

JUnit Framework

Terminology: assertions, annotations, fixtures

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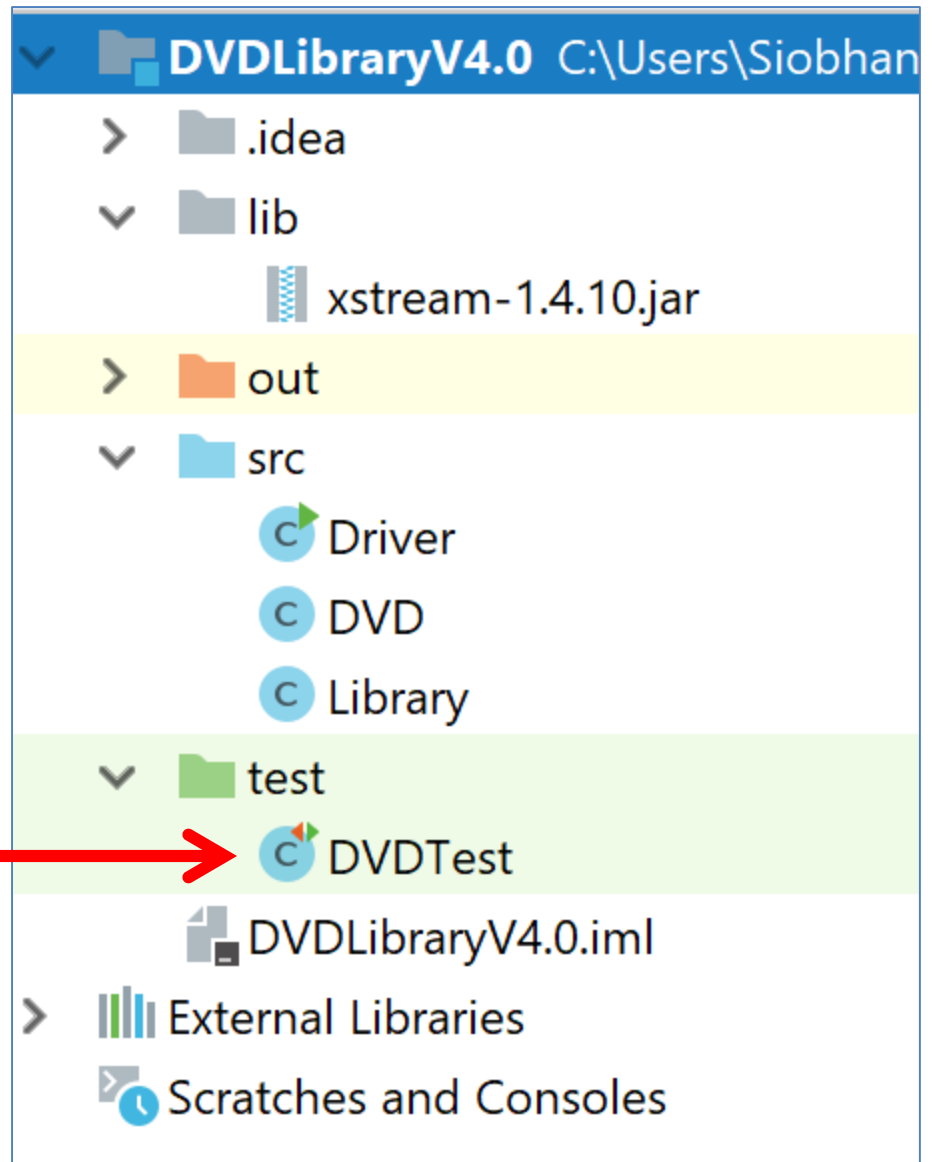
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Topic List

- General Terminology
- Assertions
- Annotations
- Fixtures

JUnit Test Class /
Test Case



Setting up
the **test
fixture**

Tearing
down the
test fixture

Test
Methods

```
import ...

class DVDTest {

    private DVD dvd1, dvd2, dvd3, dvd4;

    @BeforeEach
    void setUp() {
        dvd1 = new DVD( title: "The Hobbit(Director)"); //title with 20 characters
        dvd2 = new DVD( title: "The Steve Jobs Film"); //title with 19 characters
        dvd3 = new DVD( title: "Avatar: Directors Cut"); //title with 21 characters
        dvd4 = new DVD();
    }

    @AfterEach
    void tearDown() {
        dvd1 = dvd2 = dvd3 = dvd4 = null;
    }

    @Test
    void setTitle() {...}

    @Test
    void getTitle() {
        assertEquals( expected: "The Hobbit(Director)", dvd1.getTitle());
        assertEquals( expected: "The Steve Jobs Film", dvd2.getTitle());
        assertEquals( expected: "Avatar: Directors Cu", dvd3.getTitle());
        assertEquals( expected: null, dvd4.getTitle());
    }


    @Test
    void testToString() {...}
}
```

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JUnit 5

First you
import the
Assertions
class from
org.junit...



```
import org.junit.jupiter.api.AfterEach;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.Test;

import static org.junit.jupiter.api.Assertions.*;

class DVDTest {

    private DVD dvd1, dvd2, dvd3, dvd4;


    @BeforeEach
    void setUp() {
        dvd1 = new DVD( title: "The Hobbit(Director)"); //title with 20 characters
        dvd2 = new DVD( title: "The Steve Jobs Film"); //title with 19 characters
        dvd3 = new DVD( title: "Avatar: Directors Cut"); //title with 21 characters
        dvd4 = new DVD();
    }

    @AfterEach
    void tearDown() {
        dvd1 = dvd2 = dvd3 = dvd4 = null;
    }

    @Test
    void setTitle() {...}

    @Test
    void getTitle() {
        assertEquals( expected: "The Hobbit(Director)", dvd1.getTitle());
        assertEquals( expected: "The Steve Jobs Film", dvd2.getTitle());
        assertEquals( expected: "Avatar: Directors Cu", dvd3.getTitle());
        assertEquals( expected: null, dvd4.getTitle());
    }
}
```

Test
Methods
contain
assertions



org.junit.jupiter.api

Class Assertions

java.lang.Object

org.junit.jupiter.api.Assertions

```
@API(status=STABLE,  
      since="5.0")  
public final class Assertions  
    extends Object
```

Assertions is a collection of utility methods that support asserting conditions in tests.

Unless otherwise noted, a *failed* assertion will throw an **AssertionFailedError** or a subclass thereof.

Since:

5.0

See Also:

AssertionFailedError, **Assumptions**

The Assertions Class

- To check if code is behaving as you expect, you use an assertion.
- An assertion is a simple method call that verifies that something is true.
- The Assertions class Contains a set of assertion methods useful for writing JUnit tests.
- Only failed assertions are recorded i.e. an **AssertionFailedError** is thrown and handled by JUnit.

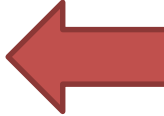
The Assertions Class

These methods can be used directly:

```
Assertions.assertEquals(...);
```

However, they read better if they are referenced through a static import:

```
import static org.junit.jupiter.api.Assertions.*;  
//some code  
assertEquals(...);
```



We will
use this
approach.

Some common Assert methods (1)

Method Summary

static void	<code>assertEquals</code> (double expected, double actual, double delta) Asserts that two doubles are equal to within a positive delta.
static void	<code>assertEquals</code> (long expected, long actual) Asserts that two longs are equal.
static void	<code>assertEquals</code> (<code>Object</code> expected, <code>Object</code> actual) Asserts that two objects are equal.
static void	<code>assertNotEquals</code> (double unexpected, double actual, double delta) Asserts that two doubles are not equal to within a positive delta.
static void	<code>assertNotEquals</code> (<code>Object</code> unexpected, <code>Object</code> actual) Asserts that two objects are not equals.
static void	<code>assertNotSame</code> (<code>Object</code> unexpected, <code>Object</code> actual) Asserts that two objects do not refer to the same object.
static void	<code>assertSame</code> (<code>Object</code> expected, <code>Object</code> actual) Asserts that two objects refer to the same object.

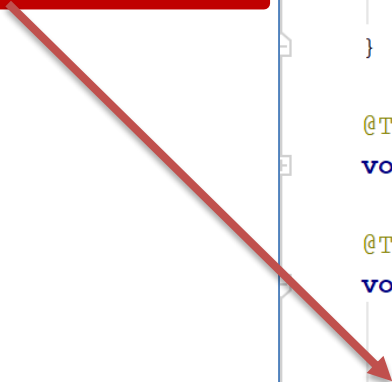
Some common Assert methods (2)

Method Summary

static void	<code>assertNotNull</code> (<code>Object</code> object) Asserts that an object isn't null.
static void	<code>assertNotNull</code> (<code>String</code> message, <code>Object</code> object) Asserts that an object isn't null.
static void	<code>assertNull</code> (<code>Object</code> object) Asserts that an object is null.
static void	<code>assertFalse</code> (boolean condition) Asserts that a condition is false.
static void	<code>assertTrue</code> (<code>String</code> message, boolean condition) Asserts that a condition is true.
static void	<code>fail</code> () Fails a test with no message.
static void	<code>fail</code> (<code>String</code> message) Fails a test with the given message.

JUnit 5

assertEquals
in
DVDTest.java



```
import org.junit.jupiter.api.AfterEach;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.Test;

import static org.junit.jupiter.api.Assertions.*;

class DVDTest {

    private DVD dvd1, dvd2, dvd3, dvd4;

    @BeforeEach
    void setUp() {
        dvd1 = new DVD( title: "The Hobbit(Director)"); //title with 20 characters
        dvd2 = new DVD( title: "The Steve Jobs Film"); //title with 19 characters
        dvd3 = new DVD( title: "Avatar: Directors Cut"); //title with 21 characters
        dvd4 = new DVD();
    }

    @AfterEach
    void tearDown() {
        dvd1 = dvd2 = dvd3 = dvd4 = null;
    }

    @Test
    void setTitle() {...}

    @Test
    void getTitle() {
        assertEquals( expected: "The Hobbit(Director)", dvd1.getTitle());
        assertEquals( expected: "The Steve Jobs Film", dvd2.getTitle());
        assertEquals( expected: "Avatar: Directors Cu", dvd3.getTitle());
        assertEquals( expected: null, dvd4.getTitle());
    }
}
```

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JUnit 5

```
import org.junit.jupiter.api.AfterEach;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.Test;

import static org.junit.jupiter.api.Assertions.*;

class DVDTest {

    private DVD dvd1, dvd2, dvd3, dvd4;

    @BeforeEach
    void setUp() {
        dvd1 = new DVD( title: "The Hobbit(Director)"); //title with 20 characters
        dvd2 = new DVD( title: "The Steve Jobs Film"); //title with 19 characters
        dvd3 = new DVD( title: "Avatar: Directors Cut"); //title with 21 characters
        dvd4 = new DVD();
    }

    @AfterEach
    void tearDown() {
        dvd1 = dvd2 = dvd3 = dvd4 = null;
    }

    @Test
    void setTitle() {...}

    @Test
    void getTitle() {
        assertEquals( expected: "The Hobbit(Director)", dvd1.getTitle());
        assertEquals( expected: "The Steve Jobs Film", dvd2.getTitle());
        assertEquals( expected: "Avatar: Directors Cu", dvd3.getTitle());
        assertEquals( expected: null, dvd4.getTitle());
    }
}
```

These
methods
have
Annotations

@someword

What are Annotations?

- Annotations provide data about a program that is not part of the program itself. They have no direct effect on the operation of the code they annotate.
- Annotations can be applied to a program's declarations of classes, fields, methods, and other program elements.

What are Annotations?

- Annotations have a number of uses, among them:
 - Information for the compiler — Annotations can be used by the compiler to detect errors or suppress warnings.
 - Compiler-time and deployment-time processing — Software tools can process annotation information to generate code, XML files, and so forth.
 - Runtime processing — Some annotations are available to be examined at runtime.

JUnit 5 Annotations

Import the required Annotation class(es) from org.junit.

@BeforeEach
run the method before each test.

@AfterEach
run the method after each test.

@Test
identifies that a method is a test method.

```
import org.junit.jupiter.api.AfterEach;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.Test;

import static org.junit.jupiter.api.Assertions.*;

class DVDTest {

    private DVD dvd1, dvd2, dvd3, dvd4;

    @BeforeEach
    void setUp() {
        dvd1 = new DVD( title: "The Hobbit(Director)"); //title with 20 characters
        dvd2 = new DVD( title: "The Steve Jobs Film"); //title with 19 characters
        dvd3 = new DVD( title: "Avatar: Directors Cut"); //title with 21 characters
        dvd4 = new DVD();
    }

    @AfterEach
    void tearDown() {
        dvd1 = dvd2 = dvd3 = dvd4 = null;
    }

    @Test
    void setTitle() {...}

    @Test
    void getTitle() {
        assertEquals( expected: "The Hobbit(Director)", dvd1.getTitle());
        assertEquals( expected: "The Steve Jobs Film", dvd2.getTitle());
        assertEquals( expected: "Avatar: Directors Cu", dvd3.getTitle());
        assertEquals( expected: null, dvd4.getTitle());
    }
}
```

JUnit 4 Annotations

Import the required Annotation class(es) from org.junit.

@Before – run the method before each test.

@After – run the method after each test.

@Test -identifies that a method is a test method.

```
D.java *DVDTest.java X
import static org.junit.Assert.*;
import org.junit.After;
import org.junit.Before;
import org.junit.Test;

public class DVDTest {

    private DVD dvd1, dvd2, dvd3, dvd4;

    @Before
    public void setUp(){
        dvd1 = new DVD("The Hobbit(Director)"); //title with 20 characters
        dvd2 = new DVD("The Steve Jobs Film"); //title with 19 characters
        dvd3 = new DVD("Avatar: Directors Cut"); //title with 21 characters
        dvd4 = new DVD();
    }

    @After
    public void tearDown(){
    }

    @Test
    public void testConstructors(){
        assertEquals("The Hobbit(Director)", dvd1.getTitle());
        assertEquals("The Steve Jobs Film", dvd2.getTitle());
        assertEquals("Avatar: Directors Cu", dvd3.getTitle());
        assertEquals(null, dvd4.getTitle());
    }

    @Test
    public void testGetTitle(){
        assertEquals("The Hobbit(Director)", dvd1.getTitle());
        assertEquals("The Steve Jobs Film", dvd2.getTitle());
    }
}
```

Other Useful **JUnit4** Annotations

@BeforeClass public void method()	Will execute the method once, before the start of all tests. This can be used to perform time intensive activities, for example to connect to a database.
@AfterClass public void method()	Will execute the method once, after all tests have finished. This can be used to perform clean-up activities, for example to disconnect from a database.
@Ignore	Will ignore the test method. This is useful when the underlying code has been changed and the test case has not yet been adapted. Or if the execution time of this test is too long to be included.

Other Useful **JUnit5** Annotations

@BeforeAll public void method()	Will execute the method once, before the start of all tests in the current class. Similar to JUnit4 @BeforeClass.
@AfterAll public void method()	Will execute the method once, after all tests in the current class have finished. Similar to JUnit4 @AfterClass.
@Disabled	Used to disable a test class or test method. Similar to JUnit4 @ignore.

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JUnit 5

Test fixture fields.

Setting up the test fixture.

Tearing down the test fixture.

```
import org.junit.jupiter.api.AfterEach;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.Test;

import static org.junit.jupiter.api.Assertions.*;

class DVDTest {

    private DVD dvd1, dvd2, dvd3, dvd4;

    @BeforeEach
    void setUp() {
        dvd1 = new DVD( title: "The Hobbit(Director)"); //title with 20 characters
        dvd2 = new DVD( title: "The Steve Jobs Film"); //title with 19 characters
        dvd3 = new DVD( title: "Avatar: Directors Cut"); //title with 21 characters
        dvd4 = new DVD();
    }

    @AfterEach
    void tearDown() {
        dvd1 = dvd2 = dvd3 = dvd4 = null;
    }

    @Test
    void setTitle() {...}

    @Test
    void getTitle() {
        assertEquals( expected: "The Hobbit(Director)", dvd1.getTitle());
        assertEquals( expected: "The Steve Jobs Film", dvd2.getTitle());
        assertEquals( expected: "Avatar: Directors Cu", dvd3.getTitle());
        assertEquals( expected: null, dvd4.getTitle());
    }
}
```

Fixtures

- A **Fixture** is a fixed state of a set of objects used as a baseline for running tests.
- Test fixtures allow tests to share common test data.
- The purpose of a test fixture is to ensure that there is a fixed environment in which tests are run so that results are repeatable.
- It includes:
 - setUp() method which runs before every test method.
 - tearDown() method which runs after every test method.

**Any
Questions?**

