BSc (Hons) in Information Technology
Year 3

Lab Exercise – SonarQube

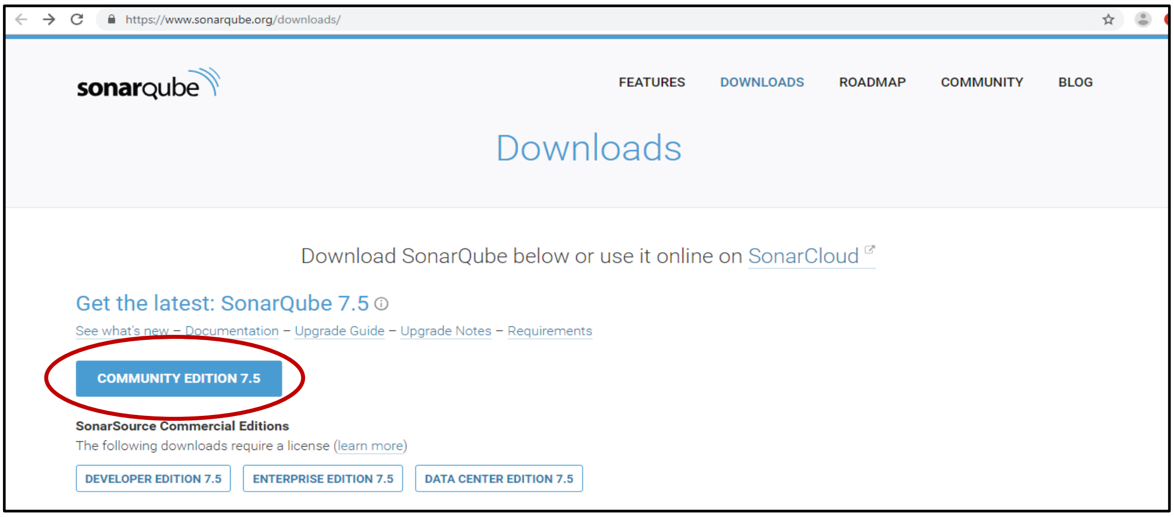
IT3040 – IT Project Management Semester 1

SonarQube is an open-source platform used for continuous inspection of code quality to perform automatic reviews with static analysis of code to detect bugs, code smells, and security vulnerabilities.

Installation:

1. Go to SonarQube website and download the SonarQube server. Extract the downloaded package on C: drive.

   URL: https://www.sonarqube.org/downloads/



Downloads

Download SonarQube below or use it online on SonarCloud

Get the latest: SonarQube 7.5

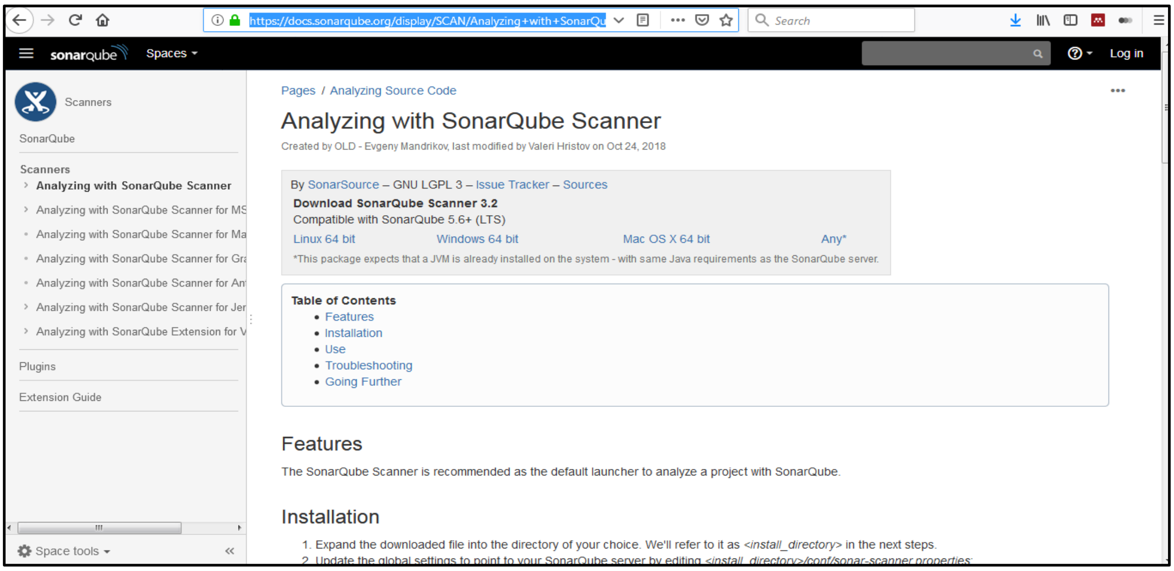
See what's new – Documentation – Upgrade Guide – Upgrade Notes – Requirements

SonarSource Commercial Editions

The following downloads require a license (learn more)

2. Download and extract SonarQube scanner.

   URL: https://docs.sonarqube.org/display/SCAN/Analyzing+with+SonarQube+Scanner


https://docs.sonarqube.org/display/SCAN/Analyzing+with+SonarQu
Search
sonarqube
Spaces
Log in
Scanners
SonarQube
Scanners
Analyzing with SonarQube Scanner
Analyzing with SonarQube Scanner for MS
Analyzing with SonarQube Scanner for Ma
Analyzing with SonarQube Scanner for Gra
Analyzing with SonarQube Scanner for An
Analyzing with SonarQube Scanner for Jer
Analyzing with SonarQube Extension for V
Plugins
Extension Guide
Space tools

Pages / Analyzing Source Code

Analyzing with SonarQube Scanner

Created by OLD - Evgeny Mandrikov, last modified by Valeri Hristov on Oct 24, 2018

By SonarSource – GNU LGPL 3 – Issue Tracker – Sources

Download SonarQube Scanner 3.2

Compatible with SonarQube 5.6+ (LTS)

Linux 64 bit Windows 64 bit Mac OS X 64 bit Any*

*This package expects that a JVM is already installed on the system - with same Java requirements as the SonarQube server.

Table of Contents

- Features
- Installation
- Use
- Troubleshooting
- Going Further

Features

The SonarQube Scanner is recommended as the default launcher to analyze a project with SonarQube.

Installation

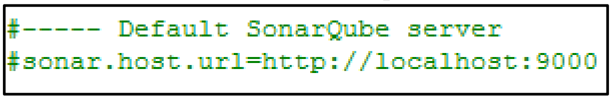
1. Expand the downloaded file into the directory of your choice. We'll refer to it as *<install_directory>* in the next steps.
2. Update the global settings to point to your SonarQube server by editing *<install_directory>/conf/sonar-scanner.properties*

Adding a project to sonar-scanner properties

1. Open sonar-scanner.properties file inside the conf folder.
   sonar-scanner-cli-3.2.0.1227-windows→sonar-scanner-3.2.0.1227-windows→conf

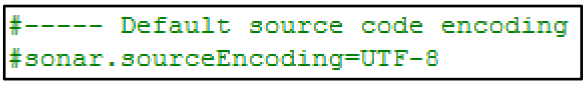
   Default content in sonar-scanner.properties file are as follows;

   Default URL to access the reports.



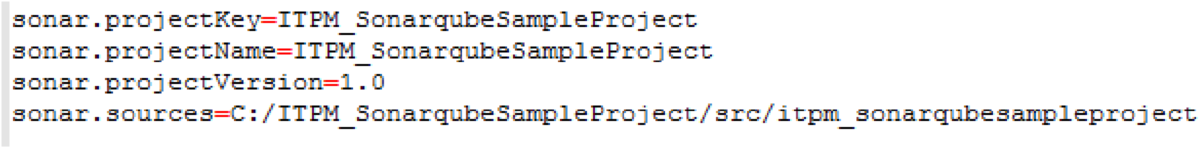
```
#----- Default SonarQube server
#sonar.host.url=http://localhost:9000
```

   Default source code encoding



```
#----- Default source code encoding
#sonar.sourceEncoding=UTF-8
```

2. Add the following lines in sonar-scanner.properties file to add a pure entry of ITPM_SonarqubeSampleProject.



```
sonar.projectKey=ITPM_SonarqubeSampleProject
sonar.projectName=ITPM_SonarqubeSampleProject
sonar.projectVersion=1.0
sonar.sources=C:/ITPM_SonarqubeSampleProject/src/itpm_sonarqubesampleproject
```

Note: *SonarQube report will be generated based on the content added in sonar-scanner.properties file.*

- ***Project Key*** *is a unique identification in sonar-scanner for the project.*
- ***Sources*** *is the path to the source codes that needs to be analyzed.*

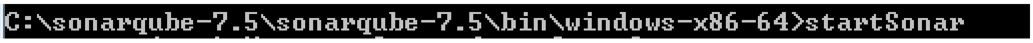
Run sonar-scanner and generate the report for ITPM_SonarqubeSampleProject

1. Start SonarQube server.
   i. Go to: C:→ sonarqube-7.5→ sonarqube-7.5→ bin
   ii. Go inside the relevant folder according to the operating system of the device and copy the folder path.
   iii. Open command prompt and change the directory by execute the following command.

cd C:\sonarqube-7.5\sonarqube-7.5\bin\windows-x86-64

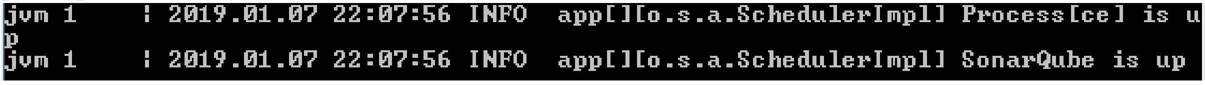
Note: C:\sonarqube-7.5\sonarqube-7.5\bin\windows-x86-64 *is the folder path copied in above step (iii).*

iv. Start SonarQube server by executing the **startSonar** command.



```
C:\sonarqube-7.5\sonarqube-7.5\bin\windows-x86-64>startSonar
```

Once the server is up, following message will be displayed in the command prompt.



```
jvm 1    | 2019.01.07 22:07:56 INFO  app[][o.s.a.SchedulerImpl] Process[ce] is u
p
jvm 1    | 2019.01.07 22:07:56 INFO  app[][o.s.a.SchedulerImpl] SonarQube is up
```

Note: *SonarQube server should be up to generate the report. In order to check whether the server is up, go to the URL http://localhost:9000 from your browser and check whether it is working.*

2. Open another command prompt window and change the directory using following command.

   cd C:\Users\User\Desktop\ITPM_SonarqubeSampleProject

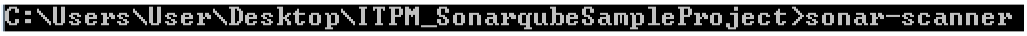
   Note: C:\Users\User\Desktop\ITPM_SonarqubeSampleProject *is the folder path to ITPM_ SonarqubeSampleProject project folder.*

3. Set the environmental variable and add the path to sonar-scanner.

   Execute the following command in the command prompt:
   set path=%PATH%; C:\sonar-scanner-cli-3.2.0.1227-windows\sonar-scanner-3.2.0.1227-windows\bin

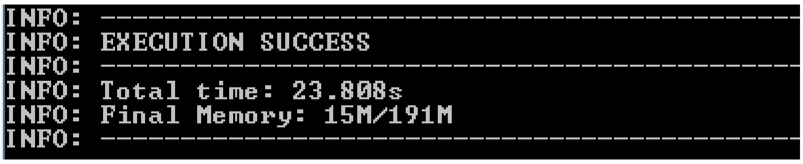
   Note*:* ***C:\sonar-scanner-cli-3.2.0.1227-windows\sonar-scanner-3.2.0.1227-windows\bin*** *in above command is the path to bin folder inside sonar-scanner. You can also add sonar-scanner bin at to the environment variable by changing system properties.*

4. Execute **sonar-scanner** command.



```
C:\Users\User\Desktop\ITPM_SonarqubeSampleProject>sonar-scanner
```

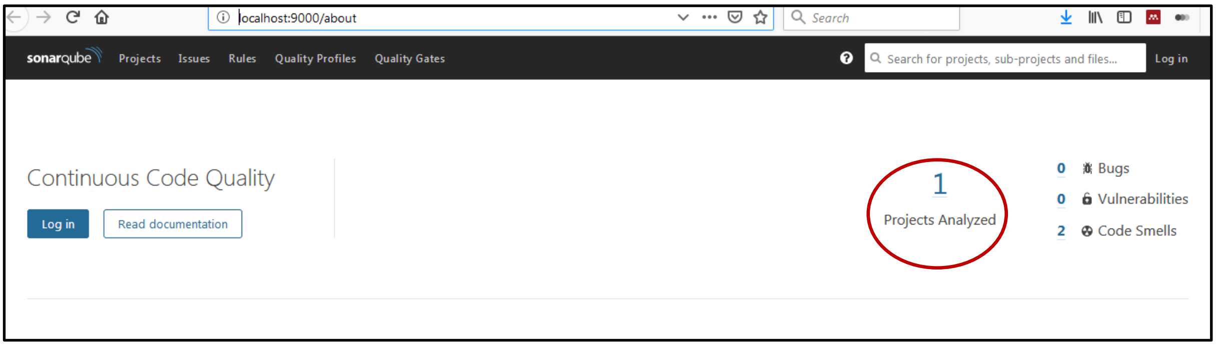
Note: *Once the sonar-scanner is successfully completed following message will be displayed in the command prompt.*



```
INFO: ------------------------------------------------------------------------
INFO: EXECUTION SUCCESS
INFO: ------------------------------------------------------------------------
INFO: Total time: 23.808s
INFO: Final Memory: 15M/191M
INFO: ------------------------------------------------------------------------
```

Once the sonar-scanner is successfully executed, report will be sent to the SonarQube server.

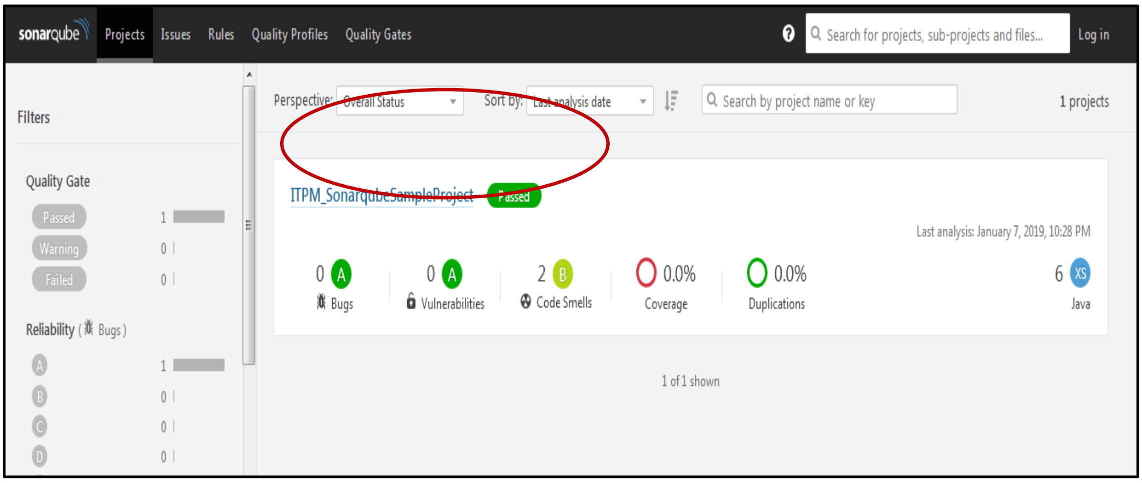
Go to URL: http://localhost:9000 . Projects Analyzed count of this page is changed.



Click the Projects Analyzed to view the report of projects analyzed.

SonarQube Report

1. Select the project to view the report.



In SonarQube report, analyzers contribute rules which are executed on source code to generate issues. There are four types of rules:

- Code Smell (Maintainability domain)
  A maintainability-related issue in the code. Leaving it as-is means that at best maintainers will have a harder time than they should making changes to the code. At worst, they'll be so confused by the state of the code that they'll introduce additional errors as they make changes.

- Bug (Reliability domain)
  An issue that represents something wrong in the code. If this has not broken yet, it will, and probably at the worst possible moment. This needs to be fixed.

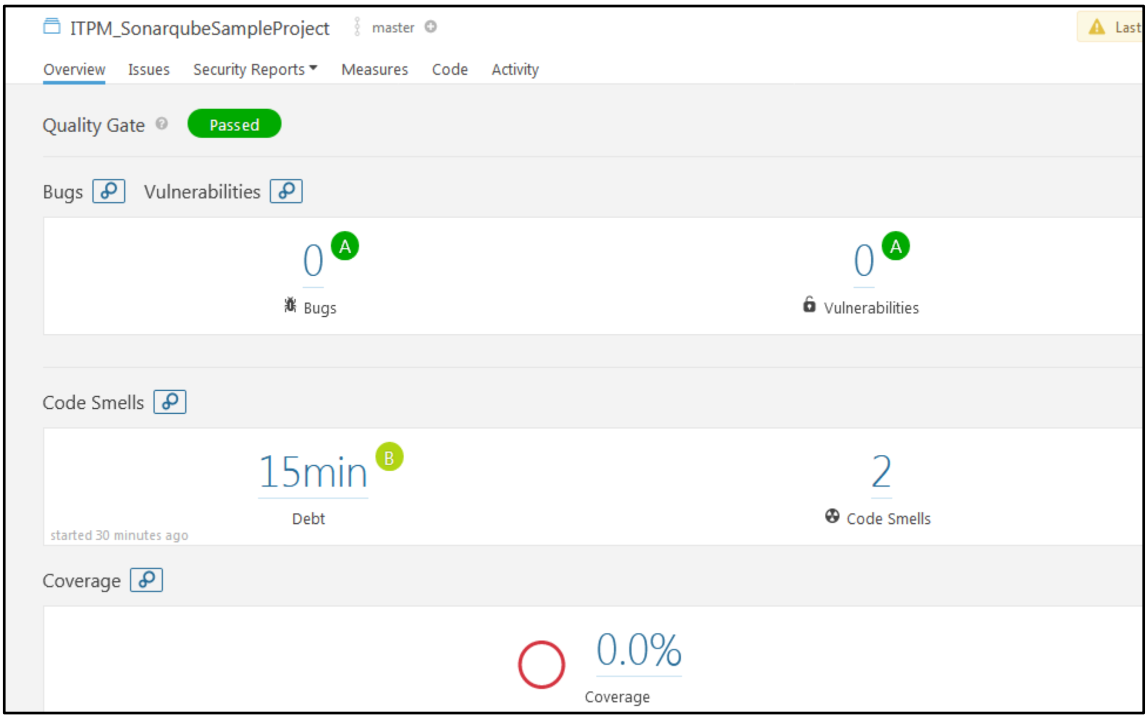
- Vulnerability (Security domain)
  A security-related issue which represents a backdoor for attackers. A special type of issue that identify sensitive areas of code that should be reviewed by a Security Auditor to determine if they are truly Vulnerabilities.

- Security Hotspot (Security domain)
  A security-related issue highlighting a piece of code that uses a security-sensitive API (E.G. useof a weak algorithm, connection to a database without a password, ...). Security hotspots must be reviewed by a security auditor who may determine that the APIs are used in ways that introduce Vulnerabilities.

For Code Smells and Bugs, zero false-positives are expected. At least this is the target so that developers don't have to wonder if a fix is required.

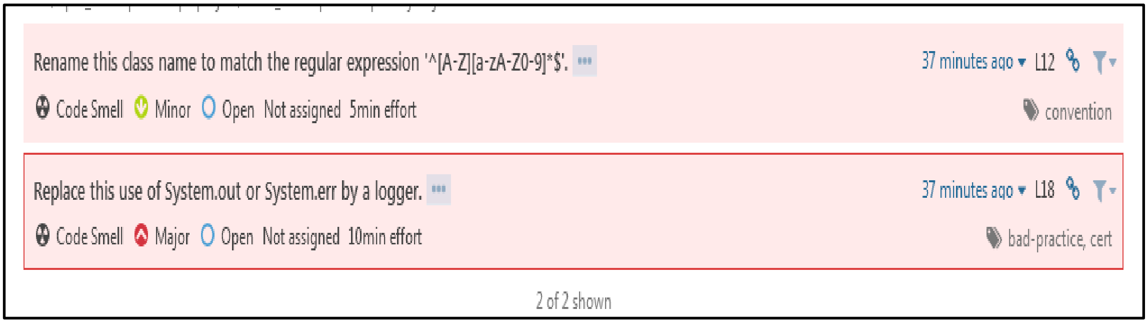
For Vulnerabilities, the target is to have more than 80% of the issues to be true-positives.

Security Hotspot rules are purposefully designed to draw attention to code is security-sensitive. It is expected that more than 80% of the issues will be quickly resolved as "Won't Fix" after review by a Security Auditor.



Note: *Debt in the output indicates the time to fix the issues in code.*

2. Click on Code Smells to get information about the errors.



Rename this class name to match the regular expression '^[A-Z][a-zA-Z0-9]*$'. 37 minutes ago L12
Code Smell Minor Open Not assigned 5min effort convention

Replace this use of System.out or System.err by a logger. 37 minutes ago L18
Code Smell Major Open Not assigned 10min effort bad-practice, cert

2 of 2 shown

In the SonarQube report, each issue has a severity type. The five severity types of issues in SonarQube are as follows:

- Blocker
  Bug with a high probability to impact the behavior of the application in production: memory leak, unclosed JDBC connection, ... The code MUST be immediately fixed.

- Critical
  Either a bug with a low probability to impact the behavior of the application in production or an issue which represents a security flaw: empty catch block, SQL injection, ... The code MUST be immediately reviewed.

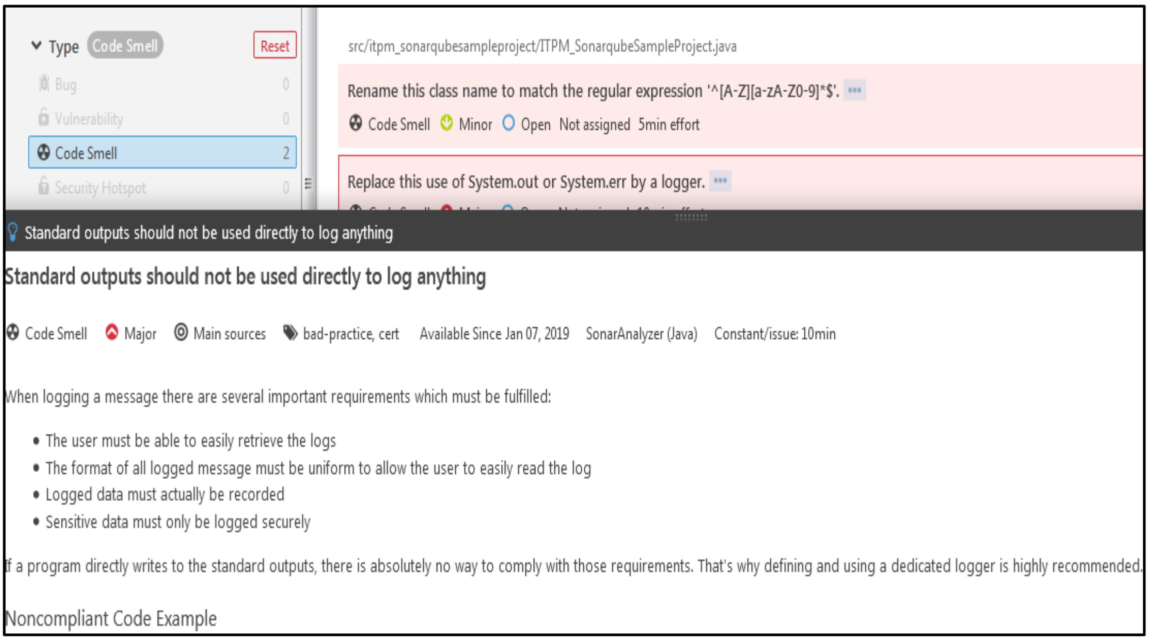
- Major
  Quality flaw which can highly impact the developer productivity: uncovered piece of code, duplicated blocks, unused parameters, etc.

- Minor
  Quality flaw which can slightly impact the developer productivity: lines should not be too long, "switch" statements should have at least 3 cases, etc.

- Info
  Neither a bug nor a quality flaw, just a finding.

3. Fix the major error listed and generate the report again.

Note: *Click the* ••• *to get more details on how to fix the error.*



src/itpm_sonarqubesampleproject/ITPM_SonarqubeSampleProject.java

Rename this class name to match the regular expression '^[A-Z][a-zA-Z0-9]*$'. •••
Code Smell Minor Open Not assigned 5min effort

Replace this use of System.out or System.err by a logger. •••

Standard outputs should not be used directly to log anything

Standard outputs should not be used directly to log anything

Code Smell Major Main sources bad-practice, cert Available Since Jan 07, 2019 SonarAnalyzer (Java) Constant/issue: 10min

When logging a message there are several important requirements which must be fulfilled:

- The user must be able to easily retrieve the logs
- The format of all logged message must be uniform to allow the user to easily read the log
- Logged data must actually be recorded
- Sensitive data must only be logged securely

If a program directly writes to the standard outputs, there is absolutely no way to comply with those requirements. That's why defining and using a dedicated logger is highly recommended.

Noncompliant Code Example

References:

1. https://docs.sonarqube.org/latest/
2. https://docs.sonarqube.org/display/SCAN/Analyzing+with+SonarQube+Scanner
3. https://www.youtube.com/watch?v=Gu9skLzRSao
4. https://www.youtube.com/watch?v=puP59_PoeUc