Lab 1. JUnit

Lab Objective:

This Lab aims to help students to gain the experience of unit testing and to learn the widely used unit testing tool, the JUnit test framework.

1. SUT Description:
The system to be tested for this lab is Geo, an open source Java framework for geohashing. You can download GeoProject form our GitLab .

Please go to the GitLab of our course and register your account.

Use your full name (e.g., 王小明) and student ID (e.g., 107598001) to register.

After registering, please sign in and **fork** the GeoProject into your account.

Also, please install git on your computer. The Git tutorial can be found in this website.

In the setting of project `Members` , please add the account of TA as **Developer** to your project (as shown below).

To prevent others from accessing your project, you have to set the project visibility to `Private` in `Setting -> General -> General -> Permissions -> Project visibility` .

General project settings

Update your project name, description, avatar, and other general settings.

[Expand]

Permissions

Enable or disable certain project features and choose access levels.

[Collapse]

Project visibility ?

Private

The project is accessible only by members of the project. Access must be granted explicitly to each user.

☐ Allow users to request access

Issues
Lightweight issue tracking system for this project

Enabled ⬤　Only Project Members

Repository
View and edit files in this project

Enabled ⬤　Only Project Members

Merge requests
Submit changes to be merged upstream

Enabled ⬤　Only Project Members

Pipelines
Build, test, and deploy your changes

Enabled ⬤　Only Project Members

Wiki
Pages for project documentation

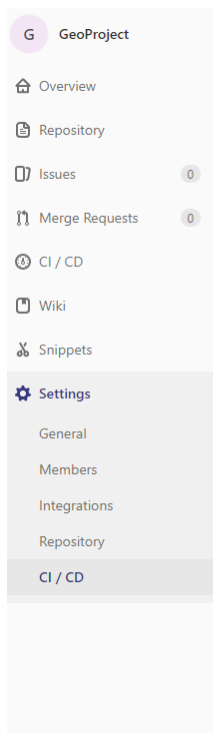Enabled ⬤　Only Project Members

Snippets
Share code pastes with others out of Git repository

Enabled ⬤　Only Project Members

[Save changes]

To show the pipeline and coverage badge on README, you need to follow the settings below.
In your own GeoProject repository, go to Setting -> CI/CD -> General pipelines settings   and copy the code of Pipeline status and Coverage report to **README.md.**

G GeoProject

🏠 Overview

📄 Repository

🗂 Issues　　　　0

🔀 Merge Requests　　0

🕐 CI / CD

📕 Wiki

✂ Snippets

⚙ **Settings**

　　General

　　Members

　　Integrations

　　Repository

　　CI / CD

Pipeline status

Pipeline status · pipeline unknown 　　　　　　master

Markdown

```
[![pipeline status](https://stv.csie.ntut.edu.tw/test1/GeoProject/badges/master/pipeline.svg)](https://stv.csie.ntut.edu.tw/test1/GeoProject/commits/master)
```

HTML

```
<a href="https://stv.csie.ntut.edu.tw/test1/GeoProject/commits/master"><img alt="pipeline status" src="https://stv.csie.ntut.edu.tw/test1/GeoProject/badges/master/pipeline.svg" /></a>
```

AsciiDoc

```
image:https://stv.csie.ntut.edu.tw/test1/GeoProject/badges/master/pipeline.svg[link="https://stv.csie.ntut.edu.tw/test1/GeoProject/commits/master",title="pipeline status"]
```

Coverage report

Coverage report · coverage unknown 　　　　　　master

Markdown

```
[![coverage report](https://stv.csie.ntut.edu.tw/test1/GeoProject/badges/master/coverage.svg)](https://stv.csie.ntut.edu.tw/test1/GeoProject/commits/master)
```

HTML

```
<a href="https://stv.csie.ntut.edu.tw/test1/GeoProject/commits/master"><img alt="coverage report" src="https://stv.csie.ntut.edu.tw/test1/GeoProject/badges/master/coverage.svg" /></a>
```

Edit file

| Write | Preview |

| ⑂ master | README.md | | ⊟ Soft wrap | text ⌄ |

```
1  [![pipeline status](https://stv.csie.ntut.edu.tw/test1/GeoProject/badges/master/pipeline.svg)](https://stv.csie.ntut.edu.tw/test1/GeoProject/commits/master)
2  [![coverage report](https://stv.csie.ntut.edu.tw/test1/GeoProject/badges/master/coverage.svg)](https://stv.csie.ntut.edu.tw/test1/GeoProject/commits/master)
```
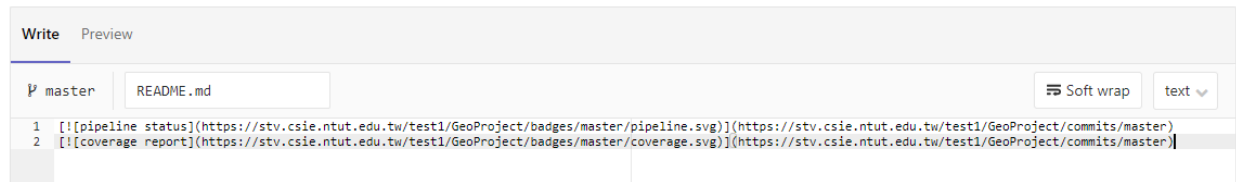
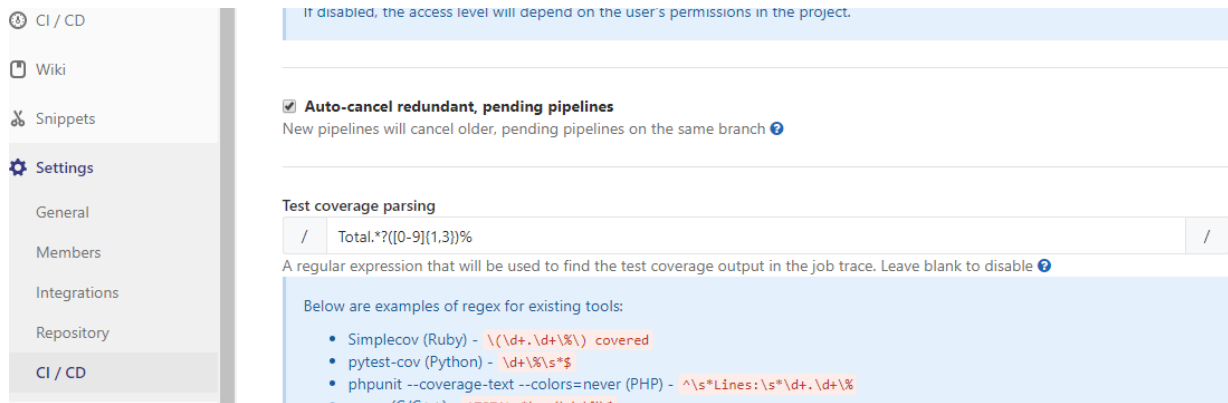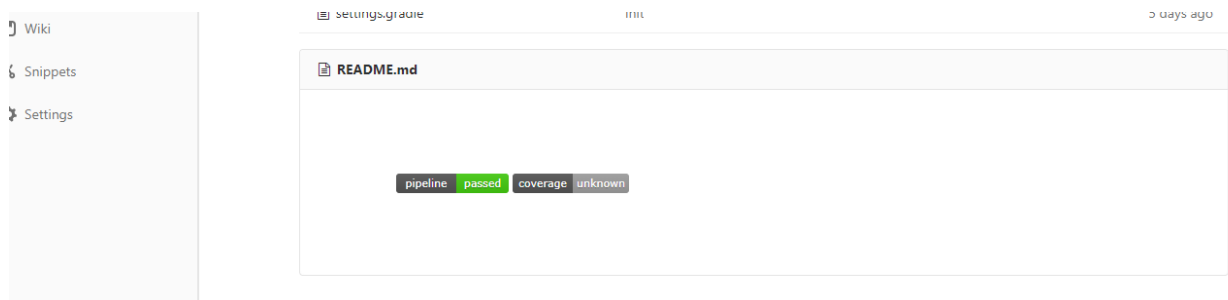At `Setting -> CI/CD -> General pipelines settings -> Test coverage parsing` , set your coverage parsing to `Total.*?([0-9]{1,3})%` .

Then you will see the pipeline status and coverage information on the index of project.

It will run CI and update the status information automatically after pushing your code to GitLab.

2. Test Environment
Please use IntelliJ IDEA as you IDE, and `import` the GeoProject as follow:
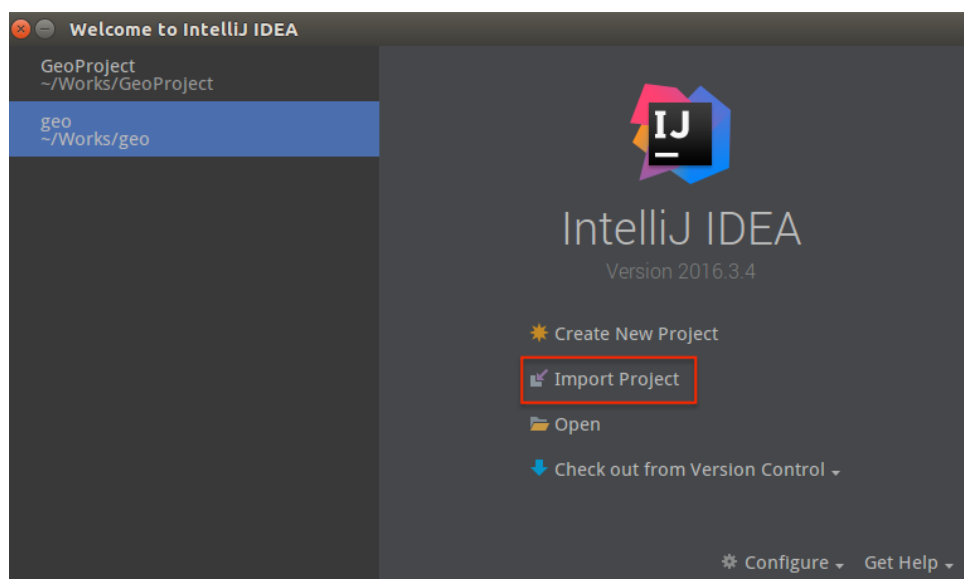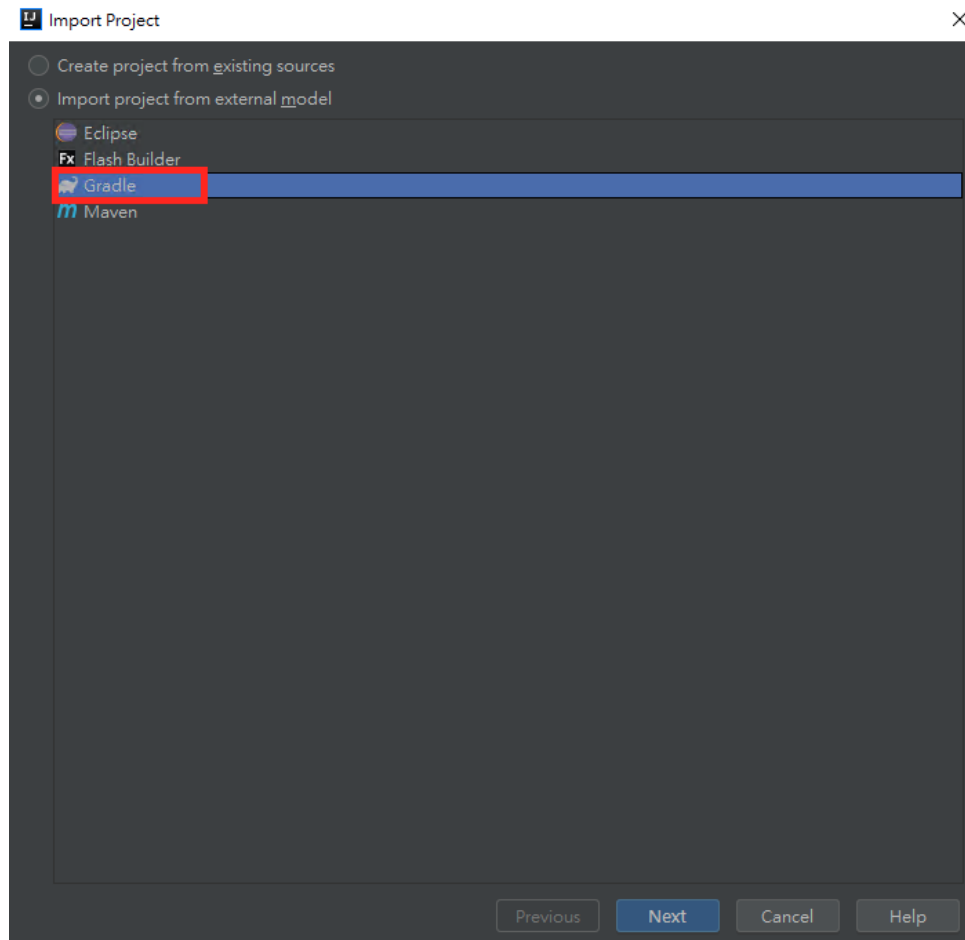
3. Test Suite Generation

You will be required to implement some unit tests for several classes in this project according to the specifications.

You can create a test as the figures below:

And select testing library for JUnit4(please clicked Fixed button if JUnit4 library not found in the module)

While designing and implementing your test cases, you may need to look up some information of each class in the Javadoc of GeoProject.

- Base32 (in the com.github.davidmoten.geo): Has 5 methods
- Coverage (in the com.github.davidmoten.geo): Has 5 methods
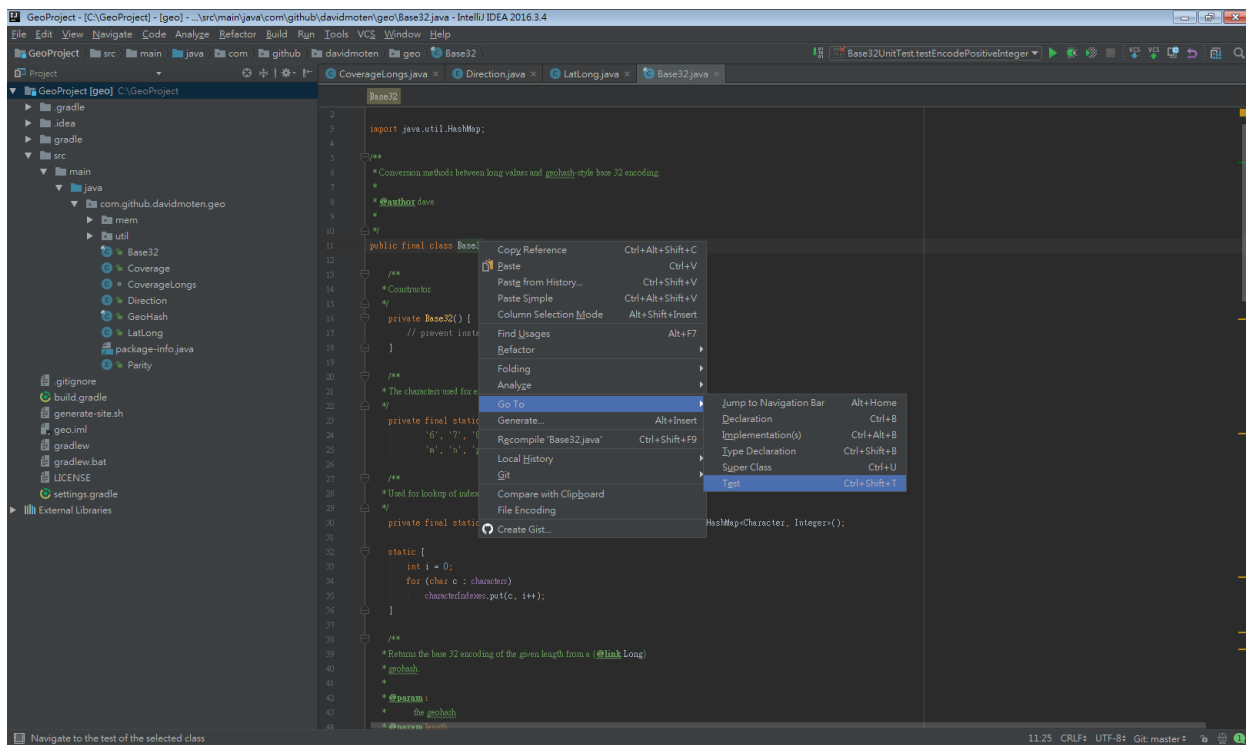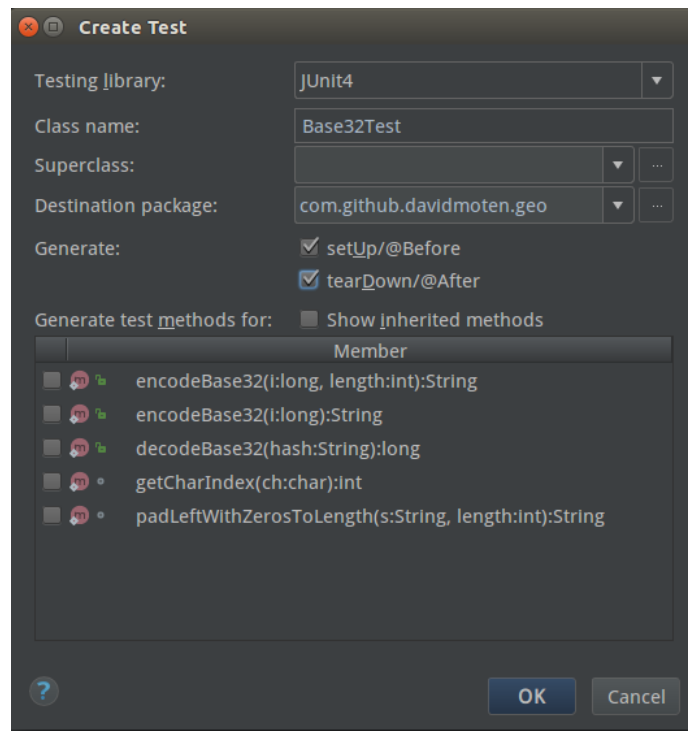- CoverageLongs (in the com.github.davidmoten.geo): Has 5 methods
- GeoHash (in the com.github.davidmoten.geo): Has 23 methods
- Geomem (In com.github.davidmoten.geo.mem): Has 6 methods
- Info (In com.github.davidmoten.geo.mem): Has 6 methods

4. Test Plan

To begin with, a test plan must be created first. You must document the test plan in your lab report. The test plan should include a brief description about the requirements of the test, the strategy and activities you plan to perform to meet the requirements, and the criteria to complete the test. (one page would be sufficient for the test plan)

Carry out your test plan. To keep your workload manageable, we would like you to create test cases for **15** out of 50 methods (38 methods of com.github.davidmoten.geo and 12 methods of com.github.davidmoten.geo.mem). Choose 15 methods to test and create test cases for them. Try to keep each test case in a separate JUnit test method if possible.

Push your code to the repository when part of the project is doon. And observe the status of CI. You shoule do that at least three or more times.

5. Code Coverage

Click `View -> Tools Windows -> Gradle` to Open gradle tool windows.

You can create your code coverage report by clicking the buttons in order `test` -> `jacocoTestReport` .
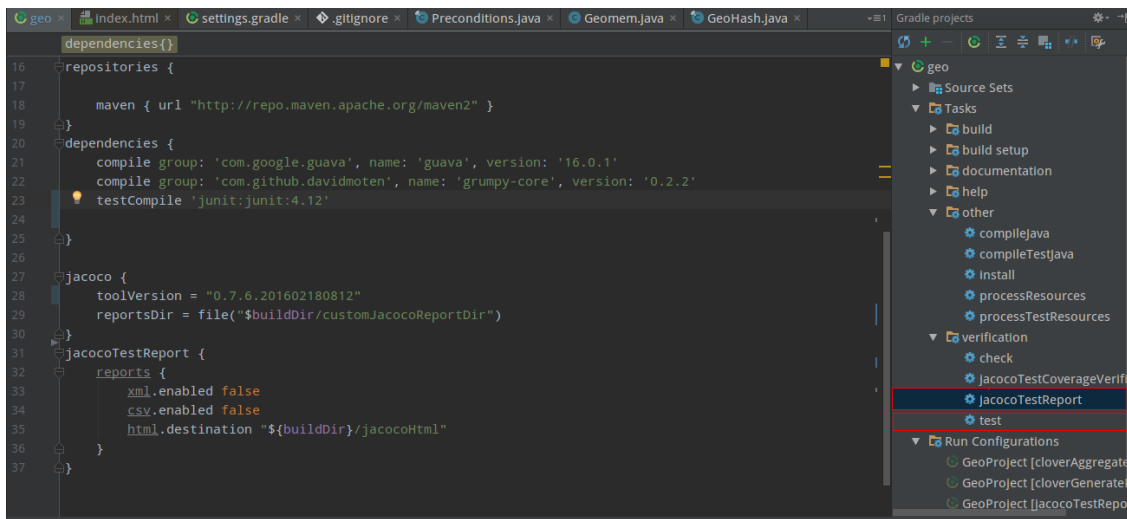
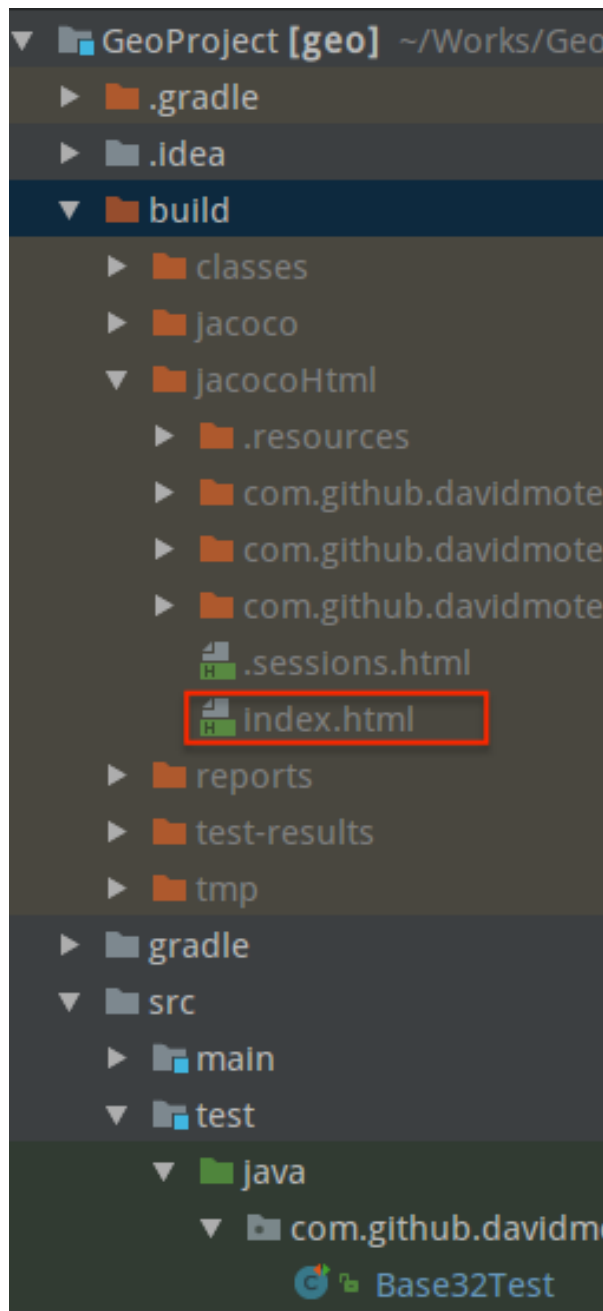After doing the previous tasks, you should get the test report in the directory `build -> jacocoHtml -> index.html` .

You can open the `index.html` file in browser, it may look like the following figure.

com.github.davidmoten.geo

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed	Classes
GeoHash.java		0%		0%	109	109	254	254	45	45	4	4
Base32.java		75%		45%	11	18	19	45	3	7	0	1
Coverage.java		0%		0%	8	8	16	16	6	6	1	1
Direction.java		0%		0%	8	8	9	9	5	5	1	1
CoverageLongs.java		0%		0%	7	7	14	14	6	6	1	1
LatLong.java		0%		n/a	5	5	14	14	5	5	1	1
Parity.java		0%		n/a	4	4	2	2	4	4	1	1
Total	1,759 of 2,015	13%	152 of 162	6%	152	159	328	354	74	78	9	10

Created with JaCoCo 0.7.6.201602180812

6. Lab Submission

The Lab report must include (but not limit to) the following sections: (sample Lab report)

1. Test Plan: briefly describe test requirements, planed test activities, and success criteria for the test.
2. Test Design : for the method under test, provide the objective, input, and expected output of the test cases.
3. Test Result: for each method under test, provide the test results (in terms of Pass/Fail or screenshots for each test case associated with the method under test.
4. Test Coverage: provide statement code coverage for each method under test and the overall statement coverage for the test.
5. The screenshots of CI/CD -> Pipelines for showing 3 or more of different CI testing.

Please convert your Lab report to `.pdf` file, `.docx` file will not be accepted.
The Lab report must put in the corresponding directory in your project (e.g. `GeoProject -> LabReport -> Lab1`).
Make sure you have pushed your code and Lab report on the GitLabsuccessfully.

Finally, you must open an new **issue** on TA's GeoProject with the following information and format to notify TA that you have done your lab.

New Issue

Title   107598001 - Lab1 Done

Add description templates to help your contributors communicate effectively!

Description

Write   Preview   B   I   99   </>   ☰   ≣   ☑   ⤢

https://stv.csie.ntut.edu.tw/107598001/GeoProject   (Your repository's URL)

Markdown and quick actions are supported   🖾 Attach a file

☑ This issue is confidential and should only be visible to team members with at least Reporter access.   (Check this checkbox)

Assignee   Unassigned   Assign to me   Due date   Select due date

Milestone   Milestone

Labels   Labels

Submit issue   Cancel

TA would check your homework on GitLab.