

# Software Evolution and Maintenance

## FCAI-CU-SWE 2022

For the Java project **University Timetabling** (<https://sourceforge.net/projects/unitime/>) you are now implementing the maintenance activity you proposed in phase 1 and are using the settings defined in phase 1. We will only focus on the Java backend.

Your tasks in this phase are:

1.  
Provide UML (based on  
reverse engineering) of the java backend system.

2.  
Register the change you  
proposed in phase 1, Implement the change and motivate it.

3.  
Run impact analysis again  
and generate the new analysis report after the change is implemented.

4.  
All of your work should be  
pushed to GitHub as pull requests and reviewed by team members.

5.  
Show how the UML model obtained  
in 1 has changed after you implemented the change.

### Deliverables

- 1- Static Analysis Report for code before changes.
- 2- Class Diagram for the parts of interest to you.
- 3- Static Analysis Report For changed code
- 4- Class Diagram after implementing the change.
- 5- Opened Tickets for Issues

### Notes:

- All of the required deliverables will be pushed to your Github repository, all team members must use Github to push their tasks.
- You should submit a text or pdf file with your names and github repo (don't push anything after deadline), the file should have the following format: file name:  
Group\_1stStudentId\_2ndStudentId\_3rdStudentId\_4thStudentId

---

### Team Member:

ID	Name	GitHub Username
20196037	Amr Halaby	AmrHalaby
20196026	Sohaila Gamal	Sohailla
20206023	Dalia Gamal	DaliaGamal11
20196003	Ahmed Gamal	Ahmedgemy2002@gmail.com

- GitHub Repository: <https://github.com/Sohailla/uni-time>

## • Static Analysis Report for code before changes.

The screenshot shows the JPA Buddy IDE interface. On the left, the project structure for 'unitime' is visible, including 'build.properties', 'README.md', and various Java source files. A terminal window in the center displays the output of a static analysis command. The output includes logs from Sensor Zero Coverage Sensor, Sensor Java CPD Block Indexer, and SCM Publisher, followed by analysis results for 2381 source files. It also mentions the generation of an analysis report and provides a link to the dashboard at <http://localhost:9000/dashboard?id=unitime>. The process took 5:32.900 seconds and resulted in a 'BUILD SUCCESS' message. The terminal also shows the current git status: 'unitime git:(master) ✘'.

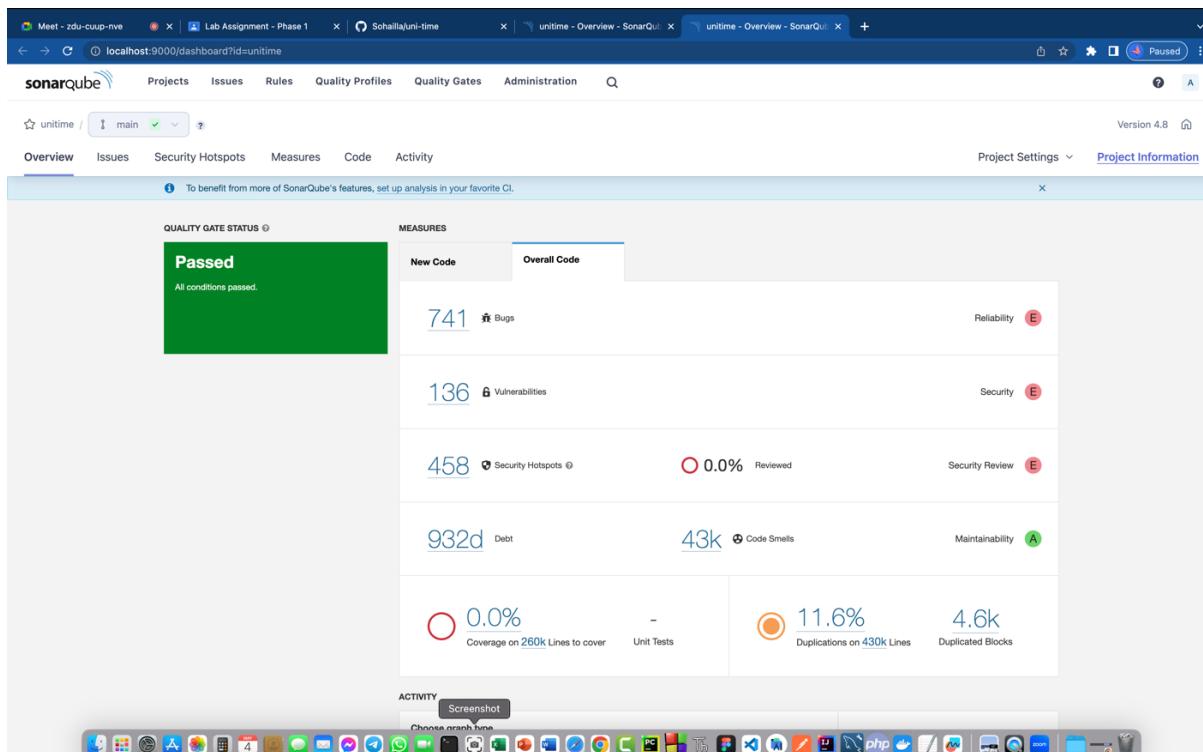
```

unitime - build.properties
unitime > build.properties
unitime ~/Desktop/unitime
> .github
> .idea
> .scannerwork
> 3rd_party
> Documentation
> JavaSource
> target
> WebContent
> .classpath

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# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.

Terminal: Local + ~
[INFO] Sensor Zero Coverage Sensor
[INFO] Sensor Zero Coverage Sensor (done) | time=318ms
[INFO] Sensor Java CPD Block Indexer
[INFO] Sensor Java CPD Block Indexer (done) | time=2008ms
[INFO] SCM Publisher SCM provider for this project is: git
[INFO] SCM Publisher 2381 source files to be analyzed
[INFO]
[INFO] SCM Publisher 2381/2381 source files have been analyzed (done) | time=13602ms
[INFO] CPD Executor 504 files had no CPD blocks
[INFO] CPD Executor Calculating CPD for 1741 files
[WARNING] Too many duplication groups on file JavaSource/org/unitime/timetable/onlinesectioning/custom/purdue/PurdueCourseRequestsValidati
onProvider.java. Keep only the first 100 groups.
[INFO] CPD Executor CPD calculation finished (done) | time=444ms
[INFO] Analysis report generated in 593ms, dir size=54.9 MB
[INFO] Analysis report compressed in 6738ms, zip size=19.3 MB
[INFO] Analysis report uploaded in 338ms
[INFO] ANALYSIS SUCCESSFUL, you can find the results at: http://localhost:9000/dashboard?id=unitime
[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=AyfoP8-j2wEp87Dcw44q
[INFO] Analysis total time: 5:32.900 s
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 11:05 min
[INFO] Finished at: 2023-05-04T21:31:50+02:00
[INFO] -----
+ unitime git:(master) ✘

```



The screenshot shows the SonarQube Issues page for the 'unitime' project. The left sidebar contains filters for Type (Bug, Vulnerability, Code Smell), Severity (Blocker, Critical, Major, Minor), Scope, Resolution, Status, Security Category, Creation Date, Language, Rule, Tag, Directory, File, Assignee, and Author. The main area displays a list of issues, each with a file icon, issue type, severity, status, assignee, effort, and comment. A 'Screenshot' button is visible at the bottom of the list. The top right corner shows '1 / 43,699 issues 952d effort'. The bottom of the screen shows a Mac OS X dock with various application icons.

This screenshot is identical to the one above, showing the SonarQube Issues page for the 'unitime' project. It displays the same list of code smell issues with their details and a 'Screenshot' button. The interface, filters, and overall layout are the same as the first screenshot.

Screenshot of SonarQube Issues page (localhost:9000/project/issues?id=uitime&resolved=false) showing 1 / 43,699 issues (952d effort).

The page displays a list of code smells found in `JavaSource/org/unitime/commons/CalendarVTimeZoneGenerator.java`. The first few items are:

- Change this "try" to a try-with-resources. (4 months ago, L71, 15min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (5 years ago, L77, 20min effort, Comment)
- Add a private constructor to hide the implicit public one. (15 years ago, L38, 5min effort, Comment)
- A "NullPointerException" could be thrown; "e" is nullable here. (15 years ago, L47, 10min effort, Comment)
- Define a constant instead of duplicating this literal "ERROR:" 4 times. (15 years ago, L97, 10min effort, Comment)
- Define a constant instead of duplicating this literal "WARNING:" 4 times. (15 years ago, L100, 10min effort, Comment)
- Define a constant instead of duplicating this literal "INFO:" 4 times. (15 years ago, L103, 10min effort, Comment)
- Provide the parametrized type for this generic. (15 years ago, L131, 5min effort, Comment)
- 0 is a valid index, but is ignored by this check. (15 years ago, L134, 2min effort, Comment)
- Convert the abstract class "Email" into an interface. (10 years ago, L33, 10min effort, Comment)

Filters on the left include: Issues in new code, Type (Bug, Vulnerability, Code Smell), Severity (Blocker, Critical, Major, Minor, Info), Scope, Resolution, Status, Security Category, Creation Date, Language, Rule, Tag, Directory, File, Assignee, Author.

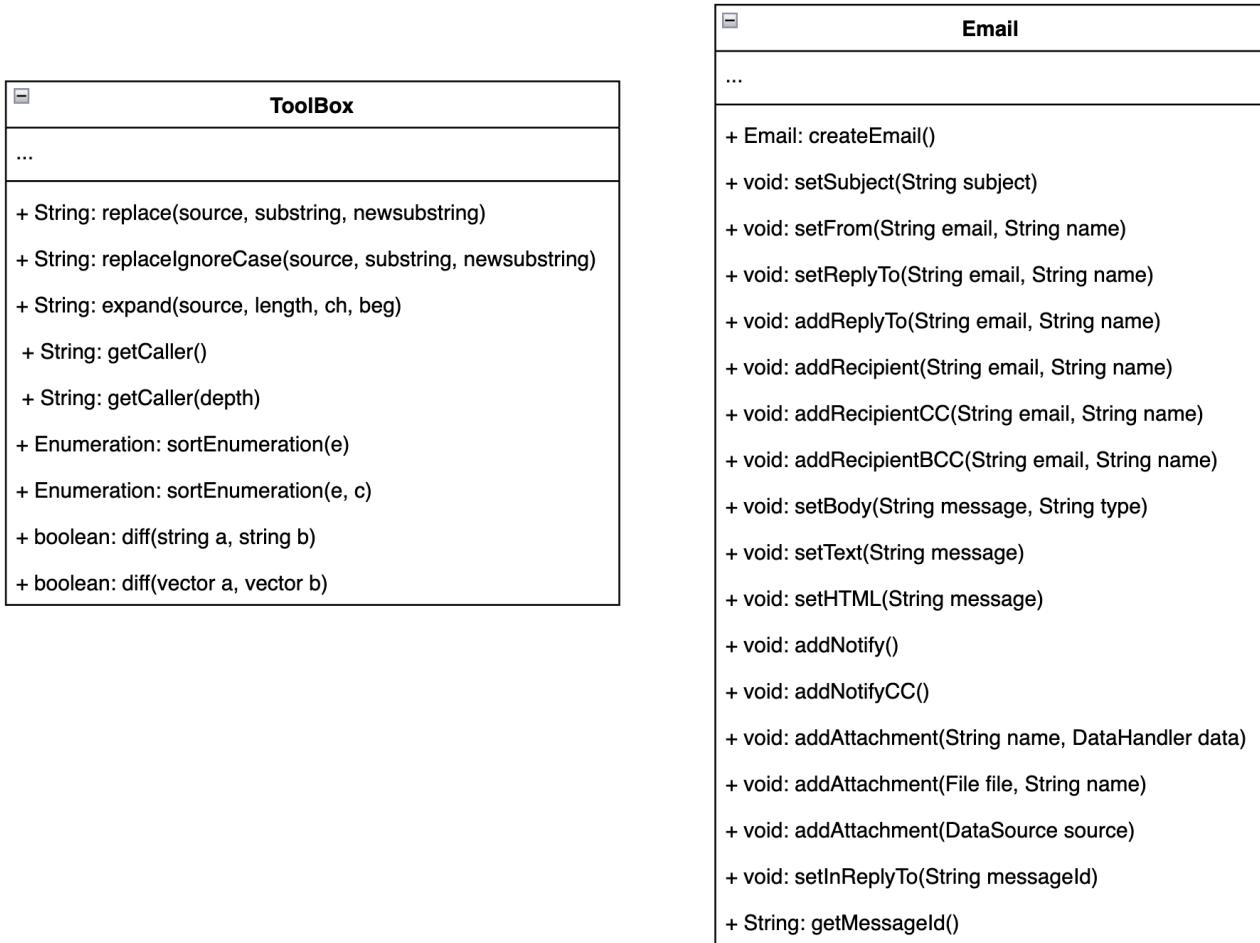
Screenshot of SonarQube Issues page (localhost:9000/project/issues?id=uitime&resolved=false) showing 1 / 43,699 issues (952d effort).

The page displays a list of code smells found in `JavaSource/org/unitime/commons/Email.java`. The first few items are:

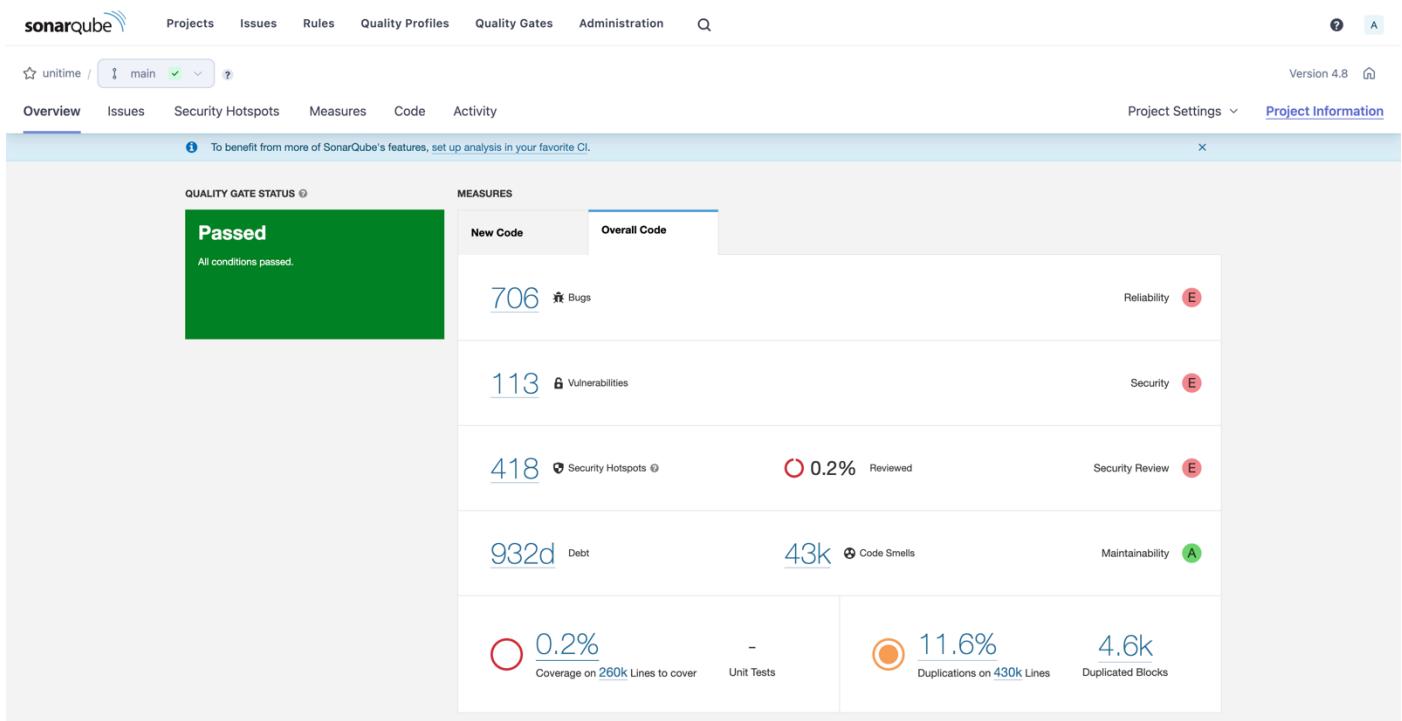
- Convert the abstract class "Email" into an interface. (10 years ago, L33, 10min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (10 years ago, L35, 20min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (10 years ago, L39, 20min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (10 years ago, L41, 20min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (10 years ago, L43, 20min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (9 years ago, L45, 20min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (10 years ago, L47, 20min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (10 years ago, L49, 20min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (10 years ago, L51, 20min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (1 month ago, L53, 20min effort, Comment)
- Define and throw a dedicated exception instead of using a generic one. (1 month ago, L71, 20min effort, Comment)

Filters on the left include: Issues in new code, Type (Bug, Vulnerability, Code Smell), Severity (Blocker, Critical, Major, Minor, Info), Scope, Resolution, Status, Security Category, Creation Date, Language, Rule, Tag, Directory, File, Assignee, Author.

- Class Diagram for the parts of interest to you



- The Static Analysis Report For changed code



SonarQube Version 4.8

unitime / main ?

Overview Issues Security Hotspots Measures Code Activity Project Settings Project Information

**My Issues All**

**Filters**

Issues in new code

Type: Bug (706), Vulnerability (113), Code Smell (43k)

Severity: Blocker (176), Critical (10k), Info (96), Major (14k)

Scope, Resolution, Status, Security Category, Creation Date, Language, Rule, Tag, Directory, File, Assignee

Bulk Change

270 / 43,699 issues 952d effort

Add a default case to this switch. (7 years ago, L142, cert, cwe, bad-practice, convention)

Replace this "switch" statement by "if" statements to increase readability. (7 years ago, L142, cert, cwe, bad-practice, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L144, cert, cwe, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L145, cert, cwe, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L147, cert, cwe, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L147, cert, cwe, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L150, cert, cwe, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L159, cert, cwe, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L168, cert, cwe, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L168, cert, cwe, convention)

Merge this if statement with the enclosing one. (7 years ago, L171, cert, cwe, clumsy)

Refactor this method to reduce its Cognitive Complexity from 27 to the 15 allowed. (7 years ago, L177, cert, cwe, convention)

SonarQube Version 4.8

unitime / main ?

Overview Issues Security Hotspots Measures Code Activity Project Settings Project Information

**My Issues All**

**Filters**

Issues in new code

Type: Bug (706), Vulnerability (113), Code Smell (43k)

Severity: Blocker (176), Critical (10k), Info (96), Major (14k)

Scope, Resolution, Status, Security Category, Creation Date, Language, Rule, Tag, Directory, File, Assignee

Bulk Change

270 / 43,699 issues 952d effort

Rename this field "info\_writer" to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L61, cert, cwe, convention)

Rename this field "clear\_table\_on\_view\_change" to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L74, cert, cwe, convention)

Rename this field "info\_writer\_max\_writes\_after\_view" to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L77, cert, cwe, convention)

Rename this field "info\_writer\_sleep\_time" to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L80, cert, cwe, convention)

Rename this field "port\_range" to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L85, cert, cwe, convention)

Rename this field "initial\_hosts" to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L90, cert, cwe, convention)

Rename this field "max\_dynamic\_hosts" to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L93, cert, cwe, convention)

Rename this field "dynamic\_hosts" to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L95, cert, cwe, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L101, cert, cwe, convention)

Rename this local variable to match the regular expression '^a-zA-Z0-9\*\$'. (7 years ago, L109, cert, cwe, convention)

sonarqube Projects Issues Rules Quality Profiles Quality Gates Administration Q Version 4.8

unitime / main ?

Overview Issues Security Hotspots Measures Code Activity Project Settings Project Information

**My Issues All**

**Filters**

Issues in new code

- Type
  - Bug 706
  - Vulnerability 113
  - Code Smell 43k
- Severity
  - Blocker 176
  - Critical 10k
  - Major 14k
- Scope
- Resolution
- Status
- Security Category
- Creation Date
- Language
- Rule
- Tag
- Directory
- File
- Assignee

**Bulk Change**

270 / 43,699 issues 952d effort

Issue Description	Created	Last Modified	Priority	Type	Status	Severity	Assignee	Effort	Comments
Declare "isNull" on a separate line.	12 years ago	L530	Minor	Code Smell	Open	Not assigned	2min effort	Comment	
Use a StringBuilder instead.	12 years ago	L533	Minor	Code Smell	Open	Not assigned	10min effort	Comment	
Use a StringBuilder instead.	12 years ago	L533	Minor	Code Smell	Open	Not assigned	10min effort	Comment	
Use a StringBuilder instead.	12 years ago	L534	Minor	Code Smell	Open	Not assigned	10min effort	Comment	
Use a StringBuilder instead.	12 years ago	L535	Minor	Code Smell	Open	Not assigned	10min effort	Comment	
Remove the non-escaped \u0009 character from this literal.	12 years ago	L537	Minor	Code Smell	Open	Not assigned	10min effort	Comment	
Remove the non-escaped \u0009 character from this literal.	12 years ago	L538	Minor	Code Smell	Open	Not assigned	10min effort	Comment	
Remove the non-escaped \u0009 character from this literal.	12 years ago	L539	Minor	Code Smell	Open	Not assigned	10min effort	Comment	
Remove the non-escaped \u0009 character from this literal.	12 years ago	L541	Minor	Code Smell	Open	Not assigned	10min effort	Comment	
Use a StringBuilder instead.	12 years ago	L545	Minor	Code Smell	Open	Not assigned	10min effort	Comment	
Use a StringBuilder instead.	12 years ago	L546	Minor	Code Smell	Open	Not assigned	10min effort	Comment	

sonarqube Projects Issues Rules Quality Profiles Quality Gates Administration Q Version 4.8

unitime / main ?

Overview Issues Security Hotspots Measures Code Activity Project Settings Project Information

**My Issues All**

**Filters**

Issues in new code

- Type
  - Bug 706
  - Vulnerability 113
  - Code Smell 43k
- Severity
  - Blocker 176
  - Critical 10k
  - Major 14k
- Scope
- Resolution
- Status
- Security Category
- Creation Date
- Language
- Rule
- Tag
- Directory
- File
- Assignee

**Bulk Change**

270 / 43,699 issues 952d effort

Issue Description	Created	Last Modified	Priority	Type	Status	Severity	Assignee	Effort	Comments
Rename this local variable to match the regular expression ^[a-zA-Z0-9]\$.	7 years ago	L168	Minor	Code Smell	Open	Not assigned	2min effort	Comment	
Rename this local variable to match the regular expression ^[a-zA-Z0-9]\$.	7 years ago	L168	Minor	Code Smell	Open	Not assigned	2min effort	Comment	
Merge this if statement with the enclosing one.	7 years ago	L171	Major	Code Smell	Open	Not assigned	5min effort	Comment	
Refactor this method to reduce its Cognitive Complexity from 27 to the 15 allowed.	7 years ago	L177	Critical	Code Smell	Open	Not assigned	17min effort	Comment	
Rename this local variable to match the regular expression ^[a-zA-Z0-9]\$.	9 years ago	L178	Minor	Code Smell	Open	Not assigned	2min effort	Comment	
Replace the type specification in this constructor call with the diamond operator (<=).	7 years ago	L184	Minor	Code Smell	Open	Not assigned	1min effort	Comment	
Rename this local variable to match the regular expression ^[a-zA-Z0-9]\$.	7 years ago	L184	Minor	Code Smell	Open	Not assigned	2min effort	Comment	
Make this anonymous inner class a lambda	7 years ago	L212	Major	Code Smell	Open	Not assigned	5min effort	Comment	
Refactor this method to reduce its Cognitive Complexity from 16 to the 15 allowed.	7 years ago	L230	Critical	Code Smell	Open	Not assigned	6min effort	Comment	
Rename this local variable to match the regular expression ^[a-zA-Z0-9]\$.	7 years ago	L230	Minor	Code Smell	Open	Not assigned	2min effort	Comment	
Rename this local variable to match the regular expression ^[a-zA-Z0-9]\$.	7 years ago	L230	Minor	Code Smell	Open	Not assigned	2min effort	Comment	

☆ uptime / I main ✓ ?

Version 4.8

Overview Issues Security Hotspots Measures Code Activity

Project Settings Project Information

**My Issues All**

**Filters**

Issues in new code

Type

- Bug 706
- Vulnerability 113
- Code Smell 43k

Severity

- Blocker 176 Minor 18k
- Critical 10k Info 96
- Major 14k

Scope

Resolution

Status

Security Category

Creation Date

Language

Rule

Tag

Directory

File

Assignee

**Bulk Change**

**270 / 43,699 issues 952d effort**

Date	Issue ID	Type	Severity	Status	Effort	Comment		
5 months ago	L116	Code Smell	Critical	Open	Not assigned	12min effort Comment		
5 months ago	L170	Code Smell	Critical	Open	Not assigned	18min effort Comment		
15 years ago	L243	Code Smell	Critical	Open	Not assigned	10min effort Comment		
5 months ago	L258	Code Smell	Critical	Open	Not assigned	10min effort Comment		
15 years ago	L457	Code Smell	Minor	Open	Not assigned	2min effort Comment		
5 months ago	L649	Code Smell	Minor	Open	Not assigned	5min effort Comment		
5 months ago	L669	Code Smell	Minor	Open	Not assigned	5min effort Comment		
12 years ago	L64	JavaSource	..../unitime/commons/hibernate/util/DatabaseUpdate.java	Code Smell	Major	Open	Not assigned	20min effort Comment
12 years ago	L65	JavaSource	..../unitime/commons/hibernate/util/DatabaseUpdate.java	Code Smell	Major	Open	Not assigned	20min effort Comment
12 years ago	L69	JavaSource	..../unitime/commons/hibernate/util/DatabaseUpdate.java	Code Smell	Major	Open	Not assigned	20min effort Comment

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Version 4.8

Overview Issues Security Hotspots Measures Code Activity

Project Settings Project Information

**My Issues All**

**Filters**

Issues in new code

Type

- Bug 706
- Vulnerability 113
- Code Smell 43k

Severity

- Blocker 176 Minor 18k
- Critical 10k Info 96
- Major 14k

Scope

Resolution

Status

Security Category

Creation Date

Language

Rule

Tag

Directory

File

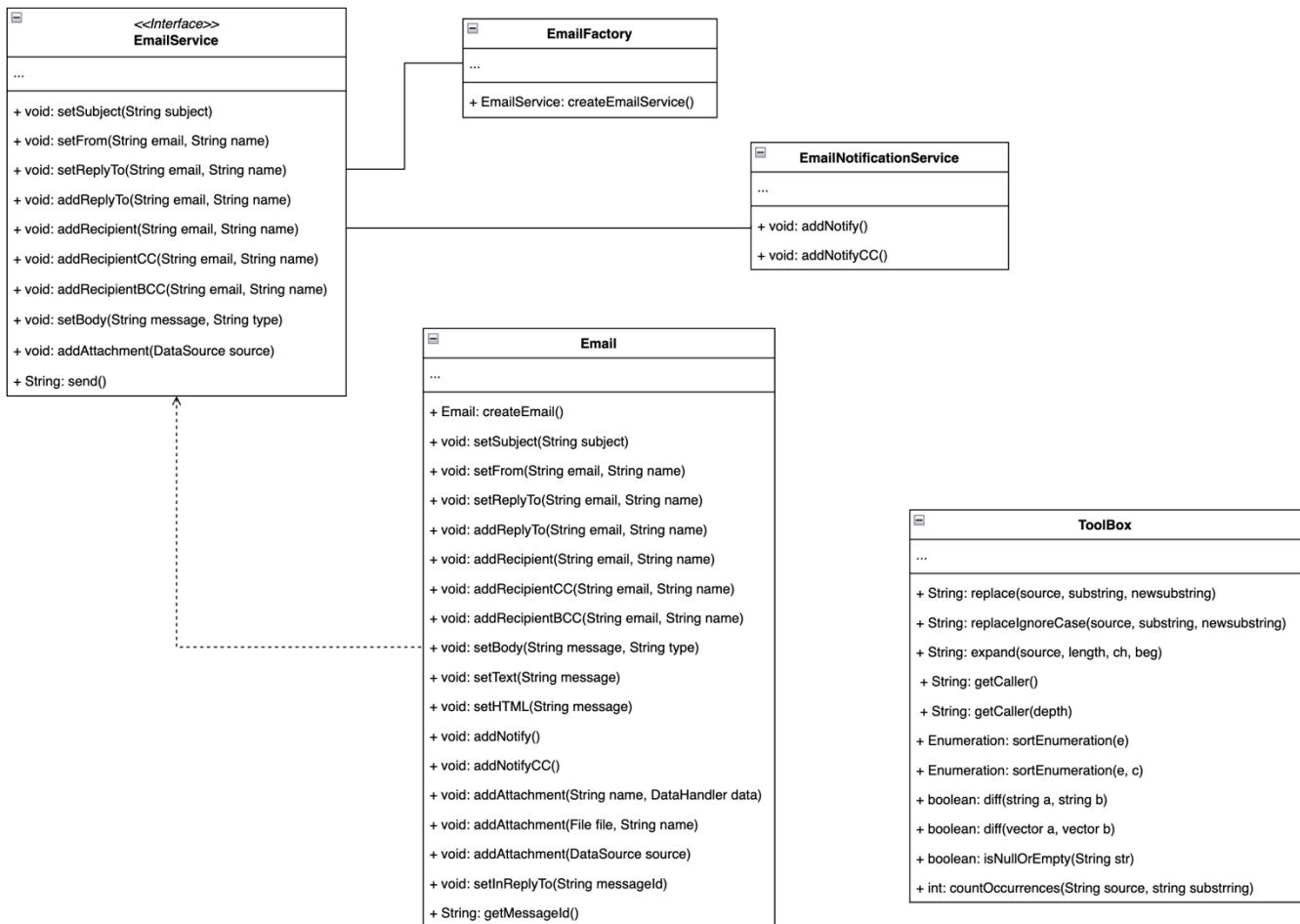
Assignee

**Bulk Change**

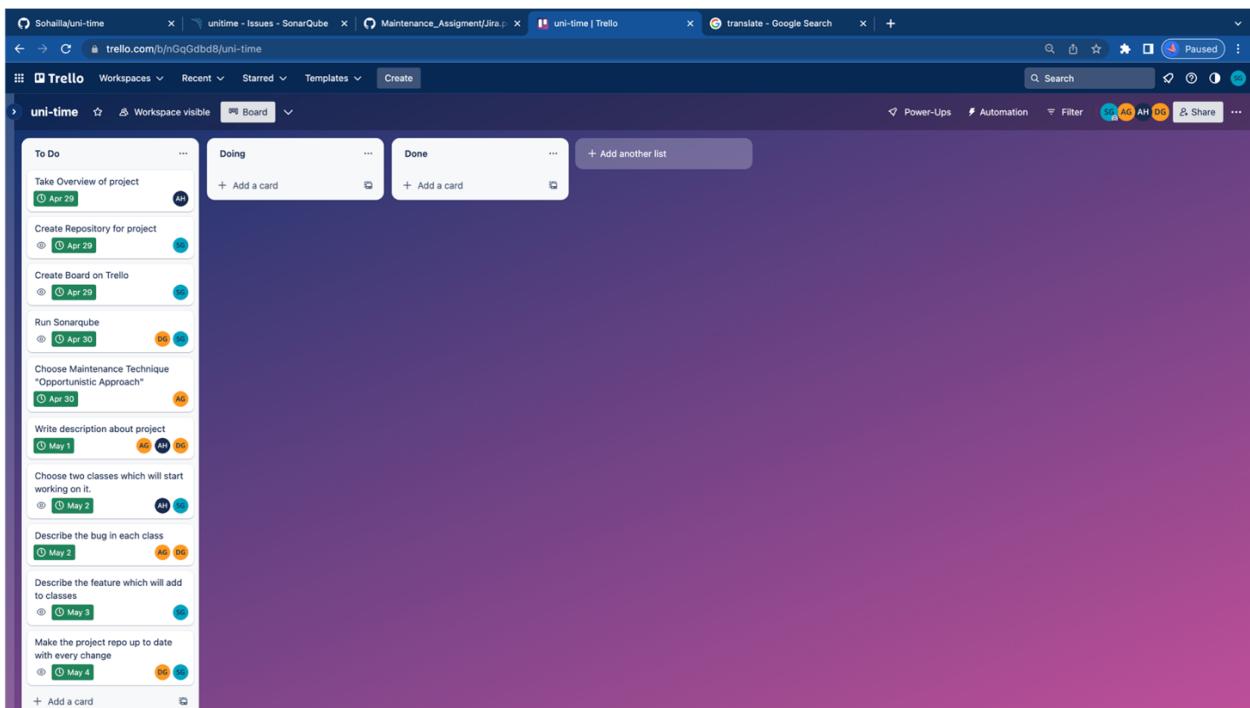
**270 / 43,699 issues 952d effort**

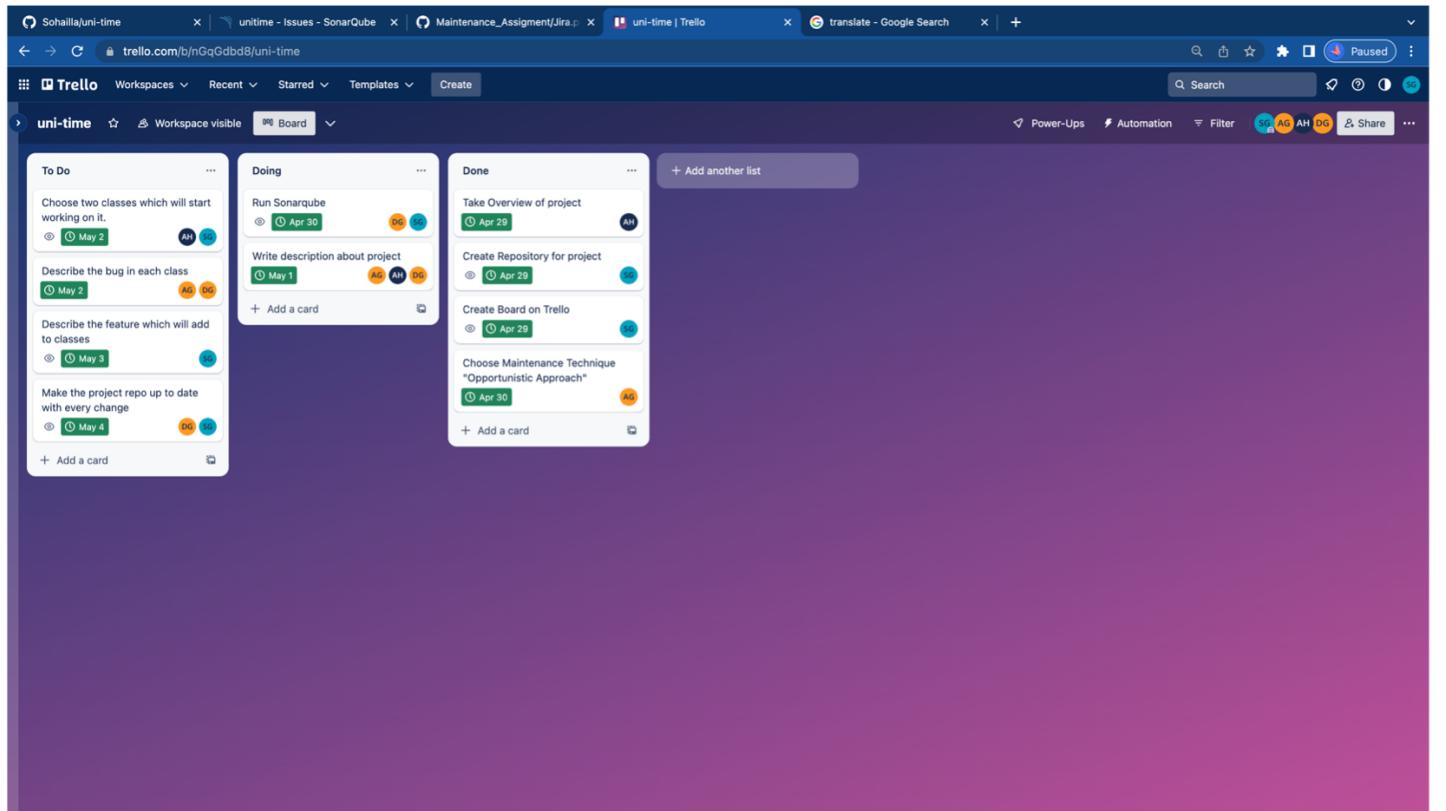
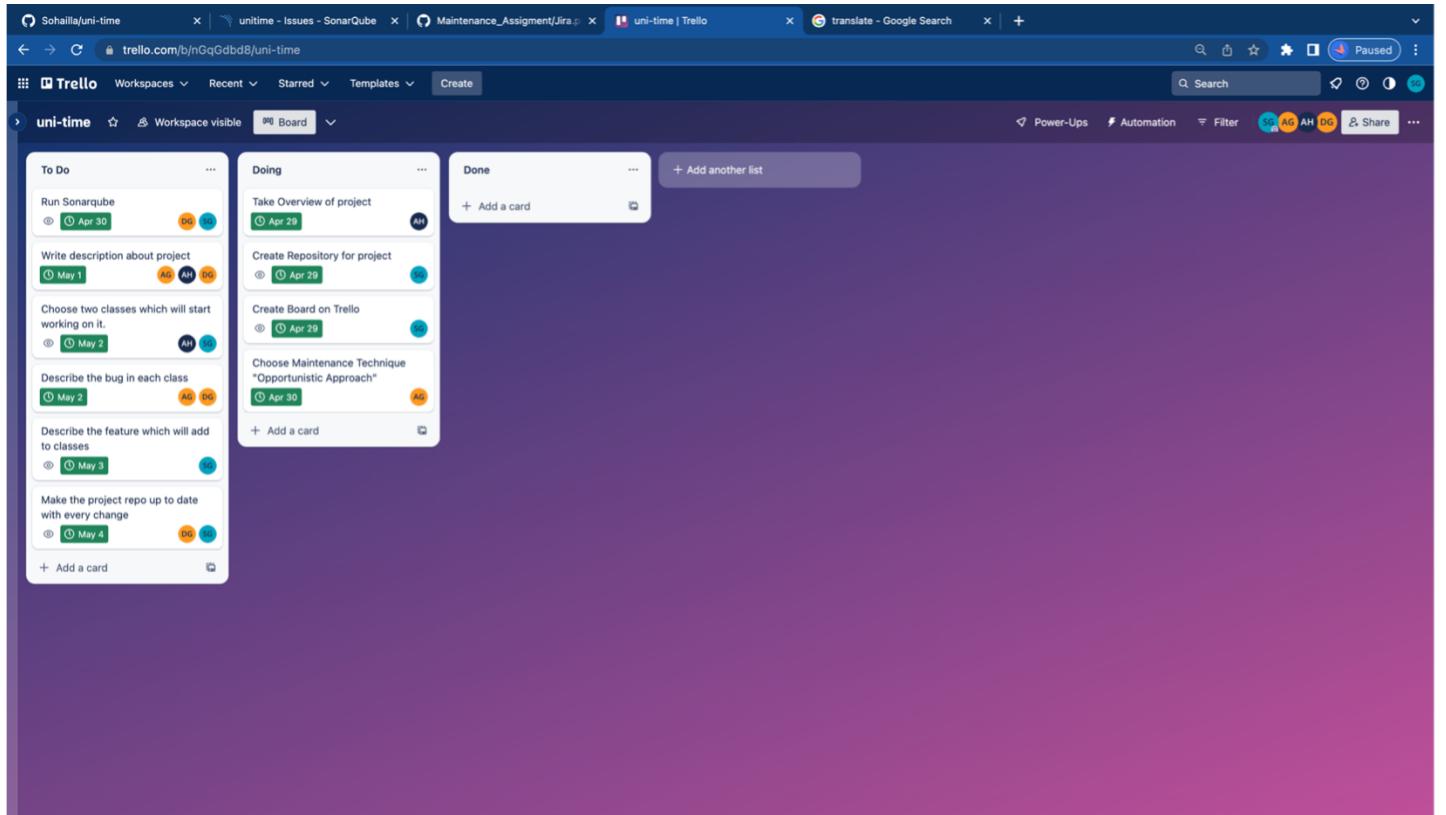
Date	Issue ID	Type	Severity	Status	Effort	Comment		
5 months ago	L116	Code Smell	Critical	Open	Not assigned	12min effort Comment		
5 months ago	L170	Code Smell	Critical	Open	Not assigned	18min effort Comment		
15 years ago	L243	Code Smell	Critical	Open	Not assigned	10min effort Comment		
5 months ago	L258	Code Smell	Critical	Open	Not assigned	10min effort Comment		
15 years ago	L457	Code Smell	Minor	Open	Not assigned	2min effort Comment		
5 months ago	L649	Code Smell	Minor	Open	Not assigned	5min effort Comment		
5 months ago	L669	Code Smell	Minor	Open	Not assigned	5min effort Comment		
12 years ago	L64	JavaSource	..../unitime/commons/hibernate/util/DatabaseUpdate.java	Code Smell	Major	Open	Not assigned	20min effort Comment
12 years ago	L65	JavaSource	..../unitime/commons/hibernate/util/DatabaseUpdate.java	Code Smell	Major	Open	Not assigned	20min effort Comment
12 years ago	L69	JavaSource	..../unitime/commons/hibernate/util/DatabaseUpdate.java	Code Smell	Major	Open	Not assigned	20min effort Comment

- A Class Diagram after implementing the change



- Ticketing System [Trello]: <https://trello.com/b/nGqGdbd8/uni-time>





The screenshot shows a Trello board titled "uni-time". The board has three main lists: "To Do", "Doing", and "Done".

- To Do:**
  - + Add a card
- Doing:**
  - Make the project repo up to date with every change (Due May 4, AG, AH, DG, SG)
  - + Add a card
- Done:**
  - Take Overview of project (Due Apr 29, AG)
  - Create Repository for project (Due Apr 29, SG)
  - Create Board on Trello (Due Apr 29, SG)
  - Choose Maintenance Technique "Opportunistic Approach" (Due Apr 30, AG)
  - Run Sonarqube (Due Apr 30, AG, AH, DG)
  - Write description about project (Due May 1, AG, AH, DG)
  - Choose two classes which will start working on it. (Due May 2, AG, SG)
  - Describe the bug in each class (Due May 2, AG, DG)
  - Describe the feature which will add to classes (Due May 3, SG)
  - + Add a card

At the top right, there are buttons for "Power-Ups", "Automation", "Filter", "Share", and a "Paused" button.

This screenshot shows the same Trello board "uni-time" after additional cards have been added to the "To Do" list.

- To Do:**
  - Design class diagram for classes before changing (Due May 12, AG, AH, DG, SG)
  - Add changes to classes (Due May 13, AG, SG)
  - Check if there are any errors in classes (Due May 15, AG)
  - Run sonarqube after changes applied (Due May 15, AG, AH)
  - Take screenshots of sonarqube results (Due May 16, AG, AH, DG, SG)
  - Design class diagram for classes after changing (Due May 16, AG, AH, DG, SG)
  - + Add a card
- Doing:**
  - + Add a card
- Done:**
  - Take Overview of project (Due Apr 29, AG, AH, DG, SG)
  - Create Repository for project (Due Apr 29, SG)
  - Create Board on Trello (Due Apr 29, SG)
  - Choose Maintenance Technique "Opportunistic Approach" (Due Apr 30, AG)
  - Run Sonarqube (Due Apr 30, AG, SG)
  - Write description about project (Due May 1, AG, AH, DG)
  - Choose two classes which will start working on it. (Due May 2, AG, SG)
  - Describe the bug in each class (Due May 2, AG, DG)
  - Describe the feature which will add to classes (Due May 3, SG)
  - + Add a card

The interface elements at the top and bottom are identical to the first screenshot.

Trello Workspaces Recent Starred Templates Create

uni-time Board + Add another list

To Do

- Design class diagram for classes before changing (May 12, AG, AH, DG, SG)
- Check if there are any errors in classes (May 15, AH)
- Run sonarqube after changes applied (May 15, AG, AH)
- Take screenshots of sonarqube results (May 16, DG, SG)
- Design class diagram for classes after changing (May 16, AG, AH, DG, SG)

+ Add a card

Doing

- Make the project repo up to date with every change (May 4, AG, AH, DG, SG)
- Add changes to classes (May 13, AH, SG)

+ Add a card

Done

- Take Overview of project (Apr 29, AG, AH, DG, SG)
- Create Repository for project (Apr 29, SG)
- Create Board on Trello (Apr 29, SG)
- Choose Maintenance Technique "Opportunistic Approach" (Apr 30, AG)
- Run Sonarqube (Apr 30, DG, SG)
- Write description about project (May 1, AG, AH, DG)
- Choose two classes which will start working on it. (May 2, AH, SG)
- Describe the bug in each class (May 2, AG, DG)
- Describe the feature which will add to classes (May 3, SG)

+ Add a card

Power-Ups Automation Filter Share

Trello Workspaces Recent Starred Templates Create

uni-time Board + Add another list

To Do

- Check if there are any errors in classes (May 15, AH)
- Run sonarqube after changes applied (May 15, AG, AH)
- Take screenshots of sonarqube results (May 16, DG, SG)
- Design class diagram for classes after changing (May 16, AG, AH, DG, SG)

+ Add a card

Doing

- Make the project repo up to date with every change (May 4, AG, AH, DG, SG)
- Add changes to classes (May 13, AH, SG)

+ Add a card

Done

- Take Overview of project (Apr 29, AG, AH, DG, SG)
- Create Repository for project (Apr 29, SG)
- Create Board on Trello (Apr 29, SG)
- Choose Maintenance Technique "Opportunistic Approach" (Apr 30, AG)
- Run Sonarqube (Apr 30, DG, SG)
- Write description about project (May 1, AG, AH, DG)
- Choose two classes which will start working on it. (May 2, AH, SG)
- Describe the bug in each class (May 2, AG, DG)
- Describe the feature which will add to classes (May 3, SG)

+ Add a card

Power-Ups Automation Filter Share

Trello Workspaces Recent Starred Templates Create

uni-time Board

To Do

- Check if there are any errors in classes (May 15) AG AH
- Run sonarqube after changes applied (May 15) AG AH
- Take screenshots of sonarqube results (May 16) DG SG
- Design class diagram for classes after changing (May 16) AG AH DG SG

+ Add a card

Doing

- Make the project repo up to date with every change (May 4) AG AH DG SG
- + Add a card

Done

- Take Overview of project (Apr 29) AG AH DG SG
- Create Repository for project (Apr 29) SG
- Create Board on Trello (Apr 29) SG
- Choose Maintenance Technique "Opportunistic Approach" (Apr 30) AG
- Run Sonarqube (Apr 30) DG SG
- Write description about project (May 1) AG AH DG
- Choose two classes which will start working on it. (May 2) AG DG
- Describe the bug in each class (May 2) AG DG
- Describe the feature which will add to classes (May 3) SG
- Add changes to classes (May 13) AG DG

+ Add a card

+ Add another list

This screenshot shows a Trello board titled 'uni-time' with three columns: 'To Do', 'Doing', and 'Done'. The 'To Do' column contains four cards: 'Check if there are any errors in classes' (due May 15), 'Run sonarqube after changes applied' (due May 15), 'Take screenshots of sonarqube results' (due May 16), and 'Design class diagram for classes after changing' (due May 16). The 'Doing' column has one card: 'Make the project repo up to date with every change' (due May 4). The 'Done' column contains ten cards: 'Take Overview of project' (due Apr 29), 'Create Repository for project' (due Apr 29), 'Create Board on Trello' (due Apr 29), 'Choose Maintenance Technique "Opportunistic Approach"' (due Apr 30), 'Run Sonarqube' (due Apr 30), 'Write description about project' (due May 1), 'Choose two classes which will start working on it.' (due May 2), 'Describe the bug in each class' (due May 2), 'Describe the feature which will add to classes' (due May 3), and 'Add changes to classes' (due May 13). Each card includes a due date, a priority level (AG, AH, DG, SG), and a set of colored circles representing team members.

Trello Workspaces Recent Starred Templates Create

uni-time Board

To Do

- Take screenshots of sonarqube results (May 16) DG SG
- Design class diagram for classes after changing (May 16) AG AH DG SG

+ Add a card

Doing

- Make the project repo up to date with every change (May 4) AG AH DG SG
- + Add a card

Done

- Take Overview of project (Apr 29) AG AH DG SG
- Create Repository for project (Apr 29) SG
- Create Board on Trello (Apr 29) SG
- Choose Maintenance Technique "Opportunistic Approach" (Apr 30) AG
- Run Sonarqube (Apr 30) DG SG
- Write description about project (May 1) AG AH DG
- Choose two classes which will start working on it. (May 2) AG DG
- Describe the bug in each class (May 2) AG DG
- Describe the feature which will add to classes (May 3) SG
- Add changes to classes (May 13) AG DG

+ Add a card

+ Add another list

This screenshot shows a Trello board titled 'uni-time' with three columns: 'To Do', 'Doing', and 'Done'. The 'To Do' column contains two cards: 'Take screenshots of sonarqube results' (due May 16) and 'Design class diagram for classes after changing' (due May 16). The 'Doing' column has one card: 'Make the project repo up to date with every change' (due May 4). The 'Done' column contains ten cards: 'Take Overview of project' (due Apr 29), 'Create Repository for project' (due Apr 29), 'Create Board on Trello' (due Apr 29), 'Choose Maintenance Technique "Opportunistic Approach"' (due Apr 30), 'Run Sonarqube' (due Apr 30), 'Write description about project' (due May 1), 'Choose two classes which will start working on it.' (due May 2), 'Describe the bug in each class' (due May 2), 'Describe the feature which will add to classes' (due May 3), and 'Add changes to classes' (due May 13). Each card includes a due date, a priority level (AG, AH, DG, SG), and a set of colored circles representing team members.

**To Do**

- Take screenshots of sonarqube results  
④ May 16 AG DG SG AH
- Design class diagram for classes after changing  
④ May 16 AG AH DG SG

**Doing**

- Make the project repo up to date with every change  
④ May 4 AG AH DG SG
- Run sonarqube after changes applied  
④ May 15 AG AH

**Done**

- Choose Maintenance Technique "Opportunistic Approach"  
④ Apr 29 AG
- Run Sonarqube  
④ Apr 30 AG
- Write description about project  
④ May 1 AG AH DG
- Choose two classes which will start working on it.  
④ May 2 AH DG
- Describe the bug in each class  
④ May 2 AG DG
- Describe the feature which will add to classes  
④ May 3 AG
- Add changes to classes  
④ May 13 AH DG
- Design class diagram for classes before changing  
④ May 12 AG AH DG SG
- Check if there are any errors in classes  
④ May 15 AH

+ Add a card

+ Add another list

**To Do**

+ Add a card

**Doing**

+ Add a card

**Done**

- Choose two classes which will start working on it.  
④ May 2 AH DG
- Describe the bug in each class  
④ May 2 AG DG
- Describe the feature which will add to classes  
④ May 3 AG
- Add changes to classes  
④ May 13 AH DG
- Design class diagram for classes before changing  
④ May 12 AG AH DG SG
- Check if there are any errors in classes  
④ May 15 AH
- Run sonarqube after changes applied  
④ May 15 AG AH
- Take screenshots of sonarqube results  
④ May 16 DG SG
- Design class diagram for classes after changing  
④ May 16 AG AH DG SG

+ Add a card

+ Add another list

Trello Workspaces Recent Starred Templates Create

uni-time Workspace visible Board

Power-Ups Automation Filter Share

To Do ... + Add a card

Doing ... + Add a card

Done ... + Add another list

Describe the bug in each class (May 2) AG DG

Describe the feature which will add to classes (May 3)

Add changes to classes (May 13) AH DG

Design class diagram for classes before changing (May 12) AG AH DG DG

Check if there are any errors in classes (May 15) AH

Run sonarqube after changes applied (May 15) AG AH

Take screenshots of sonarqube results (May 16) DG DG

Design class diagram for classes after changing (May 16) AG AH DG DG

Make the project repo up to date with every change (May 4) AG AH DG DG

+ Add a card

The image shows a Trello board titled "uni-time". The board has three columns: "To Do", "Doing", and "Done". The "Done" column contains the following cards:

- Describe the bug in each class (May 2) AG DG
- Describe the feature which will add to classes (May 3)
- Add changes to classes (May 13) AH DG
- Design class diagram for classes before changing (May 12) AG AH DG DG
- Check if there are any errors in classes (May 15) AH
- Run sonarqube after changes applied (May 15) AG AH
- Take screenshots of sonarqube results (May 16) DG DG
- Design class diagram for classes after changing (May 16) AG AH DG DG
- Make the project repo up to date with every change (May 4) AG AH DG DG

Each card includes a due date and labels such as AG, DG, AH, and DG.