

Lab 6 – Unit Testing with JUnit

Goal:

The goal of this lab is to learn how to use JUnit to write unit tests for Java programs.

Preliminary – Learn about JUnit in Eclipse:

The primary goal of unit testing is to take the smallest piece of testable software in an application, isolate it from the remainder of the code, and determine whether or not it behaves the way you expect it to behave. Each unit is tested separately before integrating it into the rest of the program. In other words, classes should be tested in isolation from other classes (test the methods of a class before you use the class elsewhere). Unit testing has proven its value in that a large percentage of defects are identified during unit testing.

Lab Exercises

1. Create a new Eclipse project, and within the project create a package.
2. Create a class for a Boa. Here's the code you can use (you may copy/paste):

```
// represents a boa constructor
public class Boa {

    private String name;
    private int length; // the length of the boa, in feet
    private String favoriteFood;

    public Boa (String name, int length, String favoriteFood){
        this.name = name;
        this.length = length;
        this.favoriteFood = favoriteFood;
    }

    // returns true if this boa constructor is healthy
    public boolean isHealthy(){
        return this.favoriteFood.equals("granola bars");
    }

    // returns true if the length of this boa constructor is
    // less than the given cage length
    public boolean fitsInCage(int cageLength){
        return this.length < cageLength;
    }
}
```

3. “Creat a JUnit Test Case in Eclipse”. You’ll be creating a test case for the class Boa. When you’re asked to select test method stubs, select both `isHealthy()` and `fitsInCage(int)`.
4. Now it’s time to write some unit tests. Notice that the `BoaTest` class that JUnit created for you contains stubs for several methods. The first stub (for the method `setUp()`) is annotated with `@Before`. The `@Before` annotation denotes that the method `setUp()` will be run prior to the execution of each test method. `setUp()` is typically used to initialize data needed by each test. Modify the `setUp()` method so that it creates a couple of `Boa` objects, as follows:

```
@Before
public void setUp() throws Exception {
    jen = new Boa("Jennifer", 2, "grapes");
    ken = new Boa ("Kenneth", 3, "granola bars");
}
```

(You will need to add private fields for `jen` and `ben` to the `BoaTest` class, otherwise the compiler will complain that there are no variables with those names.)

5. JUnit also provided stubs for two test methods, each annotated with `@Test`. Work on the `testIsHealthy()` method first. The purpose of this method is to check that the `isHealthy()` method in the `Boa` class behaves the way it’s supposed to. In the JUnit tutorial, read the section on “Writing Tests”. Modify the `testIsHealthy()` method so that it checks the results of activating the `isHealthy()` method on the two `Boa` objects you created in `setup()`.

Likewise, modify the `testFitsInCage()` method to test the results of that method. Make sure your test is robust; it should check the results when the cage length is less than the length of the `boa`, when the cage length is equal to the length of the `boa`, and when the cage length is greater than the length of the `boa`. Should you write tests for both `jen` and `ken`?

6. Now you can run your tests. Read the section “Running Your Test Case” in the tutorial. Did you get a green bar in the JUnit pane? If you got a red bar, use the output in the JUnit pane to determine which test(s) failed. Fix your tests, and try running the test case again.

It’s important to note that a red bar doesn’t necessarily mean that the test case is written incorrectly; it could be that the method that’s being tested isn’t correct. In fact, that’s what unit testing is supposed to do – help us find errors in our code. When a test

fails, you need to determine if the error is in the test case itself or in the code it's testing.

7. Add a new method to the Boa class, with this purpose and signature:

```
// produces the length of the Boa in inches
public int lengthInInches() {
    // you need to write the body of this method
}
```

Add a new test case to the BoaTest class that tests the lengthInInches() method. Make sure you annotate the new test method with @Test. Run your tests.

8. Here are some other things you should know about unit testing and JUnit:
 - Each method annotated with @Test will be run, but the order of the tests is not guaranteed.
 - Any method annotated with @Before will be run before each test executes.
 - Any method annotated with @After will be run after each test executes.