

# Software Evolution and Maintenance

## FCAI-CU-SWE 2022

You are given a Java project University Timetabling (<https://sourceforge.net/projects/unitime/>) as a base version, you are the maintenance team that needs to implement changes to the existing software. We will only focus on the Java backend.

The change request to the project can either be a bug fix, change in an existing feature or addition of a new requirement. Motivate the need for the change that you have proposed.

### Project Implementation

- You should work in teams of no more than 4 and no less than 3 From the same lab.
- **The project is organized into two phases**

Phase 1:

1. Create a GitHub repository and all team members should be contributors. contributors (Note: All of your work should be pushed to GitHub as pull requests and reviewed by another team member.)
2. Provide a description of what the project does.
3. Run static code analysis tool and generate an analysis report (You may use SonarQube as we did in the lab)
4. Provide a description for the feature/bug fix that you will start working on it.
5. Register the change request you defined in step 4 to a free ticketing system or software such as (Bugzilla, Jira, Agiloft, ...),
6. You are requested to update it through the lifetime of the change request to indicate it's status, and any changes that are related.

- **Deliverables**

- 1- A link to your Github repo
- 2- A link to your ticketing system
- 3- Static Analysis Report For java backend code
- 4- text file (word or pdf) containing the description of what the project does. Mention what technique(s) you used to obtain this description
- 5- A description for the feature/bug fix that you will start working on it.

- **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

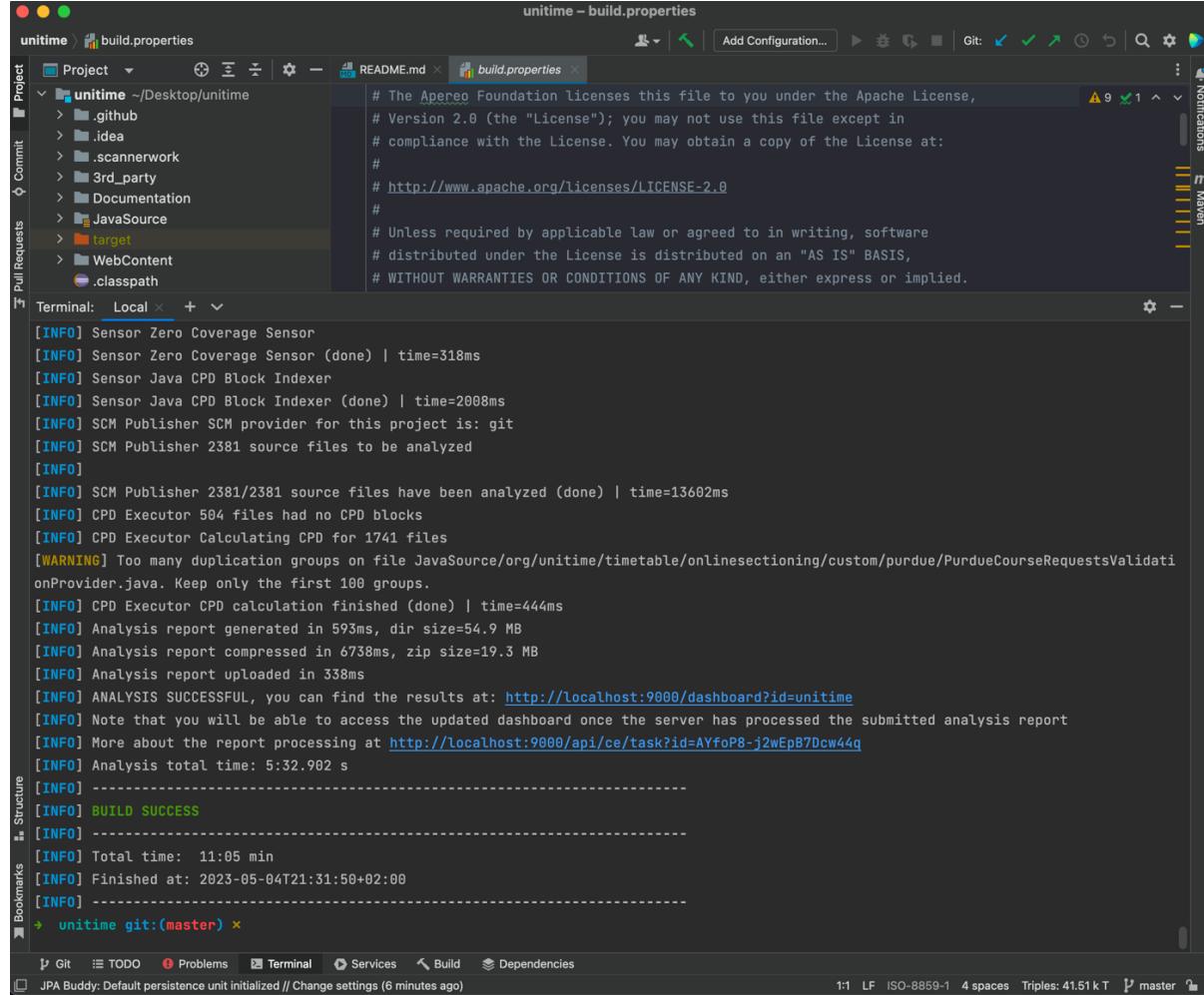
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### Team Member:

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

## • Static Analysis Report For java backend code



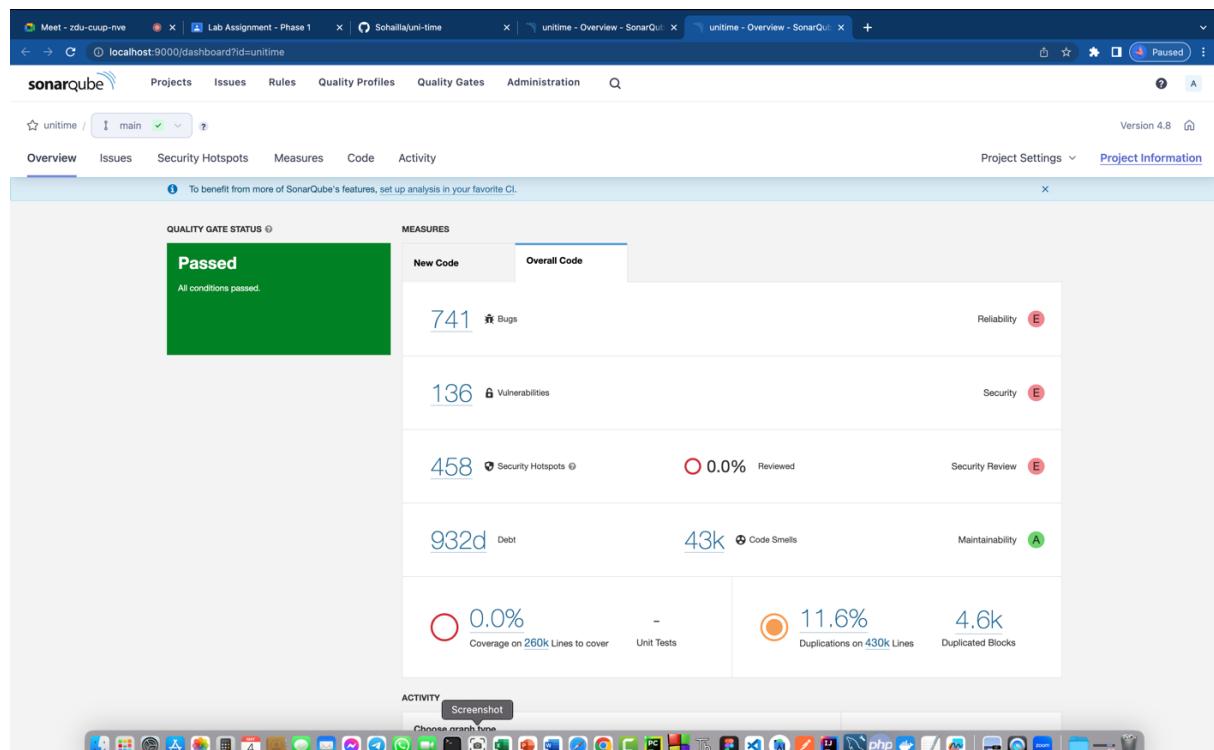
```

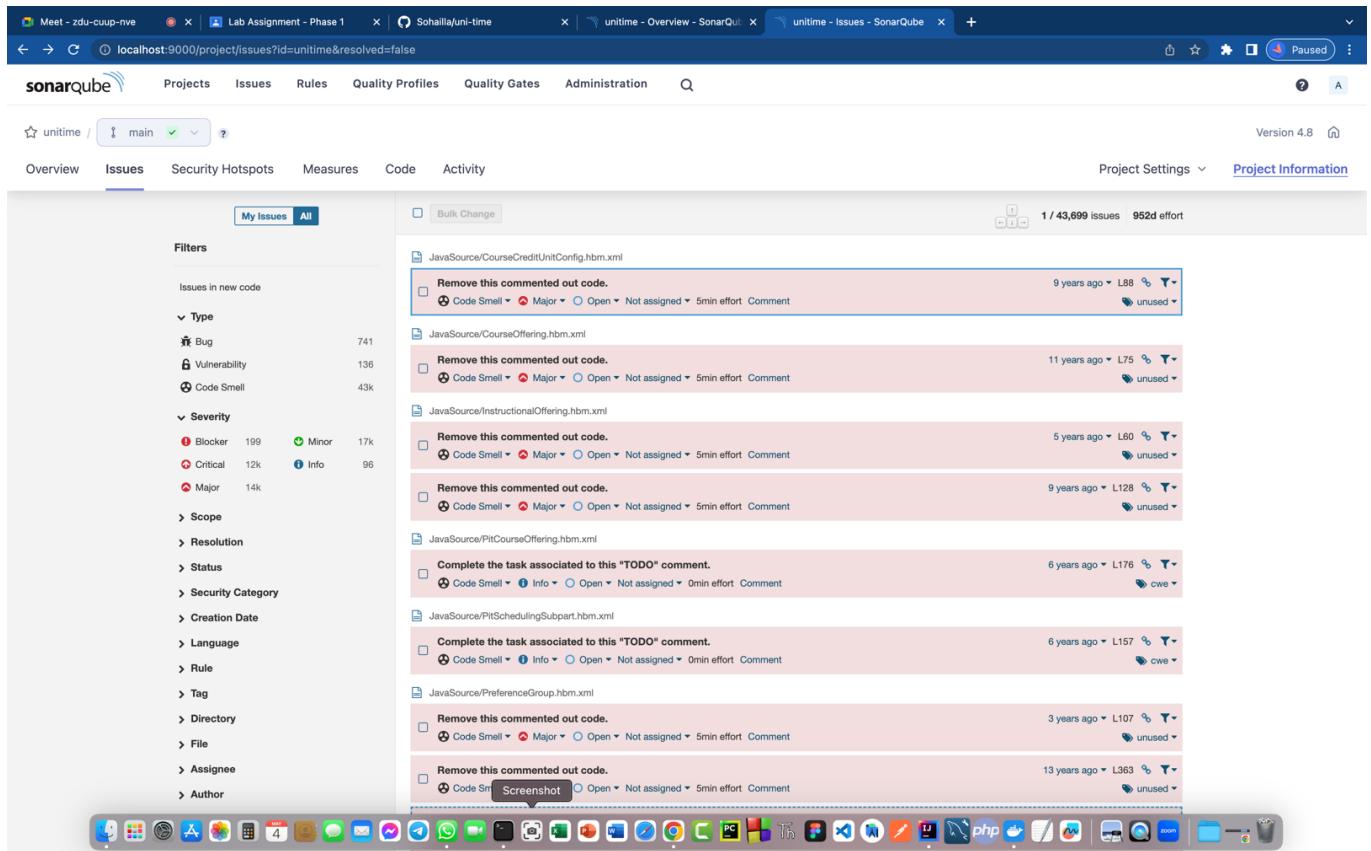
unitime - build.properties
unitime ~/Desktop/unitime
  > .github
  > .idea
  > .scannerwork
  > 3rd_party
  > Documentation
  > JavaSource
  > target
  > WebContent
  > .classpath

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# Unless required by applicable law or agreed to in writing, software
# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.

[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/PurdueCourseRequestsValidatorProvider.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-j2wEpB7Dcw44q
[INFO] Analysis total time: 5:32.902 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) x

```





sonarqube Projects Issues Rules Quality Profiles Quality Gates Administration

Overview Issues Security Hotspots Measures Code Activity

Project Settings Project Information

My Issues All

Filters

Issues in new code

Type

- Bug 741
- Vulnerability 136
- Code Smell 43k

Severity

- Blocker 199
- Critical 12k
- Major 14k
- Minor 17k

Scope

Resolution

Status

Security Category

Creation Date

Language

Rule

Tag

Directory

File

Assignee

Author

1 / 43,699 issues 952d effort

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
9 years ago L88 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
11 years ago L75 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
5 years ago L60 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
9 years ago L128 % T- unused

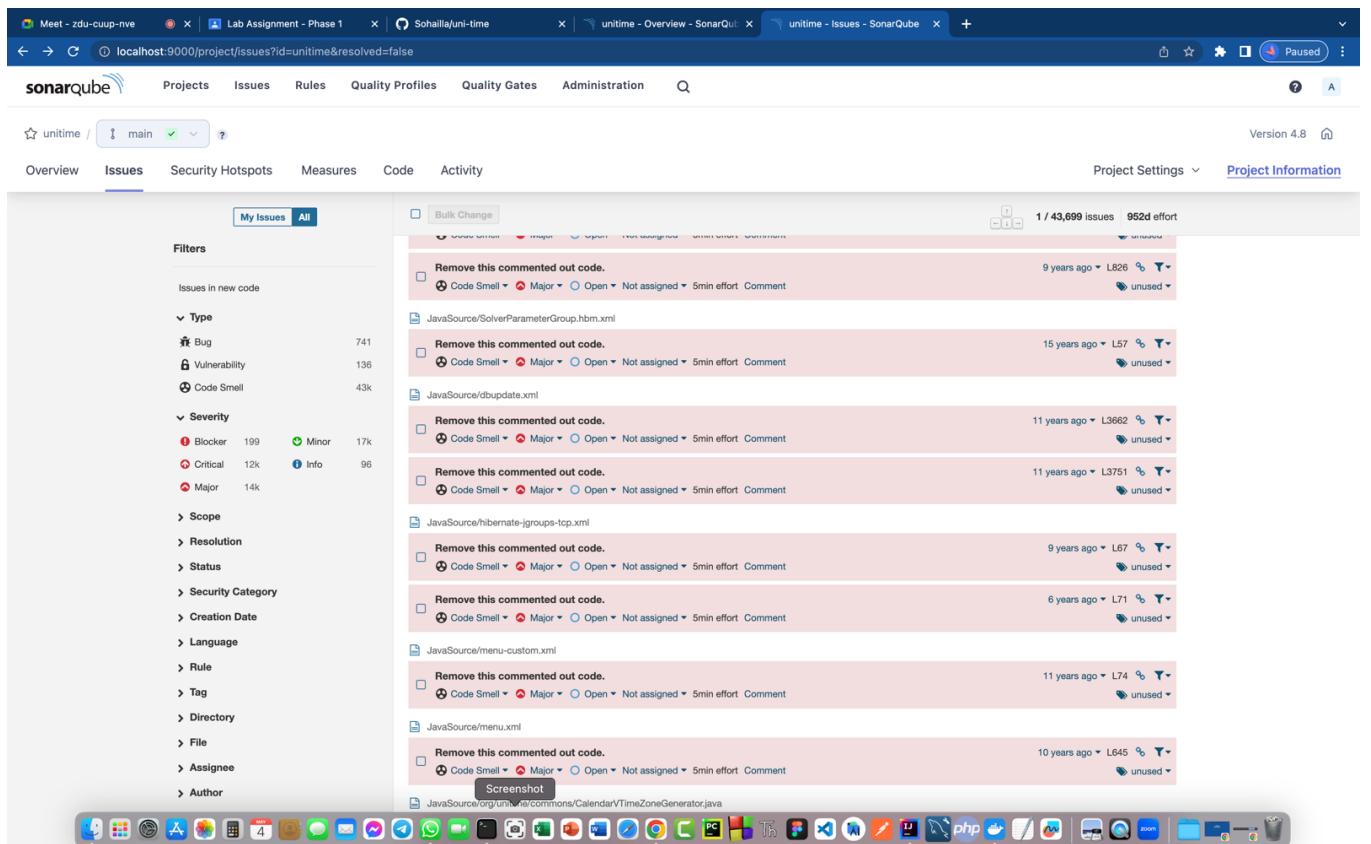
Complete the task associated to this "TODO" comment.  
Code Smell, Info, Open, Not assigned, 0min effort, Comment  
6 years ago L176 % T- cwe

Complete the task associated to this "TODO" comment.  
Code Smell, Info, Open, Not assigned, 0min effort, Comment  
6 years ago L157 % T- cwe

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
3 years ago L107 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
13 years ago L363 % T- unused

Screenshot



sonarqube Projects Issues Rules Quality Profiles Quality Gates Administration

Overview Issues Security Hotspots Measures Code Activity

Project Settings Project Information

My Issues All

Filters

Issues in new code

Type

- Bug 741
- Vulnerability 136
- Code Smell 43k

Severity

- Blocker 199
- Critical 12k
- Major 14k
- Minor 17k

Scope

Resolution

Status

Security Category

Creation Date

Language

Rule

Tag

Directory

File

Assignee

Author

1 / 43,699 issues 952d effort

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
9 years ago L826 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
15 years ago L57 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
11 years ago L3662 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
11 years ago L3751 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
9 years ago L67 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
6 years ago L71 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
11 years ago L74 % T- unused

Remove this commented out code.  
Code Smell, Major, Open, Not assigned, 5min effort, Comment  
10 years ago L645 % T- unused

Screenshot

Screenshot of the SonarQube interface showing the 'Issues' tab for the 'unitime' project. The page displays a list of 43,699 issues across 952d effort. The left sidebar contains a 'Filters' section with various dropdowns 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 content area shows a table of issues with columns for 'File', 'Type', 'Severity', 'Status', 'Assignee', 'Priority', 'Effort', 'Last Comment', and 'Tags'. A 'Screenshot' link is highlighted in the screenshot.

Screenshot of the SonarQube interface showing the 'Issues' tab for the 'unitime' project. The page displays a list of 43,699 issues across 952d effort. The left sidebar contains a 'Filters' section with various dropdowns 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 content area shows a table of issues with columns for 'File', 'Type', 'Severity', 'Status', 'Assignee', 'Priority', 'Effort', 'Last Comment', and 'Tags'. A 'Screenshot' link is highlighted in the screenshot.

- **The description of what the project does. Mention what technique(s) you used to obtain this description**

## **1. What the project does:**

UniTime is a comprehensive educational scheduling system that supports developing course and exam timetables, managing changes to these timetables, sharing rooms with other events, and scheduling students to individual classes. It is a distributed system that allows multiple university and departmental schedule managers to coordinate efforts to build and modify a schedule that meets their diverse organizational needs while allowing for minimization of student course conflicts. It can be used alone to create and maintain a school's schedule of classes and/or exams, or interfaced with an existing student information system.

### **Features**

- course timetabling
- examination timetabling
- event management
- student scheduling

## **2. Maintenance Technique: "Opportunistic Approach"**

Opportunistic Approach is a hybrid of the two

1. Begin with top-down, gain an overview of the functions of the program
2. Then selectively apply bottom-up strategies when nearing "code level"
3. Presence of beacons can indicate opportunity for change of strategy

- **A description for the feature/bug fix that you will start working on it.**

We will fix the Email.java and ToolBox.java classes.

In Email.java:

We will modify the code into two classes to support solid principles

In ToolBox.java:

Add new features to class to support availability