Lab 1: Basic Unit Testing

Software Testing 2021

2021/03/04

Overview

Lab overview

1. 10 ~ 11 Lab assignments
    a. *Unit Testing*
    b. *Continuous Integration*
    c. *Web Applications Testing*
    d. *Control Flow Graph*
    e. *Behavior-Driven Development*
    f. *Fuzz Testing*
    g. *Symbolic Execution*
2. Homework: TBD

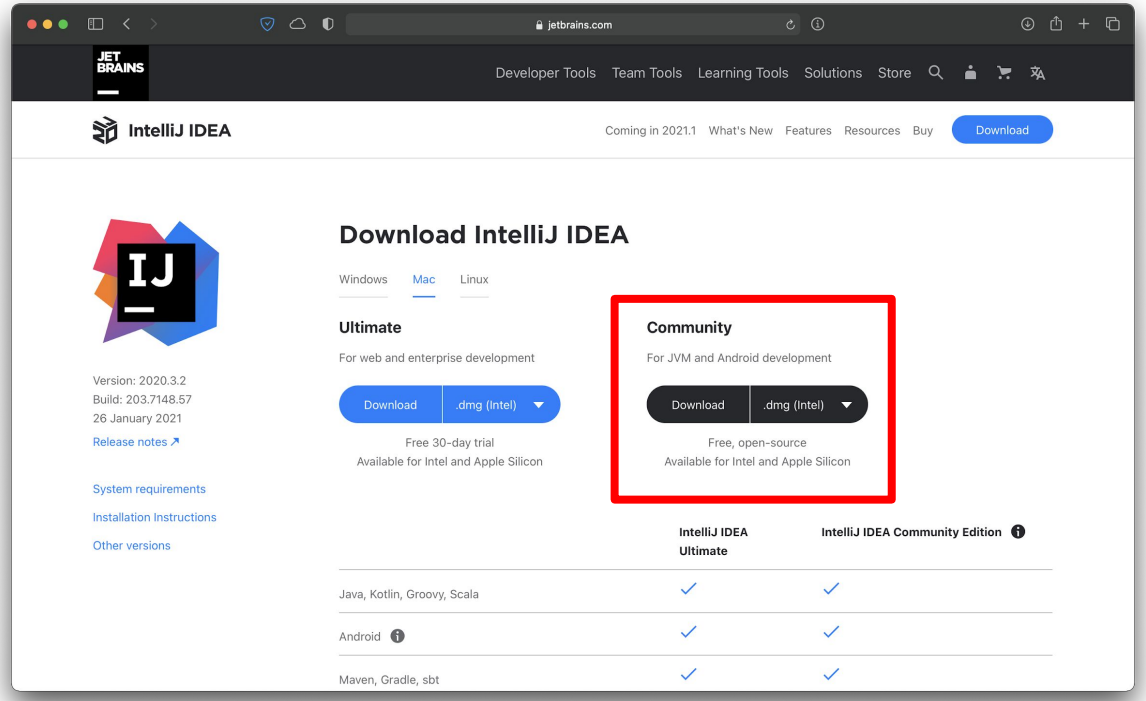
Github

- https://github.com/iasthc/NYCU-Software-Testing-2021

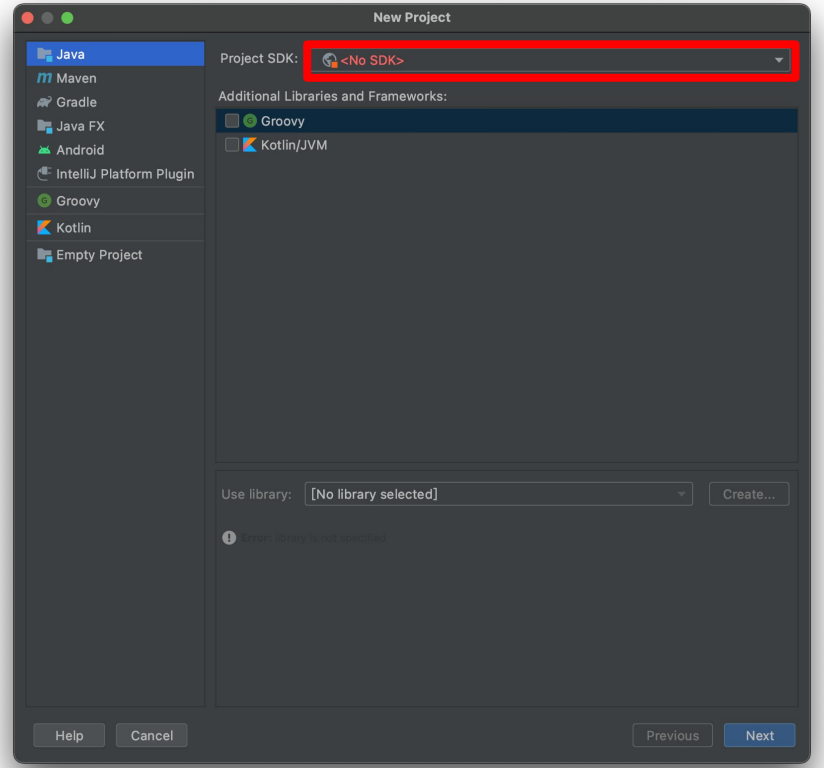
JAVA IDE

IntelliJ IDEA Community

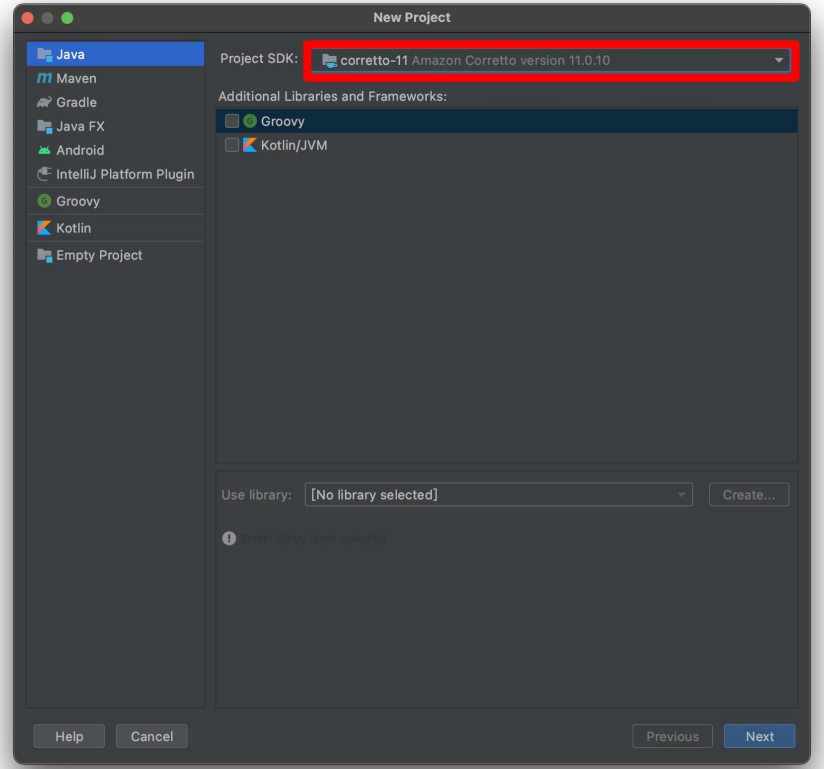
➔ https://www.jetbrains.com/idea/download



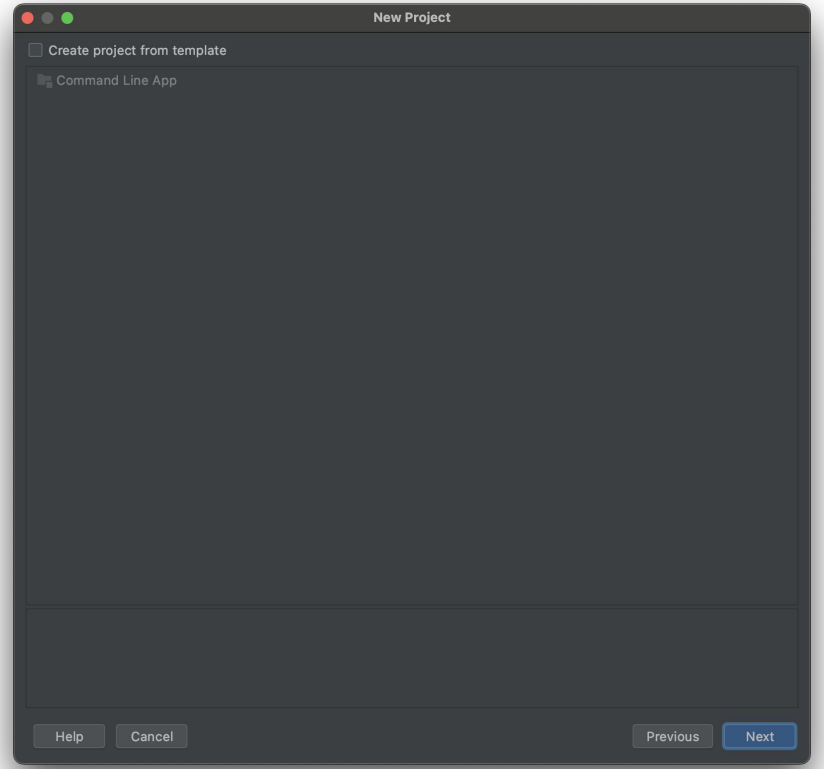
Guide - SDK


New Project
Java
Maven
Gradle
Java FX
Android
IntelliJ Platform Plugin
Groovy
Kotlin
Empty Project
Project SDK:
<No SDK>
Additional Libraries and Frameworks:
Groovy
Kotlin/JVM
Use library:
[No library selected]
Create...
Help
Cancel
Previous
Next

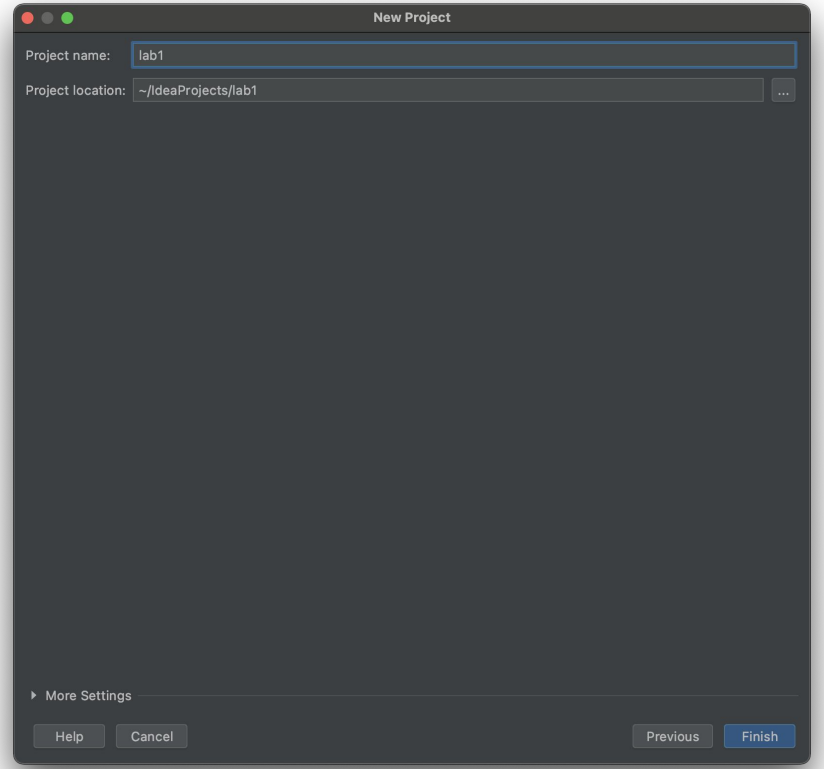
Guide - SDK


New Project
Java
Maven
Gradle
Java FX
Android
IntelliJ Platform Plugin
Groovy
Kotlin
Empty Project
Project SDK:
corretto-11 Amazon Corretto version 11.0.10
Additional Libraries and Frameworks:
Groovy
Kotlin/JVM
Use library:
[No library selected]
Create...
Error: library is not specified
Help
Cancel
Previous
Next

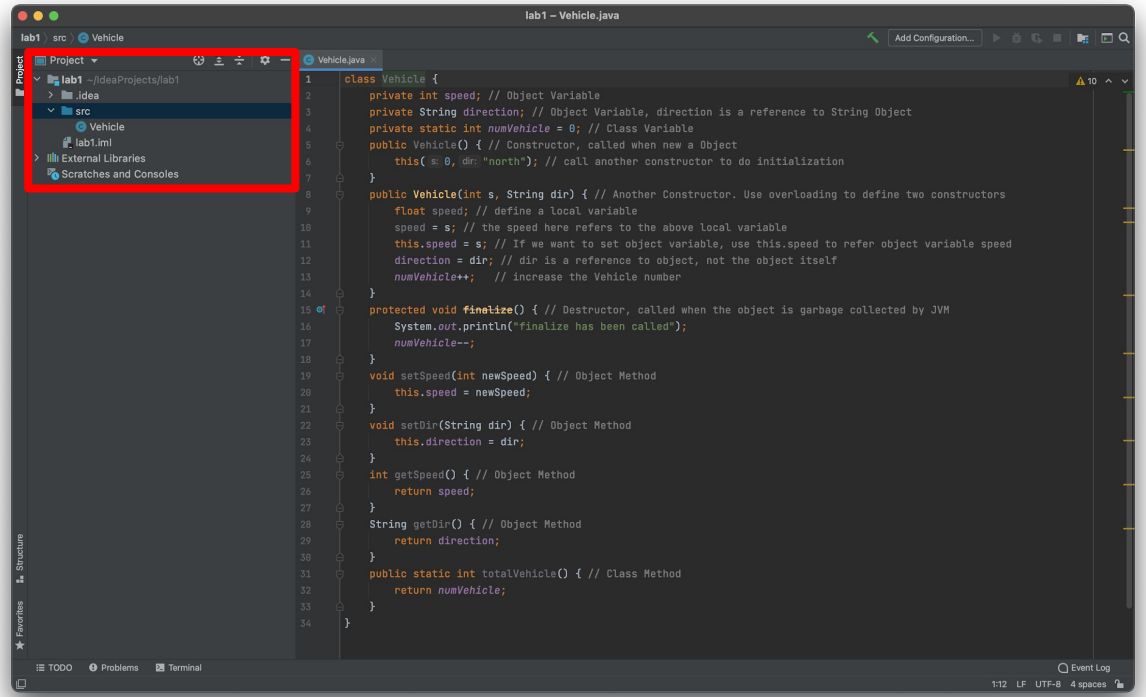
Guide - Template



Guide - Name

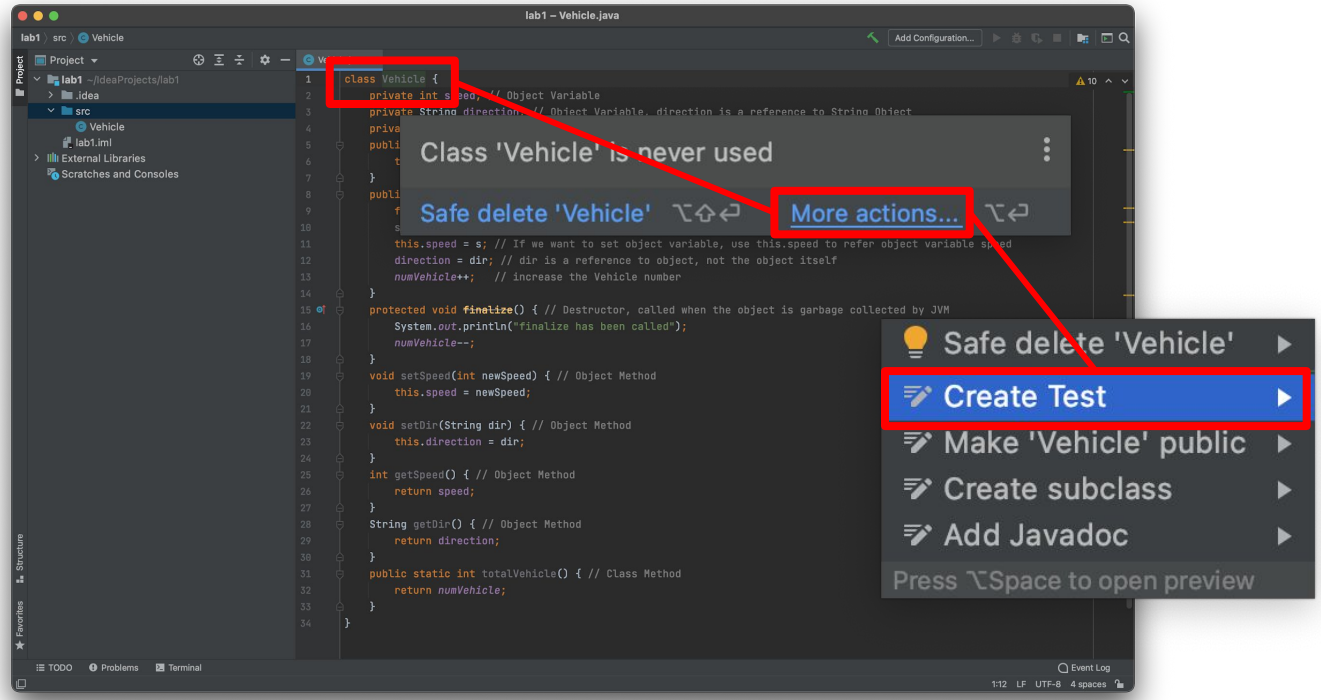

New Project
Project name:
lab1
Project location:
~/IdeaProjects/lab1
...
More Settings
Help
Cancel
Previous
Finish

Guide - SRC

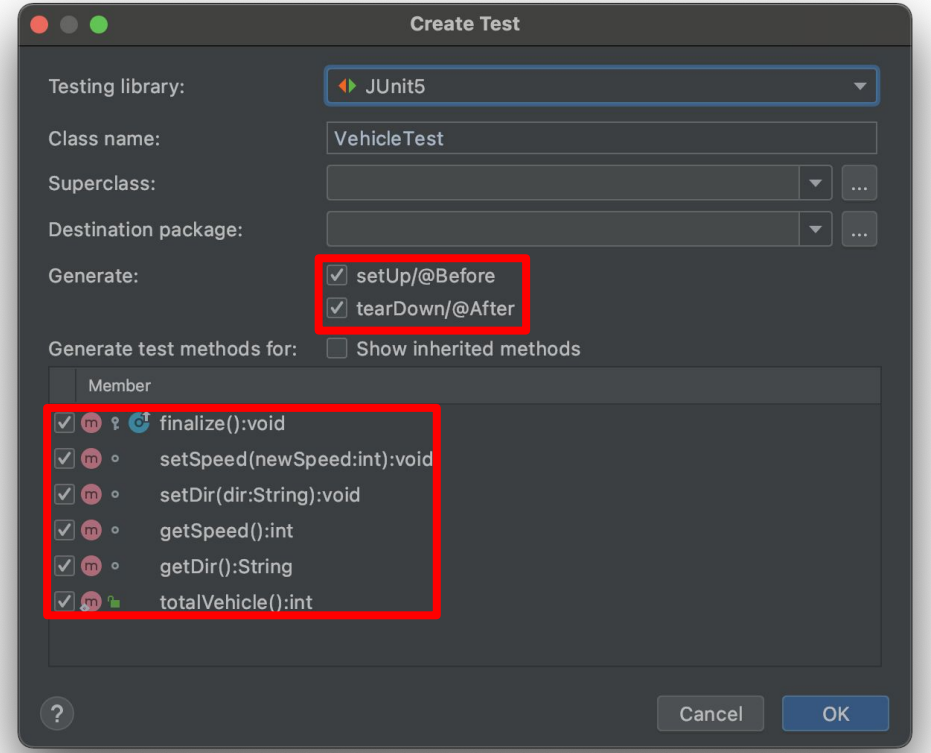

lab1 – Vehicle.java
lab1 › src › Vehicle
Add Configuration...
Project
lab1 ~/IdeaProjects/lab1
.idea
src
Vehicle
lab1.iml
External Libraries
Scratches and Consoles
Vehicle.java
class Vehicle {
private int speed; // Object Variable
private String direction; // Object Variable, direction is a reference to String Object
private static int numVehicle = 0; // Class Variable
public Vehicle() { // Constructor, called when new a Object
this(s: 0, dir: "north"); // call another constructor to do initialization
}
public Vehicle(int s, String dir) { // Another Constructor. Use overloading to define two constructors
float speed; // define a local variable
speed = s; // the speed here refers to the above local variable
this.speed = s; // If we want to set object variable, use this.speed to refer object variable speed
direction = dir; // dir is a reference to object, not the object itself
numVehicle++; // increase the Vehicle number
}
protected void finalize() { // Destructor, called when the object is garbage collected by JVM
System.out.println("finalize has been called");
numVehicle--;
}
void setSpeed(int newSpeed) { // Object Method
this.speed = newSpeed;
}
void setDir(String dir) { // Object Method
this.direction = dir;
}
int getSpeed() { // Object Method
return speed;
}
String getDir() { // Object Method
return direction;
}
public static int totalVehicle() { // Class Method
return numVehicle;
}
}
TODO
Problems
Terminal
Event Log
1:12 LF UTF-8 4 spaces

Create Test

Create Test

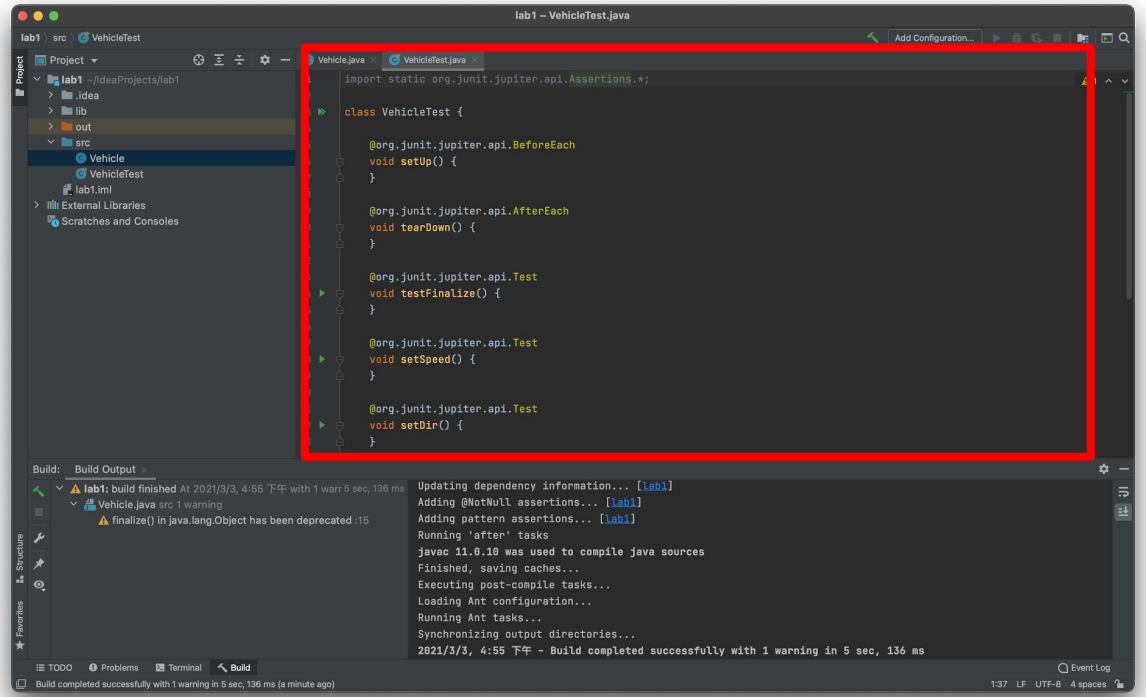

lab1 – Vehicle.java
Class 'Vehicle' is never used
Safe delete 'Vehicle'
More actions...
Safe delete 'Vehicle'
Create Test
Make 'Vehicle' public
Create subclass
Add Javadoc
Press ⌥Space to open preview

Create Test - JUnit 5



Create Test - New File

1.



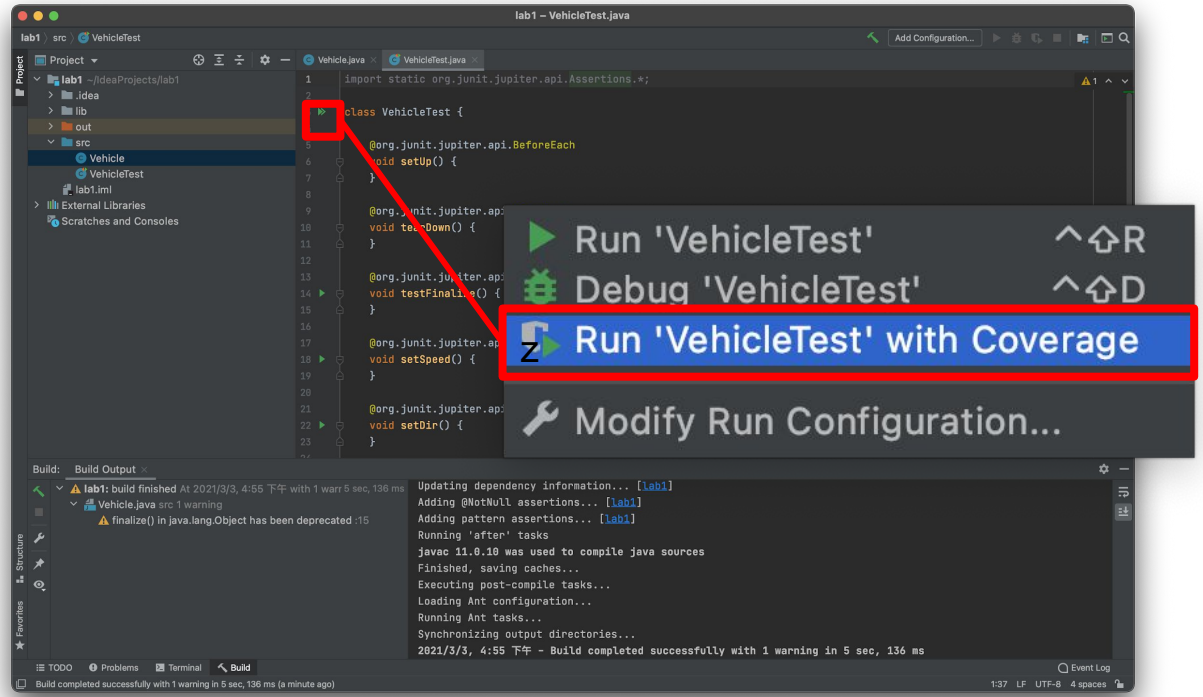
Code Coverage

Code Coverage

- In computer science, test coverage is **a measure used to describe the degree** to which the source code of **a program is executed** when a **particular test suite runs**.
- A program with high test coverage, measured as a percentage, has had more of its source code executed during testing, which suggests it has a lower chance of containing undetected software bugs compared to a program with low test coverage.

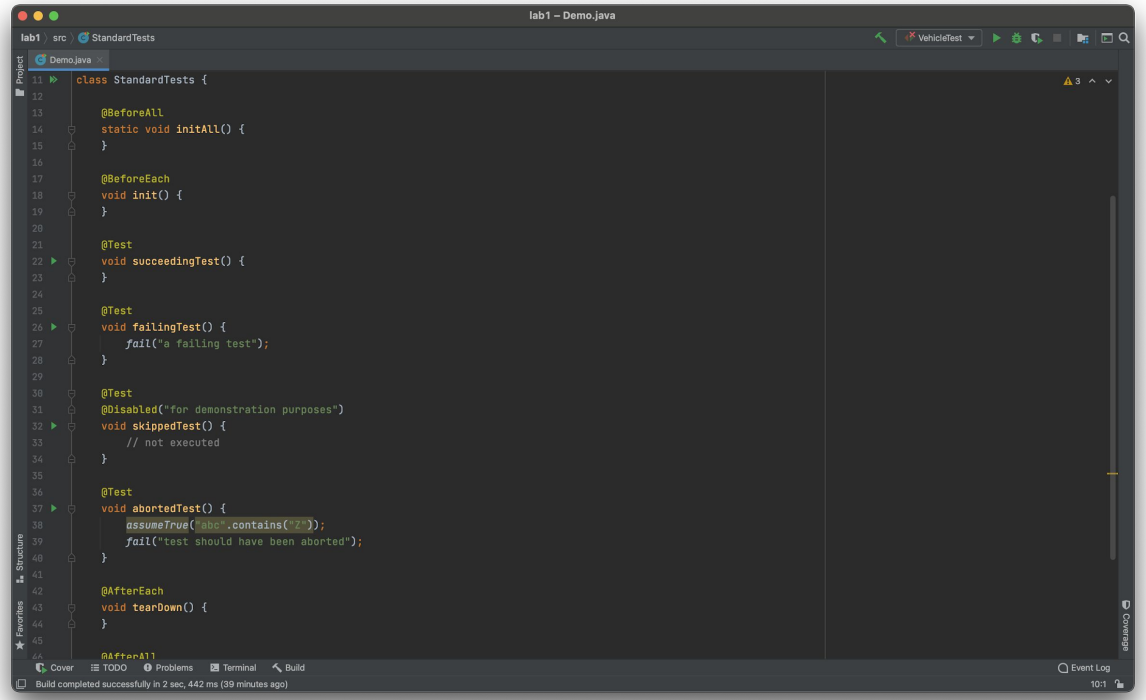
➔ *https://en.wikipedia.org/wiki/Code_coverage*

Get Code Coverage



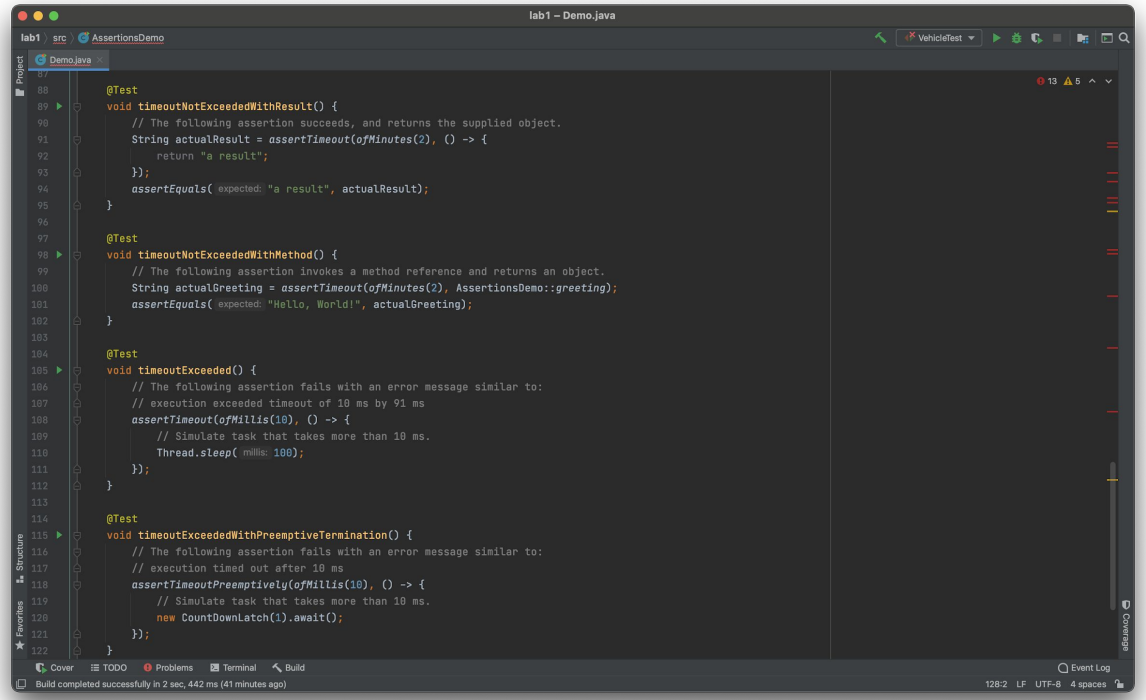
JUnit 5

Test Classes and Methods



➔ https://junit.org/junit5/docs/current/user-guide/#writing-tests-classes-and-methods

Assertions



➔ https://junit.org/junit5/docs/current/user-guide/#writing-tests-assertions

Lab

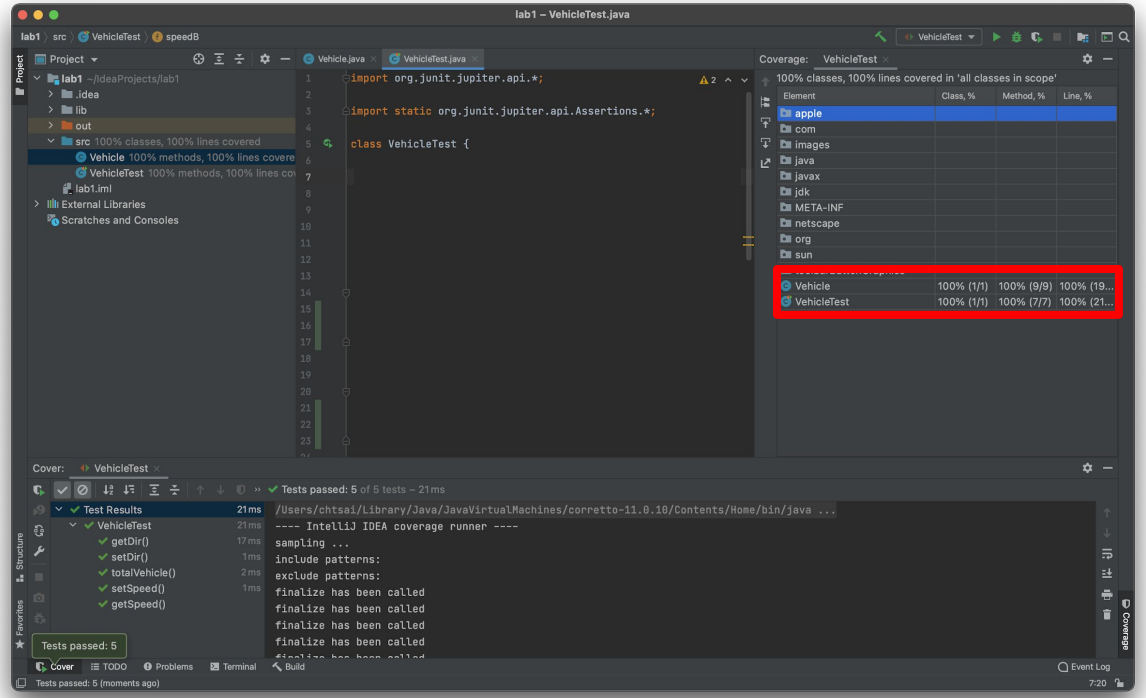
Lab

1. Download **Vehicle.java** from Github.
   a. https://github.com/iasthc/NYCU-Software-Testing-2021
2. Cover all code with test cases.
3. Deliverables shall include the following:
   a. Test Code: *VehicleTest.java*
   b. Screenshot of test coverage: *STUDENT_ID.png*

Hint: Assertion

Do not compress the files and plagiarism.

Lab


lab1 – VehicleTest.java
Project
lab1 ~/IdeaProjects/lab1
.idea
lib
out
src 100% classes, 100% lines covered
Vehicle 100% methods, 100% lines covere
VehicleTest 100% methods, 100% lines cov
lab1.iml
External Libraries
Scratches and Consoles
Vehicle.java
VehicleTest.java
import org.junit.jupiter.api.*;
import static org.junit.jupiter.api.Assertions.*;
class VehicleTest {
Coverage: VehicleTest
100% classes, 100% lines covered in 'all classes in scope'
Element
Class, %
Method, %
Line, %
apple
com
images
java
javax
jdk
META-INF
netscape
org
sun
Vehicle 100% (1/1) 100% (9/9) 100% (19...
VehicleTest 100% (1/1) 100% (7/7) 100% (21...
Cover: VehicleTest
Tests passed: 5 of 5 tests – 21 ms
Test Results 21 ms
VehicleTest 21 ms
getDir() 17 ms
setDir() 1 ms
totalVehicle() 2 ms
setSpeed() 1 ms
getSpeed()
/Users/chtsai/Library/Java/JavaVirtualMachines/corretto-11.0.10/Contents/Home/bin/java ...
---- IntelliJ IDEA coverage runner ----
sampling ...
include patterns:
exclude patterns:
finalize has been called
finalize has been called
finalize has been called
finalize has been called
Tests passed: 5
Cover
TODO
Problems
Terminal
Build
Event Log
Tests passed: 5 (moments ago)
7:20