Basic Keywords Practice Session

Introduction

In this article from my free Java 8 course, we will apply what we learned in my [Java 8 Course Introduction] to our first real Java program. If you haven't yet, I would recommend that you read it using the link above, so that you can understand the concepts that we are applying here.

Writing a Test

Whenever you write a program, you ***start*** by writing a test. Tests are extremely useful for a variety of reasons. A test allows the programmer to properly think through his idea, which will result in a cleaner final result. The test also serves as a formal definition of what needs to be done, and can be used for discussions with the client, before a single line of code for the program has been written. It gives a programmer the chance to ask: "Is that what you actually need?"

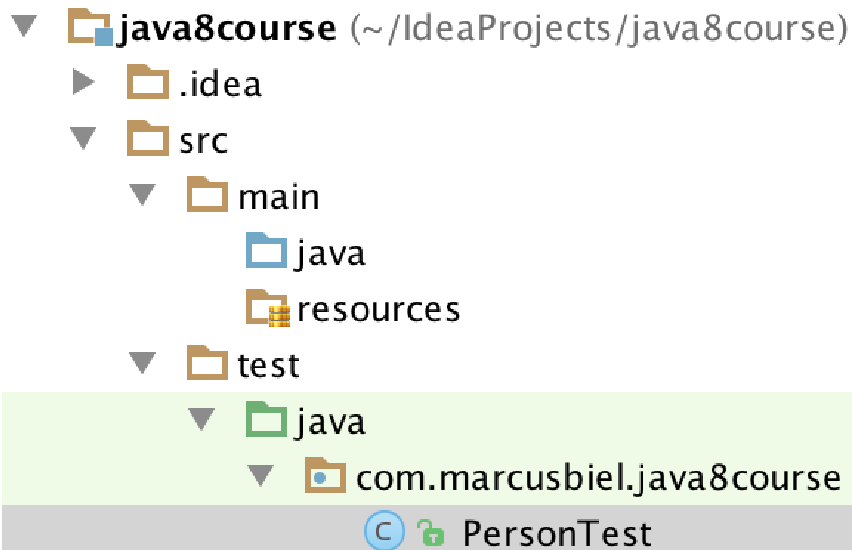
Another reason to write tests is that it will help in writing cleaner code. A test gives an external view on your program - if your code is difficult to use, you will experience the pain, and this will make you refactor and improve it. When this happens to me, I usually say: "The test speaks to me".

Last but not least, for every refactoring or new feature added to the code, the test acts as a safety net. Whenever you introduce a bug, in the ideal case, a test, running automatically after each change to the code - will fail. The test can show you the exact code line that "broke" the test, so you can instantly move in the right direction towards fixing the bug. A failing test is usually visualized as a red bar, and a passing test as a green bar, so we often speak of "green" and "red" tests instead of passing and failing tests.

PersonTest

Now that I've explained why we should write a test, let's start to code! In Example 1, I've navigated to a `PersonTest` class that I just created. I'm in my program editor or IDE (integrated development environment) which is where we write our code. There are a variety of IDEs for Java and each has its own specific functions. Generally, they act as editors for your code, highlighting different keywords, pointing out errors, and assisting you in your coding. An IDE is extremely useful and makes every step of the programming process easier for the programmer. For example, they help programmers by completing lines of code, automatically creating package structures, and auto-importing packages when they are used. However, I think that an IDE is a crutch for those who are learning to code. It doesn't allow you to completely

understand what you're doing and how you're doing it and if at some point you can't use an IDE, you wouldn't be able to function without it. For that reason, I'd recommend you ***start*** coding by using a simple text editor and compiling from the console until you've completed the first twenty lessons of this course. This will allow you to focus on learning the key aspects of Java without the assistance of the IDE.



Example 1

If you look back to Example 1, the test classes are all in a folder structure `src/test/java`, and the non-test code will be stored in `src/main/java`. A package name is basically identical to a folder structure, but Java gives the latter a special meaning. So our `package` name of `com.marcusbiel.java8course` will end up in a folder structure of `com/marcusbiel/java8course`. Remember, the folder structure must be identical to the `package` name in the Java class, Java will check that!

Now, back to our class. We have to start with our `package` declaration. For our `package` structure to match the folder structure explained above, we have to declare our package, `com.marcusbiel.java8course` at the top of our class. To end the statement we have to put a semicolon. Here's how it looks all together:

```
package com.marcusbiel.java8course;
```

Example 2

Next I define my class, which is called `PersonTest`. I do this by first typing `public`, followed by `class`, and finally the class name `PersonTest`. Then I add opening and closing curly braces. Between the curly braces is where you write your code.

```java
package com.marcusbiel.java8course;

public class PersonTest {

}
```
Example 3

@Test and our test method

According to the [JUnit 4 documentation](), the annotation `@Test` tells JUnit that the `public void` method to which the annotation is attached can be run as a test case. If we run the test and the test condition is not met, the test will fail.

To use the JUnit `@Test` annotation we import it first, as you can see in Example 4 below:

```java
import org.junit.Test;
```
Example 4

As stated above, a Junit 4 test method must be `public void`, and must not contain any parameters. Apart from that, for the name of the method we can freely choose any name we would like to. Generally, while testing, focus on *what* your program should do, not *how* this is done. This can be encouraged by following a very simple rule: start the name of your test method with “should”, followed by what you expect the method to do, from a client’s perspective.

In our case we’ll call our test method `shouldReturnHelloWorld()`. “`Hello World`” is a running gag in the world of programmers where the first program that you write in any language should always return “`Hello World`”. Needless to say that my course isn’t going to break that rule :).

Finally, above our test method, we add the annotation `@Test` to tell JUnit that this method is a test case, as explained above. Here’s what our code looks like at this point:

```java
package com.marcusbiel.java8course;

import org.junit.Test;

public class PersonTest {

    @Test
    public void shouldReturnHelloWorld() {

    }
}
```

Example 5

Variables

Ok, let's write the test! In this test we expect a `Person` object to return "`Hello World`" to us. In Java, plain text like "`Hello World`" is a specific type of data called a `String`. So in this test method, we're expecting to receive a `String` "`Hello World`". We haven't actually written any code for the `Person` object to do this, but we're starting in reverse by starting with a test, so you can assume that the `Person` class is done, even though your compiler will tell you that it's not.

For this `Person` we'll create a variable. We need a name for our variable; I'm going to call mine `marcus`. So to create the variable, we call the constructor, create the object of type `Person` in the memory, and assign it to the variable named `marcus`, as you can see below.

```
package com.marcusbiel.java8course;

import org.junit.Test;

public class PersonTest {

	@Test
	public void shouldReturnHelloWorld() {
		Person marcus = new Person();
	}
}
```

Example 6

You'll probably see that the `Person` class from Example 5 is red. This is because our `Person` class hasn't been created yet, but we'll take care of this later. Like I talked about above, this is a central part of writing a test. We're first going to create our test, in full, and then after that we'll create the classes and methods necessary to make it pass.

assertEquals

We can check that the method is returning "`Hello World`" with the help of the `static` JUnit `assertEquals()` method. We import this method by adding the `assertEquals` method below our other import statement, as you can see in Example 6. This is a special kind of import called a `static import`, which I explain in this article.

```
import static org.junit.Assert.assertEquals;
```

Example 7

The `assertEquals()` method expects two arguments. The first value is the *expected* value, the second value the *actual* value. Expected and actual value must be equal, otherwise, the `assertEquals()` method will throw an error and the test will fail.

As the first argument, we put the `String` “`Hello World`”, as this is what we expect our `helloWorld()` method to return. As the second argument, we directly put the `helloWorld()` method call, as it will return the actual value. Here’s what this looks like all put together:

```
package com.marcusbiel.java8course;

import org.junit.Test;

import static org.junit.Assert.assertEquals;

public class PersonTest {

        @Test
        public void shouldReturnHelloWorld() {
        Person marcus = new Person();
        assertEquals("Hello World", marcus.helloWorld() );
    }
}
```

Example 8

Currently, the code shown in Example 7 won’t work because we still have to implement the class `Person`. We also still haven’t created a `helloWorld()` method since we haven’t created the class (both highlighted in red). So now let’s create this class and the method. Since this is a method of type `String`, it must return a `String`. So in this case, our `Person` class will return the `String` “`Hello World`”.

In the last article I mentioned the difference between command methods and query methods. This `helloWorld()` method is the first query method we have written. It doesn't change the state of the `Person` class, however it returns something. Take a look at our `Person` class so far:

```
package com.marcusbiel.java8course;

public class Person {

     public String helloWorld() {
          return “Hello World”;
     }
}
```
Example 9

If we now execute our test, we get a green bar, so the test passed successfully! This proves that we have correctly implemented our first working code! Hooray :)

Thanks for reading!

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