

# **Introduction to JUnit**

Dependable Software Laboratory





### KU KONKUK UNIVERSITY

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- Assert
- Annotation
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# JUnit

- JUnit is a simple framework to write repeatable tests. It is an instance of the xUnit architecture for unit testing frameworks.
  - Unit test framework
  - Assertion
  - Annotation
- http://junit.org/junit4/



# **Assertions**

DEPENDABLE

- http://junit.sourceforge.net/javadoc/org/junit/Assert.html •
  - Assert API

	Asserts
assertArrayEquals	Asserts that two object arrays are equal. If they are not, an AssertionError is thrown with the given message. If expecteds and actuals are null, they are considered equal.
AssertEquals	Asserts that two objects are equal. If they are not, an AssertionError without a message is thrown. If expected and actual are null, they are considered equal.
assertFalse	Asserts that a condition is false. If it isn't it throws an AssertionError without a message.
assertNotNull	Asserts that an object isn't null. If it is an AssertionError is thrown.
assertNotSame	Asserts that two objects do not refer to the same object. If they do refer to the same object, an AssertionError without a message is thrown.
assertNull	Asserts that an object is null. If it isn't an AssertionError is thrown.
assertSame	Asserts that two objects refer to the same object. If they are not the same an AssertionError without a message is thrown.
assertThat	
assertTrue	Asserts that a condition is true. If it isn't it throws an AssertionError without a message.
fail	Fails a test with the given message.



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## **Assertions**

### assertThat

Asserts that actual satisfies the condition specified by matcher. If not, an AssertionError is thrown with information about the matcher and failing value. Example:

assertThat(O, is(1)); // fails: // failure message: // expected: is <1> // got value: <0> assertThat(O, is(not(1))) // passes

#### **Type Parameters:**

T - the static type accepted by the matcher (this can flag obvious compile-time problems such as assertThat(1, is("a"))

#### Parameters:

actual - the computed value being compared

matcher - an expression, built of Matchers, specifying allowed values

#### See Also:

CoreMatchers, <u>JUnitMatchers</u>



### • 각 assert 별로 다양한 객체 지원

static void	assertEquals(double expected, double actual)
	Deprecated. Use assertEquals(double expected, double actual, double epsilon) instead
static void	<mark>assertEquals</mark> (double expected, double actual, double delta)
	Asserts that two doubles or floats are equal to within a positive delta.
static void	assertEquals(long expected, long actual)
	Asserts that two longs are equal.
static void	assertEquals(java.lang.Object[] expecteds, java.lang.Object[] actuals)
	Deprecated. use assertArrayEquals
static void	assertEquals(java.lang.Object expected, java.lang.Object actual)
	Asserts that two objects are equal.
static void	assertEquals(java.lang.String message, double expected, double actual)
	Deprecated. Use assertEquals(String message, double expected, double actual, double epsilon) instead
static void	assertEquals(java.lang.String message, double expected, double actual, double delta)
	Asserts that two doubles or floats are equal to within a positive delta.
static void	assertEquals(java.lang.String message, long expected, long actual)
	Asserts that two longs are equal.
static void	<u>assertEquals</u> (java.lang.String message, java.lang.Object[] expecteds, java.lang.Object[] actuals)
	Deprecated. use assertArrayEquals
static void	<u>assertEquals</u> (java.lang.String message, java.lang.Object expected, java.lang.Object actual)
	Asserts that two objects are equal.



Annotation	설명
@Test	Unit Test를 수행하는 대상 method
@Before	각 Unit test의 method 실행 전에 실행되는 method
@After	각 Unit test의 실행 후에 실행되는 method
@BeforeClass	Class안에 정의된 모든 method에 대해서 Test 전, 후에 한번만 호출된다. 객체 생성 등에 사용.
@AfterClass	
@lgnore	테스트를 수행하지 않을 method
@RunWith(value=class)	Unit Test 클래스를 실행하기 위한 러너(Runner)를 명시적으로 지정할 수 있다.
@SuiteClasses (value=class)	보통 여러 개의 Test Class를 수행하기 위해 쓰인다. @Runwith를 이용해 Suite Class를 러너로 사용한다.
@Parameter	하나의 method에 대해 다양한 테스트 값을 한꺼번에 실행시키고자 할 때 사용한다.





• The Test annotation tells JUnit that the public void method to which it is attached can be run as a test case.

```
@Test
public void testSum() {
}
@Test(timeout=5000)
public void testSum() {
```

}





- If you allocate expensive external resources in a <u>BeforeClass</u> method you need to release them after all the tests in the class have run.
- Sometimes several tests need to share computationally expensive setup (like logging into a database).

```
@BeforeClass
public static void setUpBeforeClass() throws Exception {
}
@AfterClass
public static void tearDownAfterClass() throws Exception {
}
```





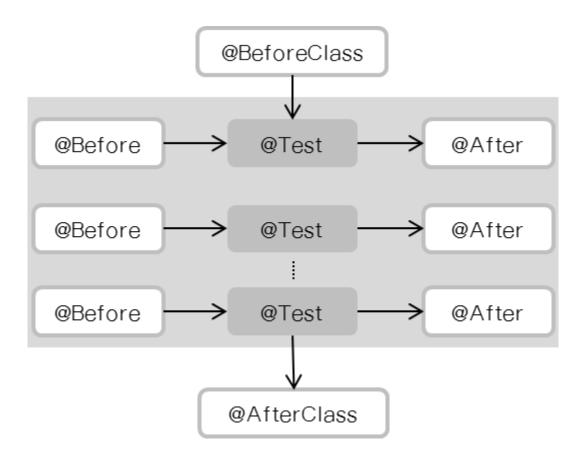
- If you allocate external resources in a <u>Before</u> method you need to release them after the test runs.
- When writing tests, it is common to find that several tests need similar objects created before they can run.

```
@Before
public void setUp() throws Exception {
}
@After
public void tearDown() throws Exception {
}
```





• Annotation 흐름







• Eclipse를 사용하면 JUnit library가 기본적으로 내장

Properties for JUnitTest		
type filter text	Java Build Path	⇔ + ⇔ + +
<ul> <li>Resource Builders</li> <li>Java Build Path</li> <li>Java Code Style</li> <li>Java Compiler</li> <li>Java Editor</li> <li>Javadoc Location</li> <li>Project Facets</li> <li>Project References</li> <li>Run/Debug Settings</li> <li>Task Repository</li> <li>Task Tags</li> <li>Validation</li> <li>WikiText</li> </ul>	Source Projects Libraries Order and Export JARs and class folders on the build path:          JRE System Library [jdk1.7.0_55]	Add JARs Add External JARs Add Variable Add Library Add Class Folder Add External Class Folder Edit Remove Migrate JAR File
?		OK Cancel





Add Library	
Add Library Select the library type to add.	5
Connectivity Driver Definition CXF Runtime EAR Libraries JRE System Library	
JUnit Maven Managed Dependencies Plug-in Dependencies Server Runtime User Library Web App Libraries	
Seck Next > Finish	Cancel





Add Library		
JUnit Library		
Select the JUnit vers	sion to use in this project.	ć
JUnit library version:	JUnit 4	
Current location:	junit.jar - D:\hyukjoon\eclispe\eclipse-jee-kepler\plu \worg.junit_4.11.0.v201303080030	ugins
Source location:	Not found	
(?)	< Back Next > Finish	Can
U		Can





Properties for JUnitTest		
type filter text <ul> <li>Resource Builders</li> <li>Java Build Path</li> <li>Java Code Style</li> <li>Java Compiler</li> <li>Java Editor</li> <li>Javadoc Location</li> <li>Project Facets</li> <li>Project References</li> <li>Run/Debug Settings</li> <li>Task Repository</li> <li>Task Tags</li> <li>Validation</li> <li>WikiText</li> </ul>	Java Build Path  Source Projects Libraries Order and Export  JARs and class folders on the build path:  JRE System Library [jdk1.7.0_55]  JUnit 4	Add JARs Add External JARs Add Variable Add Library Add Class Folder Add Class Folder Edit Edit Remove Migrate JAR File
?		OK Cancel





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• JUnit을 사용하기 위한 test class 생성

com.calculator.tes	-	New	,	B	Java Project
<ul> <li>com.db</li> <li>com.db.test</li> <li>JRE System Library [jc</li> <li>JUnit 4</li> <li>yTest</li> <li>moo.pedxing.step03</li> </ul>		Go Into		AN	Aspecti Project
		Open in New Window Open Type Hierarchy Show In	F4 Alt+Shift+W ▸	1 2 2 2 2 2 2 1 2 1 2 1 2 1 2 1 2 1 2 1	Maven Project Spring Roo Project Spring Project Spring Starter Project
		Copy Copy Qualified Name Paste Delete	Ctrl+C Ctrl+V Delete	Import Spring Getting Started Content         Project         Package	Import Spring Getting Started Content Project Package
		Remove from Context Build Path Source Refactor	Ctrl+Alt+Shift+Down Alt+Shift+S + Alt+Shift+T +		Class Interface Enum Annotation Source Folder
		Import Export		Java Working Set         Image: Set	Folder
		References Declarations	•		Untitled Text File Aspect JUnit Test Case
		Refresh Assign Working Sets	F5		
		Profile As Debug As Run As Validate Team Compare With Restore from Local History	, , , ,		Spring Bean Configuration File Spring Web Flow Definition File Example Other Ctrl+N
tor test - JUnitTest/src		Properties	Alt+Enter		



🔘 New JUnit Tes	t Case	
JUnit Test Case	e of the new JUnit test case. You have the options to spe	ecify
the class under	test and on the next page, to select methods to be test	ed.
🔘 New JUnit 3 t	est <ul> <li>New JUnit 4 test</li> </ul>	
Source folder:	JUnitTest/src	Browse
Package:	com.calculator.test	Browse
Name:	CalculatorTest (1)	3
Superclass:	java.lang.Object	Browse
Which method s	tubs would you like to create?	
	setUpBeforeClass() tearDownAfterClass()	
	setUp() tearDown()	
	Constructor	
Do you want to	add comments? (Configure templates and default value Generate comments	e <u>here</u> )
Class under test:	com.calculator.Calculator (2	Browse
?	< Back Next > Finish	Cancel



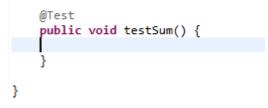


### • 생성 결과

New JUnit Test Case					
Test Methods Select methods for which test method stubs should be created.					
Available methods:					
<ul> <li>Calculator</li> <li>sum(int, int)</li> <li>Object</li> <li>C Object()</li> <li>N f getClass()</li> <li>N hashCode()</li> <li>equals(Object)</li> <li>N clone()</li> <li>toString()</li> <li>N F notify()</li> <li>N F notify()</li> <li>N F notifyAll()</li> <li>N F wait(long)</li> <li>F wait(long, int)</li> <li>F wait()</li> <li>finalize()</li> </ul>	Select All Deselect All				
1 method selected.					
<ul> <li>Create final method stubs</li> <li>Create tasks for generated test methods</li> </ul>					
Seck Next > Finish	Cancel				

### import static org.junit.Assert.\*;[]

### public class calculatorTest {





• 실행 예제

🛱 Package Explorer 🚽	for JUnit 🖾 🕂 🕂 🔤	🚮   🗞 🔝 🗏 👻 🔨	
Finished after 0.016 sec	conds		
Runs: 1/1	Errors: 0	Failures: 0	
⊳ 🔠 com.calculator.t	test.CalculatorTest [Runner	: JUnit 4] (0.000 s)	
ቹ Package Explorer 🚮	😈 JUnit 🖾 🕂 🗘 🖬	🚮 🔍 🗛 🔳 🗒 🔻 🛸	
Finished after 0.022 sec	conds		
Runs: 1/1	Errors: 0	Failures: 1	

▲ com.calculator.test.CalculatorTest [Runner: JUnit 4] (0.001 s)
★ testSum (0.001 s)



• Test Suite

### - 여러 단위의 test method들의 집합을 실행

● New	
Select a wizard Create a JUnit Test Suite	Provide the second seco
Wizards: type filter text Interface Java Project Java Project from Existing Ant Buildfile Isoura Project from Existing Ant Buildfile Isoura State Java Working Set Package Source Folder De Java Run/Debug De Junit Inti Test Case Inti Test Suite De Maven De Tasks	JUnit Test Suite
? < Back Next >	3 classes selected Fil ? < Back Next > Finish Cancel

10 import org.junit.runner.RunWith; 2 import org.junit.runners.Suite; 3 @RunWith(Suite.class) 4 @Suite.SuiteClasses({ 5 TestJunit1.class, 6 TestJunit2.class 7 }) 8 public class TestSuite { 9 }

