

Lab 3 Report

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Date 2018/04/24

1 Test Plan

1.1 Test requirements

The Lab 3 requires to

- (1) 從 SUT(GeoProject)的 6 個 classes 裡面挑選至少 15 個 methods 測試
- (2) 運用 Basis Path Coverage 技術替挑選的 methods 設計單元測試案例
- (3) 開發測試腳本實作這些測試案例
- (4) 在挑選的 methods 上執行測試腳本
- (5) 將測試結果撰寫成報告
- (6) 藉由運用 Basis Path Coverage 技術，有系統的設計測試案例且從中學習並獲取經驗

1.2 Test Strategy

為了滿足 1.1 所列需求，以下提出一些策略：

- (1) 挑選 lab2 已經測試過的 5 個 methods 標記及畫 5 張 CFG
- (2) 將 lab2 的 total 覆蓋率設為此次的最低目標，並根據剩餘時間調整目標
- (3) 使用 Basis Path Coverage 技術設計所挑選 methods 的測試案例

1.3 Test activities

為了完成 1.2 所提出之策略，計畫執行下列事項：

No.	Activity Name	Plan hours	Schedule Date
1	替挑選的 methods 設計測試案例	3	2018/04/22
2	實作測試案例	4	2018/04/22
3	執行測試	3	2018/04/23
4	完成 Lab3 測試報告	3	2018/04/24

1.4 Design Approach

以 basis path 和 graph coverage 為核心，依程式碼畫出相對應流程圖，測試案例以覆蓋各種路徑為目的，藉由考慮各種案例或使用測試經驗來添加更多測試案例。

1.5 Success criteria

所有挑選的測試案例必須通過，並盡可能提高覆蓋率已提高測試品質

2 Test Design

Test Design 寫於 excel 檔案裏面

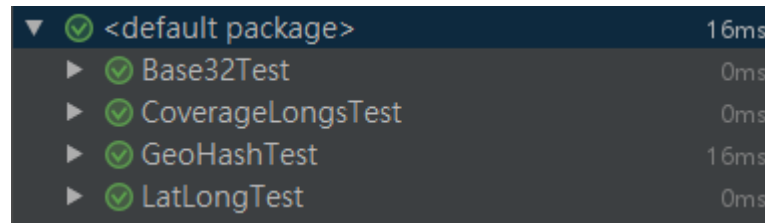
3 Test Implementation

第二節所指定的測試案例的設計是使用 Junit4 完成的，下列列出選定的三個測試案例，其餘的請參閱 gitlab 相對應連結。

N o.	Test method	Source code
1	fromLongToString ()	<pre>static String fromLongToString(long hash) { int length = (int) (hash & 0xf); if (length > 12 length < 1) throw new IllegalArgumentException("invalid long geohash " + hash); char[] geohash = new char[length]; for (int pos = 0; pos < length; pos++) { geohash[pos] = BASE32.charAt(((int) (hash >> 59))); hash <<= 5; } return new String(geohash); }</pre>
2	padLeftWithZerosToLength ()	<pre>static String padLeftWithZerosToLength(String s, int length) { if (s.length() < length) { int count = length - s.length(); StringBuilder b = new StringBuilder(); for (int i = 0; i < count; i++) b.append('0'); b.append(s); return b.toString(); } else return s; }</pre>
3	encodeBase32 ()	<pre>public static String encodeBase32(long i, int length) { char[] buf = new char[65]; int charPos = 64; boolean negative = (i < 0); if (!negative) i = -i; while (i <= -32) { buf[charPos--] = characters[(int) (-(i % 32))]; i /= 32; } buf[charPos] = characters[(int) (-i)]; String result = padLeftWithZerosToLength(new String(buf, charPos, (65 - charPos)), length); if (negative) return "-" + result; else return result; }</pre>

4 Test Results

4.1 JUnit test result snapshot



▼ ✓ <default package>	16ms
▶ ✓ Base32Test	0ms
▶ ✓ CoverageLongsTest	0ms
▶ ✓ GeoHashTest	16ms
▶ ✓ LatLongTest	0ms

Test Summary

34 tests	0 failures	0 ignored	0.057s duration	100% successful
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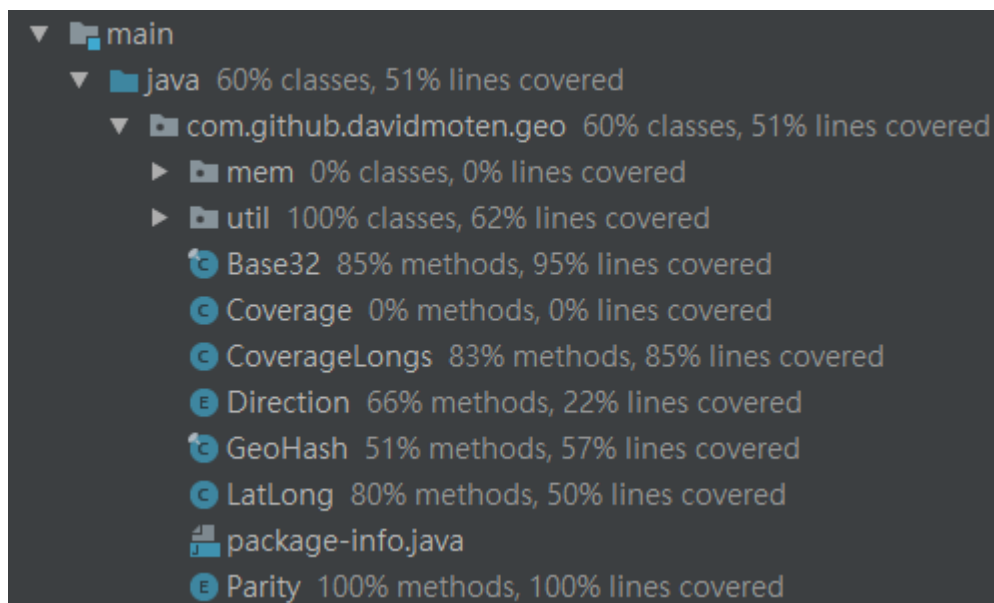
Packages

Classes

Package	Tests	Failures	Ignored	Duration	Success rate
com.github.davidmoten.geo	34	0	0	0.057s	100%

4.2 Code coverage snapshot

- Coverage of each selected method



▼ main
▼ java 60% classes, 51% lines covered
▼ com.github.davidmoten.geo 60% classes, 51% lines covered
▶ mem 0% classes, 0% lines covered
▶ util 100% classes, 62% lines covered
Base32 85% methods, 95% lines covered
Coverage 0% methods, 0% lines covered
CoverageLongs 83% methods, 85% lines covered
Direction 66% methods, 22% lines covered
GeoHash 51% methods, 57% lines covered
LatLong 80% methods, 50% lines covered
package-info.java
Parity 100% methods, 100% lines covered

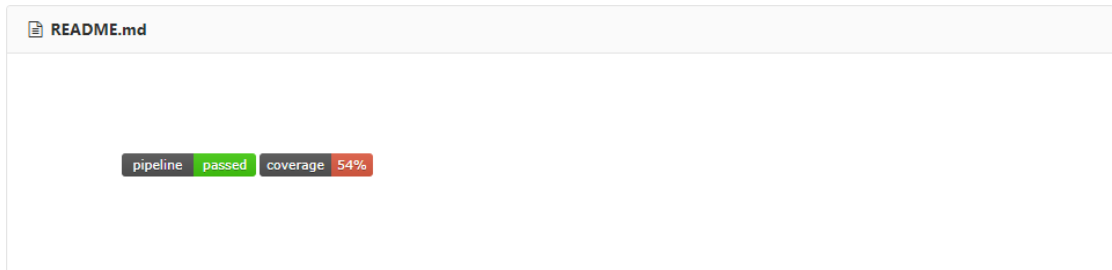
- Total coverage

geo

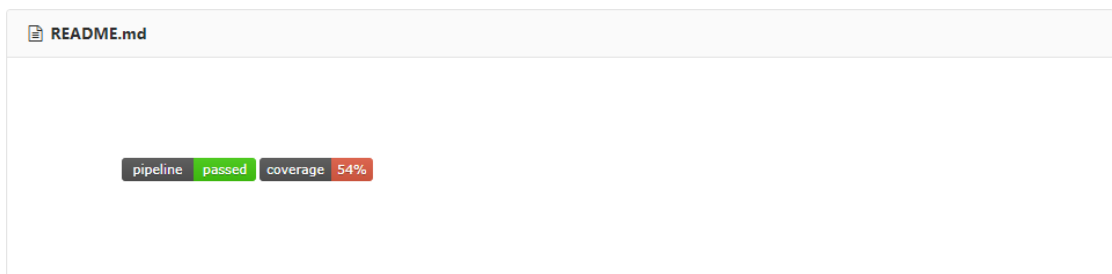
Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed Ctxy	Missed Lines	Missed Methods	Missed Classes
com.github.davidmoten.geo	<div><div></div></div>	66%	<div><div></div></div>	52%	71 159	128 354	27 78	1 10
com.github.davidmoten.geo.mem	<div><div></div></div>	0%	<div><div></div></div>	0%	30 30	61 61	20 20	3 3
com.github.davidmoten.geo.util	<div><div></div></div>	59%	<div><div></div></div>	75%	2 5	3 8	1 3	0 1
Total	1,037 of 2,379	56%	99 of 186	47%	103 194	192 423	48 101	4 14

4.3 CI result snapshot (4 iterations for CI)

- CI#1



- CI#2



- CI Pipeline

	#646 by	P master -> 300b7fa6 test		00:01:34 43 minutes ago	
	#645 by	P master -> eaf3d086 Lab3 add 2		00:01:59 about an hour ago	
	#603 by	P master -> 3677a16d commit hw3 ver2		00:01:04 a day ago	
	#600 by	P master -> 80ccbdfe commit hw3		00:00:55 a day ago	

5 Summary

在此次 Lab3，已使用 Junit 及 ISP 技術設計 20 個測試案例。通 2 個 CI 進行測試，並通過了 20 個測試。總覆蓋率為 54%，想較於上次 Lab2 的 52% 有了些提升，因此在第一節所描述的測試要求是達成的。本 Lab3 所學習到的透過覆蓋率設計來達成良好的測試案例，使以後能更有系統畫的設計測試案例。