ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL

FACULTY OF ELECTRICAL AND COMPUTER ENGINEERING

SOFTWARE ENGINEERING II

Professor: Eng. Mónica Katiuska Villavicencio Cabezas **Parallel:** 2

Group: 4

Members:

- Dayse Joselyne Maroto Lema
- Ricardo Aurelio Rivera Guerra
- Yuleixi Katherine Garcia Anchundia

Start Date: June 10, 2021

End Date: June 10, 2021

Code Inspection - I Term 2021

Github link:

https://github.com/dmaroto98/CodeInspection.git

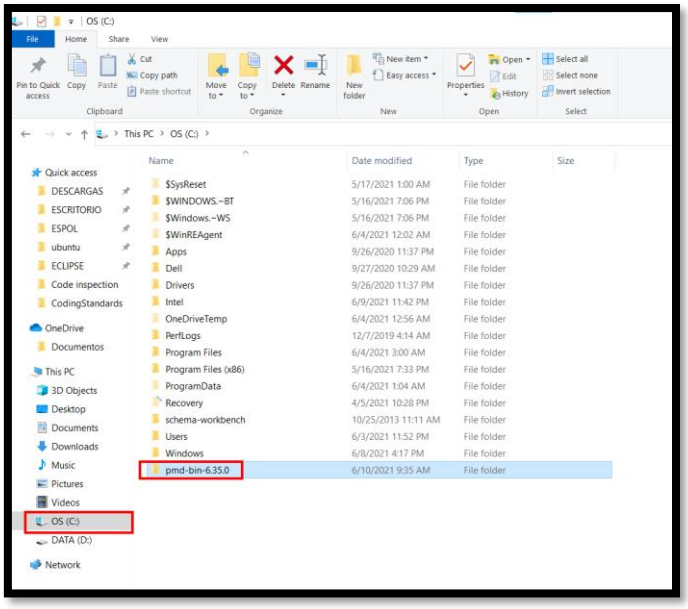
For this workshop you must have Maven, you can help yourself with this tutorial for its installation, part 1:

https://github.com/leortyz/softwareEngineeringResources/wiki/Code-Inspection

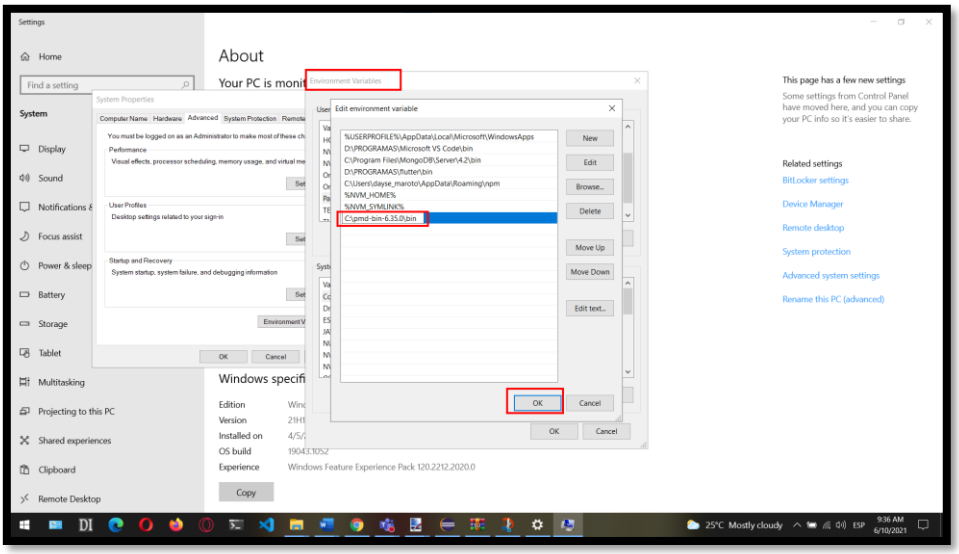
1) Results of activities

Part 2: Install the Eclipse PDM plug-in

1. Download pmd-bin-6.35.0.zip
2. Extract the zip-archive, e.g. to C:\pmd-bin-6.35.0



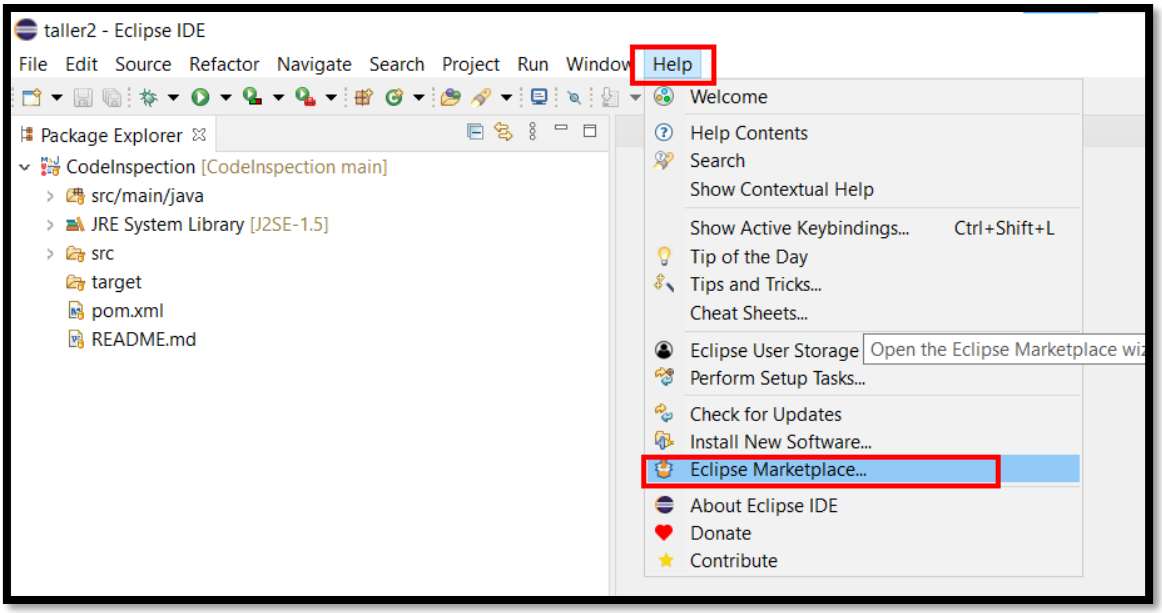
3. Add folder C:\pmd-bin-6.35.0\bin to PATH, either

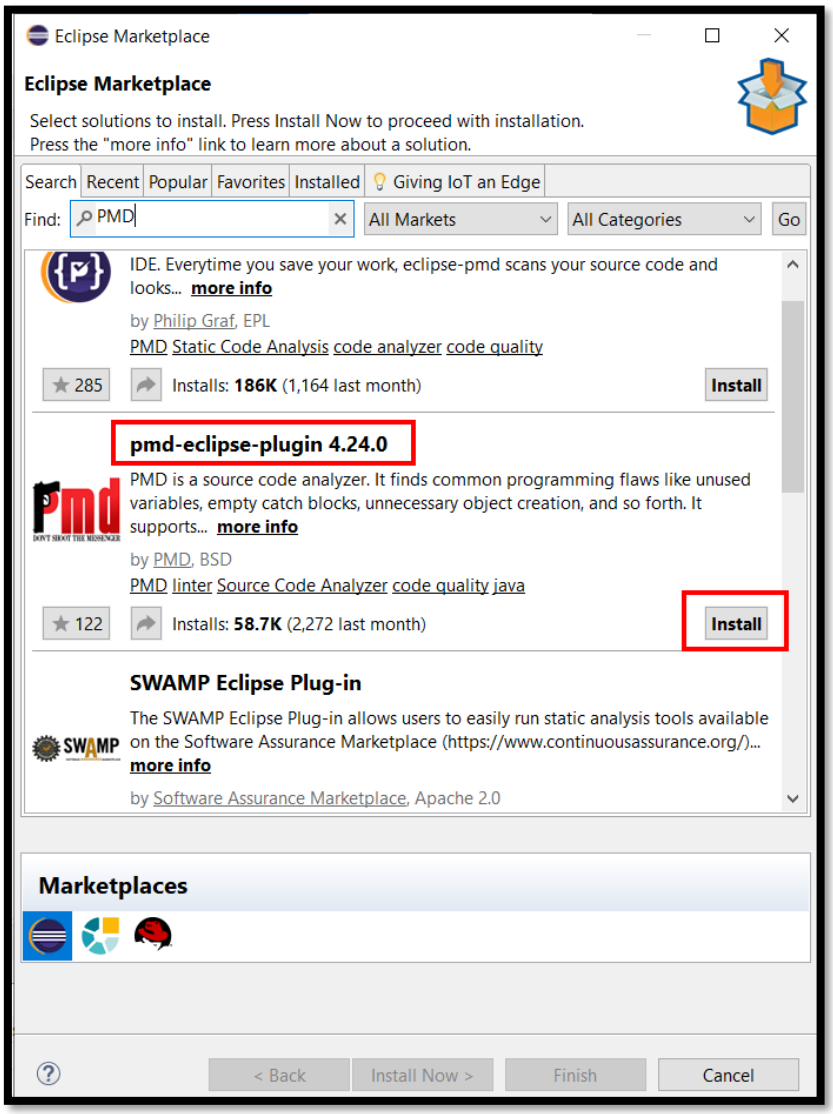


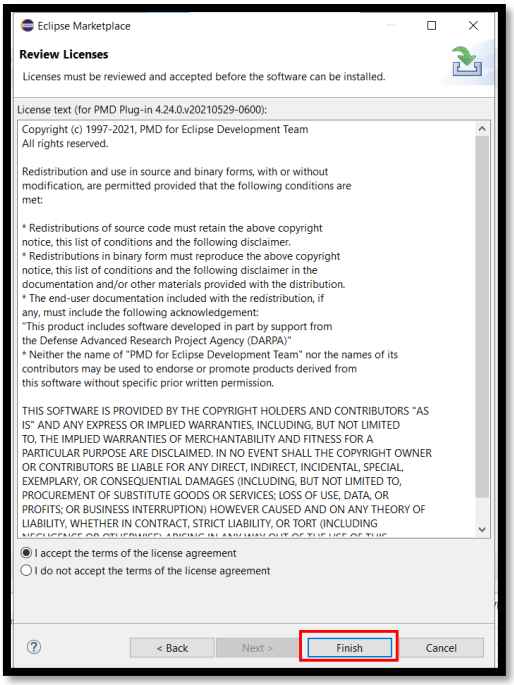
4. Execute at command line:

```
pmd.bat -d c:\src -R rulesets/java/quickstart.xml -f text
```

or download it from the eclipse marketplace.

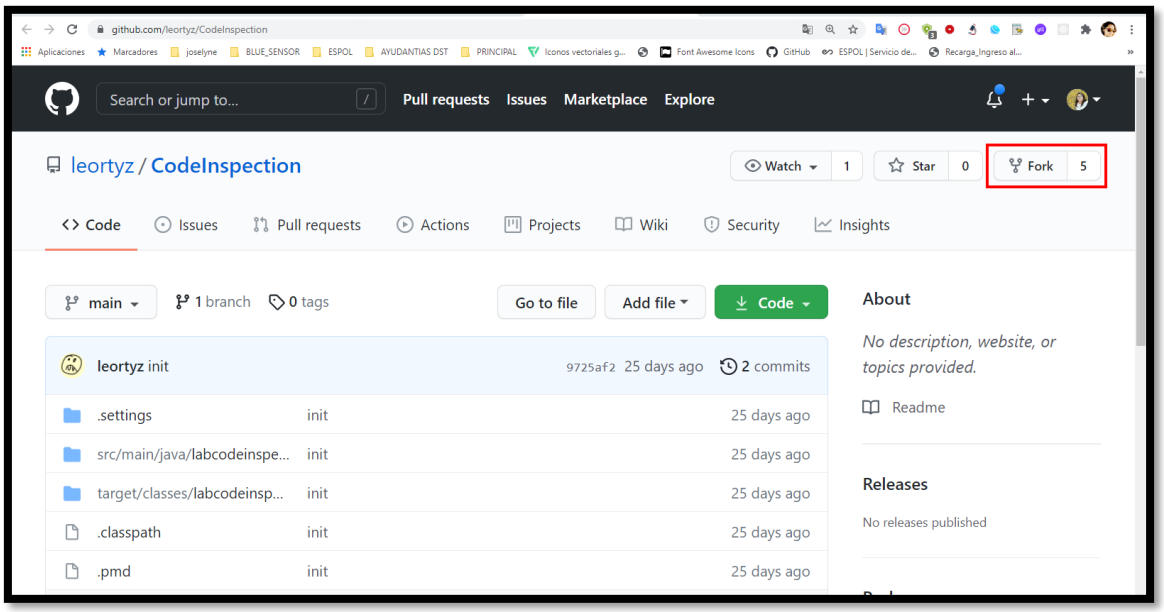

taller2 - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
CodeInspection [CodeInspection main]
src/main/java
JRE System Library [J2SE-1.5]
src
target
pom.xml
README.md
Welcome
Help Contents
Search
Show Contextual Help
Show Active Keybindings... Ctrl+Shift+L
Tip of the Day
Tips and Tricks...
Cheat Sheets...
Eclipse User Storage
Open the Eclipse Marketplace wi
Perform Setup Tasks...
Check for Updates
Install New Software...
Eclipse Marketplace...
About Eclipse IDE
Donate
Contribute

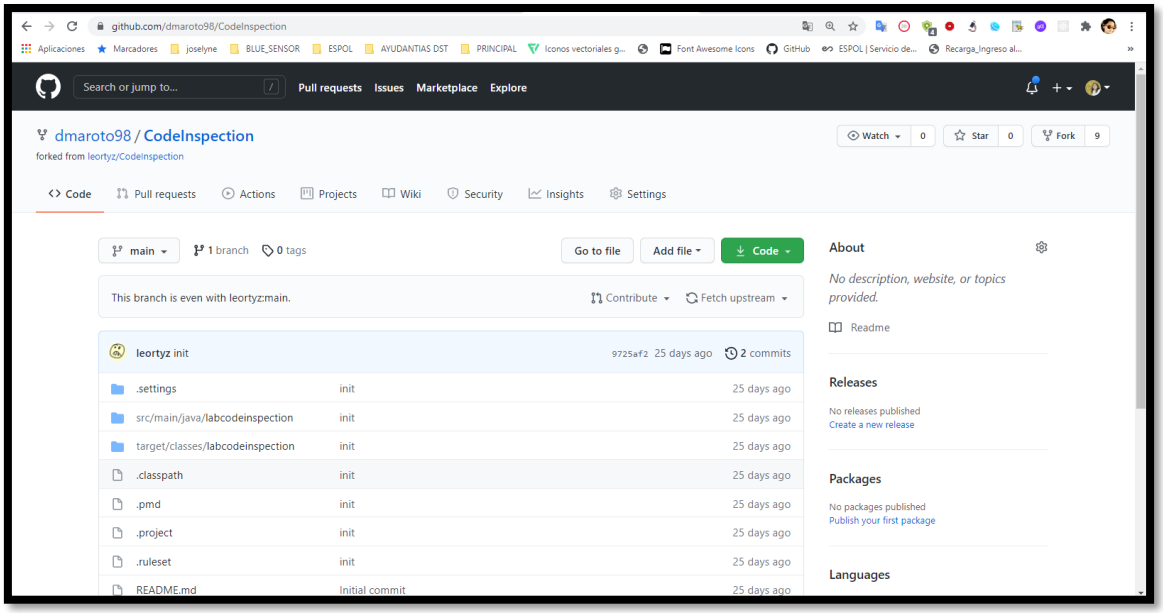

Eclipse Marketplace
Eclipse Marketplace
Select solutions to install. Press Install Now to proceed with installation.
Press the "more info" link to learn more about a solution.
Search Recent Popular Favorites Installed Giving IoT an Edge
Find: PMD
All Markets
All Categories
Go
IDE. Everytime you save your work, eclipse-pmd scans your source code and looks... more info
by Philip Graf, EPL
PMD Static Code Analysis code analyzer code quality
285
Installs: 186K (1,164 last month)
Install
pmd-eclipse-plugin 4.24.0
PMD is a source code analyzer. It finds common programming flaws like unused variables, empty catch blocks, unnecessary object creation, and so forth. It supports... more info
by PMD, BSD
PMD linter Source Code Analyzer code quality java
122
Installs: 58.7K (2,272 last month)
Install
SWAMP Eclipse Plug-in
The SWAMP Eclipse Plug-in allows users to easily run static analysis tools available on the Software Assurance Marketplace (https://www.continuousassurance.org/)... more info
by Software Assurance Marketplace, Apache 2.0
Marketplaces
< Back
Install Now >
Finish
Cancel

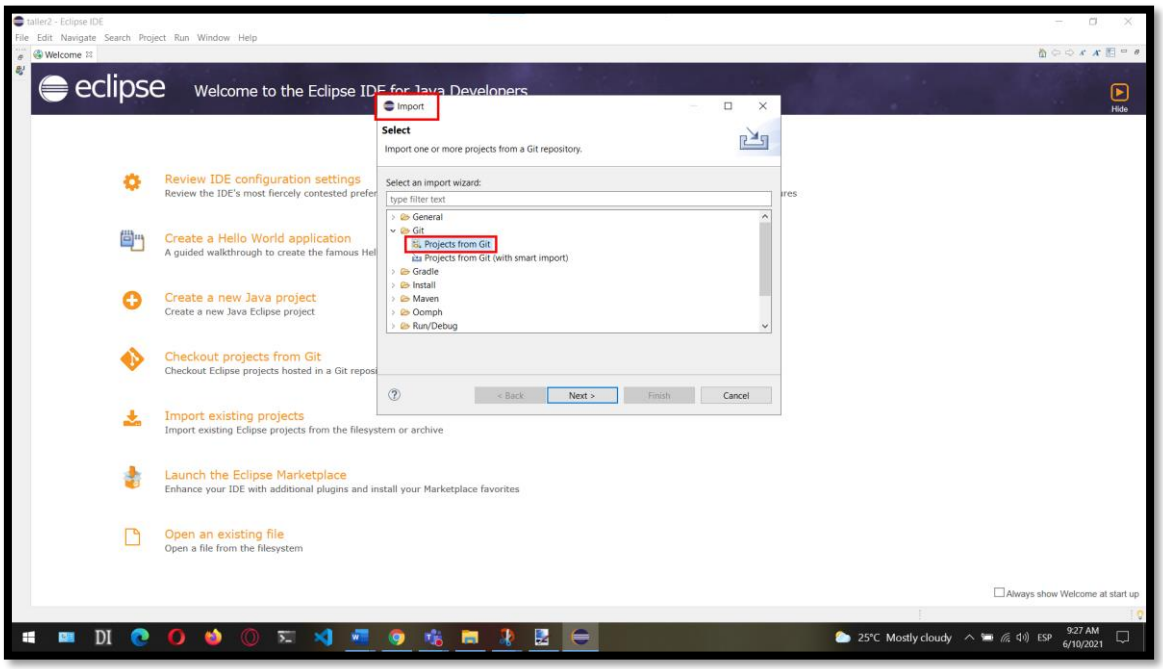


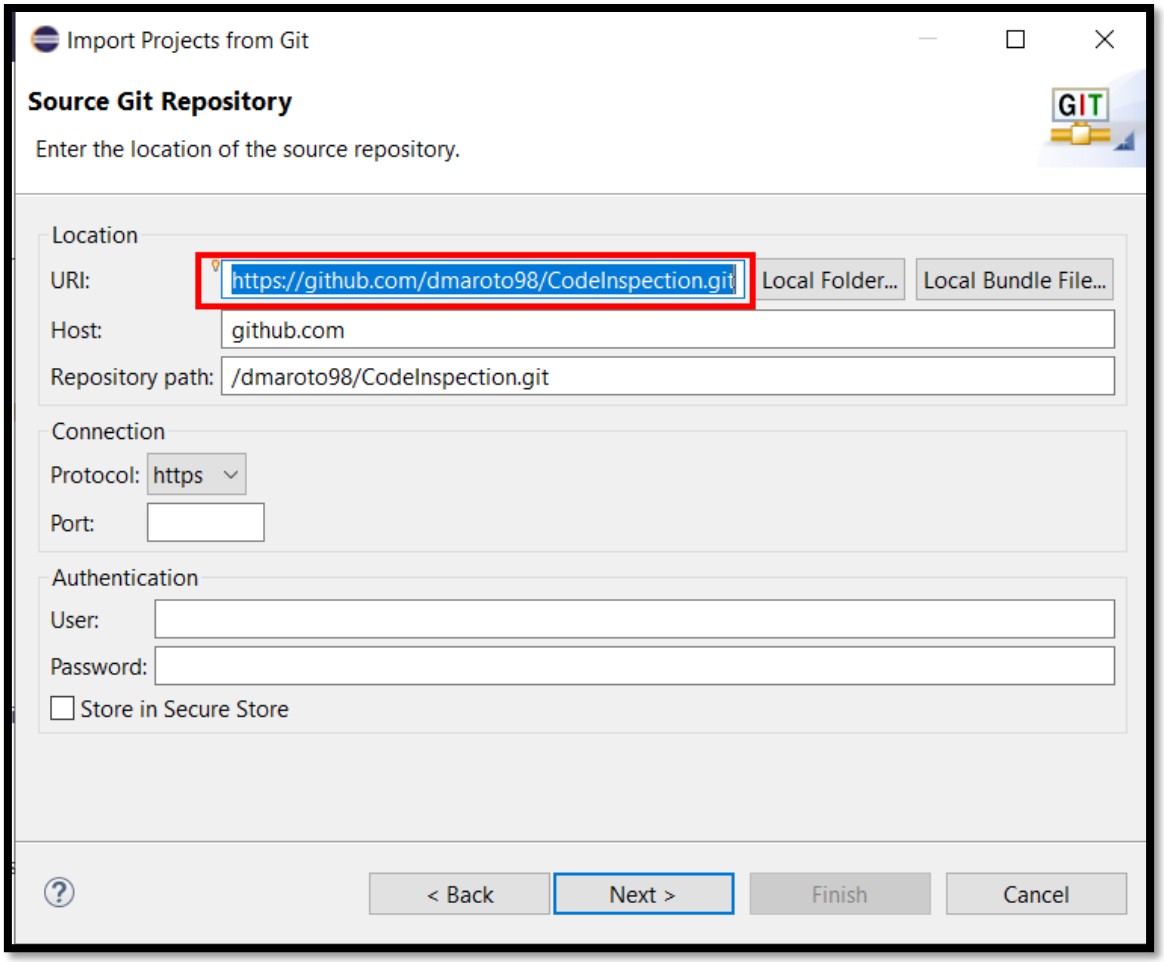
Part 3: Download and configure the project

1. Fork the following repository: CodeInspection and open the project in eclipse.

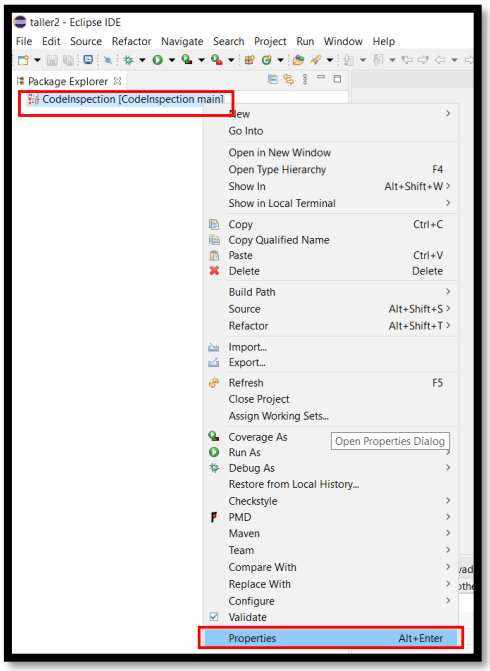



github.com/dmaroto98/CodeInspection
Search or jump to...
Pull requests
Issues
Marketplace
Explore
dmaroto98 / CodeInspection
forked from leortyz/CodeInspection
Watch 0
Star 0
Fork 9
Code
Pull requests
Actions
Projects
Wiki
Security
Insights
Settings
main
1 branch
0 tags
Go to file
Add file
Code
This branch is even with leortyz:main.
Contribute
Fetch upstream
leortyz init
9725af2 25 days ago
2 commits
.settings init 25 days ago
src/main/java/labcodeinspection init 25 days ago
target/classes/labcodeinspection init 25 days ago
.classpath init 25 days ago
.pmd init 25 days ago
.project init 25 days ago
.ruleset init 25 days ago
README.md Initial commit 25 days ago
About
No description, website, or topics provided.
Readme
Releases
No releases published
Create a new release
Packages
No packages published
Publish your first package
Languages

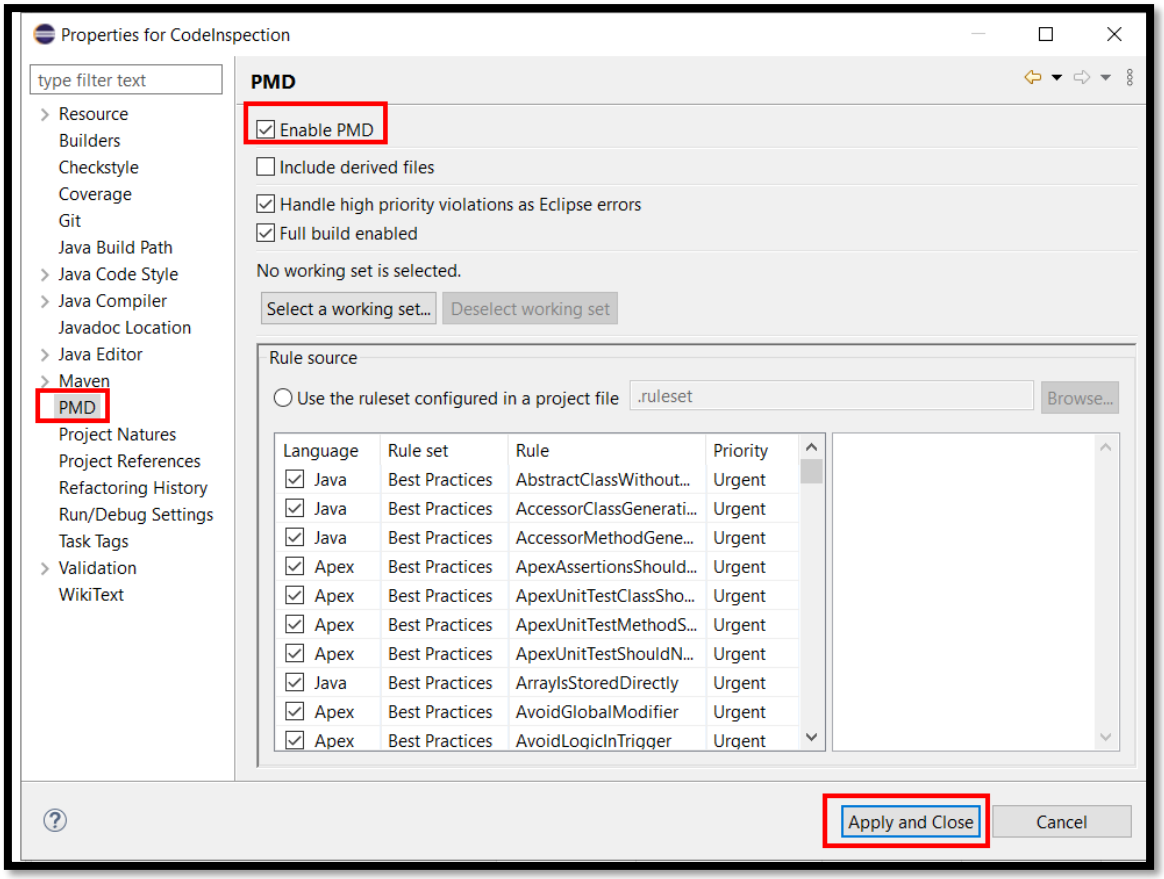

eclipse
Welcome to the Eclipse IDE for Java Developers
Review IDE configuration settings
Create a Hello World application
Create a new Java project
Create a new Java Eclipse project
Checkout projects from Git
Import existing projects
Import existing Eclipse projects from the filesystem or archive
Launch the Eclipse Marketplace
Enhance your IDE with additional plugins and install your Marketplace favorites
Open an existing file
Open a file from the filesystem
Import
Select
Import one or more projects from a Git repository.
Select an import wizard:
type filter text
General
Git
Projects from Git
Projects from Git (with smart import)
Gradle
Install
Maven
Oomph
Run/Debug
< Back
Next >
Finish
Cancel
Always show Welcome at start up
25°C Mostly cloudy
ESP
9:27 AM
6/10/2021



2. PMD will not be activated for the project by default. Open the project properties window by clicking in “Project >> Properties”.

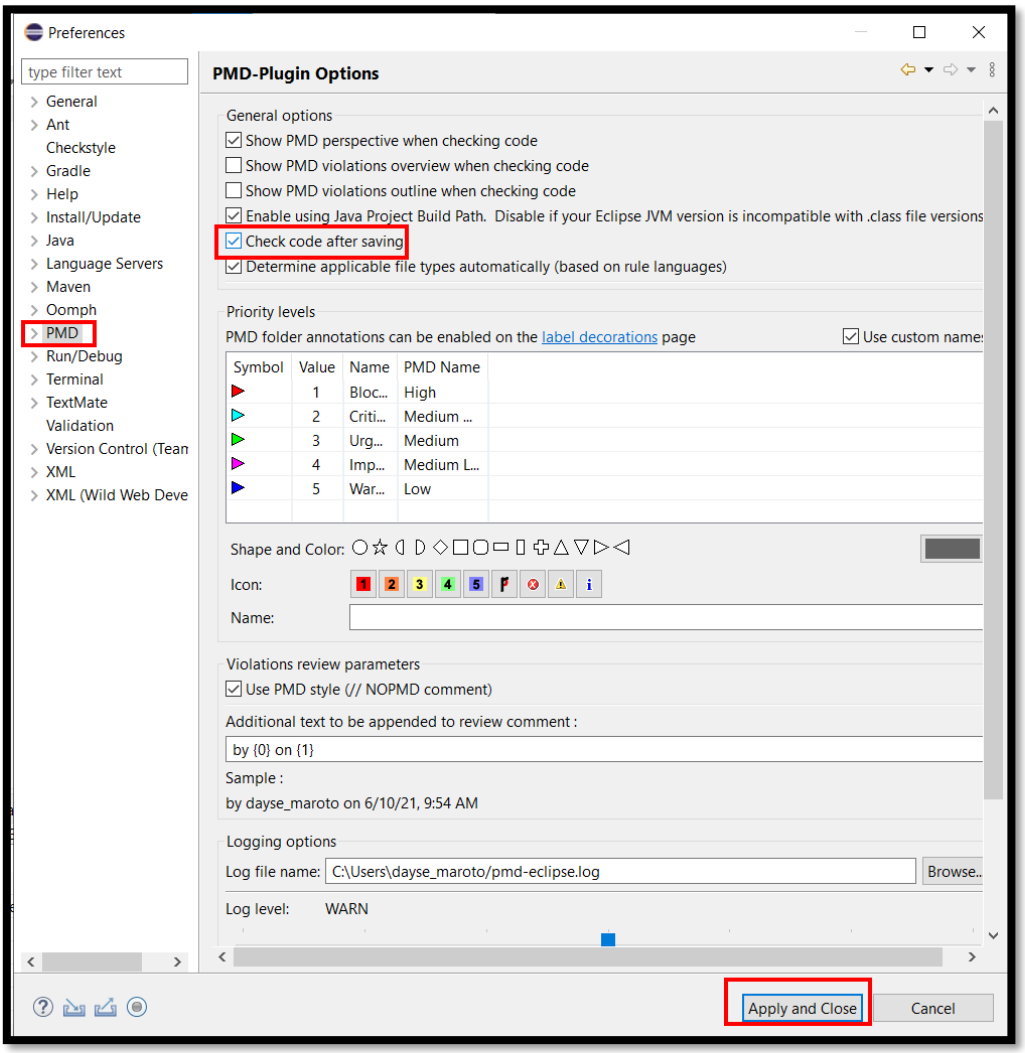


3. Select “PMD” on the side bar and check “Enabled PMD ”.
4. Look at all the rulesets that come with PMD, leave the default set of rules.
5. Click “Apply and Close” and “Yes”.



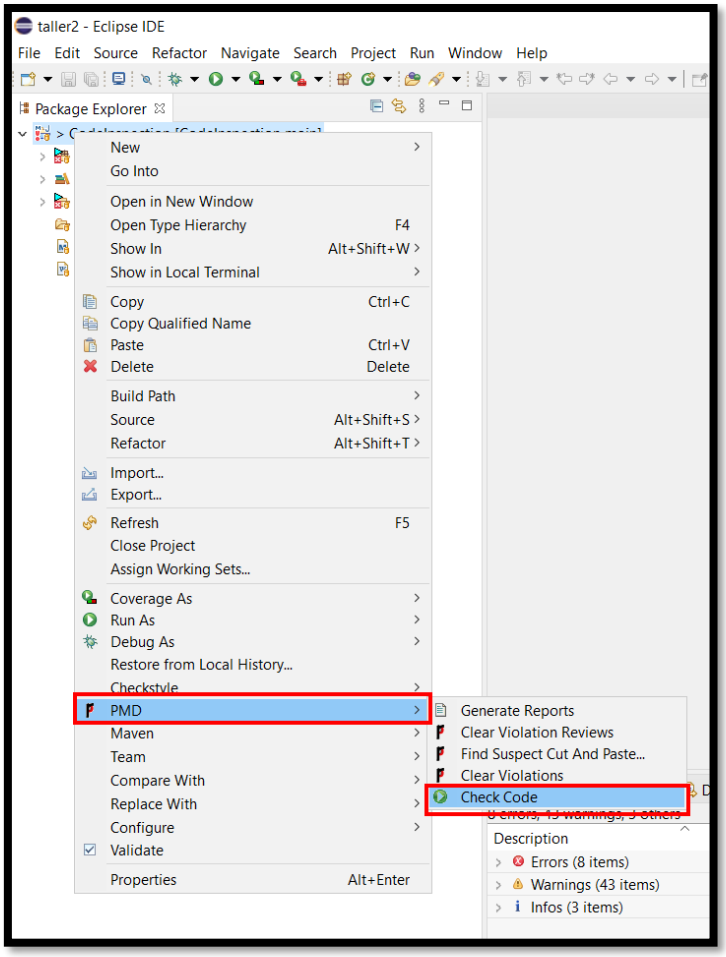
Part 4: Using PMD

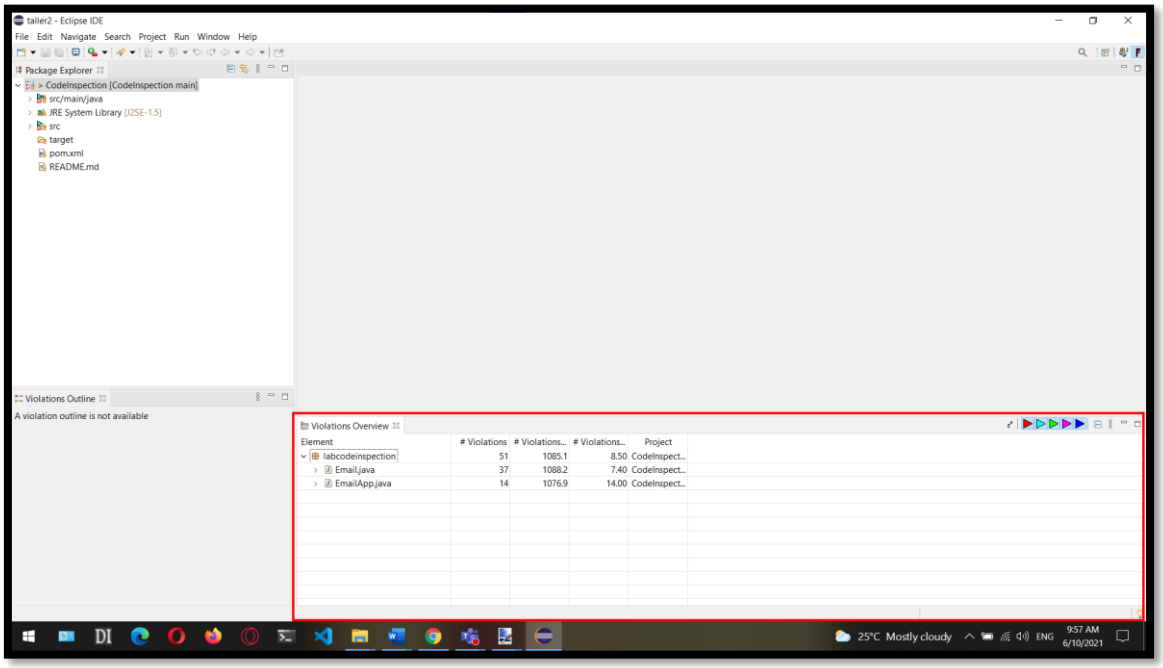
Go to “Window >> Preferences”, select “PMD” and check “Check code after saving”



To run PMD, right click on the project and select “PMD >> Check code” Two new windows are displayed with all violations. Each violation has its priority represented by a color and corresponding rule. The meaning of the colors is:

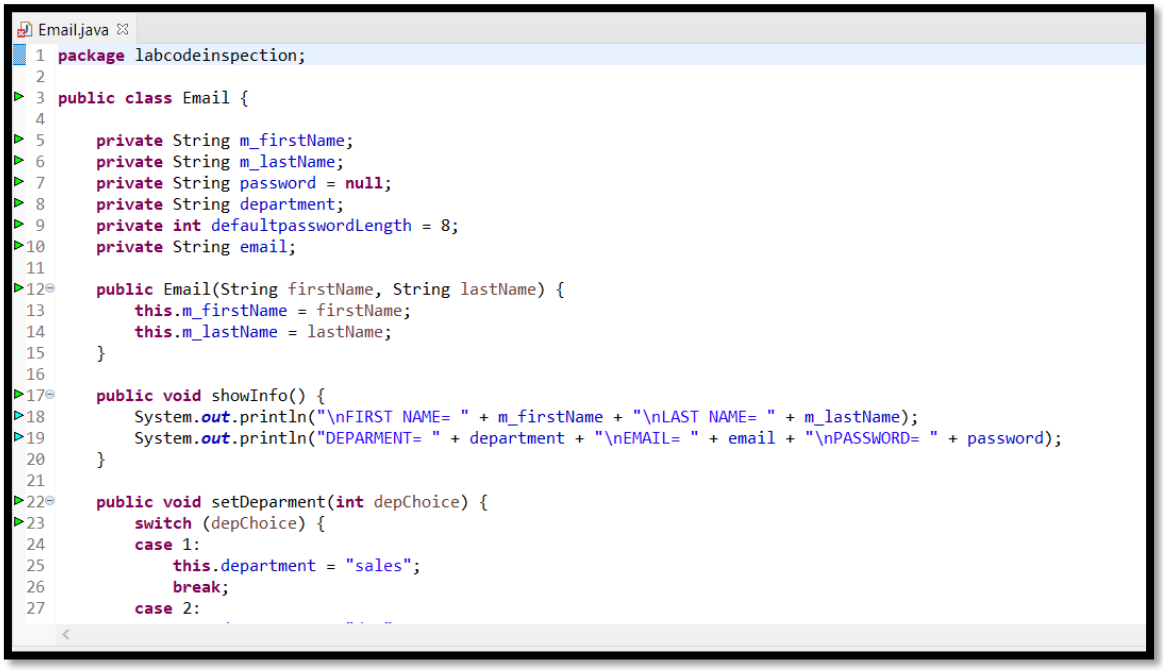
- Red is blocker >>> High priority.
- Cyan is critical >>> Medium priority.
- Green is urgent >>> Medium priority.
- Pink is Important >>> Medium priority.
- Blue is Warning >>> Low priority.



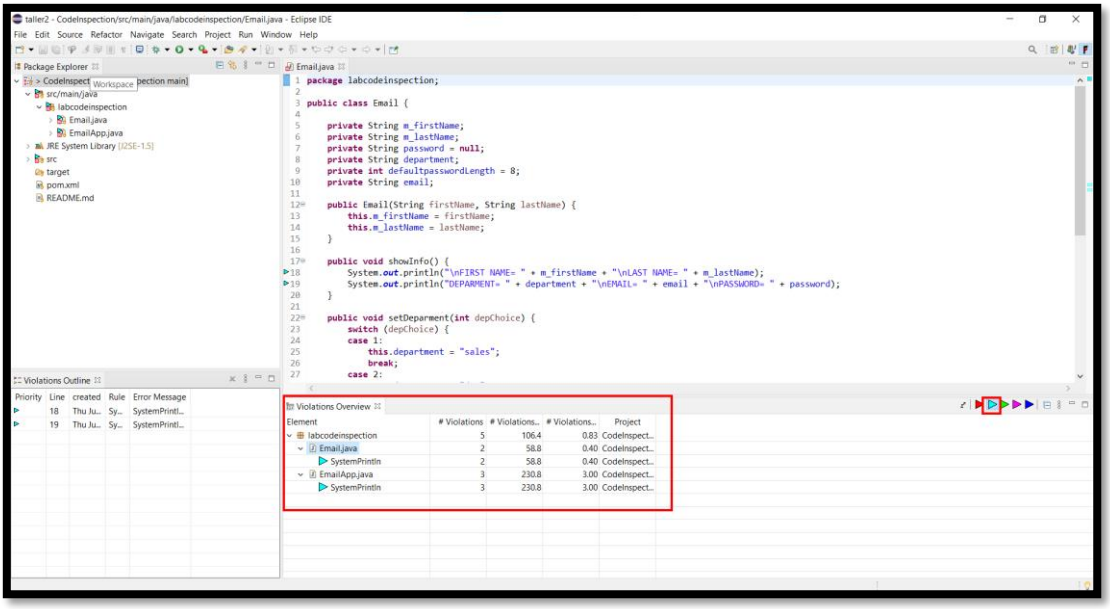


If you see that files are duplicated in the Violation Overview Window, check code again.

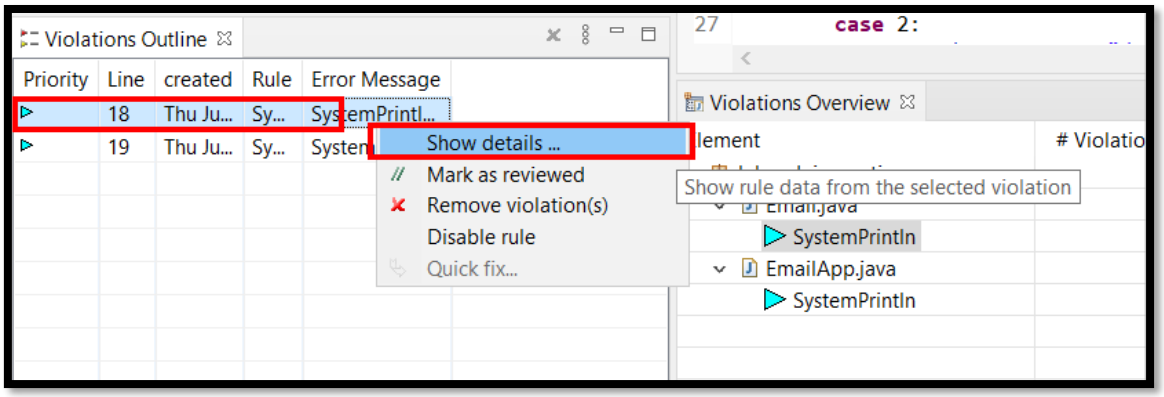
PMD shows the violations next to the lines that generate them.

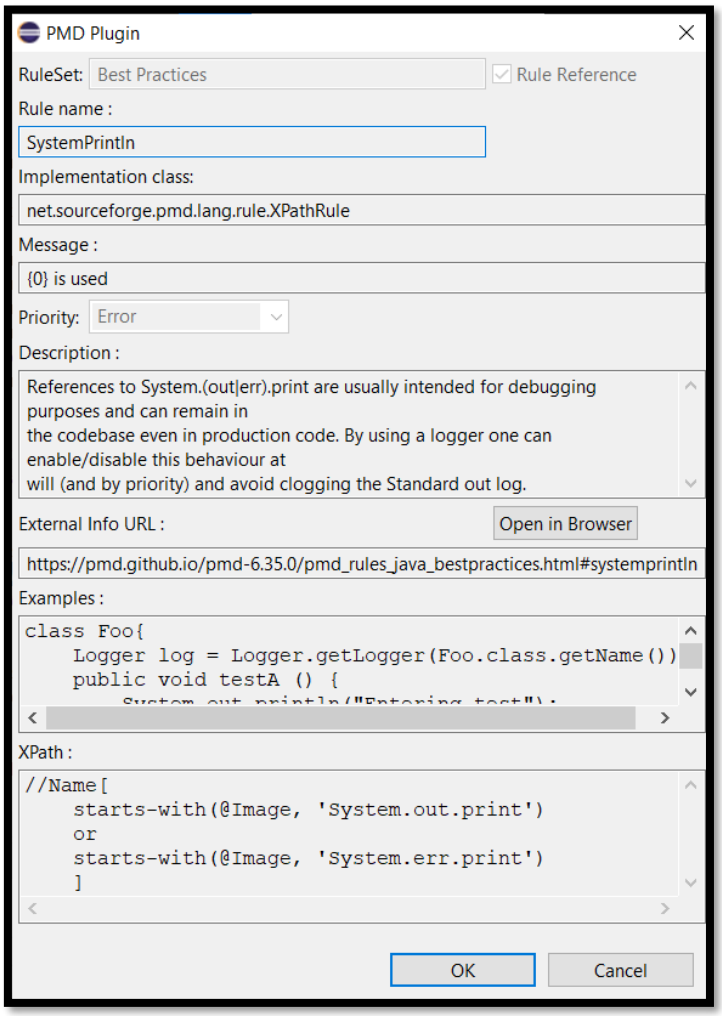


We can filter violations using the color indicators on the top right of Violations Overview window.
For example, if we filter only by critical violations, Violations Overview window shows that Email.java and EmalApp.java have 2 and 3 violations respectively for the rule “SystemPrintln”. If we double-click on an element, the Violation Outline window will update showing all errors related to a file and some important data such as the violation line, the affected rule, and the error message.



We can right-click on a violation and select "Show details..." for more information and an example solution.

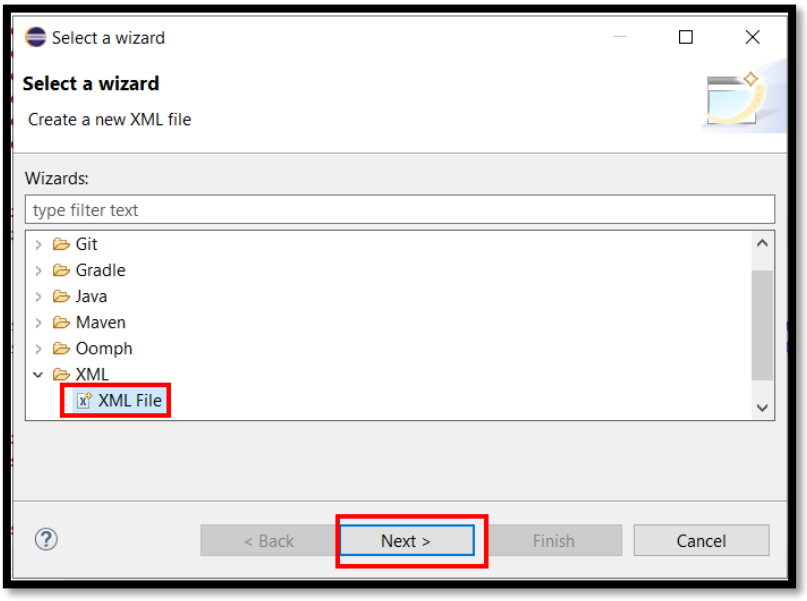




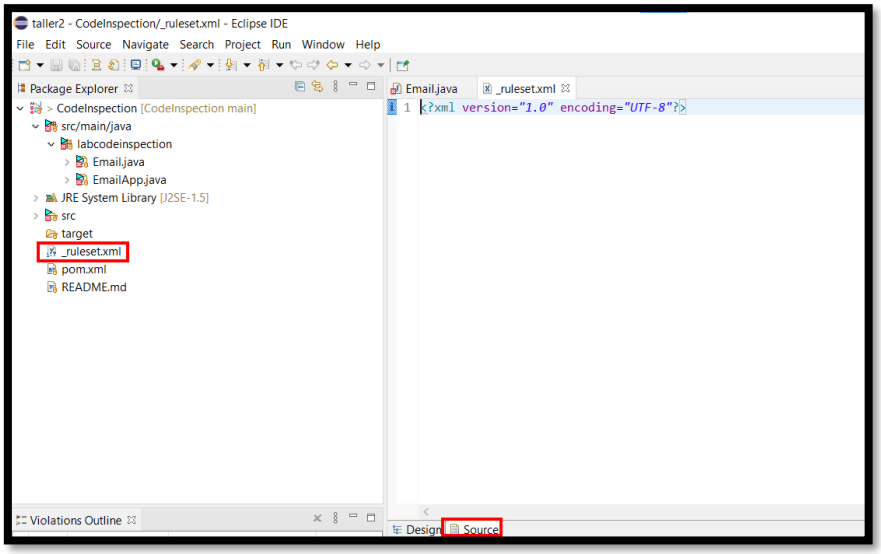
Part 5: Creating PMD rulesets

A PMD ruleset is simply an XML file that lists a set of rules that fit the project. You can include entire rulesets, or selectively choose specific rules from within other rulesets. You can also provide extra parameters to certain rules to customize their behavior. To do so, follow these steps:

1. Right click on the project, then “New >> Other >> XML >> XML File”.



2. Select the project, enter a file name as “_ ruleset “
3. Click “Source” in the bottom tab to change the view and edit the file directly.



4. Here is a fragment of a typical configuration document, copy and paste into the file:

```
<?xml version="1.0" encoding="UTF-8"?>

<ruleset name="Dayse Maroto Rules"
    xmlns="http://pmd.sourceforge.net/ruleset/2.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://pmd.sourceforge.net/ruleset/2.0.0
https://pmd.sourceforge.io/ruleset_2_0_0.xsd">

          <description>
        Code Inspection Lab, Dayse Joselyne Maroto Lema
    </description>

</ruleset>
```

5. Let's reference a complete ruleset. Add the following line below the description tag:

```
        <rule ref="category/java/performance.xml" />
```

```
<?xml version="1.0" encoding="UTF-8"?>

<ruleset name="Dayse Maroto Rules"
    xmlns="http://pmd.sourceforge.net/ruleset/2.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://pmd.sourceforge.net/ruleset/2.0.0
https://pmd.sourceforge.io/ruleset_2_0_0.xsd">
    <description>
        Code Inspection Lab, Dayse Joselyne Maroto Lema
    </description>
    <rule ref="category/java/performance.xml" />

</ruleset>
```

6. Now, add another reference, but exclude some rules from the ruleset:

```
<rule ref="category/java/bestpractices.xml">
        <exclude name="SystemPrintln" />
</rule>
```

```
<?xml version="1.0" encoding="UTF-8"?>

<ruleset name="Dayse Maroto Rules"
    xmlns="http://pmd.sourceforge.net/ruleset/2.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://pmd.sourceforge.net/ruleset/2.0.0
https://pmd.sourceforge.io/ruleset_2_0_0.xsd">

    <description>
```

```
        Code Inspection Lab, Dayse Joselyne Maroto Lema
    </description>
    <rule ref="category/java/performance.xml" />
    <rule ref="category/java/bestpractices.xml">
      <exclude name="SystemPrintln" />
    </rule>
</ruleset>
```

This ruleset also comes by default with PMD and it has rules which enforce generally accepted best practices but excluding “SystemPrintln” rule.

7. We can add rules from a specific ruleset as follow:

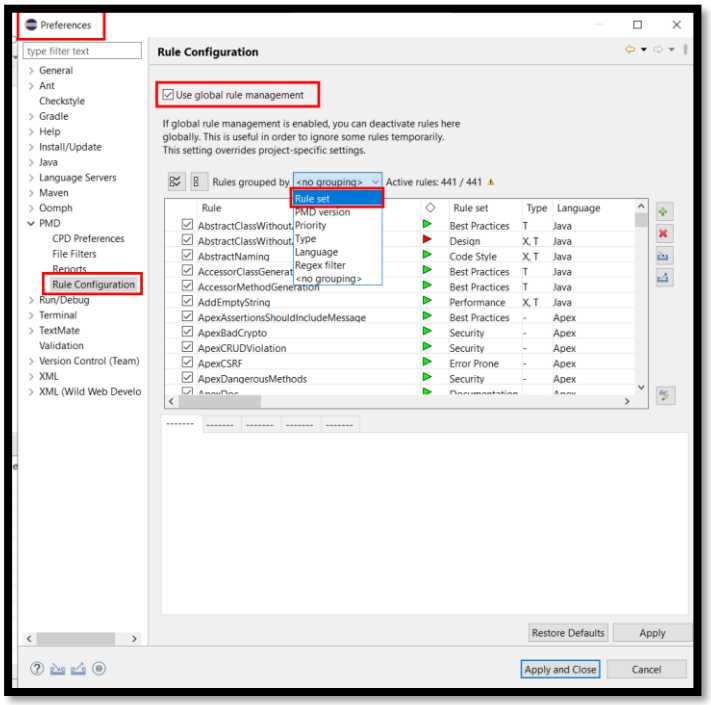
```
<rule ref="category/java/design.xml/ImmutableField" />
<rule ref="category/java/design.xml/UseUtilityClass">
        <priority>1</priority>
</rule>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<ruleset name="Dayse Rules"
    xmlns="http://pmd.sourceforge.net/ruleset/2.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://pmd.sourceforge.net/ruleset/2.0.0
https://pmd.sourceforge.io/ruleset_2_0_0.xsd">
    <description>
        Code Inspection Lab, Dayse Joselyne Maroto Lema
    </description>
    <rule ref="category/java/performance.xml" />
    <rule ref="category/java/bestpractices.xml">
            <exclude name="SystemPrintln" />
      </rule>
      <rule ref="category/java/design.xml/ImmutableField" />
      <rule ref="category/java/design.xml/UseUtilityClass">
            <priority>1</priority>
      </rule>
</ruleset>
```

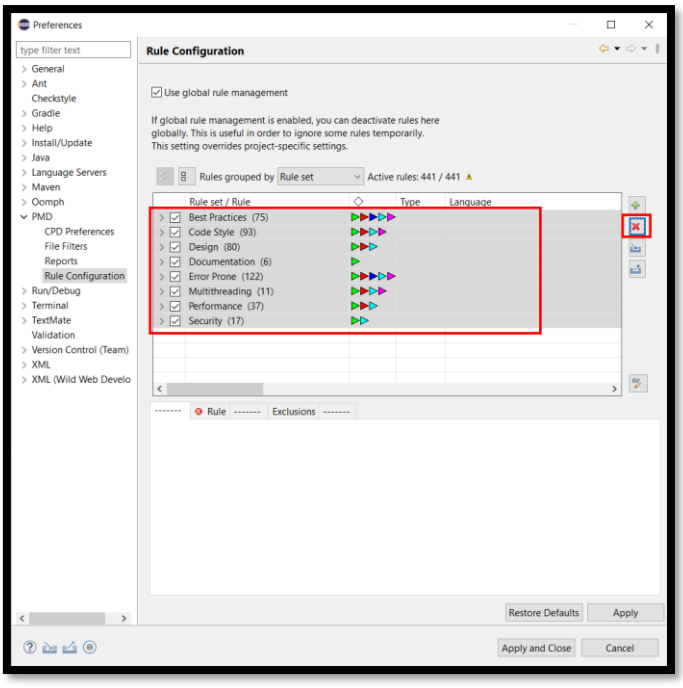
Here, we are adding “ImmutableField” rule and “UseUtilityClass” rule from the Design ruleset and changing its priority to 1. Priority is an integer ranging from 1 to 5, with 1 being the highest priority.

For more information about PMD rulesets, refer to PMD documentation [3]

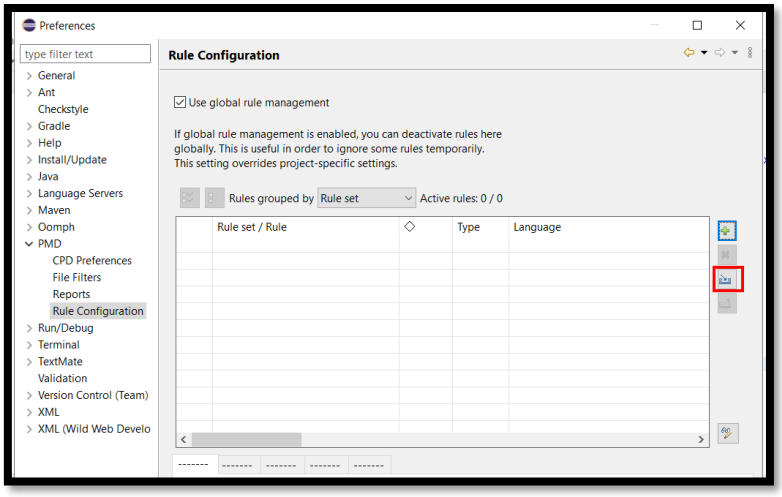
8. To use an external ruleset, we need to go to the PMD Configuration Window. Go to “Window >> Preferences ◊ PMD ◊ Rule Configurations”.
9. Check “Use global rule management”, then group rules by “Rule Set”.

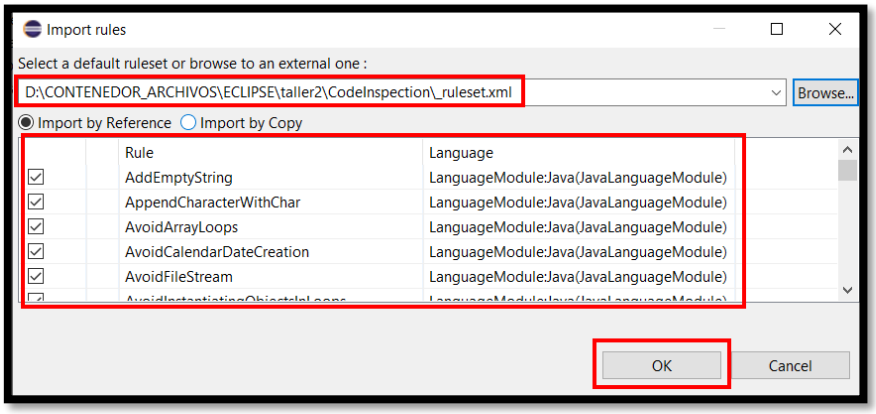


10. Select all the rule sets with shift and select one by one and click in the “X” button to delete them.

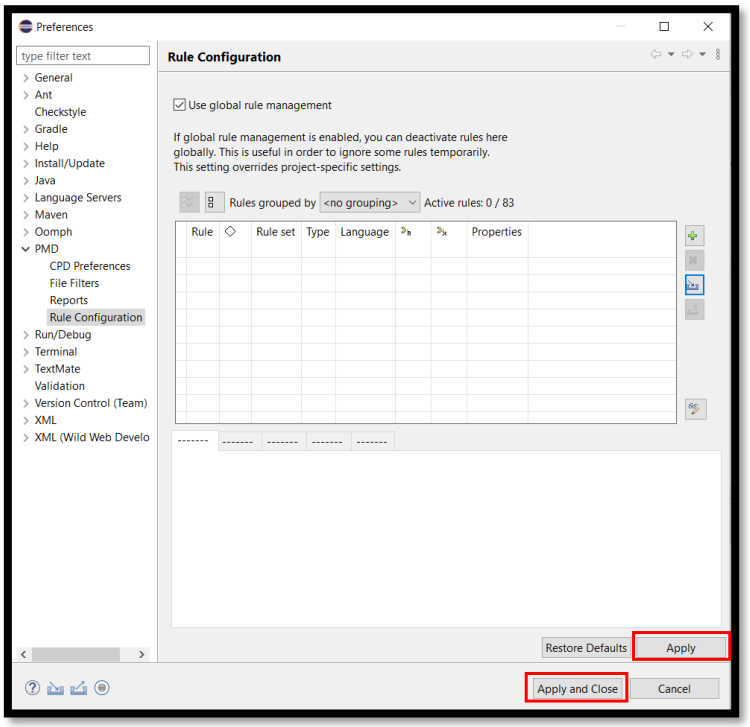


11. Click "Import rule set..." (under the "x"), browse your file and Click “Ok”.

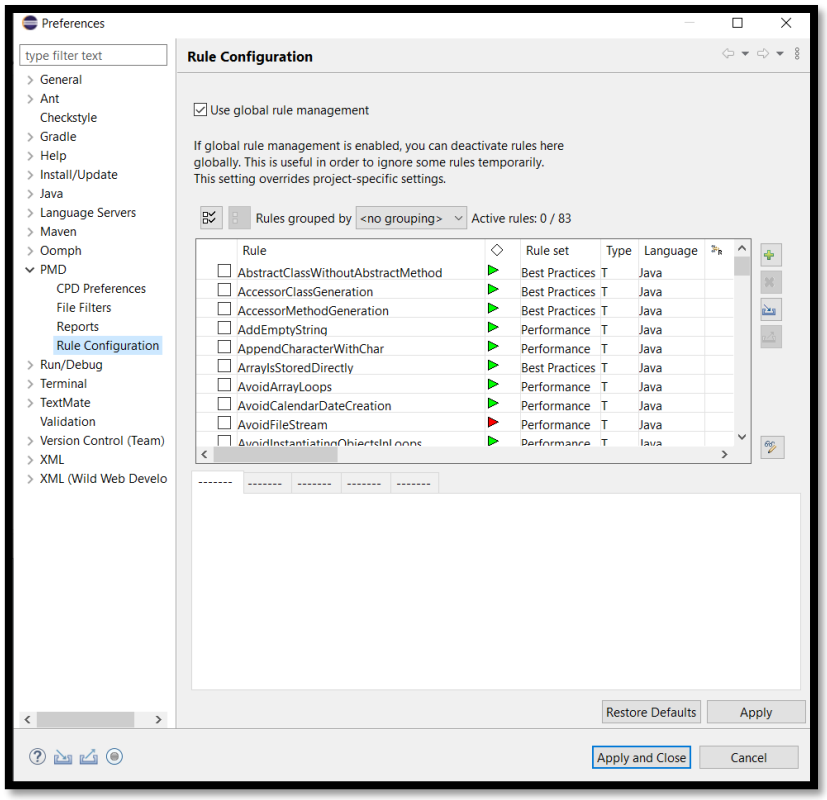




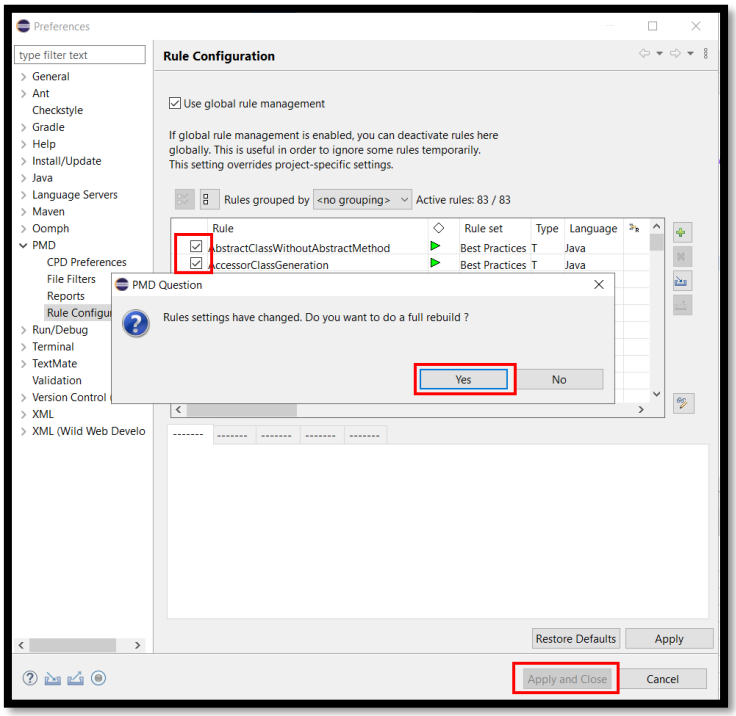
12. The rules we added are not listed yet, press "Apply and close", then "Yes".



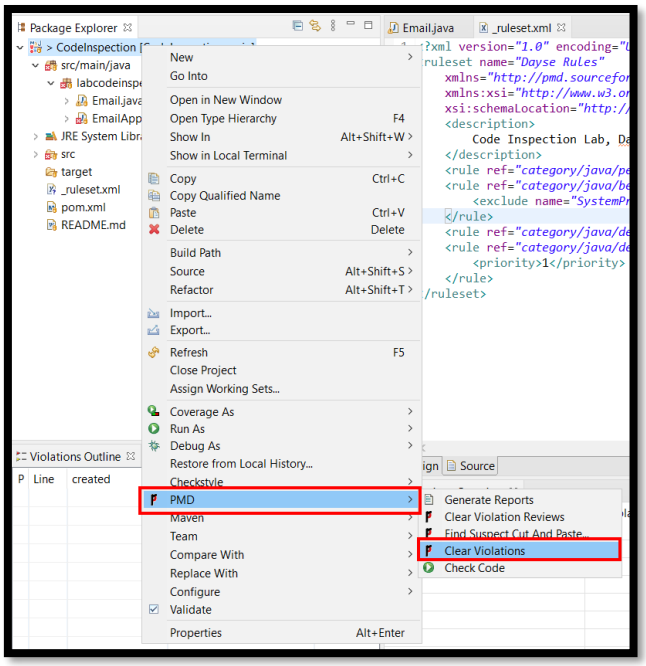
13. Return to PMD Configuration Window. Notice that the checkbox next to the rule names is unchecked.

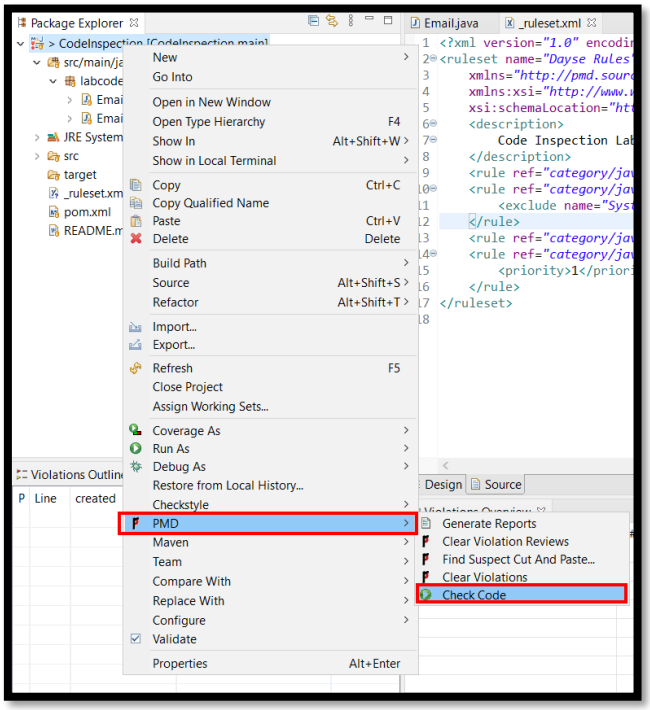


14. Press "Apply and close", then "Yes".



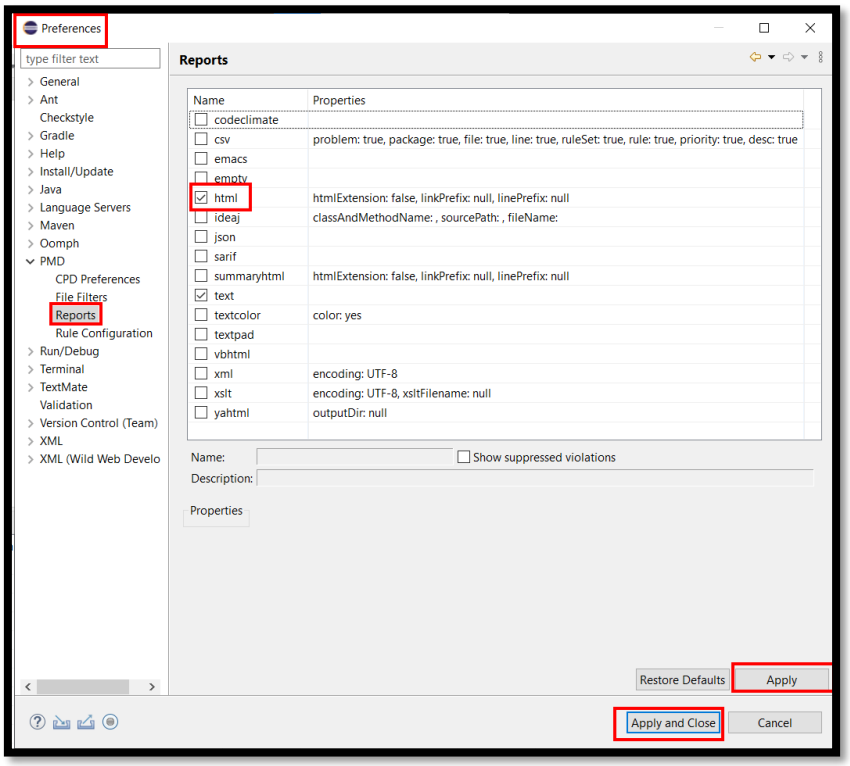
15. Right click on the project and select “PMD >> Clear Violations”. Then “PMD ◊ Check Code.”
    Note that it is possible to configure the properties for each rule we add. To learn more about rulesets and their properties, refer to PMD Java Rules [3]



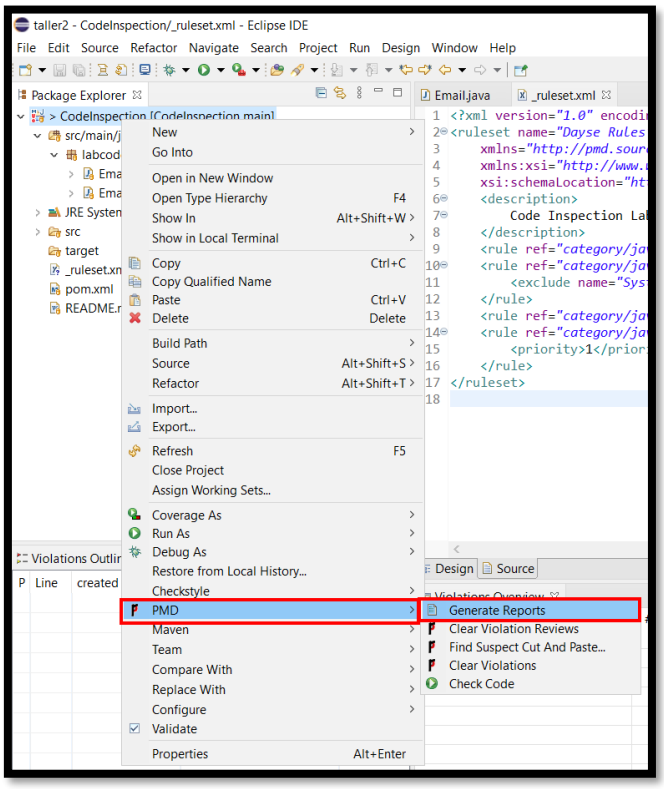


Part 6: Generating a PMD report

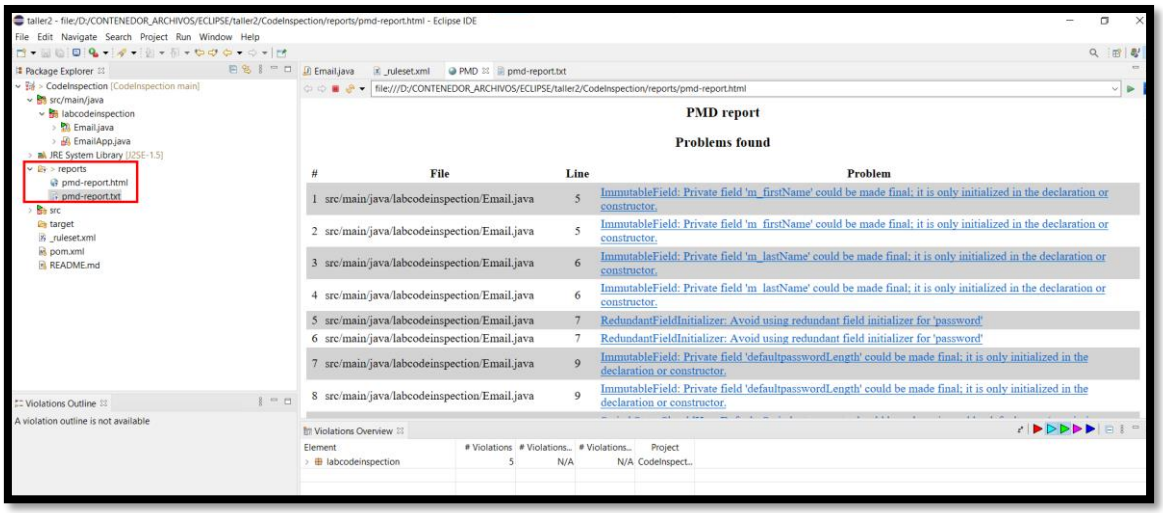
1. Open PMD configuration window, select Reports and check “html.”



2. Right-click the project then click “PMD ◊ Generate Report.”



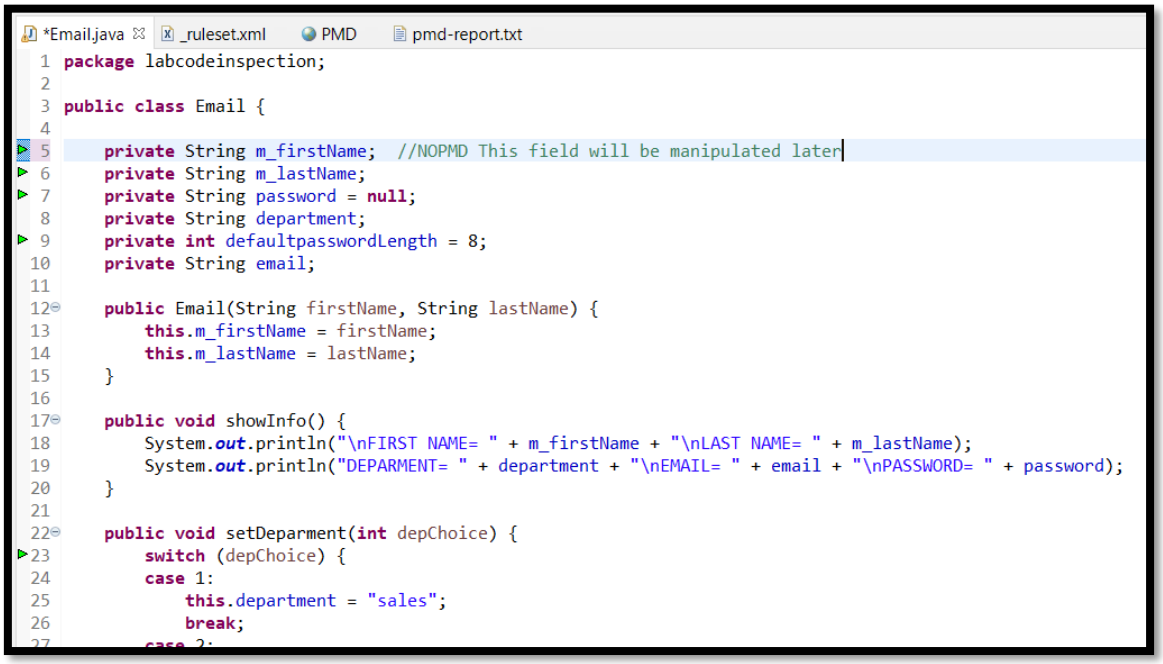
3. A folder named reports is created in the tree project. Open it and double click the "pmd-report.html" to see the full report.



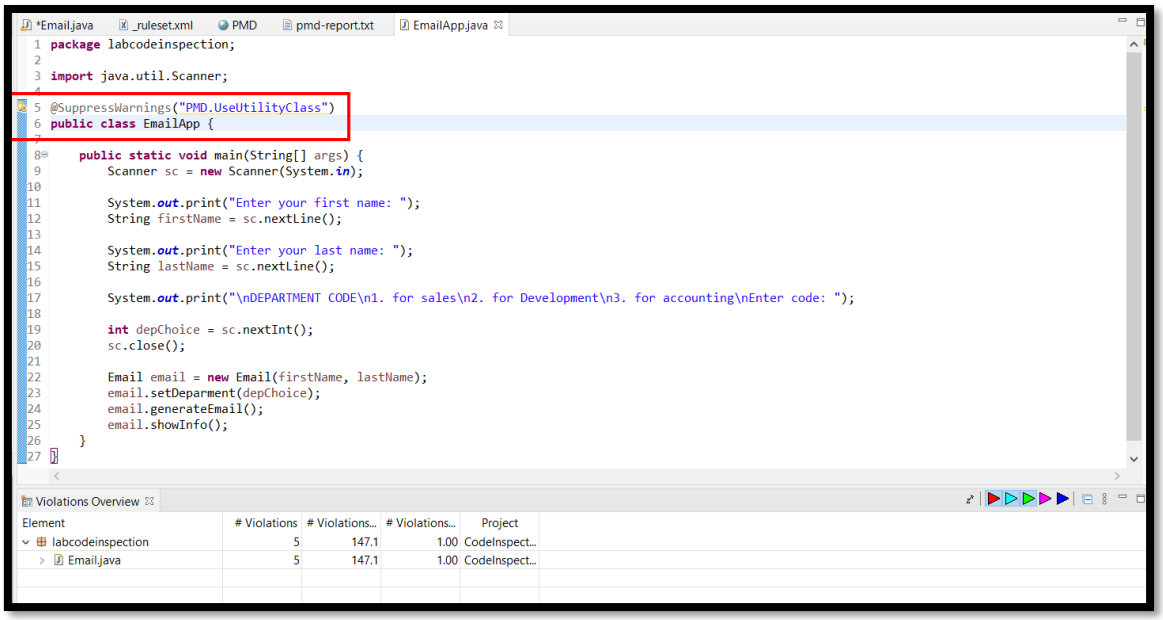
Part 7: Suppressing PMD Rules

Sometimes you will have a legitimate reason for not respecting one of the PMD rules. PMD provides several methods by which Rule violations can be suppressed. We will be using comments and annotations.

1. Go to Email.java. See that line 5 has a violation related to ImmutableField rule.
2. Write "NOPMD" as a comment in the same line where the violation occurred.
3. Optionally, add a message placed after the NOPMD marker. This will get placed in the report.



4. Go to EmailApp.java and check the violation. The rule violated is “UseUtilityClass”.
5. Write an annotation above the line as follow:

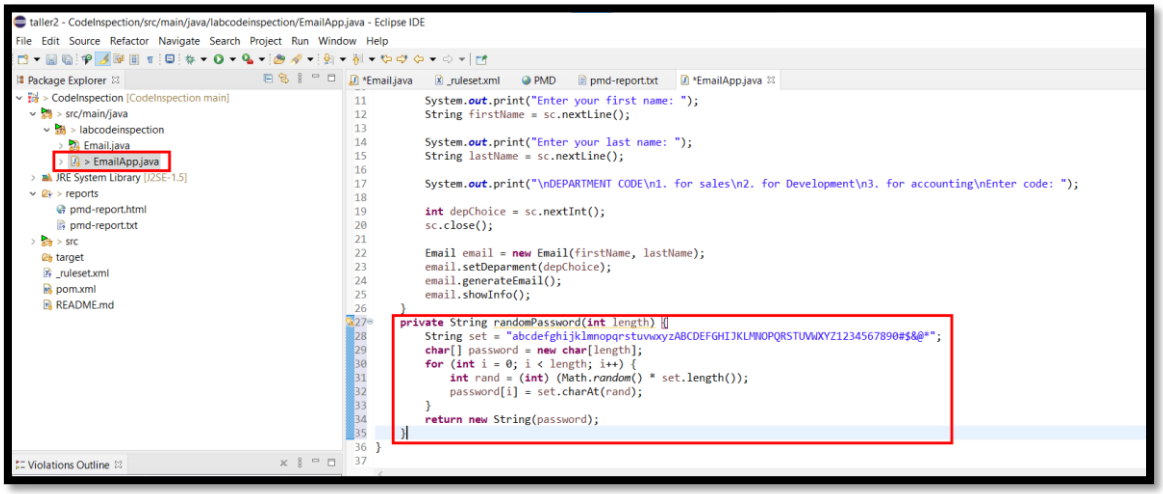


Please note that only that rule will be ignored. 6. Save the file and see the results.

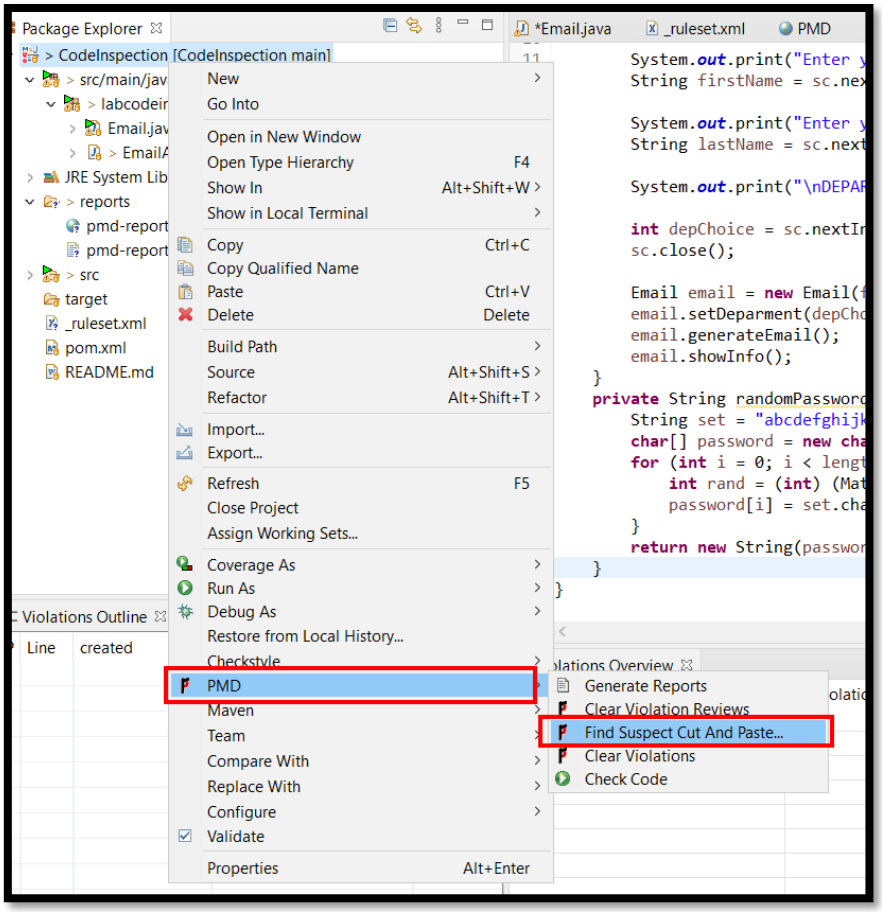
Part 8: Detecting Cut-and-Paste with CPD

PMD comes with a useful tool for detecting cut-and-pasted code called CPD (Cut-and-Paste Detector). Follow these steps to use it and generate a report.

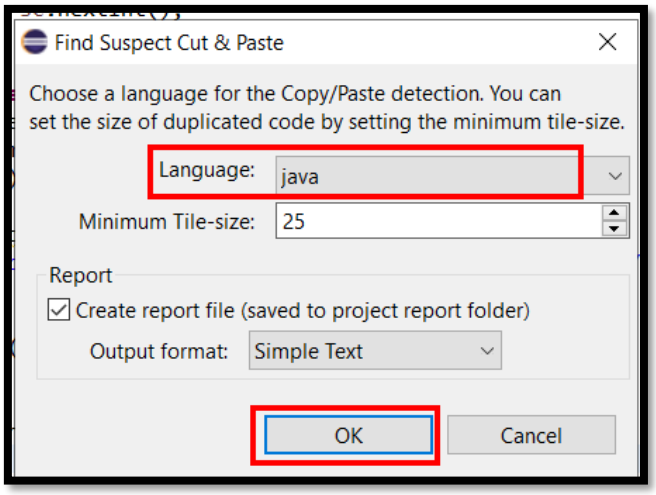
1. Just for demonstration purpose, copy and paste the “randomPassword” method from Email.java to EmalApp.java.



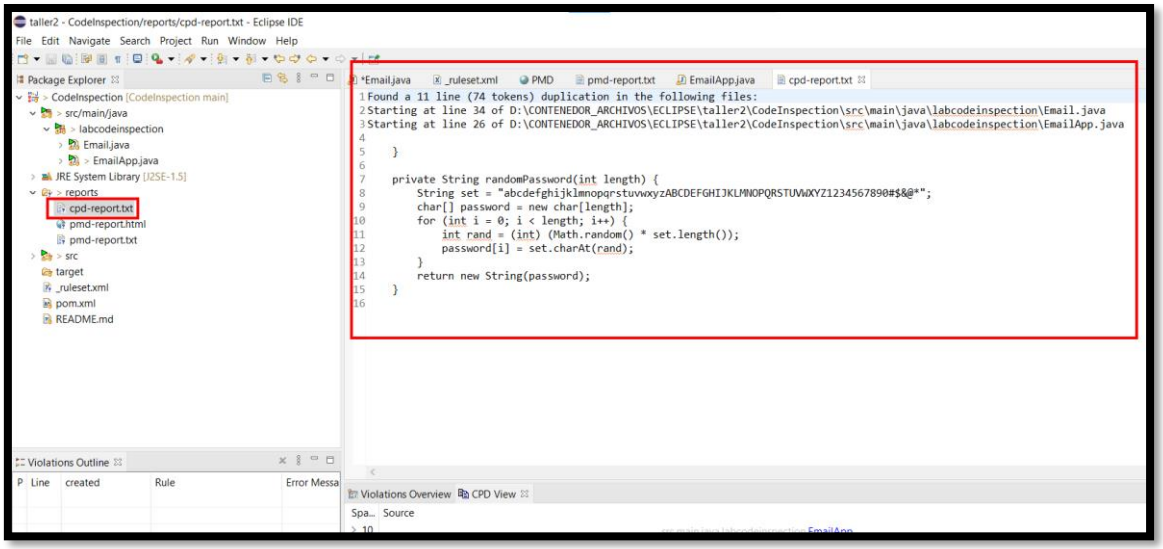
2. Right-click the project and select “PMD >> Find Suspect Cut and Paste” from menu options.



3. Select “java” for Language, then click “Ok”.



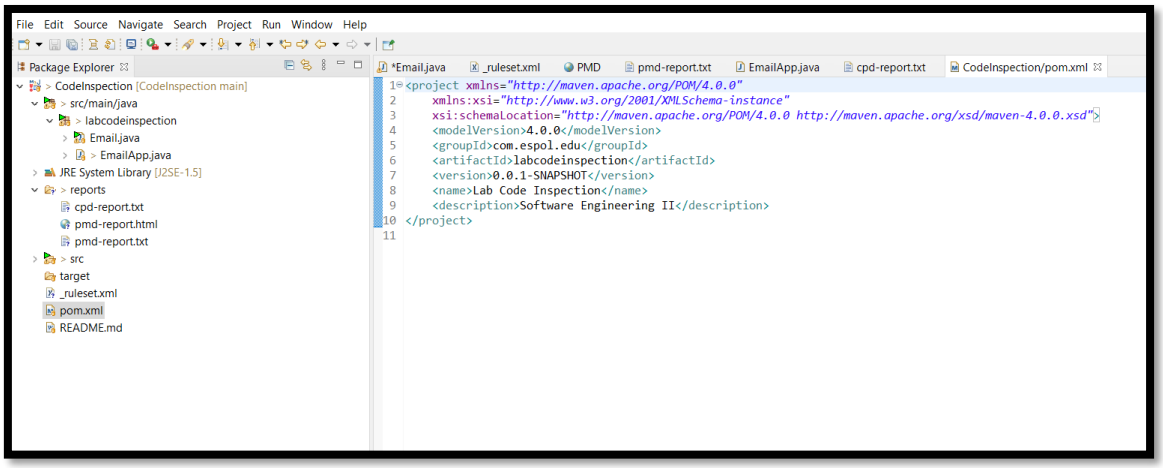
4. CPD View Window will open with the results. Also, a text file called cpd-report.txt will be generated in the /report directory.



5. Revert the changes made in EmailApp.java.

Part 9: PMD and Maven

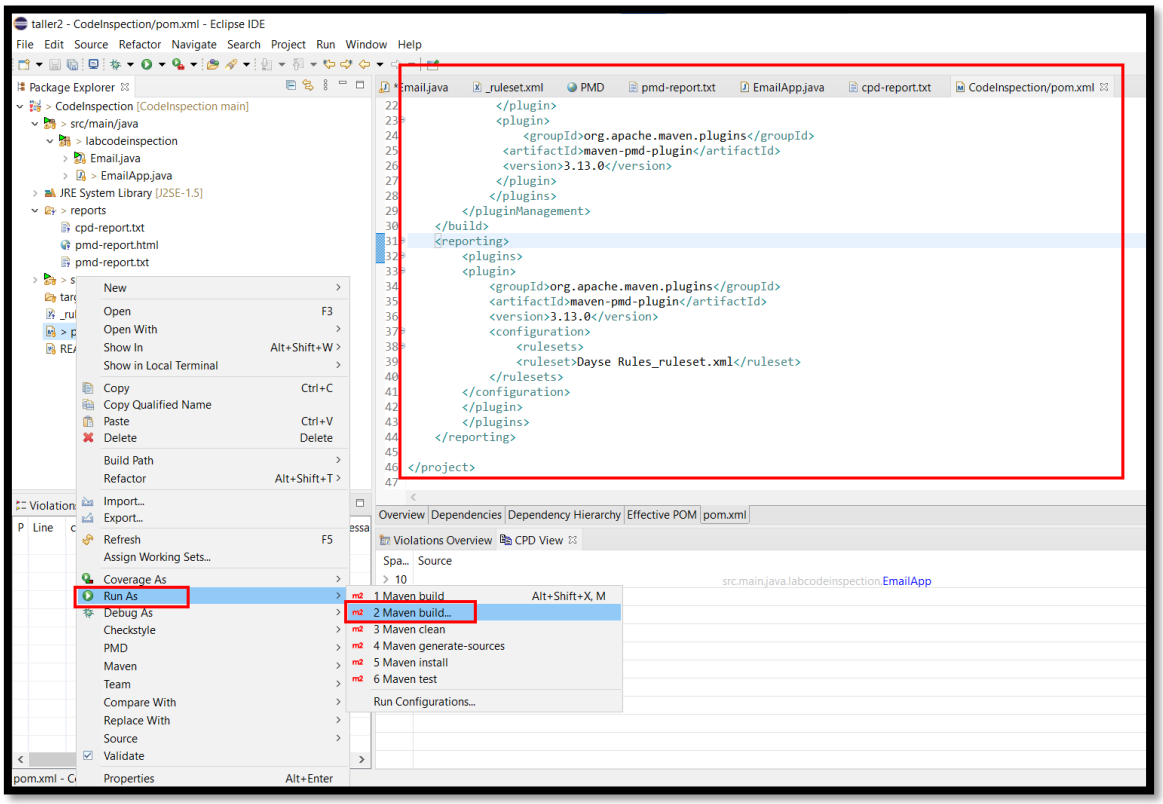
1. Open “pom.xml” file



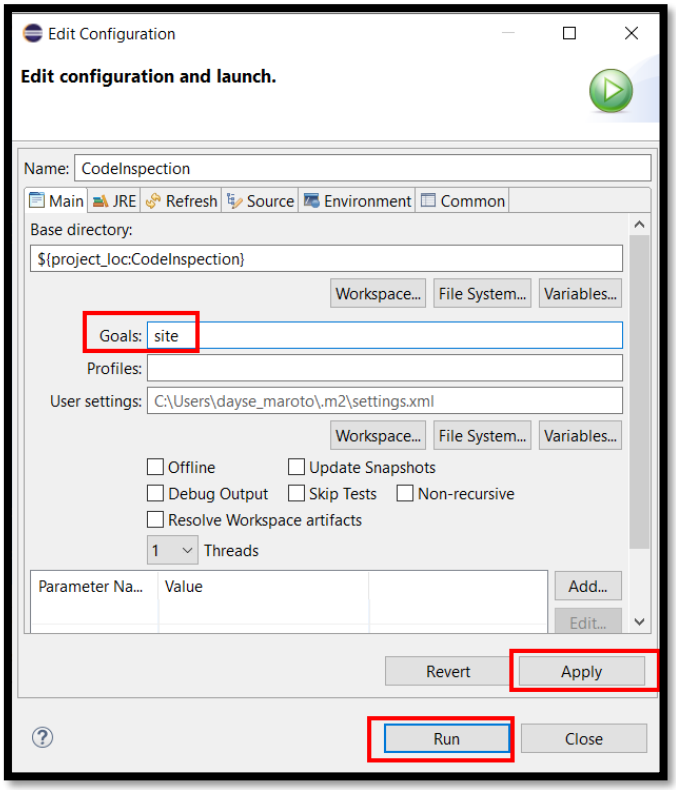
2. Add the following lines under project tag to install all the necessary plugins:

```
<project xmlns="http://maven.apache.org/POM/4.0.0"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">
       <modelVersion>4.0.0</modelVersion>
       <groupId>com.espol.edu</groupId>
       <artifactId>labcodeinspection</artifactId>
       <version>0.0.1-SNAPSHOT</version>
       <name>Lab Code Inspection</name>
       <description>Software Engineering II</description>
       <build>
           <pluginManagement>
               <plugins>
            <plugin>
               <groupId>org.apache.maven.plugins</groupId>
                           <artifactId>maven-site-plugin</artifactId>
                           <version>3.7.1</version>
                        </plugin>
                        <plugin>
                            <groupId>org.apache.maven.plugins</groupId>
                           <artifactId>maven-project-info-reports-
plugin</artifactId>
                           <version>3.0.0</version>
                    </plugin>
                    <plugin>
                        <groupId>org.apache.maven.plugins</groupId>
                       <artifactId>maven-pmd-plugin</artifactId>
                       <version>3.13.0</version>
                    </plugin>
                </plugins>
           </pluginManagement>
       </build>
       <reporting>
           <plugins>
             <plugin>
                <groupId>org.apache.maven.plugins</groupId>
                <artifactId>maven-pmd-plugin</artifactId>
                <version>3.13.0</version>
                <configuration>
                    <rulesets>
                      <ruleset>Dayse Rules_ruleset.xml</ruleset>
                  </rulesets>
           </configuration>
             </plugin>
           </plugins>
       </reporting>

</project>
```

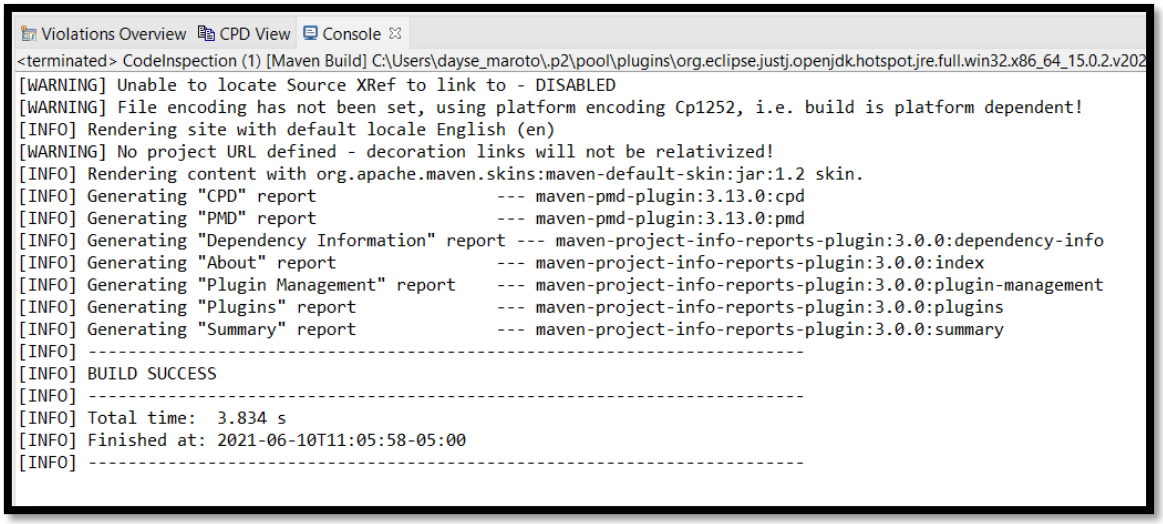
The ruleset tag is used to specify a file that contains rules to use in the checking process. In this case, we are telling the plugin to use our ruleset file. 3. Save the file, right Click on it, then “Run as >> Maven build…”



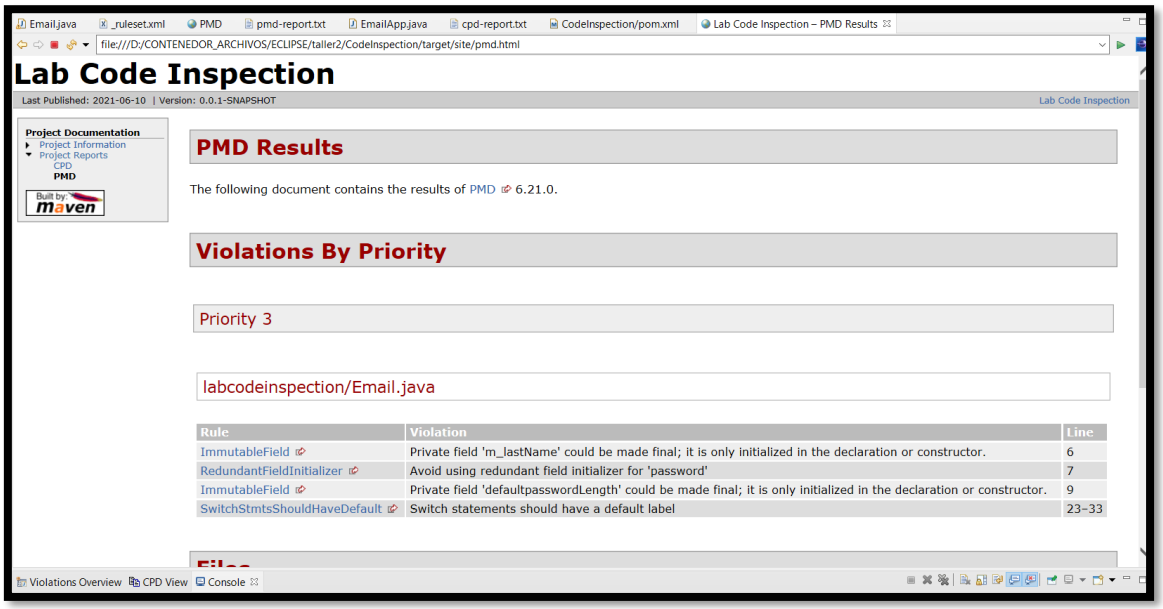
4. Type “site" for the Goals and Click Run.



5. Wait for the process to finish.



6. Go to your project directory, open “target>> site”. This folder is visible from the tree project in Eclipse too.
7. Several html files are shown. Open “index.html".



2) Development

1. Delete all comments and annotations from the code.
2. Add the following ruleset and rules:

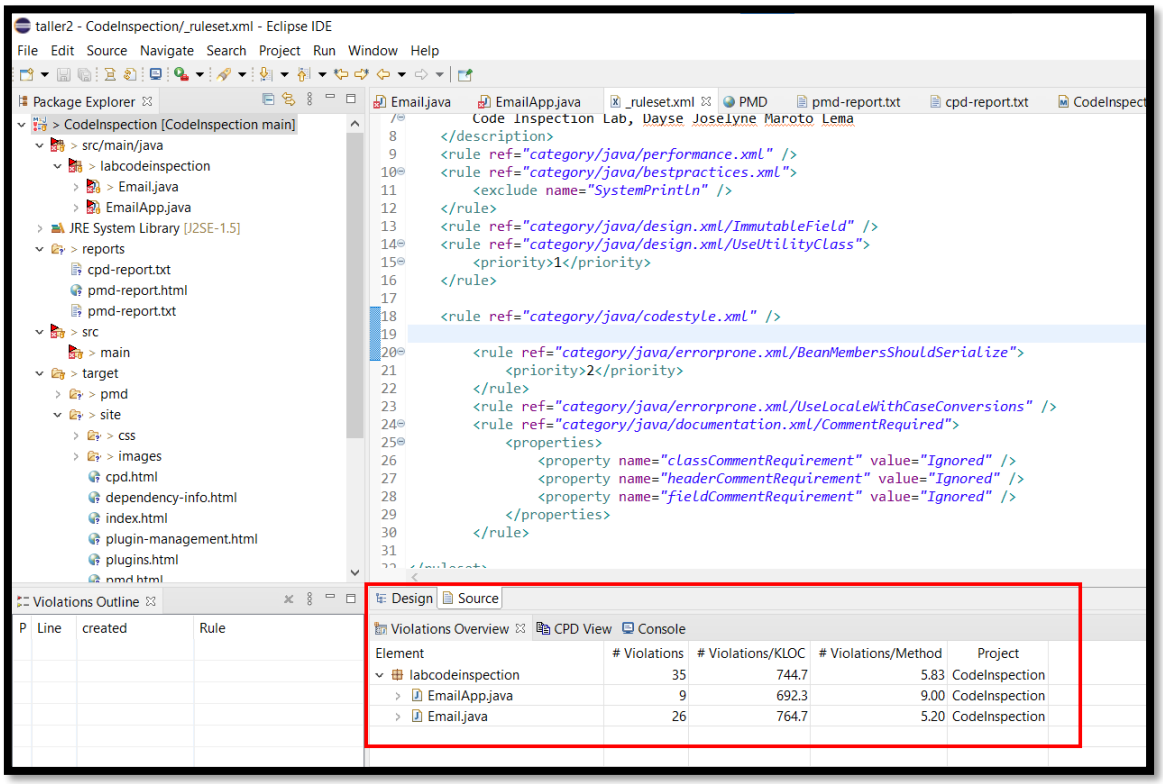
   - Code Style Ruleset
   - Rule “BeanMembersShouldSerialize” from Error Prone ruleset with a priority of 2
   - Rule “UseLocaleWithCaseConvertion” from Error Prone ruleset
   - Rule “CommentRequired” from Documentation ruleset with these properties set to “Ignored”:

   - classCommentRequirement
   - headerCommentRequirement
   - fieldCommentRequirement

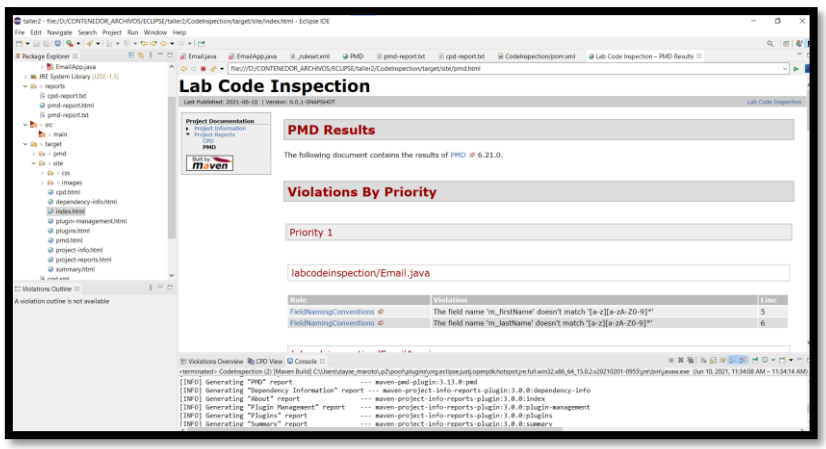
TIP: Refer to the PMD Java Rules [3].
The errors per class are show below:

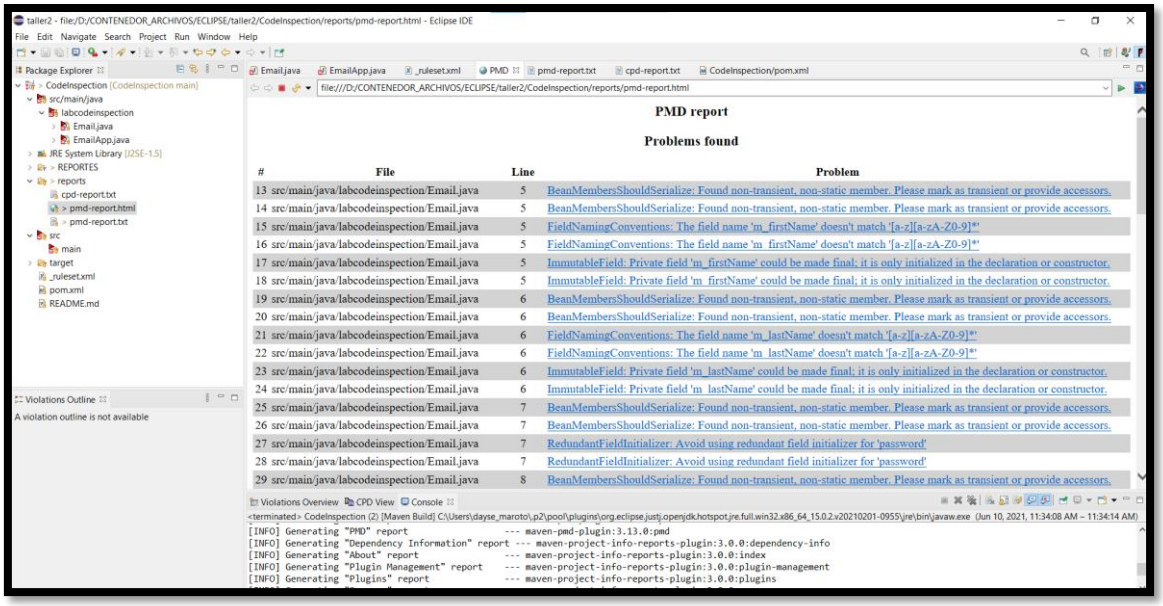
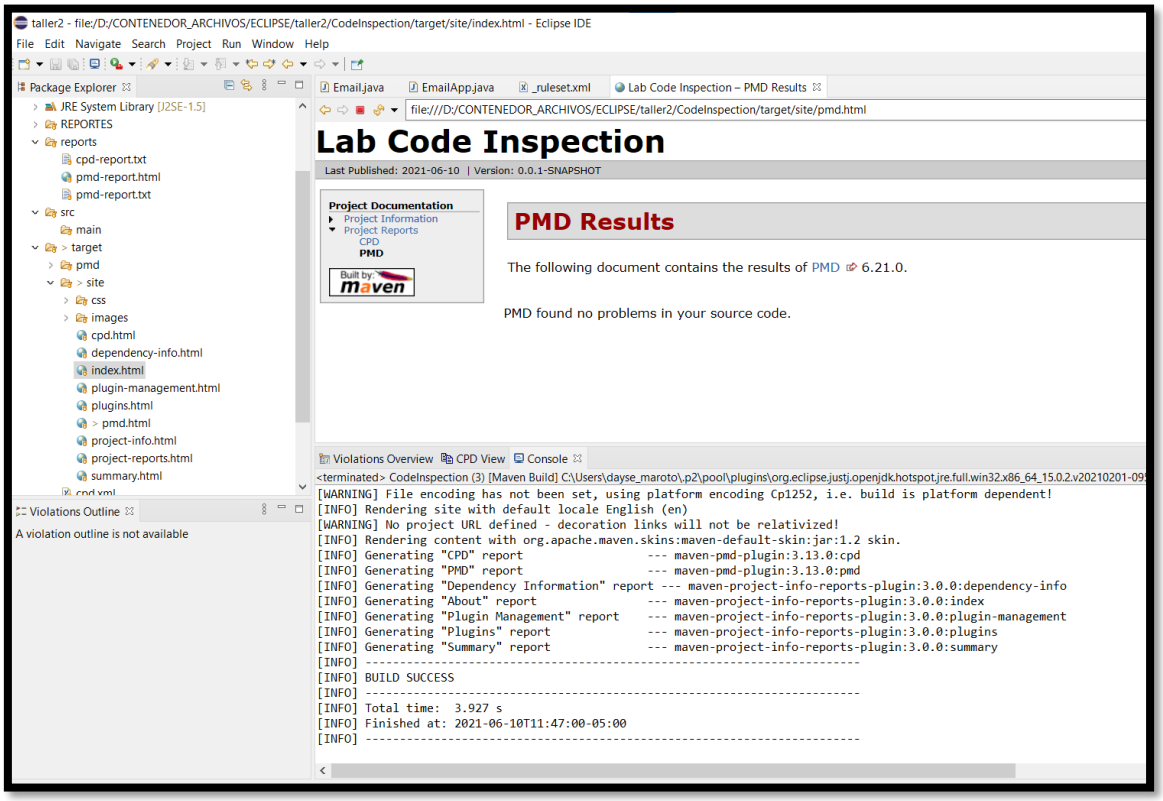
```
<?xml version="1.0" encoding="UTF-8"?>
<ruleset name="Dayse Rules"
    xmlns="http://pmd.sourceforge.net/ruleset/2.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://pmd.sourceforge.net/ruleset/2.0.0
https://pmd.sourceforge.io/ruleset_2_0_0.xsd">
    <description>
        Code Inspection Lab, Dayse Joselyne Maroto Lema
    </description>
    <rule ref="category/java/performance.xml" />
    <rule ref="category/java/bestpractices.xml">
            <exclude name="SystemPrintln" />
      </rule>
      <rule ref="category/java/design.xml/ImmutableField" />
      <rule ref="category/java/design.xml/UseUtilityClass">
            <priority>1</priority>
      </rule>

      <rule ref="category/java/codestyle.xml" />

            <rule
ref="category/java/errorprone.xml/BeanMembersShouldSerialize">
                  <priority>2</priority>
            </rule>
            <rule
ref="category/java/errorprone.xml/UseLocaleWithCaseConversions" />
```

```
            <rule ref="category/java/documentation.xml/CommentRequired">
            <properties>
                    <property name="classCommentRequirement"
value="Ignored" />
                    <property name="headerCommentRequirement"
value="Ignored" />
                    <property name="fieldCommentRequirement"
value="Ignored" />
            </properties>
            </rule>

</ruleset>
```



3. Generate an html report, make a copy and save it somewhere on your disk.





4. Correct any violation in the code that have been generated in the report.
5. Generate a new report (without violations).