	Topics
CMPT 276 - © Dr. B. Fraser	 1) What tools support unit testing? 2) What makes a good bug report? 3) What testing tools are available for the Android?
	JUnit Unit Testing
Unit testing with JUnit	 Unit Tests Purpose: For <i>you</i> to "know" <i>your</i> code works. Should test 100% of a class. Helps improve quality of code. Supports aggressive refactoring because you can Simplifies reasoning about whole program correctness
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JUnit Context

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- · You create a test class which is...
- JUnit test runner executes your test class.

Basic JUnit Architecture



Running the test	Test Runner
 A test runner Test runner's will: Search the method names of the testing class for all Must be public, return type void, and accept no parameters. For each "test" function: Runs the selected "test" method. Report on which tests passed/failed. 	 Displays summary of results and a coloured bar: Green-bar Saying "Green-bar" means all tests passing. Red-bar Saying "Red-bar" means a test failing. IDEs often have a built in test-runner: IDEs often have a built in test-runner: IDEs often have a built in test-runner: IDEs often have a built in test-runner:
Bug reports Bug FEATURE	 Bug Reports When a tester or user finds a bug, they submit a bug-report Also called a The bug report must: Clearly state the problem, Explain the steps to cause the problem, State the environment in which it occurs.
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Usual portions of a bug report	Bug suggestions
ItemDescriptionSummaryShort description of problem. In one line, catch eye of person who might fix it	The better the bug report, the more likely the developer is to identify the problem and fix it.
ComponentState which product had error.Steps toGive steps which cause error.ReproduceState if it always occurs, or occasionally	 Example files: For an office application, or a compiler, provide an example file which causes the problem. Screenshots: A picture of the problem is great at definitively.
Expected vs What the steps <i>should</i> do, vs what they <i>did</i> do. Actual result Ensure it is actually an error not a feature: "Working as intended"?	 Showing what happened. Often developers are
Environment Describe operating environment: Operating system, hardware, software versions, other software, driver versions, serial-numbers	
 Life-cycle of a bug Some resolutions: Fixed Duplicate Won't Fix "ID-10-T" "PEBKAC" Enhancement / feature request 	Android testing tools
15-03-20 Image Source: Bugzilla – lifecycle. Mozilla guidelines and bugzilla. 16	15-03-20 17

Android and JUnit

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Android and JUnit	Robotium code
 Android integrates support for JUnit. Allows deep testing of application. 	<pre>package com.androidbook.triviaquiz12.test; // imports go here See example. public class ActivitySwitchTest extends ActivityInstrumentationTestCase2<quizmenuactivity>{ private Solo solo;</quizmenuactivity></pre>
 But, awkward to setup large tests. Robotium Open source tool for of Android applications. Allows tests to be specified at a simpler level than the JUnit white-box testing. For example, you don't have to know names of views within an activity 	<pre>public ActivitySwitchTest() throws ClassNotFoundException { super("com.androidbook.triviaquiz12", QuizMenuActivity.class); } protected void setUp() throws Exception { solo = new Solo(getInstrumentation(), getActivity()); } public void testHelpScreen(){ solo.assertCurrentActivity("Check is main screen", QuizMenuActivity.class); solo.clickInList(4); solo.assertCurrentActivity("Check is help screen", QuizHelpActivity.class); solo.goBack(); solo.assertCurrentActivity("Check is main screen", QuizMenuActivity.class); } public void testViewScores(){ } </pre>
15-03-20 18	ActivitySwitchTest.java ¹⁹
Robotium code – explained	Instrumentation
<pre>package com.androidbook.triviaquiz12.test; // imports go here See example. public class ActivitySwitchTest extends ActivityInstrumentationTestCase2<quizmenuactivity>{</quizmenuactivity></pre>	 Instrumentation: A technique to allow Android uses the ActivityInstrumentationTestCase2 class to instrument our activity class so we can: Control it:
<pre>private Solo solo; protected void setUp() throws Exception { solo = new Solo(getInstrumentation(), getActivity()); }</pre> Solo is the Robotium object we do all our interactions with.	 Measure it: Check its outputs and behaviour.

ActivitySwitchTest.java ²⁰

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Monkey

• Android's Monkey tool ...

 Useful for finding strange combinations of events which cause problems.

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Monkey demo	22

Summary

- JUnit is an automated testing tool.
- Asserts used to automatically check conditions.
- Bug reports include
 - Description of problem.
 - Steps to reproduce.
 - Description of product version, hardware, software.
- Android supports:
 - JUnit for detailed activity testing (white-box).
 - Robotium for black-box testing.
 - Monkey for random UI stress-testing.

