Lab 1 Report

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3/9

1 Test Plan

1.1 Test requirements

The Lab 1 requires to (1) select 15 methods from 6 classes of the SUT (GeoProject), (2) design Unit test cases based on the experience or intuition for the selected methods, (3) develop test scripts to implement the test cases, (4) execute the test script on the selected methods, and (5) report the test result.

In particular, based on the statement coverage criterion, the **test requirements** for Lab 1 are to design test cases for each selected method so that "*each statement of the method will be covered by at least one test case* and *the minimum statement coverage is 40%*".

1.2 Strategy

To satisfy the test requirements listed in Section 1, a proposed strategy is to

(1) select those public methods that are easy to understand and have primitive types of input and output parameters (if possible).

(2) set the objective of the minimum statement coverage to be 50% initially and (if necessary) adjust the objective based on the time available.

(3) learn the necessary skills and tools as soon as possible.

1.3 Test activities

To implement the proposed strategy, the following activities are planned to perform.

No.	Activity Name	Plan hours	Schedule Date
1	Study GeoProject	1	3/4
2	Learn Junit	1	3/4
3	Design test cases for the selected methods	0.5	3/4
4	Implement test cases	3	3/4
5	Perform test	1	3/4
6	Complete Lab1 report	2	3/8

1.4 Success criteria

All test cases designed for the selected methods must pass (or "90% of all test cases must pass) and *the statement coverage should have achieved at least 80%*.

2 Test Design

To fulfill the test requirements listed in section 1.1, the following methods are selected and corresponding test cases are designed.

No.	Class	Method	Inputs	Expected Outputs
1	Base32	encodeBase32()	233,2	79
2	Base32	encodeBase32()	258	000000000082
3	Base32	decodeBase32()	“123”	1091
4	Base32	getCharIndex()	‘1’	1
5	Base32	padLeftWithZerosToLength()	“123”,4	0123
6	Coverage	getHashes()	Null	[abc]
7	Coverage	getRatio()	Null	0
8	Coverage	getHashLength()	Null	3
9	Coverage	toString()	Null	Coverage [hashes=[abc], ratio=0.0]
10	CoverageLongs	getHashes()	Null	1
11	CoverageLongs	getRatio()	Null	1.1
12	CoverageLongs	getHashLength()	Null	1
13	CoverageLongs	getCount()	Null	1
14	GeoHash	adjacentHash()	“1”,TOP	“3”
15	GeoHash	right()	“1”	“4”
16	GeoHash	left()	“1”	“0”
17	GeoHash	top()	“1”	“3”
18	GeoHash	bottom()	“1”	“j”

3 Test Implementation

The design of test cases specified in Section 2 was implemented using JUnit 4. The test script of 3 selected test cases are given below. The rest of test script implementation can be found in the link.

No.	Test method	Source code

1	Base32.encodeBase32()	`@Test`
		`public void encodeBase321() {`
		`assertEquals("000000000082",Base32.encodeBase32(258));`
		`}`

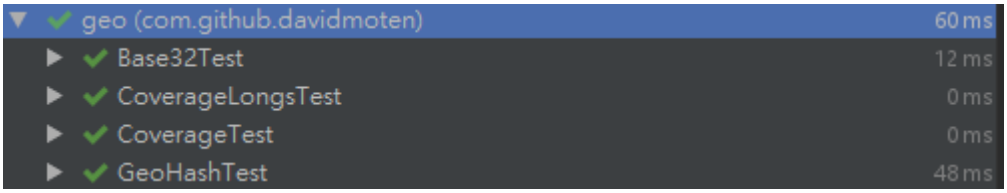
2	GeoHash.adjacentHash()	`@Test`
		`public void adjacentHash() {`
		
		`assertEquals("3",GeoHash.adjacentHash(hash,Direction.TOP));`
		`}`

3	GeoHash.right()	`@Test` `public void right() {`

```
        assertEquals("4",GeoHash.right(hash));
    }
```

4 Test Results

4.1 JUnit test result snapshot



Test Summary

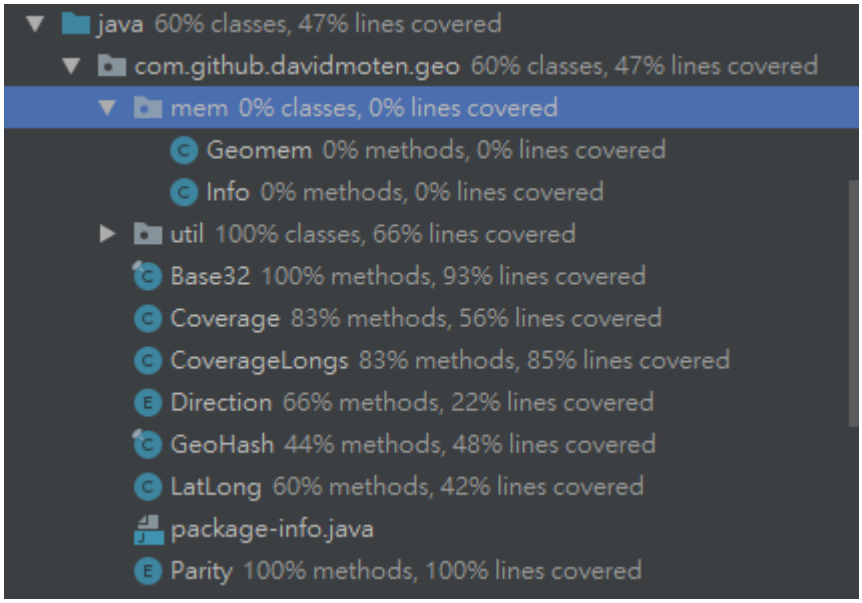
18 tests	0 failures	0 ignored	0.141s duration	100% successful

Packages **Classes**

Class	Tests	Failures	Ignored	Duration	Success rate
com.github.davidmoten.geo.Base32Test	5	0	0	0.016s	100%
com.github.davidmoten.geo.CoverageLongsTest	4	0	0	0s	100%
com.github.davidmoten.geo.CoverageTest	4	0	0	0s	100%
com.github.davidmoten.geo.GeoHashTest	5	0	0	0.125s	100%

4.2 Code coverage snapshot

- Coverage of each selected method

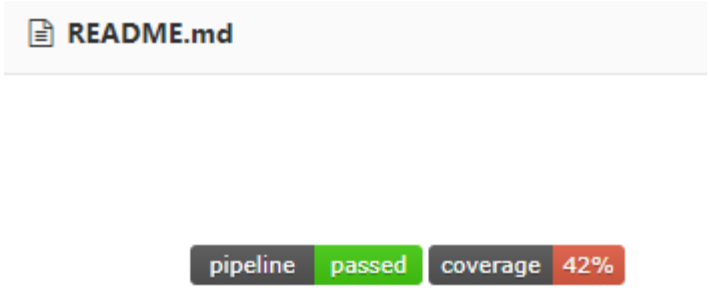


- Total coverage

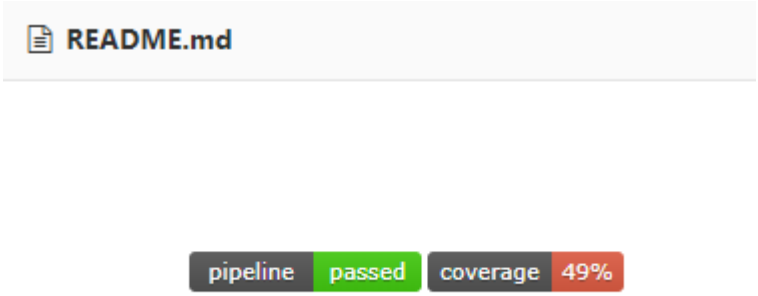
Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed	Classes
com.github.davidmoten.geo		58%		40%	85	149	154	348	25	68	2	10
com.github.davidmoten.geo.mem		0%		0%	30	30	61	61	20	20	3	3
com.github.davidmoten.geo.util		36%		50%	2	4	2	6	0	2	0	1
Total	1,157 of 2,326	50%	119 of 186	36%	117	183	217	415	45	90	5	14

4.3 CI result snapshot (3 iterations for CI)

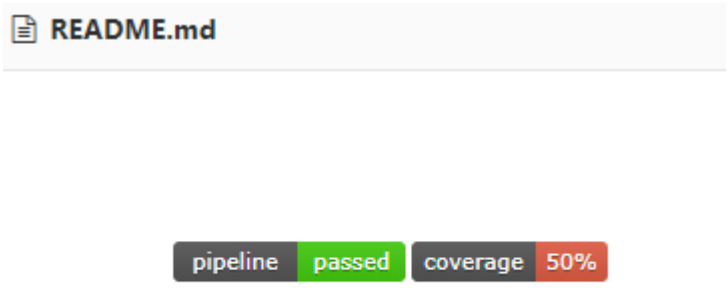
- CI#1



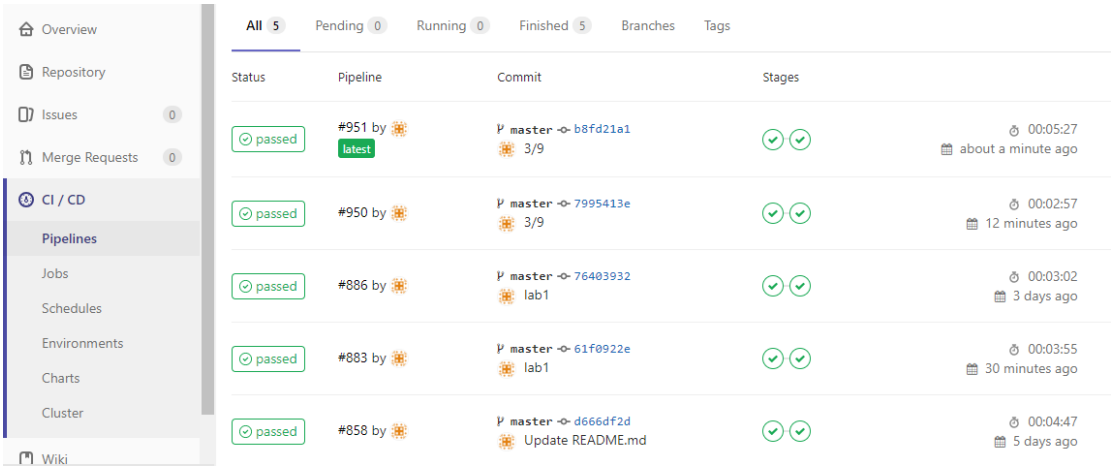
- CI#2



- CI#3



- CI Pipeline



5 Summary

In Lab 1, **18 test cases have been designed and implemented using JUnit**. The test is conducted in 3 CI and **the execution results of the 18 test methods are all passed**. **The total statement coverage of the test is 50%.** Thus, the test requirements described in Section 1 are satisfied. Some lessons learned in this Lab are …