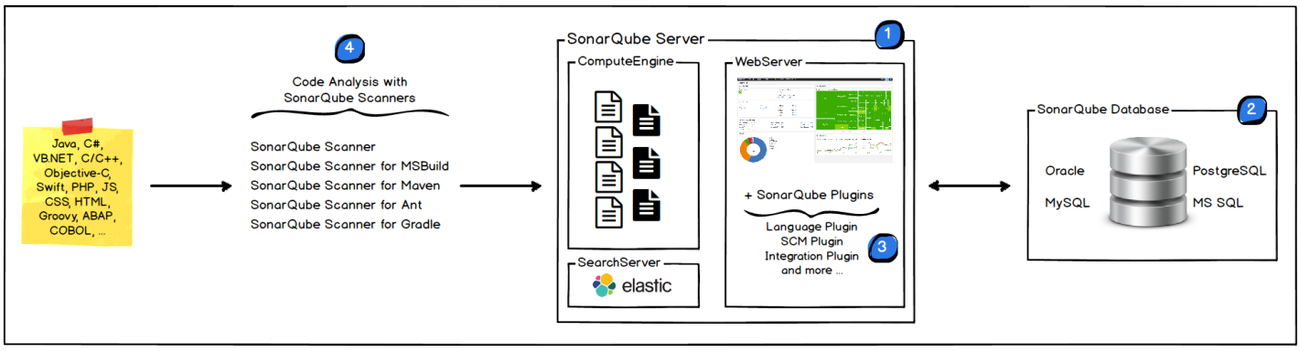
1. Introduction -SonarQube Tutorial

SonarQube (http://en.wikipedia.org/wiki/SonarQube) (previously known as Sonar) is an open source platform for **Continuous Inspection of code** quality. It is written in java and supported for **25+ languages** such as Java, C/C++, C#, PHP, Flex, Groovy, JavaScript, Python, PL/SQL, COBOL, etc, it is also used for Android Development

1.1 SonarQube Architecture

The SonarQube Platform is made of 4 components:



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1.One **SonarQube Server** starting 3 main processes:

- **Web Server** for developers, managers to browse quality snapshots and configure the SonarQube instance
- **Search Server** based on Elasticsearch to back searches from the UI
- **Compute Engine Server** in charge of processing code analysis reports and saving them in the SonarQube Database

2.One **SonarQube Database** to store:

- The configuration of the SonarQube instance (security, plugins settings, etc.)
- The quality snapshots of projects, views, etc.

3.Multiple **SonarQube Plugins** installed on the server, possibly including language, SCM, integration, authentication, and governance plugins

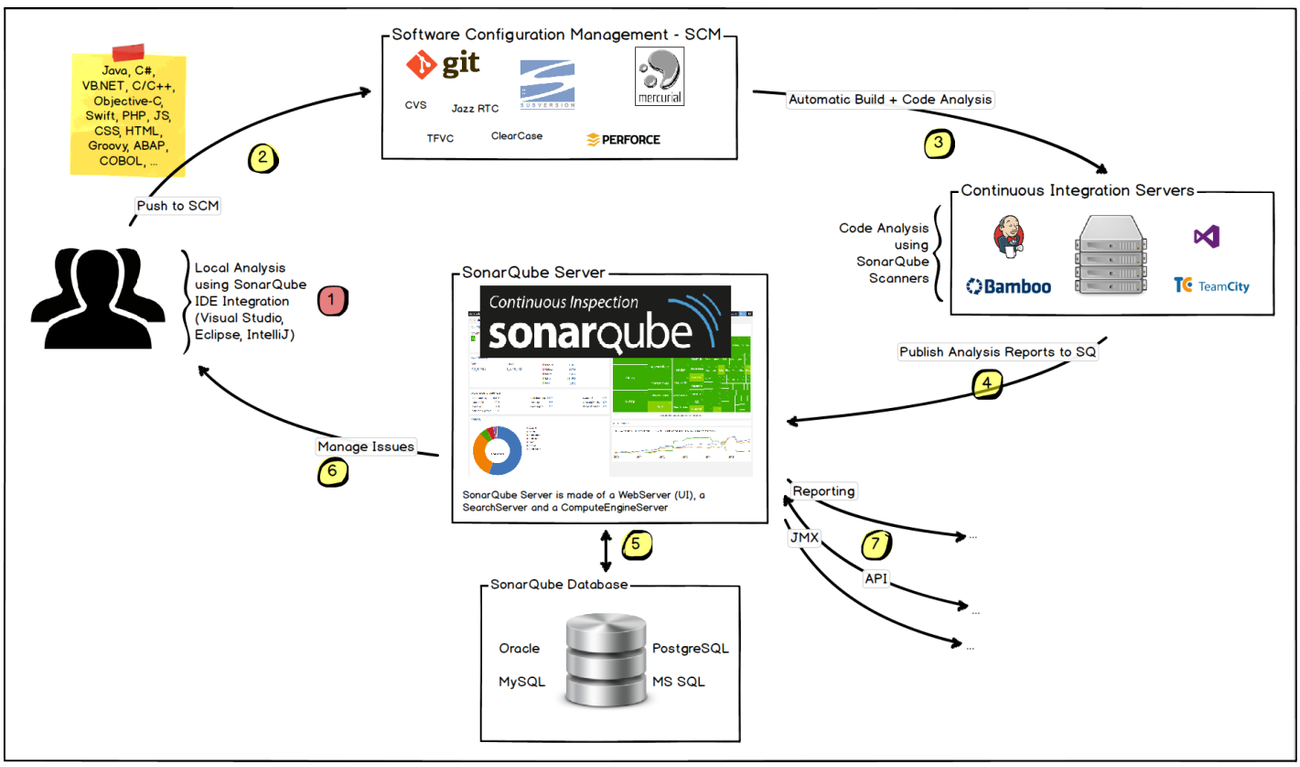
4.One or more **SonarQube Scanners** running on your Build / Continuous Integration Servers to analyze projects

1.2 SonarQube Integration

The following schema shows how SonarQube integrates with other ALM tools and where the various components of SonarQube are used.

1. Developers code in their IDEs and use SonarLint (http://en.wikipedia.org/wiki/SonarQube) to run the local analysis.
2. Developers push their code into their favorite SCM: git, SVN, TFVC, …
3. The Continuous Integration Server triggers an automatic build, and the execution of the SonarQube Scanner required to run the SonarQube analysis.
4. The analysis report is sent to the SonarQube Server for processing.
5. SonarQube Server processes and stores the analysis report results in the SonarQube Database and displays the results in the UI.
6. Developers review, comment, challenge their Issues to manage and reduce their Technical Debt through the SonarQube UI.

7. Managers receive Reports from the analysis.
   Ops use APIs to automate configuration and extract data from SonarQube.
   Ops use JMX to monitor SonarQube Server.



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2. Installation & Configuration

1.Download (http://www.sonarsource.org/downloads/) and unzip the SonarQube distribution (let's say in `"C:\sonarqube" or "/etc/sonarqube"`)

2.Start the SonarQube server as follows

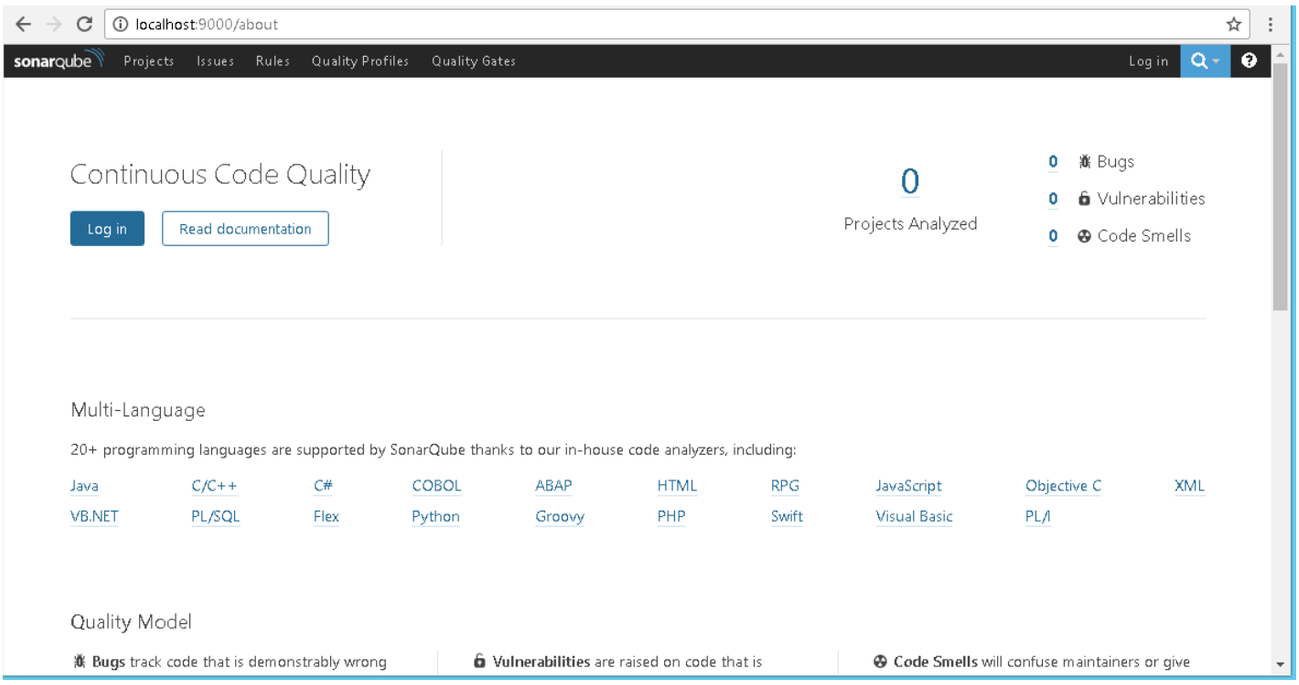
```
# On Windows, execute:
C:\sonarqube\bin\windows-x86-xx\StartSonar.bat

# On other operating system, execute:
/etc/sonarqube/bin/[OS]/sonar.sh console
```

3.It will Open the command prompt & you can observe the message once it is ready like. "`SonarQube is up`"

```
jvm 1    | 2017.03.21 18:18:36 INFO  app[][o.s.p.m.Monitor] Process[web] is up
jvm 1    | 2017.03.21 18:18:36 INFO  app[][o.s.p.m.JavaProcessLauncher] Launch p
rocess[ce]: E:\Users\SmlCodes\Desktop\Java\JDK 8.0\jre\bin\java -Djav
a.awt.headless=true -Dfile.encoding=UTF-8 -Xmx512m -Xms128m -XX:+HeapDumpOnOutOf
MemoryError -Djava.io.tmpdir=C:\DevOps\sonarqube\temp -javaagent:E:\Users\smlcodes
_s.SmlCodes\Desktop\Java\JDK 8.0\jre\lib\management-agent.jar -cp ./lib/common
/*;./lib/server/*;./lib/ce/*;C:\DevOps\sonarqube\lib\jdbc\h2\h2-1.3.176.jar org.
sonar.ce.app.CeServer C:\DevOps\sonarqube\temp\sq-process5966313576283705229prop
erties
jvm 1    | 2017.03.21 18:18:55 INFO  app[][o.s.p.m.Monitor] Process[ce] is up
jvm 1    | 2017.03.21 18:18:55 INFO  app[][o.s.application.App] SonarQube is up
```

4.Once it is up, open **http://localhost:9000/** (http://localhost:9000/) from the browser to access SonarQube



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5.You can Login by using default System administrator (https://docs.sonarqube.org/display/SONAR/Authorization) credentials **`admin/admin`**

6.9000 is the default port and can be changed in ***`SONAR_HOME\conf\sonar.properties`***

2.1 Configure MySQL Database with SonarQube

1.Go to MySQL website (https://www.mysql.com/downloads/), **download & Install MySQL Server Database**

2.Login to MySQL database

3.Create new Database. For Ex: **`CREATE DATABASE`** `sonarqube ;`

4.Go To SonarQube config folder location (`C:\DevOps\sonarqube\conf`) edit `sonar.properties` file and **uncomment** the following line for MySql and save it

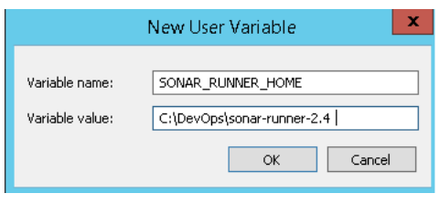
```
sonar.jdbc.url=jdbc:mysql://localhost:3306/sonar?useUnicode=true&
characterEncoding=utf8&rewriteBatchedStatements=true&useConfigs=maxPerformance
```

5.Start the sonar server by executing **`'C:\DevOps\sonarqube\bin\windows-x86-64\StartSonar.bat'`**

2.2 SonarQube Runner

SonarQube Runner (https://docs.sonarqube.org/display/SONARQUBE45/Installing+and+Configuring+SonarQube+Runner) – Download the latest version of SonarQube runner from and unzip to the desired location. SonarQube Runner is recommended as the default launcher to analyze a project with SonarQube.

1.Set a new environment variable as **`SONAR_RUNNER_HOME`** . And its value should be the unzipped path of **sonar-runner zip file**.
Example, **`" C:\DevOps\sonar-runner-2.4"`** don't put the semicolon (;)



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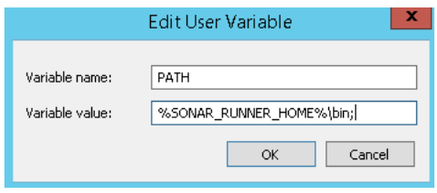
2.Append Sonar Runner's bin path **`(%SONAR_RUNNER_HOME%\bin)`** to the environment variable **`"PATH".`**



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3.Uncomment the following lines in the property file, ' `C:\DevOps\sonar-runner-2.4\conf\sonar-runner.properties` ' and save it.

```
C:\DevOps\sonar-runner-2.4\conf\sonar-runner.properties
#----- Default SonarQube server
 sonar.host.url=http://localhost:9000


#----- MySQL sonar.jdbc.url=jdbc:mysql://localhost:3306/sonar?useUnicode=true&amp;characterEncoding=utf8
```

3. Analyzing Source Code

SonarQube can perform analysis on 20+ different languages (https://docs.sonarqube.org/display/PLUG/Plugin+Library). The outcome of this analysis will be quality measures and issues (instances where coding rules were broken). However, what gets analyzed will vary depending on the language

- On all languages, "blame" data will automatically be imported from supported SCM providers. Git and SVN have supported automatically. Other providers require additional plugins (https://docs.sonarqube.org/display/PLUG/Plugin+Library).
- On all languages, a static analysis of source code is performed (Java files, COBOL programs, etc.)
- A static analysis of compiled code can be performed for certain languages (*.class*files in Java, *.dll* files in C#, etc.)
- A dynamic analysis of code can be performed on certain languages.

During analysis, data is requested from the server, the files provided to the analysis are analyzed, and the resulting data is sent back to the server at the end in the form of a report, which is then analyzed asynchronously server-side.

3.1 Running Analysis

First, you should install the plugin(s) for the language(s) of the project to be analyzed, either by a direct download (https://docs.sonarqube.org/display/PLUG/Plugin+Library) or through the update center (https://docs.sonarqube.org/display/SONAR/Update+Center).

Then, you need to choose an analysis method. The following are available:

- **SonarQube Scanner** (https://docs.sonarqube.org/display/SCAN/Analyzing+with+SonarQube+Scanner): Launch analysis from the command line
- **SonarQube Scanner for MSBuild** (https://docs.sonarqube.org/display/SCAN/Analyzing+with+SonarQube+Scanner+for+MSBuild): Launch analysis of .Net projects
- **SonarQube Scanner for Ant** (https://docs.sonarqube.org/display/SCAN/Analyzing+with+SonarQube+Scanner+for+Ant): Launch analysis from Ant
- **SonarQube Scanner for Maven** (https://docs.sonarqube.org/display/SCAN/Analyzing+with+SonarQube+Scanner+for+Maven): Launch analysis from Maven with minimal configuration
- **SonarQube Scanner for Gradle** (https://docs.sonarqube.org/display/SCAN/Analyzing+with+SonarQube+Scanner+for+Gradle)**:** Launch Gradle analysis
- **SonarQube Scanner For Jenkins** (https://docs.sonarqube.org/display/SCAN/Analyzing+with+SonarQube+Scanner+for+Jenkins)**:** Launch analysis from Jenkins

We can add any plugins by downloading jars and places `sonarqube\extensions\plugins` folder

3.2 Using the Update Center behind a Proxy

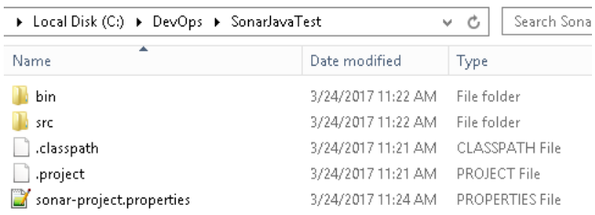
Update Center uses HTTP(S) connections to external servers to provide these services. If SonarQube is located behind a proxy, additional information must be provided in the ***`SONAR_HOME/conf/sonar.properties`*** configuration file:

```
SONAR_HOME/conf/sonar.properties
http.proxyHost=<your.proxy.host>
http.proxyPort=<yout.proxy.port>

#If proxy authentication is required
http.proxyUser=<your.proxy.user>
http.proxyPassword=<your.proxy.password>
```

3.3 SonarQube Java Project Configuration

1.Go to the root folder of the Java Project to be analyze



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2.Create **'sonar-project.properties'** file under the root folder of the project

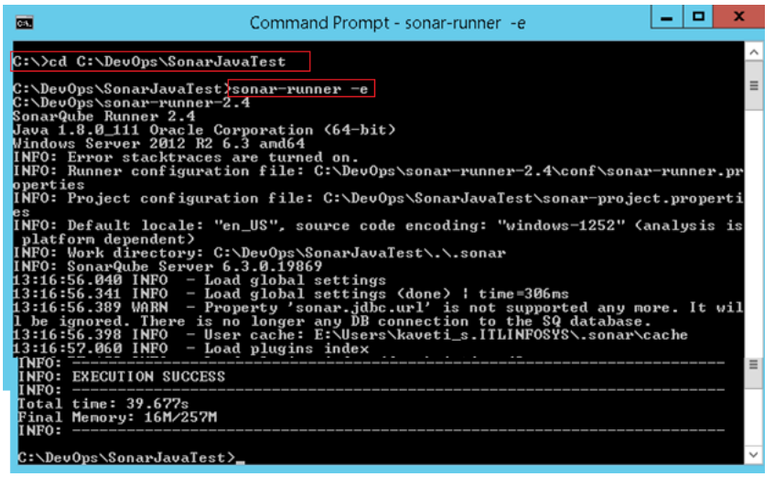
3.Provide project details in sonar-project.properties like below

```
sonar.projectKey=SonarJavaTest
sonar.projectName=Sonar Java Test
sonar.projectVersion=1.0
sonar.sources=.
```

4.Go to the project root folder through the Command prompt

5.Execute the command **'sonar-runner -e'.**

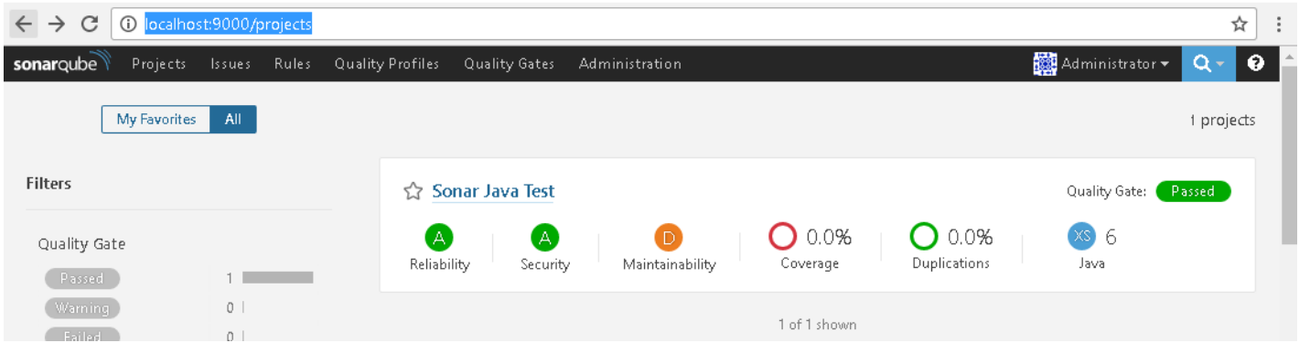
- '-e' option is useful when some error occurs and it gives the stack trace.
- '-X' options will run it in debug mode.



(http://www.smlcodes.com/wp-content/uploads/2017/03/SonarQube-Tutorial-SmlCodes-7.png)

6.Once the analysis is successful, launch the sonar web application **http://localhost:9000** (http://localhost:9000) and login as administrator.

7.Go to http://localhost:9000/projects (http://localhost:9000/projects) it will show the summary of the analysis of the project.



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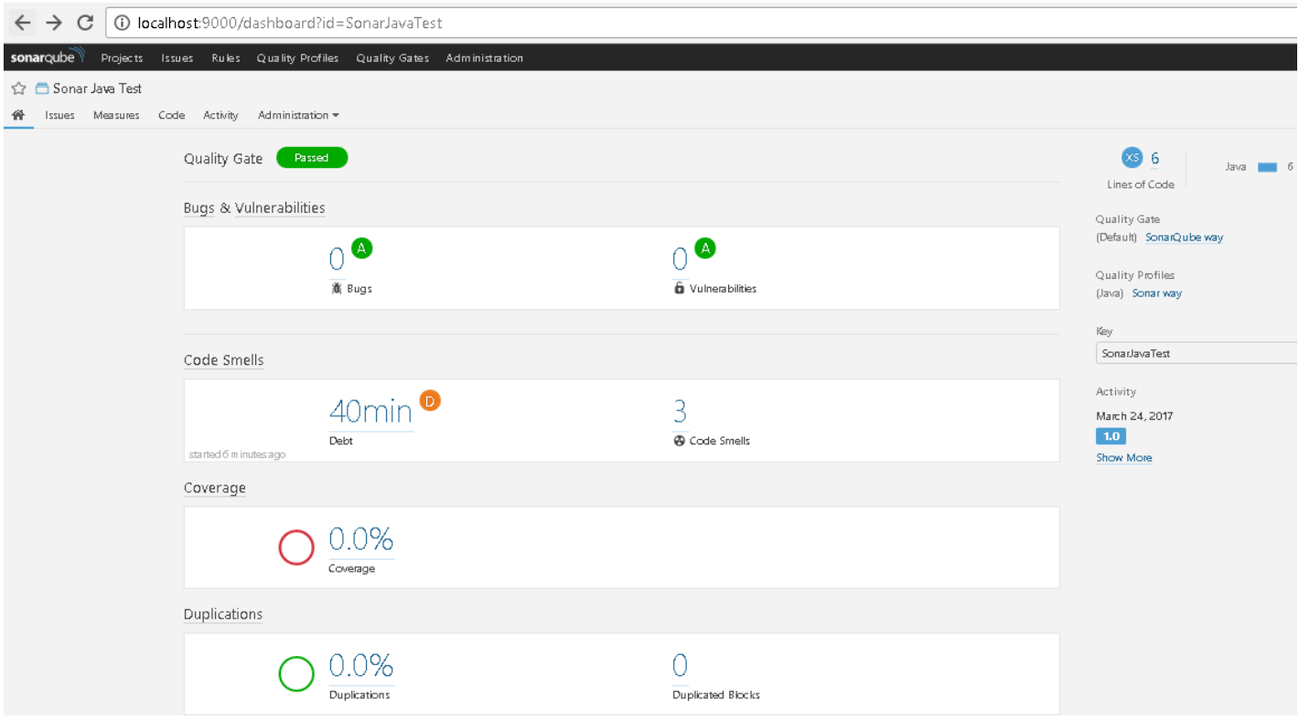
8.By Clicking on the Sonar Java Test, you can get the more details about the project



(http://www.smlcodes.com/wp-content/uploads/2017/03/SonarQube-Tutorial-SmlCodes-9.png)

9.If you want to run the analysis in module wise just change **`sonar-project.properties`** ' file as below

```
sonar-project.properties
sonar.projectKey=Project Name
sonar.projectName= Project project
sonar.projectVersion=1.0
sonar.sources=.
sonar.modules=Module1, Module2,Module3
Module1.projectName=Module 1
Module2.projectName=Module 2
Module3.projectName=Module 3
```

- **SonarQube Ant Project Configuration (http://www.smlcodes.com/devops/sonarqube-ant-project-configuration/)**
- **SonarQube Maven Project Configuration (http://www.smlcodes.com/devops/sonarqube-maven-project-configuration/)**
- **SonarQube Eclipse Configuration with SonarLint Plugin (http://www.smlcodes.com/devops/sonarqube-eclipse-configuration-with-sonarlint-plugin/)**

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