CS608

LAB 1

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Notes

- While doing the labs, watch the CLASS DISCUSSION FORUM and LECTURER ANNOUNCEMENTS on Moodle for any issues
- The purpose of lab 1 was:
  - To make sure you can run the gradle scripts
  - To get you used to filling in tables
  - To make you start thinking about software testing
- In future labs you will be:
  - Developing your own tests (using Java and TestNG)
  - Executing gradle commands directly from the command line (not from a script)

LAB 1 Summary – 3 Tasks

1. Run some examples from the book
2. Examine RandomTest.java
3. Complete the lab 1 quiz questions

Enter the data from your manual testing into the table below. Note: the answers are case sensitive.

Manual Test Example

Command	bonusPoints	gold customer flag	Results	Correct?
check				
check				
check				

If this manual test took you 30 seconds to run (including checking the output is correct against the specification), how long would it take you to run 1000 tests? seconds.

Could you expect a tester do this reliably and accurately for 8.33 hours?

Manual Test Example

Command	bonusPoints	gold customer flag	Results	Correct?
check	100	false	FULLPRICE	yes
check	100	true	DISCOUNT	yes
check	-10	false	ERROR	yes

If this manual test took you 30 seconds to run (including checking the output is correct against the specification), how long would it take you to run 1000 tests?

30000 seconds.

Could you expect a tester do this reliably and accurately for 8.33 hours? no

The results from Googenough and Gerhart's paper on the theory of software testing can be summarised as follows:

- For a test to be successful, all test data within the test set must produce the results as defined by the specification.
- The test data selection criteria is reliable if it consistently produces test sets which are successful, or it consistently produces test sets which are not successful.
- If a set of test data is chosen using a criterion that is reliable and valid, then the successful execution of that test data implies that the program will produce correct results over its entire input domain.

This leads to the result:

- the only criterion that can be guaranteed to be reliable and valid is one that selects each and every value in the program domain.

This means that to fully test a program you must: [ ] .

If you can execute 2^30 automated tests in one second, how many seconds would it take to execute enough tests for 2^64 possible input values? [ ] (note: no commas in your answer) or [ ] years (assuming 365 days in a year, and rounded up to the nearest year).

The results from Googenough and Gerhart's paper on the theory of software testing can be summarised as follows:

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This leads to the result:

- the only criterion that can be guaranteed to be reliable and valid is one that selects each and every value in the program domain.

This means that to fully test a program you must: test for every possible input and output .

If you can execute 2^30 automated tests in one second, how many seconds would it take to execute enough tests for 2^64 possible input values? 17179869184 (note: no commas in your answer) or 545 years (assuming 365 days in a year, and rounded up to the nearest year).

In running the random tests you can see the three problems: the test oracle problem, the test data problem, and the test completion problem.

Complete the following statements.

1. Test Oracle Problem: the random test as shown [ ] check that each output is correct.
2. Test Data Problem: the output value [ ] occurs least frequently in the random tests.
3. Test Completion Problem: the test completes after [ ]. This is [ ]. You should examine the source code RandomTest.java before answering this.

Run the random test example from Chapter 1.

In running the random tests you can see the three problems: the test oracle problem, the test data problem, and the test completion problem.

Complete the following statements.

1. Test Oracle Problem: the random test as shown [does not] ✔ check that each output is correct.
2. Test Data Problem: the output value [FULLPRICE] ✔ occurs least frequently in the random tests.
3. Test Completion Problem: the test completes after [1000 loops] ✔ . This is [essentially an arbitrary value] ✔ . You should examine the source code RandomTest.java before answering this.

```
public static void checkRandomTest(long loops) {

   long sTime=System.currentTimeMillis();

   for (long i=0; i<loops; i++) {
      bonusPoints = r.nextLong();
      goldCustomer = r.nextBoolean();
      result = Check.check( bonusPoints, goldCustomer );
      System.out.println("check("+bonusPoints+","+goldCustomer+")->"+result);
   }

}

public static void main(String[] args) {

   checkRandomTest(1000);

}
```

Running the book examples

1. Run Chapter 2 Example 4:

- Did all 4 tests pass? [ ]
- The test output for test[0] is:

  [ ] - hint: copy-and-paste the entire line

2. Run chapter 5 Example 1,:

- Were you able to see a a table of execution data for OnlineSales (as shown below) - either opened automatically, or by manually opening the .html file? [ ]

OnlineSales

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods
OnlineSales()		0%		n/a	1	1	1	1	1	1
giveDiscount(long, boolean)		93%		87%	1	5	1	11	0	1
Total	5 of 32	84%	1 of 8	87%	2	6	2	12	1	2

- Test output for test[13] is:

  [ ] - again, copy-and-paste the entire line

3. Run Chapter 10 Example 1

- What is the Test Result: [ ] - again, copy-and-paste the entire line

Running the book examples

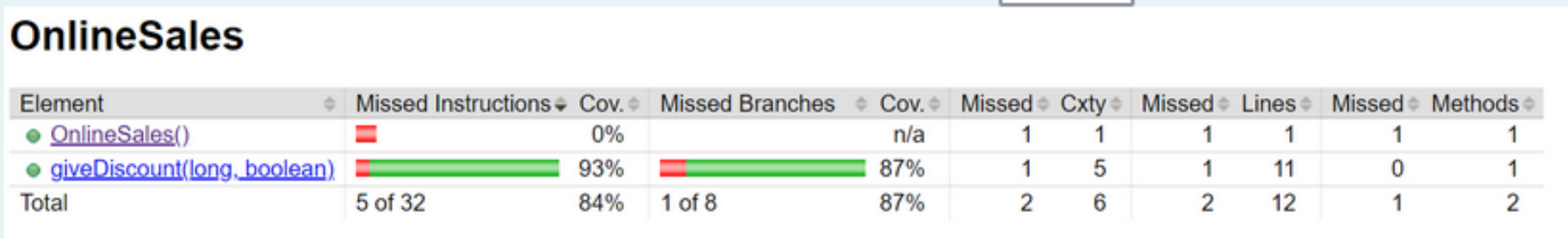
1. Run Chapter 2 Example 4:

- Did all 4 tests pass? YES
- The test output for test[0] is:

  test_giveDiscount[0](T1.1, 40, true, FULLPRICE) PASSED - hint: copy-and-paste the entire line

2. Run chapter 5 Example 1,:

- Were you able to see a a table of execution data for OnlineSales (as shown below) - either opened automatically, or by manually opening the .html file? YES



OnlineSales

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods
OnlineSales()		0%		n/a	1	1	1	1	1	1
giveDiscount(long, boolean)		93%		87%	1	5	1	11	0	1
Total	5 of 32	84%	1 of 8	87%	2	6	2	12	1	2

- Test output for test[13] is: test_giveDiscount[13](T3.2, 200, true, DISCOUNT) PASSED

  - again, copy-and-paste the entire line

3. Run Chapter 10 Example 1

- What is the Test Result: Test Result: SUCCESS - again, copy-and-paste the entire line