Intro to JUnit

References:
Dr. Ghosh's slides based on http://www.junit.org/
Paul Ammann & Jeff Offutt from http://www.cs.gmu.edu/~offutt/softwaretest/

What is JUnit?

- Open source Java testing framework used to write and run repeatable automated tests
- JUnit is open source (junit.org)
- A structure for writing test drivers
- JUnit features include:
  - Assertions for testing expected results
  - Test features for sharing common test data
  - Test suites for easily organizing and running tests
  - Graphical and textual test runners
- JUnit is widely used in industry
- JUnit can be used as stand alone Java programs (from the command line) or within an IDE such as Eclipse

JUnit Tests

- JUnit can be used to test …
  - … an entire object
  - … part of an object – a method or some interacting methods
  - … interaction between several objects
- It is primarily for unit and integration testing, not system testing
- Each test is embedded into one test method
- A test class contains one or more test methods
- Test classes include :
  - A test runner to run the tests (main())
  - A collection of test methods
  - Methods to set up the state before and update the state after each test and before and after all tests
- Get started at junit.org

Using JUnit

- Integrated with Eclipse – several advantages
  - Environment variables set up automagically
  - Execution tied with the Eclipse debugger
  - Test driver skeleton generated – just fill in test cases

Writing test cases in JUnit (Eclipse)

- Right-click on the ProjectWithJUnit title
- Select **New -> Other**
- Expand the "Java" selection, and choose **JUnit**.
- On the right column of the dialog, choose **Test Case**
- Click **Next**.
- Run the JUnit file as an application/debug mode.

Steps for using JUnit

- Simple framework to write repeatable tests.
- Write a test:
  - Import *junit.framework.**
  - Extends class *junit.framework.TestCase*
  - Modify the following methods:
    - *protected void setUp()* – set up the fixture of the test.
    - *protected void tearDown()* – release resources allocated in *setUp()*.
- Write test methods for the test case (method name should begin with *test)*:

  public void testMoney(){ …}
  - Use the following method for test:
    - *assertEqual(Object, Object)* – check if two objects are equal
    - *assertTrue(boolean)* – check if boolean expression is true
- Run the test using three different test runners:
  - *java junit.awtui.TestRunner ClassName*
  - *java junit.swingui.TestRunner ClassName*
  - *java junit.textui.TestRunner ClassName*

Example JUnit Test Case

```
public class Calc
{
public long add (int a, int b)
  {
    return a + b;
  }
}
```

```
import org.junit.Test
import static org.junit.Assert.*;
public class calcTest
{
  private Calc calc;
  @Test public void testAdd()
  {
    calc = new Calc ();
    assertEquals ((long) 5, calc.add (2, 3));
  }
}
```

Expected result

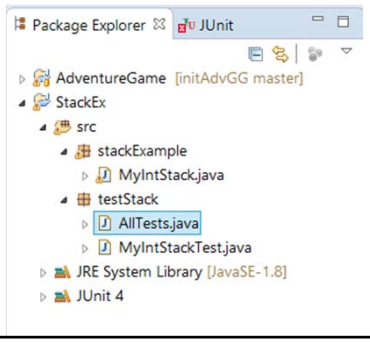
The test

AllTests

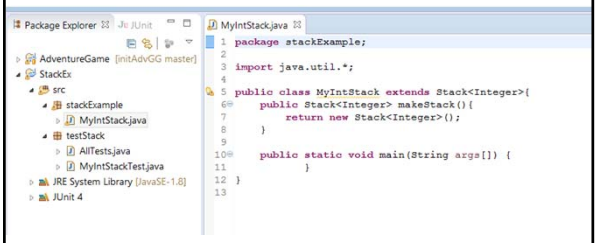
```
import org.junit.runner.RunWith;
import org.junit.runners.Suite;
import junit.framework.JUnit4TestAdapter;

// This section declares all of the test classes in the program.
@RunWith (Suite.class)
@Suite.SuiteClasses ({ StackTest.class }) // Add test classes here.

public class AllTests
{
   // Execution begins at main(). In this test class, we will execute
   // a text test runner that will tell you if any of your tests fail.
   public static void main (String[] args)
   {
     junit.textui.TestRunner.run (suite());
   }

   // The suite() method is helpful when using JUnit 3 Test Runners or Ant.
   public static junit.framework.Test suite()
   {
     return new JUnit4TestAdapter (AllTests.class);
   }
}
```

The name of your test class

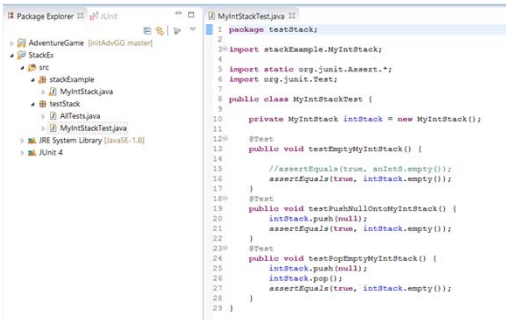
Package Structure for JUnit tests



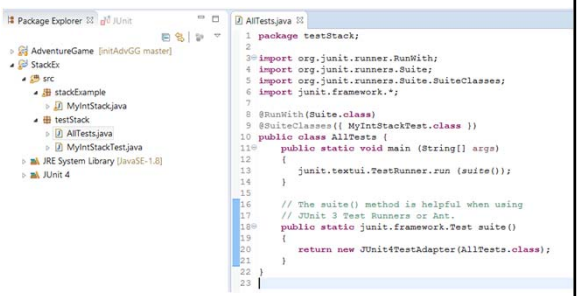
Class under test



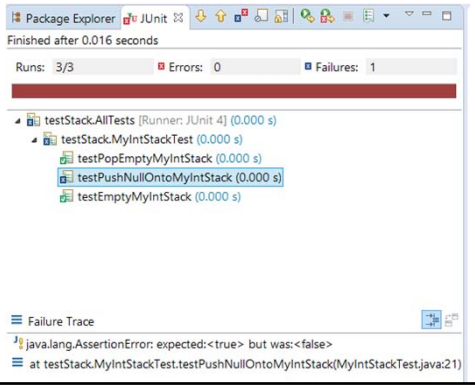
Test Code



All Tests – test driver



Results



What to do and not to do

- Do's:
  - Create new objects using constructors that are known to be correct.
  - Use the equals() method if it is known to be correct.
- Don'ts:
  - Suppose you want to test method `foo()`. ***DO NOT*** use methods `bar()` and `foo()` in the same test case if `bar()` is not known to be correct.
    - If the test failed, you don't know if it is because of `foo()` or `bar()`.

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