Spock Framework Reference Documentation

[Introduction](http://spockframework.org/spock/docs/1.3/all_in_one.html#_introduction)

Spock is a testing and specification framework for Java and Groovy applications. What makes it stand out from the crowd is its beautiful and highly expressive specification language. Thanks to its JUnit runner, Spock is compatible with most IDEs, build tools, and continuous integration servers. Spock is inspired from [JUnit](http://junit.org/), [jMock](http://www.jmock.org/), [RSpec](http://rspec.info/), [Groovy](http://groovy-lang.org/), [Scala](http://scala-lang.org/), [Vulcans](https://en.wikipedia.org/wiki/Vulcan_(Star_Trek)), and other fascinating life forms.

[Getting Started](http://spockframework.org/spock/docs/1.3/all_in_one.html#_getting_started)

It’s really easy to get started with Spock. This section shows you how.

[Spock Web Console](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spock_web_console)

[Spock Web Console](http://webconsole.spockframework.org/) is a website that allows you to instantly view, edit, run, and even publish Spock specifications. It is the perfect place to toy around with Spock without making any commitments. So why not run [Hello, Spock!](http://webconsole.spockframework.org/edit/9001) right away?

[Spock Example Project](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spock_example_project)

To try Spock in your local environment, clone or download/unzip the [Spock Example Project](https://github.com/spockframework/spock-example). It comes with fully working Ant, Gradle, and Maven builds that require no further setup. The Gradle build even bootstraps Gradle itself and gets you up and running in Eclipse or IDEA with a single command. See the README for detailed instructions.

[Spock Primer](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spock_primer)

This chapter assumes that you have a basic knowledge of Groovy and unit testing. If you are a Java developer but haven’t heard about Groovy, don’t worry - Groovy will feel very familiar to you! In fact, one of Groovy’s main design goals is to be *the* scripting language alongside Java. So just follow along and consult the [Groovy documentation](http://groovy-lang.org/documentation.html) whenever you feel like it.

The goals of this chapter are to teach you enough Spock to write real-world Spock specifications, and to whet your appetite for more.

To learn more about Groovy, go to <http://groovy-lang.org/>.

To learn more about unit testing, go to <http://en.wikipedia.org/wiki/Unit_testing>.

[Terminology](http://spockframework.org/spock/docs/1.3/all_in_one.html" \l "_terminology)(术语)

Let’s start with a few definitions: Spock lets you write [*specifications*](https://en.wikipedia.org/wiki/Specification_by_example) that describe expected *features* (properties, aspects) exhibited by a system of interest. The system of interest could be anything between a single class and a whole application, and is also called the *system under specification or SUS*. The description of a feature starts from a specific snapshot of the SUS and its collaborators; this snapshot is called the feature’s *fixture*.

The following sections walk you through all building blocks of which a Spock specification may be composed. A typical specification uses only a subset of them.

[Imports](http://spockframework.org/spock/docs/1.3/all_in_one.html#_imports)

**import** spock.lang.\*

Package spock.lang contains the most important types for writing specifications.

[Specification](http://spockframework.org/spock/docs/1.3/all_in_one.html#_specification)

**class** **MyFirstSpecification** **extends** Specification {

*// fields*

*// fixture methods*

*// feature methods*

*// helper methods*

}

A specification is represented as a Groovy class that extends from spock.lang.Specification. The name of a specification usually relates to the system or system operation described by the specification. For example, CustomerSpec, H264VideoPlayback, and ASpaceshipAttackedFromTwoSides are all reasonable names for a specification.

Class Specification contains a number of useful methods for writing specifications. Furthermore it instructs JUnit to run specification with Sputnik, Spock’s JUnit runner. Thanks to Sputnik, Spock specifications can be run by most modern Java IDEs and build tools.

[Fields](http://spockframework.org/spock/docs/1.3/all_in_one.html#_fields)

**def** obj = **new** ClassUnderSpecification()

**def** coll = **new** Collaborator()

Instance fields are a good place to store objects belonging to the specification’s fixture. It is good practice to initialize them right at the point of declaration. (Semantically, this is equivalent to initializing them at the very beginning of the setup() method.) Objects stored into instance fields are *not* shared between feature methods. Instead, every feature method gets its own object. This helps to isolate feature methods from each other, which is often a desirable goal.

@Shared res = **new** VeryExpensiveResource()

Sometimes you need to share an object between feature methods. For example, the object might be very expensive to create, or you might want your feature methods to interact with each other. To achieve this, declare a @Shared field. Again it’s best to initialize the field right at the point of declaration. (Semantically, this is equivalent to initializing the field at the very beginning of the setupSpec() method.)

**static** **final** PI = 3.141592654

Static fields should only be used for constants. Otherwise shared fields are preferable, because their semantics with respect to sharing are more well-defined.

[Fixture Methods](http://spockframework.org/spock/docs/1.3/all_in_one.html#_fixture_methods)

**def** **setupSpec**() {} *// runs once - before the first feature method*

**def** **setup**() {} *// runs before every feature method*

**def** **cleanup**() {} *// runs after every feature method*

**def** **cleanupSpec**() {} *// runs once - after the last feature method*

Fixture methods are responsible for setting up and cleaning up the environment in which feature methods are run. Usually it’s a good idea to use a fresh fixture for every feature method, which is what the setup() and cleanup() methods are for.

All fixture methods are optional.

Occasionally it makes sense for feature methods to share a fixture, which is achieved by using shared fields together with the setupSpec() and cleanupSpec() methods. Note that setupSpec() and cleanupSpec() *may not* reference instance fields unless they are annotated with @Shared.

[Invocation Order](http://spockframework.org/spock/docs/1.3/all_in_one.html#_invocation_order)

If fixture methods are overridden in a specification subclass then setup() of the superclass will run before setup() of the subclass. cleanup() works in reverse order, that is cleanup() of the subclass will execute before cleanup() of the superclass. setupSpec() and cleanupSpec() behave in the same way. There is no need to explicitly call super.setup() or super.cleanup() as Spock will automatically find and execute fixture methods at all levels in an inheritance hierarchy.

1. super.setupSpec
2. sub.setupSpec
3. super.setup
4. sub.setup
5. feature method
6. sub.cleanup
7. super.cleanup
8. sub.cleanupSpec
9. super.cleanupSpec

[Feature Methods](http://spockframework.org/spock/docs/1.3/all_in_one.html#_feature_methods)

**def** "pushing an element on the stack"() {

*// blocks go here*

}

Feature methods are the heart of a specification. They describe the features (properties, aspects) that you expect to find in the system under specification. By convention, feature methods are named with String literals. Try to choose good names for your feature methods, and feel free to use any characters you like!

Conceptually, a feature method consists of four phases:

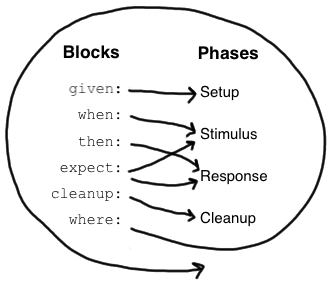
1. Set up the feature’s fixture
2. Provide a *stimulus* to the system under specification
3. Describe the *response* expected from the system
4. Clean up the feature’s fixture

Whereas the first and last phases are optional, the stimulus and response phases are always present (except in interacting feature methods), and may occur more than once.

[Blocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_blocks)

Spock has built-in support for implementing each of the conceptual phases of a feature method. To this end, feature methods are structured into so-called *blocks*. Blocks start with a label, and extend to the beginning of the next block, or the end of the method. There are six kinds of blocks: given, when, then, expect, cleanup, and where blocks. Any statements between the beginning of the method and the first explicit block belong to an implicit given block.

A feature method must have at least one explicit (i.e. labelled) block - in fact, the presence of an explicit block is what makes a method a feature method. Blocks divide a method into distinct sections, and cannot be nested.



The picture on the right shows how blocks map to the conceptual phases of a feature method. The where block has a special role, which will be revealed shortly. But first, let’s have a closer look at the other blocks.

[Given Blocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_given_blocks)

given:

**def** stack = **new** Stack()

**def** elem = "push me"

The given block is where you do any setup work for the feature that you are describing. It may not be preceded by other blocks, and may not be repeated. A given block doesn’t have any special semantics. The given: label is optional and may be omitted, resulting in an *implicit* given block. Originally, the alias setup: was the preferred block name, but using given: often leads to a more readable feature method description (see [Specifications as Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#specifications_as_documentation)).

[When and Then Blocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_when_and_then_blocks)

when: *// stimulus*

then: *// response*

The when and then blocks always occur together. They describe a stimulus and the expected response. Whereas when blocks may contain arbitrary code, then blocks are restricted to *conditions*, *exception conditions*, *interactions*, and variable definitions. A feature method may contain multiple pairs of when-then blocks.

[Conditions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_conditions)

Conditions describe an expected state, much like JUnit’s assertions. However, conditions are written as plain boolean expressions, eliminating the need for an assertion API. (More precisely, a condition may also produce a non-boolean value, which will then be evaluated according to Groovy truth.) Let’s see some conditions in action:

when:

stack.push(elem)

then:

!stack.empty

stack.size() == 1

stack.peek() == elem

|  |  |
| --- | --- |
| **TIP** | Try to keep the number of conditions per feature method small. One to five conditions is a good guideline. If you have more than that, ask yourself if you are specifying multiple unrelated features at once. If the answer is yes, break up the feature method in several smaller ones. If your conditions only differ in their values, consider using a [data table](http://spockframework.org/spock/docs/1.3/all_in_one.html#data-tables). |

What kind of feedback does Spock provide if a condition is violated? Let’s try and change the second condition to stack.size() == 2. Here is what we get:

Condition not satisfied:

stack.size() == 2

| | |

| 1 false

[push me]

As you can see, Spock captures all values produced during the evaluation of a condition, and presents them in an easily digestible form. Nice, isn’t it?

[Implicit and explicit conditions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_implicit_and_explicit_conditions)

Conditions are an essential ingredient of then blocks and expect blocks. Except for calls to void methods and expressions classified as interactions, all top-level expressions in these blocks are implicitly treated as conditions. To use conditions in other places, you need to designate them with Groovy’s assert keyword:

**def** **setup**() {

stack = **new** Stack()

**assert** stack.empty

}

If an explicit condition is violated, it will produce the same nice diagnostic message as an implicit condition.

[Exception Conditions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_exception_conditions)

Exception conditions are used to describe that a when block should throw an exception. They are defined using the thrown() method, passing along the expected exception type. For example, to describe that popping from an empty stack should throw an EmptyStackException, you could write the following:

when:

stack.pop()

then:

thrown(EmptyStackException)

stack.empty

As you can see, exception conditions may be followed by other conditions (and even other blocks). This is particularly useful for specifying the expected content of an exception. To access the exception, first bind it to a variable:

when:

stack.pop()

then:

**def** e = thrown(EmptyStackException)

e.cause == null

Alternatively, you may use a slight variation of the above syntax:

when:

stack.pop()

then:

EmptyStackException e = thrown()

e.cause == null

This syntax has two small advantages: First, the exception variable is strongly typed, making it easier for IDEs to offer code completion. Second, the condition reads a bit more like a sentence ("then an EmptyStackException is thrown"). Note that if no exception type is passed to the thrown() method, it is inferred from the variable type on the left-hand side.

Sometimes we need to convey that an exception should **not** be thrown. For example, let’s try to express that a HashMap should accept a null key:

**def** "HashMap accepts null key"() {

setup:

**def** map = **new** HashMap()

map.put(null, "elem")

}

This works but doesn’t reveal the intention of the code. Did someone just leave the building before he had finished implementing this method? After all, where are the conditions? Fortunately, we can do better:

**def** "HashMap accepts null key"() {

given:

**def** map = **new** HashMap()

when:

map.put(null, "elem")

then:

notThrown(NullPointerException)

}

By using notThrown(), we make it clear that in particular a NullPointerException should not be thrown. (As per the contract of Map.put(), this would be the right thing to do for a map that doesn’t support null keys.) However, the method will also fail if any other exception is thrown.

[Interactions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_interactions)

Whereas conditions describe an object’s state, interactions describe how objects communicate with each other. Interactions and Interaction based testing are described in a separate [chapter](http://spockframework.org/spock/docs/1.3/all_in_one.html), so we only give a quick example here. Suppose we want to describe the flow of events from a publisher to its subscribers. Here is the code:

**def** "events are published to all subscribers"() {

given:

**def** subscriber1 = Mock(Subscriber)

**def** subscriber2 = Mock(Subscriber)

**def** publisher = **new** Publisher()

publisher.add(subscriber1)

publisher.add(subscriber2)

when:

publisher.fire("event")

then:

1 \* subscriber1.receive("event")

1 \* subscriber2.receive("event")

}

[Expect Blocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_expect_blocks)

An expect block is more limited than a then block in that it may only contain conditions and variable definitions. It is useful in situations where it is more natural to describe stimulus and expected response in a single expression. For example, compare the following two attempts to describe the Math.max() method:

when:

**def** x = Math.max(1, 2)

then:

x == 2

expect:

Math.max(1, 2) == 2

Although both snippets are semantically equivalent, the second one is clearly preferable. As a guideline, use when-then to describe methods with side effects, and expect to describe purely functional methods.

|  |  |
| --- | --- |
| **TIP** | Leverage [Groovy JDK](http://docs.groovy-lang.org/docs/latest/html/groovy-jdk/) methods like any() and every() to create more expressive and succinct conditions. |

[Cleanup Blocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_cleanup_blocks)

given:

**def** file = **new** File("/some/path")

file.createNewFile()

*// ...*

cleanup:

file.delete()

A cleanup block may only be followed by a where block, and may not be repeated. Like a cleanup method, it is used to free any resources used by a feature method, and is run even if (a previous part of) the feature method has produced an exception. As a consequence, a cleanup block must be coded defensively; in the worst case, it must gracefully handle the situation where the first statement in a feature method has thrown an exception, and all local variables still have their default values.

|  |  |
| --- | --- |
| **TIP** | Groovy’s safe dereference operator (foo?.bar()) simplifies writing defensive code. |

Object-level specifications usually don’t need a cleanup method, as the only resource they consume is memory, which is automatically reclaimed by the garbage collector. More coarse-grained specifications, however, might use a cleanup block to clean up the file system, close a database connection, or shut down a network service.

|  |  |
| --- | --- |
| **TIP** | If a specification is designed in such a way that all its feature methods require the same resources, use a cleanup() method; otherwise, prefer cleanup blocks. The same trade-off applies to setup() methods and given blocks. |

[Where Blocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_where_blocks)

A where block always comes last in a method, and may not be repeated. It is used to write data-driven feature methods. To give you an idea how this is done, have a look at the following example:

**def** "computing the maximum of two numbers"() {

expect:

Math.max(a, b) == c

where:

a << [5, 3]

b << [1, 9]

c << [5, 9]

}

This where block effectively creates two "versions" of the feature method: One where a is 5, b is 1, and c is 5, and another one where a is 3, b is 9, and c is 9.

Although it is declared last, the where block is evaluated before the feature method containing it runs.

The where block is further explained in the [Data Driven Testing](http://spockframework.org/spock/docs/1.3/all_in_one.html) chapter.

[Helper Methods](http://spockframework.org/spock/docs/1.3/all_in_one.html#_helper_methods)

Sometimes feature methods grow large and/or contain lots of duplicated code. In such cases it can make sense to introduce one or more helper methods. Two good candidates for helper methods are setup/cleanup logic and complex conditions. Factoring out the former is straightforward, so let’s have a look at conditions:

**def** "offered PC matches preferred configuration"() {

when:

**def** pc = shop.buyPc()

then:

pc.vendor == "Sunny"

pc.clockRate >= 2333

pc.ram >= 4096

pc.os == "Linux"

}

If you happen to be a computer geek, your preferred PC configuration might be very detailed, or you might want to compare offers from many different shops. Therefore, let’s factor out the conditions:

**def** "offered PC matches preferred configuration"() {

when:

**def** pc = shop.buyPc()

then:

matchesPreferredConfiguration(pc)

}

**def** **matchesPreferredConfiguration**(pc) {

pc.vendor == "Sunny"

&& pc.clockRate >= 2333

&& pc.ram >= 4096

&& pc.os == "Linux"

}

The new helper method matchesPreferredConfiguration() consists of a single boolean expression whose result is returned. (The return keyword is optional in Groovy.) This is fine except for the way that an inadequate offer is now presented:

Condition not satisfied:

matchesPreferredConfiguration(pc)

| |

false ...

Not very helpful. Fortunately, we can do better:

**void** matchesPreferredConfiguration(pc) {

**assert** pc.vendor == "Sunny"

**assert** pc.clockRate >= 2333

**assert** pc.ram >= 4096

**assert** pc.os == "Linux"

}

When factoring out conditions into a helper method, two points need to be considered: First, implicit conditions must be turned into explicit conditions with the assert keyword. Second, the helper method must have return type void. Otherwise, Spock might interpret the return value as a failing condition, which is not what we want.

As expected, the improved helper method tells us exactly what’s wrong:

Condition not satisfied:

**assert** pc.clockRate >= 2333

| | |

| 1666 false

...

A final advice: Although code reuse is generally a good thing, don’t take it too far. Be aware that the use of fixture and helper methods can increase the coupling between feature methods. If you reuse too much or the wrong code, you will end up with specifications that are fragile and hard to evolve.

[Using with for expectations](http://spockframework.org/spock/docs/1.3/all_in_one.html#_using_code_with_code_for_expectations)

As an alternative to the above helper methods, you can use a with(target, closure) method to interact on the object being verified. This is especially useful in then and expect blocks.

**def** "offered PC matches preferred configuration"() {

when:

**def** pc = shop.buyPc()

then:

with(pc) {

vendor == "Sunny"

clockRate >= 2333

ram >= 406

os == "Linux"

}

}

Unlike when you use helper methods, there is no need for explicit assert statements for proper error reporting.

When verifying mocks, a with statement can also cut out verbose verification statements.

**def** service = Mock(Service) *// has start(), stop(), and doWork() methods*

**def** app = **new** Application(service) *// controls the lifecycle of the service*

when:

app.run()

then:

with(service) {

1 \* start()

1 \* doWork()

1 \* stop()

}

Sometimes an IDE as trouble to determine the type of the target, in that case you can help out by manually specifying the target type via with(target, type, closure).

[Using verifyAll to assert multiple expectations together](http://spockframework.org/spock/docs/1.3/all_in_one.html#_using_code_verifyall_code_to_assert_multiple_expectations_together)

Normal expectations fail the test on the first failed assertions. Sometimes it is helpful to collect these failures before failing the test to have more information, this behavior is also known as soft assertions.

The verifyAll method can be used like with,

**def** "offered PC matches preferred configuration"() {

when:

**def** pc = shop.buyPc()

then:

verifyAll(pc) {

vendor == "Sunny"

clockRate >= 2333

ram >= 406

os == "Linux"

}

}

or it can be used without a target.

expect:

verifyAll {

2 == 2

4 == 4

}

Like with you can also optionally define a type hint for the IDE.

[Specifications as Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#specifications_as_documentation)

Well-written specifications are a valuable source of information. Especially for higher-level specifications targeting a wider audience than just developers (architects, domain experts, customers, etc.), it makes sense to provide more information in natural language than just the names of specifications and features. Therefore, Spock provides a way to attach textual descriptions to blocks:

given: "open a database connection"

*// code goes here*

Use the and: label to describe logically different parts of a block:

given: "open a database connection"

*// code goes here*

and: "seed the customer table"

*// code goes here*

and: "seed the product table"

*// code goes here*

An and: label followed by a description can be inserted at any (top-level) position of a feature method, without altering the method’s semantics.

In Behavior Driven Development, customer-facing features (called *stories*) are described in a given-when-then format. Spock directly supports this style of specification with the given: label:

given: "an empty bank account"

*// ...*

when: "the account is credited $10"

*// ...*

then: "the account's balance is $10"

*// ...*

Block descriptions are not only present in source code, but are also available to the Spock runtime. Planned usages of block descriptions are enhanced diagnostic messages, and textual reports that are equally understood by all stakeholders.

[Extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_extensions)

As we have seen, Spock offers lots of functionality for writing specifications. However, there always comes a time when something else is needed. Therefore, Spock provides an interception-based extension mechanism. Extensions are activated by annotations called *directives*. Currently, Spock ships with the following directives:

|  |  |
| --- | --- |
| @Timeout | Sets a timeout for execution of a feature or fixture method. |
| @Ignore | Ignores any feature method carrying this annotation. |
| @IgnoreRest | Any feature method carrying this annotation will be executed, all others will be ignored. Useful for quickly running just a single method. |
| @FailsWith | Expects a feature method to complete abruptly. @FailsWith has two use cases: First, to document known bugs that cannot be resolved immediately. Second, to replace exception conditions in certain corner cases where the latter cannot be used (like specifying the behavior of exception conditions). In all other cases, exception conditions are preferable. |

Go to the [Extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html) chapter to learn how to implement your own directives and extensions.

[Comparison to JUnit](http://spockframework.org/spock/docs/1.3/all_in_one.html#_comparison_to_junit)

Although Spock uses a different terminology, many of its concepts and features are inspired by JUnit. Here is a rough comparison:

| **Spock** | **JUnit** |
| --- | --- |
| Specification | Test class |
| setup() | @Before |
| cleanup() | @After |
| setupSpec() | @BeforeClass |
| cleanupSpec() | @AfterClass |
| Feature | Test |
| Feature method | Test method |
| Data-driven feature | Theory |
| Condition | Assertion |
| Exception condition | @Test(expected=…​) |
| Interaction | Mock expectation (e.g. in Mockito) |

`

[Data Driven Testing](http://spockframework.org/spock/docs/1.3/all_in_one.html#_data_driven_testing)

Oftentimes, it is useful to exercise the same test code multiple times, with varying inputs and expected results. Spock’s data driven testing support makes this a first class feature.

[Introduction](http://spockframework.org/spock/docs/1.3/all_in_one.html#_introduction_2)

Suppose we want to specify the behavior of the Math.max method:

**class** **MathSpec** **extends** Specification {

**def** "maximum of two numbers"() {

expect:

*// exercise math method for a few different inputs*

Math.max(1, 3) == 3

Math.max(7, 4) == 7

Math.max(0, 0) == 0

}

}

Although this approach is fine in simple cases like this one, it has some potential drawbacks:

* Code and data are mixed and cannot easily be changed independently
* Data cannot easily be auto-generated or fetched from external sources
* In order to exercise the same code multiple times, it either has to be duplicated or extracted into a separate method
* In case of a failure, it may not be immediately clear which inputs caused the failure
* Exercising the same code multiple times does not benefit from the same isolation as executing separate methods does

Spock’s data-driven testing support tries to address these concerns. To get started, let’s refactor above code into a data-driven feature method. First, we introduce three method parameters (called *data variables*) that replace the hard-coded integer values:

**class** **MathSpec** **extends** Specification {

**def** "maximum of two numbers"(**int** a, **int** b, **int** c) {

expect:

Math.max(a, b) == c

...

}

}

We have finished the test logic, but still need to supply the data values to be used. This is done in a where: block, which always comes at the end of the method. In the simplest (and most common) case, the where: block holds a *data table*.

[Data Tables](http://spockframework.org/spock/docs/1.3/all_in_one.html#data-tables)

Data tables are a convenient way to exercise a feature method with a fixed set of data values:

**class** **MathSpec** **extends** Specification {

**def** "maximum of two numbers"(**int** a, **int** b, **int** c) {

expect:

Math.max(a, b) == c

where:

a | b | c

1 | 3 | 3

7 | 4 | 7

0 | 0 | 0

}

}

The first line of the table, called the *table header*, declares the data variables. The subsequent lines, called *table rows*, hold the corresponding values. For each row, the feature method will get executed once; we call this an *iteration* of the method. If an iteration fails, the remaining iterations will nevertheless be executed. All failures will be reported.

Data tables must have at least two columns. A single-column table can be written as:

where:

a | \_

1 | \_

7 | \_

0 | \_

[Isolated Execution of Iterations](http://spockframework.org/spock/docs/1.3/all_in_one.html#_isolated_execution_of_iterations)

Iterations are isolated from each other in the same way as separate feature methods. Each iteration gets its own instance of the specification class, and the setup and cleanup methods will be called before and after each iteration, respectively.

[Sharing of Objects between Iterations](http://spockframework.org/spock/docs/1.3/all_in_one.html#_sharing_of_objects_between_iterations)

In order to share an object between iterations, it has to be kept in a @Shared or static field.

|  |  |
| --- | --- |
| **NOTE** | Only @Shared and static variables can be accessed from within a where: block. |

Note that such objects will also be shared with other methods. There is currently no good way to share an object just between iterations of the same method. If you consider this a problem, consider putting each method into a separate spec, all of which can be kept in the same file. This achieves better isolation at the cost of some boilerplate code.

[Syntactic Variations](http://spockframework.org/spock/docs/1.3/all_in_one.html#_syntactic_variations)

The previous code can be tweaked in a few ways. First, since the where: block already declares all data variables, the method parameters can be omitted.[[1](http://spockframework.org/spock/docs/1.3/all_in_one.html#_footnote_1)] Second, inputs and expected outputs can be separated with a double pipe symbol (||) to visually set them apart. With this, the code becomes:

**class** **MathSpec** **extends** Specification {

**def** "maximum of two numbers"() {

expect:

Math.max(a, b) == c

where:

a | b || c

1 | 3 || 3

7 | 4 || 7

0 | 0 || 0

}

}

[Reporting of Failures](http://spockframework.org/spock/docs/1.3/all_in_one.html#_reporting_of_failures)

Let’s assume that our implementation of the max method has a flaw, and one of the iterations fails:

maximum of two numbers FAILED

Condition not satisfied:

Math.max(a, b) == c

| | | | |

| 7 4 | 7

42 false

The obvious question is: Which iteration failed, and what are its data values? In our example, it isn’t hard to figure out that it’s the second iteration that failed. At other times this can be more difficult or even impossible. [[2](http://spockframework.org/spock/docs/1.3/all_in_one.html#_footnote_2)] In any case, it would be nice if Spock made it loud and clear which iteration failed, rather than just reporting the failure. This is the purpose of the @Unroll annotation.

[Method Unrolling](http://spockframework.org/spock/docs/1.3/all_in_one.html#_method_unrolling)

A method annotated with @Unroll will have its iterations reported independently:

@Unroll

**def** "maximum of two numbers"() {

...

Why isn’t @Unroll the default?

One reason why @Unroll isn’t the default is that some execution environments (in particular IDEs) expect to be told the number of test methods in advance, and have certain problems if the actual number varies. Another reason is that @Unroll can drastically change the number of reported tests, which may not always be desirable.

Note that unrolling has no effect on how the method gets executed; it is only an alternation in reporting. Depending on the execution environment, the output will look something like:

maximum of two numbers[0] PASSED

maximum of two numbers[1] FAILED

Math.max(a, b) == c

| | | | |

| 7 4 | 7

42 false

maximum of two numbers[2] PASSED

This tells us that the second iteration (with index 1) failed. With a bit of effort, we can do even better:

@Unroll

**def** "maximum of #a and #b is #c"() {

...

This method name uses placeholders, denoted by a leading hash sign (#), to refer to data variables a, b, and c. In the output, the placeholders will be replaced with concrete values:

maximum of 3 and 5 is 5 PASSED

maximum of 7 and 4 is 7 FAILED

Math.max(a, b) == c

| | | | |

| 7 4 | 7

42 false

maximum of 0 and 0 is 0 PASSED

Now we can tell at a glance that the max method failed for inputs 7 and 4. See [More on Unrolled Method Names](http://spockframework.org/spock/docs/1.3/all_in_one.html#_more_on_unrolled_method_names) for further details on this topic.

The @Unroll annotation can also be placed on a spec. This has the same effect as placing it on each data-driven feature method of the spec.

|  |  |
| --- | --- |
| **TIP** | You can set the system property spock.assertUnrollExpressions to true, to let tests fail that have invalid unroll expressions. This can be used to help catch errors during refactoring. |

[Data Pipes](http://spockframework.org/spock/docs/1.3/all_in_one.html#_data_pipes)

Data tables aren’t the only way to supply values to data variables. In fact, a data table is just syntactic sugar for one or more *data pipes*:

...

where:

a << [1, 7, 0]

b << [3, 4, 0]

c << [3, 7, 0]

A data pipe, indicated by the left-shift (<<) operator, connects a data variable to a *data provider*. The data provider holds all values for the variable, one per iteration. Any object that Groovy knows how to iterate over can be used as a data provider. This includes objects of type Collection, String, Iterable, and objects implementing the Iterable contract. Data providers don’t necessarily have to *be* the data (as in the case of a Collection); they can fetch data from external sources like text files, databases and spreadsheets, or generate data randomly. Data providers are queried for their next value only when needed (before the next iteration).

[Multi-Variable Data Pipes](http://spockframework.org/spock/docs/1.3/all_in_one.html#_multi_variable_data_pipes)

If a data provider returns multiple values per iteration (as an object that Groovy knows how to iterate over), it can be connected to multiple data variables simultaneously. The syntax is somewhat similar to Groovy multi-assignment but uses brackets instead of parentheses on the left-hand side:

@Shared sql = Sql.newInstance("jdbc:h2:mem:", "org.h2.Driver")

**def** "maximum of two numbers"() {

expect:

Math.max(a, b) == c

where:

[a, b, c] << sql.rows("select a, b, c from maxdata")

}

Data values that aren’t of interest can be ignored with an underscore (\_):

...

where:

[a, b, \_, c] << sql.rows("select \* from maxdata")

[Data Variable Assignment](http://spockframework.org/spock/docs/1.3/all_in_one.html#_data_variable_assignment)

A data variable can be directly assigned a value:

...

where:

a = 3

b = Math.random() \* 100

c = a > b ? a : b

Assignments are re-evaluated for every iteration. As already shown above, the right-hand side of an assignment may refer to other data variables:

...

where:

where:

row << sql.rows("select \* from maxdata")

*// pick apart columns*

a = row.a

b = row.b

c = row.c

[Combining Data Tables, Data Pipes, and Variable Assignments](http://spockframework.org/spock/docs/1.3/all_in_one.html#_combining_data_tables_data_pipes_and_variable_assignments)

Data tables, data pipes, and variable assignments can be combined as needed:

...

where:

a | \_

3 | \_

7 | \_

0 | \_

b << [5, 0, 0]

c = a > b ? a : b

[Number of Iterations](http://spockframework.org/spock/docs/1.3/all_in_one.html#_number_of_iterations)

The number of iterations depends on how much data is available. Successive executions of the same method can yield different numbers of iterations. If a data provider runs out of values sooner than its peers, an exception will occur. Variable assignments don’t affect the number of iterations. A where: block that only contains assignments yields exactly one iteration.

[Closing of Data Providers](http://spockframework.org/spock/docs/1.3/all_in_one.html#_closing_of_data_providers)

After all iterations have completed, the zero-argument close method is called on all data providers that have such a method.

[More on Unrolled Method Names](http://spockframework.org/spock/docs/1.3/all_in_one.html#_more_on_unrolled_method_names)

An unrolled method name is similar to a Groovy GString, except for the following differences:

* Expressions are denoted with # instead of $ [[3](http://spockframework.org/spock/docs/1.3/all_in_one.html#_footnote_3)], and there is no equivalent for the ${…​} syntax.
* Expressions only support property access and zero-arg method calls.

Given a class Person with properties name and age, and a data variable person of type Person, the following are valid method names:

**def** "#person is #person.age years old"() { *// property access*

**def** "#person.name.toUpperCase()"() { *// zero-arg method call*

Non-string values (like #person above) are converted to Strings according to Groovy semantics.

The following are invalid method names:

**def** "#person.name.split(' ')[1]" { *// cannot have method arguments*

**def** "#person.age / 2" { *// cannot use operators*

If necessary, additional data variables can be introduced to hold more complex expression:

**def** "#lastName"() { *// zero-arg method call*

...

where:

person << [**new** Person(age: 14, name: 'Phil Cole')]

lastName = person.name.split(' ')[1]

}

[Interaction Based Testing](http://spockframework.org/spock/docs/1.3/all_in_one.html#_interaction_based_testing)

Interaction-based testing is a design and testing technique that emerged in the Extreme Programming (XP) community in the early 2000’s. Focusing on the behavior of objects rather than their state, it explores how the object(s) under specification interact, by way of method calls, with their collaborators.

For example, suppose we have a Publisher that sends messages to its `Subscriber`s:

**class** **Publisher** {

List<Subscriber> subscribers = **[]**

**int** messageCount = 0

**void** send(String message){

subscribers\*.receive(message)

messageCount++

}

}

**interface** Subscriber {

**void** receive(String message)

}

**class** **PublisherSpec** **extends** Specification {

Publisher publisher = **new** Publisher()

}

How are we going to test Publisher? With state-based testing, we can verify that the publisher keeps track of its subscribers. The more interesting question, though, is whether a message sent by the publisher is received by the subscribers. To answer this question, we need a special implementation of Subscriber that listens in on the conversation between the publisher and its subscribers. Such an implementation is called a *mock object*.

While we could certainly create a mock implementation of Subscriber by hand, writing and maintaining this code can get unpleasant as the number of methods and complexity of interactions increases. This is where mocking frameworks come in: They provide a way to describe the expected interactions between an object under specification and its collaborators, and can generate mock implementations of collaborators that verify these expectations.

How Are Mock Implementations Generated?

Like most Java mocking frameworks, Spock uses [JDK dynamic proxies](http://docs.oracle.com/javase/7/docs/api/java/lang/reflect/Proxy.html) (when mocking interfaces) and [Byte Buddy](http://bytebuddy.net/) or [CGLIB](https://github.com/cglib/cglib) proxies (when mocking classes) to generate mock implementations at runtime. Compared to implementations based on Groovy meta-programming, this has the advantage that it also works for testing Java code.

The Java world has no shortage of popular and mature mocking frameworks: [JMock](http://www.jmock.org/), [EasyMock](http://www.easymock.org/), [Mockito](http://mockito.org/), to name just a few. Although each of these tools can be used together with Spock, we decided to roll our own mocking framework, tightly integrated with Spock’s specification language. This decision was driven by the desire to leverage all of Groovy’s capabilities to make interaction-based tests easier to write, more readable, and ultimately more fun. We hope that by the end of this chapter, you will agree that we have achieved these goals.

Except where indicated, all features of Spock’s mocking framework work both for testing Java and Groovy code.

[Creating Mock Objects](http://spockframework.org/spock/docs/1.3/all_in_one.html#_creating_mock_objects)

Mock objects are created with the MockingApi.Mock() method.[[4](http://spockframework.org/spock/docs/1.3/all_in_one.html#_footnote_4)] Let’s create two mock subscribers:

**def** subscriber = Mock(Subscriber)

**def** subscriber2 = Mock(Subscriber)

Alternatively, the following Java-like syntax is supported, which may give better IDE support:

Subscriber subscriber = Mock()

Subscriber subscriber2 = Mock()

Here, the mock’s type is inferred from the variable type on the left-hand side of the assignment.

|  |  |
| --- | --- |
| **NOTE** | If the mock’s type is given on the left-hand side of the assignment, it’s permissible (though not required) to omit it on the right-hand side. |

Mock objects literally implement (or, in the case of a class, extend) the type they stand in for. In other words, in our example subscriber *is-a* Subscriber. Hence it can be passed to statically typed (Java) code that expects this type.

[Default Behavior of Mock Objects](http://spockframework.org/spock/docs/1.3/all_in_one.html#_default_behavior_of_mock_objects)

Lenient vs. Strict Mocking Frameworks

Like Mockito, we firmly believe that a mocking framework should be lenient by default. This means that unexpected method calls on mock objects (or, in other words, interactions that aren’t relevant for the test at hand) are allowed and answered with a default response. Conversely, mocking frameworks like EasyMock and JMock are strict by default, and throw an exception for every unexpected method call. While strictness enforces rigor, it can also lead to over-specification, resulting in brittle tests that fail with every other internal code change. Spock’s mocking framework makes it easy to describe only what’s relevant about an interaction, avoiding the over-specification trap.

Initially, mock objects have no behavior. Calling methods on them is allowed but has no effect other than returning the default value for the method’s return type (false, 0, or null). An exception are the Object.equals, Object.hashCode, and Object.toString methods, which have the following default behavior: A mock object is only equal to itself, has a unique hash code, and a string representation that includes the name of the type it represents. This default behavior is overridable by stubbing the methods, which we will learn about in the [Stubbing](http://spockframework.org/spock/docs/1.3/all_in_one.html#_stubbing) section.

[Injecting Mock Objects into Code Under Specification](http://spockframework.org/spock/docs/1.3/all_in_one.html#_injecting_mock_objects_into_code_under_specification)

After creating the publisher and its subscribers, we need to make the latter known to the former:

**class** **PublisherSpec** **extends** Specification {

Publisher publisher = **new** Publisher()

Subscriber subscriber = Mock()

Subscriber subscriber2 = Mock()

**def** **setup**() {

publisher.subscribers << subscriber *// << is a Groovy shorthand for List.add()*

publisher.subscribers << subscriber2

}

We are now ready to describe the expected interactions between the two parties.

[Mocking](http://spockframework.org/spock/docs/1.3/all_in_one.html#_mocking)

Mocking is the act of describing (mandatory) interactions between the object under specification and its collaborators. Here is an example:

**def** "should send messages to all subscribers"() {

when:

publisher.send("hello")

then:

1 \* subscriber.receive("hello")

1 \* subscriber2.receive("hello")

}

Read out aloud: "When the publisher sends a 'hello' message, then both subscribers should receive that message exactly once."

When this feature method gets run, all invocations on mock objects that occur while executing the when block will be matched against the interactions described in the then: block. If one of the interactions isn’t satisfied, a (subclass of) InteractionNotSatisfiedError will be thrown. This verification happens automatically and does not require any additional code.

[Interactions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_interactions_2)

Is an Interaction Just a Regular Method Invocation?

Not quite. While an interaction looks similar to a regular method invocation, it is simply a way to express which method invocations are expected to occur. A good way to think of an interaction is as a regular expression that all incoming invocations on mock objects are matched against. Depending on the circumstances, the interaction may match zero, one, or multiple invocations.

Let’s take a closer look at the then: block. It contains two *interactions*, each of which has four distinct parts: a *cardinality*, a *target constraint*, a *method constraint*, and an *argument constraint*:

1 \* subscriber.receive("hello")

| | | |

| | | argument constraint

| | method constraint

| target constraint

cardinality

[Cardinality](http://spockframework.org/spock/docs/1.3/all_in_one.html#_cardinality)

The cardinality of an interaction describes how often a method call is expected. It can either be a fixed number or a range:

1 \* subscriber.receive("hello") *// exactly one call*

0 \* subscriber.receive("hello") *// zero calls*

(1..3) \* subscriber.receive("hello") *// between one and three calls (inclusive)*

(1..\_) \* subscriber.receive("hello") *// at least one call*

(\_..3) \* subscriber.receive("hello") *// at most three calls*

\_ \* subscriber.receive("hello") *// any number of calls, including zero*

*// (rarely needed; see 'Strict Mocking')*

[Target Constraint](http://spockframework.org/spock/docs/1.3/all_in_one.html#_target_constraint)

The target constraint of an interaction describes which mock object is expected to receive the method call:

1 \* subscriber.receive("hello") *// a call to 'subscriber'*

1 \* \_.receive("hello") *// a call to any mock object*

[Method Constraint](http://spockframework.org/spock/docs/1.3/all_in_one.html#_method_constraint)

The method constraint of an interaction describes which method is expected to be called:

1 \* subscriber.receive("hello") *// a method named 'receive'*

1 \* subscriber./r.\*e/("hello") *// a method whose name matches the given regular expression*

*// (here: method name starts with 'r' and ends in 'e')*

When expecting a call to a getter method, Groovy property syntax *can* be used instead of method syntax:

1 \* subscriber.status *// same as: 1 \* subscriber.getStatus()*

When expecting a call to a setter method, only method syntax can be used:

1 \* subscriber.setStatus("ok") *// NOT: 1 \* subscriber.status = "ok"*

[Argument Constraints](http://spockframework.org/spock/docs/1.3/all_in_one.html#_argument_constraints)

The argument constraints of an interaction describe which method arguments are expected:

1 \* subscriber.receive("hello") *// an argument that is equal to the String "hello"*

1 \* subscriber.receive(!"hello") *// an argument that is unequal to the String "hello"*

1 \* subscriber.receive() *// the empty argument list (would never match in our example)*

1 \* subscriber.receive(\_) *// any single argument (including null)*

1 \* subscriber.receive(\*\_) *// any argument list (including the empty argument list)*

1 \* subscriber.receive(!null) *// any non-null argument*

1 \* subscriber.receive(\_ **as** String) *// any non-null argument that is-a String*

1 \* subscriber.receive(endsWith("lo")) *// any non-null argument that is-a String*

1 \* subscriber.receive({ it.size() > 3 && it.contains('a') })

*// an argument that satisfies the given predicate, meaning that*

*// code argument constraints need to return true of false*

*// depending on whether they match or not*

*// (here: message length is greater than 3 and contains the character a)*

Argument constraints work as expected for methods with multiple arguments:

1 \* process.invoke("ls", "-a", \_, !null, { ["abcdefghiklmnopqrstuwx1"].contains(it) })

When dealing with vararg methods, vararg syntax can also be used in the corresponding interactions:

**interface** VarArgSubscriber {

**void** receive(String... messages)

}

...

subscriber.receive("hello", "goodbye")

Spock Deep Dive: Groovy Varargs

Groovy allows any method whose last parameter has an array type to be called in vararg style. Consequently, vararg syntax can also be used in interactions matching such methods.

[Equality Constraint](http://spockframework.org/spock/docs/1.3/all_in_one.html#_equality_constraint)

The equality constraint uses groovy equality to check the argument, i.e, argument == constraint. You can use

* any literal 1 \* check('string') / 1 \* check(1) / 1 \* check(null),
* a variable 1 \* check(var),
* a list or map literal 1 \* check([1]) / 1 \* check([foo: 'bar']),
* an object 1 \* check(new Person('sam')),
* or the result of a method call 1 \* check(person())

as an equality constraint.

[Hamcrest Constraint](http://spockframework.org/spock/docs/1.3/all_in_one.html#_hamcrest_constraint)

A variation of the equality constraint, if the constraint object is a Hamcrest matcher, then it will use that matcher to check the argument.

[Wildcard Constraint](http://spockframework.org/spock/docs/1.3/all_in_one.html#_wildcard_constraint)

The wildcard constraint will match any argument null or otherwise. It is the *, i.e. 1 \* subscriber.receive(*). There is also the spread wildcard constraint \*\_ which matches any number of arguments 1 \* subscriber.receive(\*\_) including none.

[Code Constraint](http://spockframework.org/spock/docs/1.3/all_in_one.html#_code_constraint)

The code constraint is the most versatile of all. It is a groovy closure that gets the argument as its parameter. The closure is treated as an condition block, so it behaves like a then block, i.e., every line is treated as an implicit assertion. It can emulate all but the spread wildcard constraint, however it is suggested to use the simpler constraints where possible. You can do multiple assertions, call methods for assertions, or use with/verifyAll.

1 \* list.add({

verifyAll(it, Person) {

firstname == 'William'

lastname == 'Kirk'

age == 45

}

})

[Negating Constraint](http://spockframework.org/spock/docs/1.3/all_in_one.html#_negating_constraint)

The negating constraint ! is a compound constraint, i.e. it needs to be combined with another constraint to work. It inverts the result of the nested constraint, e.g, 1 \* subscriber.receive(!null) is the combination of an equality constraint checking for null and then the negating constraint inverting the result, turning it into not null.

Although it can be combined with any other constraint it does not always make sense, e.g., 1 \* subscriber.receive(!\_) will match nothing. Also keep in mind that the diagnostics for a non matching negating constraint will just be that the inner constraint did match, without any more information.

[Type Constraint](http://spockframework.org/spock/docs/1.3/all_in_one.html#_type_constraint)

The type constraint checks for the type/class of the argument, like the negating constraint it is also a compound constraint. It usually written as \_ as Type, which is a combination of the wildcard constraint and the type constraint. You can combined it with other constraints as well, 1 \* subscriber.receive({ it.contains('foo')} as String) will assert that it is a String before executing the code constraint to check if it contains foo.

[Matching Any Method Call](http://spockframework.org/spock/docs/1.3/all_in_one.html#_matching_any_method_call)

Sometimes it can be useful to match "anything", in some sense of the word:

1 \* subscriber.\_(\*\_) *// any method on subscriber, with any argument list*

1 \* subscriber.\_ *// shortcut for and preferred over the above*

1 \* \_.\_ *// any method call on any mock object*

1 \* \_ *// shortcut for and preferred over the above*

|  |  |
| --- | --- |
| **NOTE** | Although (*..*) \* *.*(\*\_) >> \_ is a valid interaction declaration, it is neither good style nor particularly useful. |

[Strict Mocking](http://spockframework.org/spock/docs/1.3/all_in_one.html#_strict_mocking)

Now, when would matching any method call be useful? A good example is *strict mocking*, a style of mocking where no interactions other than those explicitly declared are allowed:

when:

publisher.publish("hello")

then:

1 \* subscriber.receive("hello") *// demand one 'receive' call on 'subscriber'*

\_ \* auditing.\_ *// allow any interaction with 'auditing'*

0 \* \_ *// don't allow any other interaction*

0 \* only makes sense as the last interaction of a then: block or method. Note the use of \_ \* (any number of calls), which allows any interaction with the auditing component.

|  |  |
| --- | --- |
| **NOTE** | \_ \* is only meaningful in the context of strict mocking. In particular, it is never necessary when [Stubbing](http://spockframework.org/spock/docs/1.3/all_in_one.html#_stubbing) an invocation. For example, \_ \* auditing.record(*) >> "ok" can (and should!) be simplified to auditing.record(*) >> "ok". |

[Where to Declare Interactions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_where_to_declare_interactions)

So far, we declared all our interactions in a then: block. This often results in a spec that reads naturally. However, it is also permissible to put interactions anywhere *before* the when: block that is supposed to satisfy them. In particular, this means that interactions can be declared in a setup method. Interactions can also be declared in any "helper" instance method of the same specification class.

When an invocation on a mock object occurs, it is matched against interactions in the interactions' declared order. If an invocation matches multiple interactions, the earliest declared interaction that hasn’t reached its upper invocation limit will win. There is one exception to this rule: Interactions declared in a then: block are matched against before any other interactions. This allows to override interactions declared in, say, a setup method with interactions declared in a then: block.

Spock Deep Dive: How Are Interactions Recognized?

In other words, what makes an expression an interaction declaration, rather than, say, a regular method call? Spock uses a simple syntactic rule to recognize interactions: If an expression is in statement position and is either a multiplication (\*) or a right-shift (>>, >>>) operation, then it is considered an interaction and will be parsed accordingly. Such an expression would have little to no value in statement position, so changing its meaning works out fine. Note how the operations correspond to the syntax for declaring a cardinality (when mocking) or a response generator (when stubbing). Either of them must always be present; foo.bar() alone will never be considered an interaction.

[Declaring Interactions at Mock Creation Time](http://spockframework.org/spock/docs/1.3/all_in_one.html#declaring-interactions-at-creation-time)

If a mock has a set of "base" interactions that don’t vary, they can be declared right at mock creation time:

Subscriber subscriber = Mock {

1 \* receive("hello")

1 \* receive("goodbye")

}

This feature is particularly attractive for [Stubbing](http://spockframework.org/spock/docs/1.3/all_in_one.html#_stubbing) and with dedicated [Stubs](http://spockframework.org/spock/docs/1.3/all_in_one.html#Stubs). Note that the interactions don’t (and cannot [[5](http://spockframework.org/spock/docs/1.3/all_in_one.html#_footnote_5)]) have a target constraint; it’s clear from the context which mock object they belong to.

Interactions can also be declared when initializing an instance field with a mock:

**class** **MySpec** **extends** Specification {

Subscriber subscriber = Mock {

1 \* receive("hello")

1 \* receive("goodbye")

}

}

[Grouping Interactions with Same Target](http://spockframework.org/spock/docs/1.3/all_in_one.html#_grouping_interactions_with_same_target)

Interactions sharing the same target can be grouped in a Specification.with block. Similar to [Declaring Interactions at Mock Creation Time](http://spockframework.org/spock/docs/1.3/all_in_one.html#declaring-interactions-at-creation-time), this makes it unnecessary to repeat the target constraint:

with(subscriber) {

1 \* receive("hello")

1 \* receive("goodbye")

}

A with block can also be used for grouping conditions with the same target.

[Mixing Interactions and Conditions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_mixing_interactions_and_conditions)

A then: block may contain both interactions and conditions. Although not strictly required, it is customary to declare interactions before conditions:

when:

publisher.send("hello")

then:

1 \* subscriber.receive("hello")

publisher.messageCount == 1

Read out aloud: "When the publisher sends a 'hello' message, then the subscriber should receive the message exactly once, and the publisher’s message count should be one."

[Explicit Interaction Blocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_explicit_interaction_blocks)

Internally, Spock must have full information about expected interactions *before* they take place. So how is it possible for interactions to be declared in a then: block? The answer is that under the hood, Spock moves interactions declared in a then: block to immediately before the preceding when: block. In most cases this works out just fine, but sometimes it can lead to problems:

when:

publisher.send("hello")

then:

**def** message = "hello"

1 \* subscriber.receive(message)

Here we have introduced a variable for the expected argument. (Likewise, we could have introduced a variable for the cardinality.) However, Spock isn’t smart enough (huh?) to tell that the interaction is intrinsically linked to the variable declaration. Hence it will just move the interaction, which will cause a MissingPropertyException at runtime.

One way to solve this problem is to move (at least) the variable declaration to before the when: block. (Fans of [Data Driven Testing](http://spockframework.org/spock/docs/1.3/all_in_one.html) might move the variable into a where: block.) In our example, this would have the added benefit that we could use the same variable for sending the message.

Another solution is to be explicit about the fact that variable declaration and interaction belong together:

when:

publisher.send("hello")

then:

interaction {

**def** message = "hello"

1 \* subscriber.receive(message)

}

Since an MockingApi.interaction block is always moved in its entirety, the code now works as intended.

[Scope of Interactions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_scope_of_interactions)

Interactions declared in a then: block are scoped to the preceding when: block:

when:

publisher.send("message1")

then:

1 \* subscriber.receive("message1")

when:

publisher.send("message2")

then:

1 \* subscriber.receive("message2")

This makes sure that subscriber receives "message1" during execution of the first when: block, and "message2" during execution of the second when: block.

Interactions declared outside a then: block are active from their declaration until the end of the containing feature method.

Interactions are always scoped to a particular feature method. Hence they cannot be declared in a static method, setupSpec method, or cleanupSpec method. Likewise, mock objects should not be stored in static or @Shared fields.

[Verification of Interactions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_verification_of_interactions)

There are two main ways in which a mock-based test can fail: An interaction can match more invocations than allowed, or it can match fewer invocations than required. The former case is detected right when the invocation happens, and causes a TooManyInvocationsError:

Too many invocations for:

2 \* subscriber.receive(\_) (3 invocations)

To make it easier to diagnose why too many invocations matched, Spock will show all invocations matching the interaction in question:

Matching invocations (ordered by last occurrence):

2 \* subscriber.receive("hello") <-- this triggered the error

1 \* subscriber.receive("goodbye")

According to this output, one of the receive("hello") calls triggered the TooManyInvocationsError. Note that because indistinguishable calls like the two invocations of subscriber.receive("hello") are aggregated into a single line of output, the first receive("hello") may well have occurred before the receive("goodbye").

The second case (fewer invocations than required) can only be detected once execution of the when block has completed. (Until then, further invocations may still occur.) It causes a TooFewInvocationsError:

Too few invocations for:

1 \* subscriber.receive("hello") (0 invocations)

Note that it doesn’t matter whether the method was not called at all, the same method was called with different arguments, the same method was called on a different mock object, or a different method was called "instead" of this one; in either case, a TooFewInvocationsError error will occur.

To make it easier to diagnose what happened "instead" of a missing invocation, Spock will show all invocations that didn’t match any interaction, ordered by their similarity with the interaction in question. In particular, invocations that match everything but the interaction’s arguments will be shown first:

Unmatched invocations (ordered by similarity):

1 \* subscriber.receive("goodbye")

1 \* subscriber2.receive("hello")

[Invocation Order](http://spockframework.org/spock/docs/1.3/all_in_one.html#_invocation_order_2)

Often, the exact method invocation order isn’t relevant and may change over time. To avoid over-specification, Spock defaults to allowing any invocation order, provided that the specified interactions are eventually satisfied:

then:

2 \* subscriber.receive("hello")

1 \* subscriber.receive("goodbye")

Here, any of the invocation sequences "hello" "hello" "goodbye", "hello" "goodbye" "hello", and "goodbye" "hello" "hello" will satisfy the specified interactions.

In those cases where invocation order matters, you can impose an order by splitting up interactions into multiple then: blocks:

then:

2 \* subscriber.receive("hello")

then:

1 \* subscriber.receive("goodbye")

Now Spock will verify that both "hello"'s are received before the "goodbye". In other words, invocation order is enforced *between* but not *within* then: blocks.

|  |  |
| --- | --- |
| **NOTE** | Splitting up a then: block with and: does not impose any ordering, as and: is only meant for documentation purposes and doesn’t carry any semantics. |

[Mocking Classes](http://spockframework.org/spock/docs/1.3/all_in_one.html#_mocking_classes)

Besides interfaces, Spock also supports mocking of classes. Mocking classes works just like mocking interfaces; the only additional requirement is to put cglib-nodep-2.2 or higher and objenesis-1.2 or higher on the class path. If either of these libraries is missing from the class path, Spock will gently let you know.

|  |  |
| --- | --- |
| **NOTE** | Java 8 is only supported from CGLIB 3.2.0 onwards. |

[Stubbing](http://spockframework.org/spock/docs/1.3/all_in_one.html#_stubbing)

Stubbing is the act of making collaborators respond to method calls in a certain way. When stubbing a method, you don’t care if and how many times the method is going to be called; you just want it to return some value, or perform some side effect, *whenever* it gets called.

For the sake of the following examples, let’s modify the Subscriber's receive method to return a status code that tells if the subscriber was able to process a message:

**interface** Subscriber {

String receive(String message)

}

Now, let’s make the receive method return "ok" on every invocation:

subscriber.receive(\_) >> "ok"

Read out aloud: "*Whenever* the subscriber receives a message, *make* it respond with 'ok'."

Compared to a mocked interaction, a stubbed interaction has no cardinality on the left end, but adds a *response generator* on the right end:

subscriber.receive(\_) >> "ok"

| | | |

| | | response generator

| | argument constraint

| method constraint

target constraint

A stubbed interaction can be declared in the usual places: either inside a then: block, or anywhere before a when: block. (See [Where to Declare Interactions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_where_to_declare_interactions) for the details.) If a mock object is only used for stubbing, it’s common to declare interactions [at mock creation time](http://spockframework.org/spock/docs/1.3/all_in_one.html#declaring-interactions-at-creation-time) or in a given: block.

[Returning Fixed Values](http://spockframework.org/spock/docs/1.3/all_in_one.html#_returning_fixed_values)

We have already seen the use of the right-shift (>>) operator to return a fixed value:

subscriber.receive(\_) >> "ok"

To return different values for different invocations, use multiple interactions:

subscriber.receive("message1") >> "ok"

subscriber.receive("message2") >> "fail"

This will return "ok" whenever "message1" is received, and "fail" whenever "message2" is received. There is no limit as to which values can be returned, provided they are compatible with the method’s declared return type.

[Returning Sequences of Values](http://spockframework.org/spock/docs/1.3/all_in_one.html#_returning_sequences_of_values)

To return different values on successive invocations, use the triple-right-shift (>>>) operator:

subscriber.receive(\_) >>> ["ok", "error", "error", "ok"]

This will return "ok" for the first invocation, "error" for the second and third invocation, and "ok" for all remaining invocations. The right-hand side must be a value that Groovy knows how to iterate over; in this example, we’ve used a plain list.

[Computing Return Values](http://spockframework.org/spock/docs/1.3/all_in_one.html#_computing_return_values)

To compute a return value based on the method’s argument, use the the right-shift (>>) operator together with a closure. If the closure declares a single untyped parameter, it gets passed the method’s argument list:

subscriber.receive(\_) >> { args -> args[0].size() > 3 ? "ok" : "fail" }

Here "ok" gets returned if the message is more than three characters long, and "fail" otherwise.

In most cases it would be more convenient to have direct access to the method’s arguments. If the closure declares more than one parameter or a single *typed* parameter, method arguments will be mapped one-by-one to closure parameters:[[6](http://spockframework.org/spock/docs/1.3/all_in_one.html" \l "_footnote_6" \o "View footnote.)]

subscriber.receive(\_) >> { String message -> message.size() > 3 ? "ok" : "fail" }

This response generator behaves the same as the previous one, but is arguably more readable.

If you find yourself in need of more information about a method invocation than its arguments, have a look at org.spockframework.mock.IMockInvocation. All methods declared in this interface are available inside the closure, without a need to prefix them. (In Groovy terminology, the closure *delegates* to an instance of IMockInvocation.)

[Performing Side Effects](http://spockframework.org/spock/docs/1.3/all_in_one.html#_performing_side_effects)

Sometimes you may want to do more than just computing a return value. A typical example is throwing an exception. Again, closures come to the rescue:

subscriber.receive(\_) >> { **throw** **new** InternalError("ouch") }

Of course, the closure can contain more code, for example a println statement. It will get executed every time an incoming invocation matches the interaction.

[Chaining Method Responses](http://spockframework.org/spock/docs/1.3/all_in_one.html#_chaining_method_responses)

Method responses can be chained:

subscriber.receive(\_) >>> ["ok", "fail", "ok"] >> { **throw** **new** InternalError() } >> "ok"

This will return "ok", "fail", "ok" for the first three invocations, throw InternalError for the fourth invocations, and return ok for any further invocation.

[Combining Mocking and Stubbing](http://spockframework.org/spock/docs/1.3/all_in_one.html#_combining_mocking_and_stubbing)

Mocking and stubbing go hand-in-hand:

1 \* subscriber.receive("message1") >> "ok"

1 \* subscriber.receive("message2") >> "fail"

When mocking and stubbing the same method call, they have to happen in the same interaction. In particular, the following Mockito-style splitting of stubbing and mocking into two separate statements will *not* work:

given:

subscriber.receive("message1") >> "ok"

when:

publisher.send("message1")

then:

1 \* subscriber.receive("message1")

As explained in [Where to Declare Interactions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_where_to_declare_interactions), the receive call will first get matched against the interaction in the then: block. Since that interaction doesn’t specify a response, the default value for the method’s return type (null in this case) will be returned. (This is just another facet of Spock’s lenient approach to mocking.). Hence, the interaction in the given: block will never get a chance to match.

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| --- | --- |
| **NOTE** | Mocking and stubbing of the same method call has to happen in the same interaction. |

[Other Kinds of Mock Objects](http://spockframework.org/spock/docs/1.3/all_in_one.html#OtherKindsOfMockObjects)

So far, we have created mock objects with the MockingApi.Mock method. Aside from this method, the MockingApi class provides a couple of other factory methods for creating more specialized kinds of mock objects.

[Stubs](http://spockframework.org/spock/docs/1.3/all_in_one.html#Stubs)

A *stub* is created with the MockingApi.Stub factory method:

Subscriber subscriber = Stub()

Whereas a mock can be used both for stubbing and mocking, a stub can only be used for stubbing. Limiting a collaborator to a stub communicates its role to the readers of the specification.

|  |  |
| --- | --- |
| **NOTE** | If a stub invocation matches a *mandatory* interaction (like 1 \* foo.bar()), an InvalidSpecException is thrown. |

Like a mock, a stub allows unexpected invocations. However, the values returned by a stub in such cases are more ambitious:

* For primitive types, the primitive type’s default value is returned.
* For non-primitive numerical values (such as BigDecimal), zero is returned.
* For non-numerical values, an "empty" or "dummy" object is returned. This could mean an empty String, an empty collection, an object constructed from its default constructor, or another stub returning default values. See class org.spockframework.mock.EmptyOrDummyResponse for the details.

|  |  |
| --- | --- |
| **NOTE** | If the response type of the method is a final class or if it requires a class-mocking library and cglib or ByteBuddy are not available, then the "dummy" object creation will fail with a CannotCreateMockException. |

A stub often has a fixed set of interactions, which makes [declaring interactions at mock creation time](http://spockframework.org/spock/docs/1.3/all_in_one.html#declaring-interactions-at-creation-time) particularly attractive:

Subscriber subscriber = Stub {

receive("message1") >> "ok"

receive("message2") >> "fail"

}

[Spies](http://spockframework.org/spock/docs/1.3/all_in_one.html#Spies)

(Think twice before using this feature. It might be better to change the design of the code under specification.)

A *spy* is created with the MockingApi.Spy factory method:

SubscriberImpl subscriber = Spy(constructorArgs: ["Fred"])

A spy is always based on a real object. Hence you must provide a class type rather than an interface type, along with any constructor arguments for the type. If no constructor arguments are provided, the type’s default constructor will be used.

You may also create a spy from an instantiated object. This may be useful in cases where you do not have full control over the instatiation of types you are interested in spying. (For example when testing within a Dependency Injection framework such as Spring or Guice.)

Method calls on a spy are automatically delegated to the real object. Likewise, values returned from the real object’s methods are passed back to the caller via the spy.

After creating a spy, you can listen in on the conversation between the caller and the real object underlying the spy:

1 \* subscriber.receive(\_)

Apart from making sure that receive gets called exactly once, the conversation between the publisher and the SubscriberImpl instance underlying the spy remains unaltered.

When stubbing a method on a spy, the real method no longer gets called:

subscriber.receive(\_) >> "ok"

Instead of calling SubscriberImpl.receive, the receive method will now simply return "ok".

Sometimes, it is desirable to both execute some code *and* delegate to the real method:

subscriber.receive(\_) >> { String message -> callRealMethod(); message.size() > 3 ? "ok" : "fail" }

Here we use callRealMethod() to delegate the method invocation to the real object. Note that we don’t have to pass the message argument along; this is taken care of automatically. callRealMethod() returns the real invocation’s result, but in this example we opted to return our own result instead. If we had wanted to pass a different message to the real method, we could have used callRealMethodWithArgs("changed message").

[Partial Mocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#PartialMocks)

(Think twice before using this feature. It might be better to change the design of the code under specification.)

Spies can also be used as partial mocks:

*// this is now the object under specification, not a collaborator*

MessagePersister persister = Spy {

*// stub a call on the same object*

isPersistable(\_) >> true

}

when:

persister.receive("msg")

then:

*// demand a call on the same object*

1 \* persister.persist("msg")

[Groovy Mocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#GroovyMocks)

So far, all the mocking features we have seen work the same no matter if the calling code is written in Java or Groovy. By leveraging Groovy’s dynamic capabilities, Groovy mocks offer some additional features specifically for testing Groovy code. They are created with the MockingApi.GroovyMock(), MockingApi.GroovyStub(), and MockingApi.GroovySpy() factory methods.

|  |  |
| --- | --- |
| **TIP** | When Should Groovy Mocks be Favored over Regular Mocks? Groovy mocks should be used when the code under specification is written in Groovy *and* some of the unique Groovy mock features are needed. When called from Java code, Groovy mocks will behave like regular mocks. Note that it isn’t necessary to use a Groovy mock merely because the code under specification and/or mocked type is written in Groovy. Unless you have a concrete reason to use a Groovy mock, prefer a regular mock. |

[Mocking Dynamic Methods](http://spockframework.org/spock/docs/1.3/all_in_one.html#_mocking_dynamic_methods)

All Groovy mocks implement the GroovyObject interface. They support the mocking and stubbing of dynamic methods as if they were physically declared methods:

Subscriber subscriber = GroovyMock()

1 \* subscriber.someDynamicMethod("hello")

[Mocking All Instances of a Type](http://spockframework.org/spock/docs/1.3/all_in_one.html#MockingAllInstancesOfAType)

(Think twice before using this feature. It might be better to change the design of the code under specification.)

Usually, Groovy mocks need to be injected into the code under specification just like regular mocks. However, when a Groovy mock is created as *global*, it automagically replaces all real instances of the mocked type for the duration of the feature method:[[7](http://spockframework.org/spock/docs/1.3/all_in_one.html" \l "_footnote_7" \o "View footnote.)]

**def** publisher = **new** Publisher()

publisher << **new** RealSubscriber() << **new** RealSubscriber()

RealSubscriber anySubscriber = GroovyMock(global: true)

when:

publisher.publish("message")

then:

2 \* anySubscriber.receive("message")

Here, we set up the publisher with two instances of a real subscriber implementation. Then we create a global mock of the *same* type. This reroutes all method calls on the real subscribers to the mock object. The mock object’s instance isn’t ever passed to the publisher; it is only used to describe the interaction.

|  |  |
| --- | --- |
| **NOTE** | A global mock can only be created for a class type. It effectively replaces all instances of that type for the duration of the feature method. |

Since global mocks have a somewhat, well, global effect, it’s often convenient to use them together with GroovySpy. This leads to the real code getting executed *unless* an interaction matches, allowing you to selectively listen in on objects and change their behavior just where needed.

How Are Global Groovy Mocks Implemented?

Global Groovy mocks get their super powers from Groovy meta-programming. To be more precise, every globally mocked type is assigned a custom meta class for the duration of the feature method. Since a global Groovy mock is still based on a CGLIB proxy, it will retain its general mocking capabilities (but not its super powers) when called from Java code.

[Mocking Constructors](http://spockframework.org/spock/docs/1.3/all_in_one.html#MockingConstructors)

(Think twice before using this feature. It might be better to change the design of the code under specification.)

Global mocks support mocking of constructors:

RealSubscriber anySubscriber = GroovySpy(global: true)

1 \* **new** RealSubscriber("Fred")

Since we are using a spy, the object returned from the constructor call remains unchanged. To change which object gets constructed, we can stub the constructor:

**new** RealSubscriber("Fred") >> **new** RealSubscriber("Barney")

Now, whenever some code tries to construct a subscriber named Fred, we’ll construct a subscriber named Barney instead.

[Mocking Static Methods](http://spockframework.org/spock/docs/1.3/all_in_one.html#_mocking_static_methods)

(Think twice before using this feature. It might be better to change the design of the code under specification.)

Global mocks support mocking and stubbing of static methods:

RealSubscriber anySubscriber = GroovySpy(global: true)

1 \* RealSubscriber.someStaticMethod("hello") >> 42

The same works for dynamic static methods.

When a global mock is used solely for mocking constructors and static methods, the mock’s instance isn’t really needed. In such a case one can just write:

GroovySpy(RealSubscriber, global: true)

[Advanced Features](http://spockframework.org/spock/docs/1.3/all_in_one.html#_advanced_features)

Most of the time you shouldn’t need these features. But if you do, you’ll be glad to have them.

[A la Carte Mocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#ALaCarteMocks)

At the end of the day, the Mock(), Stub(), and Spy() factory methods are just canned ways to create mock objects with a certain configuration. If you want more fine-grained control over a mock’s configuration, have a look at the org.spockframework.mock.IMockConfiguration interface. All properties of this interface [[8](http://spockframework.org/spock/docs/1.3/all_in_one.html#_footnote_8)] can be passed as named arguments to the Mock() method. For example:

**def** person = Mock(name: "Fred", type: Person, defaultResponse: ZeroOrNullResponse, verified: false)

Here, we create a mock whose default return values match those of a Mock(), but whose invocations aren’t verified (as for a Stub()). Instead of passing ZeroOrNullResponse, we could have supplied our own custom org.spockframework.mock.IDefaultResponse for responding to unexpected method invocations.

[Detecting Mock Objects](http://spockframework.org/spock/docs/1.3/all_in_one.html#DetectingMockObjects)

To find out whether a particular object is a Spock mock object, use a org.spockframework.mock.MockUtil:

MockUtil mockUtil = **new** MockUtil()

List list1 = **[]**

List list2 = Mock()

expect:

!mockUtil.isMock(list1)

mockUtil.isMock(list2)

An util can also be used to get more information about a mock object:

IMockObject mock = mockUtil.asMock(list2)

expect:

mock.name == "list2"

mock.type == List

mock.nature == MockNature.MOCK

[Further Reading](http://spockframework.org/spock/docs/1.3/all_in_one.html#_further_reading)

If you would like to dive deeper into interaction-based testing, we recommend the following resources:

[**Endo-Testing: Unit Testing with Mock Objects**](http://www.ccs.neu.edu/research/demeter/related-work/extreme-programming/MockObjectsFinal.PDF)

Paper from the XP2000 conference that introduces the concept of mock objects.

[**Mock Roles, not Objects**](http://www.jmock.org/oopsla2004.pdf)

Paper from the OOPSLA2004 conference that explains how to do mocking *right*.

[**Mocks Aren’t Stubs**](http://martinfowler.com/articles/mocksArentStubs.html)

Martin Fowler’s take on mocking.

[**Growing Object-Oriented Software Guided by Tests**](http://www.growing-object-oriented-software.com/)

TDD pioneers Steve Freeman and Nat Pryce explain in detail how test-driven development and mocking work in the real world.

[Extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_extensions_2)

Spock comes with a powerful extension mechanism, which allows to hook into a spec’s lifecycle to enrich or alter its behavior. In this chapter, we will first learn about Spock’s built-in extensions, and then dive into writing custom extensions.

[Spock Configuration File](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spock_configuration_file)

Some extensions can be configured with options in a Spock configuration file. The description for each extension will mention how it can be configured. All those configurations are in a Groovy file that usually is called SpockConfig.groovy. Spock first searches for a custom location given in a system property called spock.configuration which is then used either as classpath location or if not found as file system location if it can be found there, otherwise the default locations are investigated for a configuration file. Next it searches for the SpockConfig.groovy in the root of the test execution classpath. If there is also no such file, you can at last have a SpockConfig.groovy in your Spock user home. This by default is the directory .spock within your home directory, but can be changed using the system property spock.user.home or if not set the environment property SPOCK\_USER\_HOME.

[Stack Trace Filtering](http://spockframework.org/spock/docs/1.3/all_in_one.html#_stack_trace_filtering)

You can configure Spock whether it should filter stack traces or not by using the configuration file. The default value is true.

*Stack Trace Filtering Configuration*

runner {

filterStackTrace false

}

[Built-In Extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_built_in_extensions)

Most of Spock’s built-in extensions are *annotation-driven*. In other words, they are triggered by annotating a spec class or method with a certain annotation. You can tell such an annotation by its @ExtensionAnnotation meta-annotation.

[Ignore](http://spockframework.org/spock/docs/1.3/all_in_one.html#_ignore)

To temporarily prevent a feature method from getting executed, annotate it with spock.lang.Ignore:

@Ignore

**def** "my feature"() { ... }

For documentation purposes, a reason can be provided:

@Ignore("TODO")

**def** "my feature"() { ... }

To ignore a whole specification, annotate its class:

@Ignore

**class** **MySpec** **extends** Specification { ... }

In most execution environments, ignored feature methods and specs will be reported as "skipped".

Care should be taken when ignoring feature methods in a spec class annotated with spock.lang.Stepwise since later feature methods may depend on earlier feature methods having executed.

[IgnoreRest](http://spockframework.org/spock/docs/1.3/all_in_one.html#_ignorerest)

To ignore all but a (typically) small subset of methods, annotate the latter with spock.lang.IgnoreRest:

**def** "I'll be ignored"() { ... }

@IgnoreRest

**def** "I'll run"() { ... }

**def** "I'll also be ignored"() { ... }

@IgnoreRest is especially handy in execution environments that don’t provide an (easy) way to run a subset of methods.

Care should be taken when ignoring feature methods in a spec class annotated with spock.lang.Stepwise since later feature methods may depend on earlier feature methods having executed.

[IgnoreIf](http://spockframework.org/spock/docs/1.3/all_in_one.html#_ignoreif)

To ignore a feature method under certain conditions, annotate it with spock.lang.IgnoreIf, followed by a predicate:

@IgnoreIf({ System.getProperty("os.name").contains("windows") })

**def** "I'll run everywhere but on Windows"() { ... }

To make predicates easier to read and write, the following properties are available inside the closure:

* sys A map of all system properties
* env A map of all environment variables
* os Information about the operating system (see spock.util.environment.OperatingSystem)
* jvm Information about the JVM (see spock.util.environment.Jvm)

Using the os property, the previous example can be rewritten as:

@IgnoreIf({ os.windows })

**def** "I'll run everywhere but on Windows"() { ... }

Care should be taken when ignoring feature methods in a spec class annotated with spock.lang.Stepwise since later feature methods may depend on earlier feature methods having executed.

[Requires](http://spockframework.org/spock/docs/1.3/all_in_one.html#_requires)

To execute a feature method under certain conditions, annotate it with spock.lang.Requires, followed by a predicate:

@Requires({ os.windows })

**def** "I'll only run on Windows"() { ... }

Requires works exactly like IgnoreIf, except that the predicate is inverted. In general, it is preferable to state the conditions under which a method gets executed, rather than the conditions under which it gets ignored.

[PendingFeature](http://spockframework.org/spock/docs/1.3/all_in_one.html#_pendingfeature)

To indicate that the feature is not fully implemented yet and should not be reported as error, annotate it with spock.lang.PendingFeature.

The use case is to annotate tests that can not yet run but should already be committed. The main difference to Ignore is that the test are executed, but test failures are ignored. If the test passes without an error, then it will be reported as failure since the PendingFeature annotation should be removed. This way the tests will become part of the normal tests instead of being ignored forever.

Groovy has the groovy.transform.NotYetImplemented annotation which is similar but behaves a differently.

* it will mark failing tests as passed
* if at least one iteration of a data-driven test passes it will be reported as error

PendingFeature:

* it will mark failing tests as skipped
* if at least one iteration of a data-driven test fails it will be reported as skipped
* if every iteration of a data-driven test passes it will be reported as error

@PendingFeature

**def** "not implemented yet"() { ... }

[Stepwise](http://spockframework.org/spock/docs/1.3/all_in_one.html#_stepwise)

To execute features in the order that they are declared, annotate a spec class with spock.lang.Stepwise:

@Stepwise

**class** **RunInOrderSpec** **extends** Specification {

**def** "I run first"() { ... }

**def** "I run second"() { ... }

}

Stepwise only affects the class carrying the annotation; not sub or super classes. Features after the first failure are skipped.

Stepwise does not override the behaviour of annotations such as Ignore, IgnoreRest, and IgnoreIf, so care should be taken when ignoring feature methods in spec classes annotated with Stepwise.

[Timeout](http://spockframework.org/spock/docs/1.3/all_in_one.html#_timeout)

To fail a feature method, fixture, or class that exceeds a given execution duration, use spock.lang.Timeout, followed by a duration, and optionally a time unit. The default time unit is seconds.

When applied to a feature method, the timeout is per execution of one iteration, excluding time spent in fixture methods:

@Timeout(5)

**def** "I fail if I run for more than five seconds"() { ... }

@Timeout(value = 100, unit = TimeUnit.MILLISECONDS)

**def** "I better be quick" { ... }

Applying Timeout to a spec class has the same effect as applying it to each feature that is not already annotated with Timeout, excluding time spent in fixtures:

@Timeout(10)

**class** **TimedSpec** **extends** Specification {

**def** "I fail after ten seconds"() { ... }

**def** "Me too"() { ... }

@Timeout(value = 250, unit = MILLISECONDS)

**def** "I fail much faster"() { ... }

}

When applied to a fixture method, the timeout is per execution of the fixture method.

When a timeout is reported to the user, the stack trace shown reflects the execution stack of the test framework when the timeout was exceeded.

[Retry](http://spockframework.org/spock/docs/1.3/all_in_one.html#_retry)

The @Retry extensions can be used for flaky integration tests, where remote systems can fail sometimes. By default it retries an iteration 3 times with 0 delay if either an Exception or AssertionError has been thrown, all this is configurable. In addition, an optional condition closure can be used to determine if a feature should be retried. It also provides special support for data driven features, offering to either retry all iterations or just the failing ones.

**class** **FlakyIntegrationSpec** **extends** Specification {

@Retry

**def** **retry3Times**() { ... }

@Retry(count = 5)

**def** **retry5Times**() { ... }

@Retry(exceptions=[IOException])

**def** **onlyRetryIOException**() { ... }

@Retry(condition = { failure.message.contains('foo') })

**def** **onlyRetryIfConditionOnFailureHolds**() { ... }

@Retry(condition = { instance.field != null })

**def** **onlyRetryIfConditionOnInstanceHolds**() { ... }

@Retry

**def** **retryFailingIterations**() {

...

where:

data << sql.select()

}

@Retry(mode = Retry.Mode.FEATURE)

**def** **retryWholeFeature**() {

...

where:

data << sql.select()

}

@Retry(delay = 1000)

**def** **retryAfter1000MsDelay**() { ... }

}

Retries can also be applied to spec classes which has the same effect as applying it to each feature method that isn’t already annotated with {@code Retry}.

@Retry

**class** **FlakyIntegrationSpec** **extends** Specification {

**def** "will be retried with config from class"() {

...

}

@Retry(count = 5)

**def** "will be retried using its own config"() {

...

}

}

A {@code @Retry} annotation that is declared on a spec class is applied to all features in all subclasses as well, unless a subclass declares its own annotation. If so, the retries defined in the subclass are applied to all feature methods declared in the subclass as well as inherited ones.

Given the following example, running FooIntegrationSpec will execute both inherited and foo with one retry. Running BarIntegrationSpec will execute inherited and bar with two retries.

@Retry(count = 1)

**abstract** **class** **AbstractIntegrationSpec** **extends** Specification {

**def** **inherited**() {

...

}

}

**class** **FooIntegrationSpec** **extends** AbstractIntegrationSpec {

**def** **foo**() {

...

}

}

@Retry(count = 2)

**class** **BarIntegrationSpec** **extends** AbstractIntegrationSpec {

**def** **bar**() {

...

}

}

Check [RetryFeatureExtensionSpec](https://github.com/spockframework/spock/blob/master/spock-specs/src/test/groovy/org/spockframework/smoke/extension/RetryFeatureExtensionSpec.groovy) for more examples.

[Use](http://spockframework.org/spock/docs/1.3/all_in_one.html#_use)

To activate one or more Groovy categories within the scope of a feature method or spec, use spock.util.mop.Use:

**class** **ListExtensions** {

**static** avg(List list) { list.sum() / list.size() }

}

**class** **MySpec** **extends** Specification {

@Use(listExtensions)

**def** "can use avg() method"() {

expect:

[1, 2, 3].avg() == 2

}

}

This can be useful for stubbing of dynamic methods, which are usually provided by the runtime environment (e.g. Grails). It has no effect when applied to a helper method. However, when applied to a spec class, it will also affect its helper methods.

[ConfineMetaClassChanges](http://spockframework.org/spock/docs/1.3/all_in_one.html#_confinemetaclasschanges)

To confine meta class changes to the scope of a feature method or spec class, use spock.util.mop.ConfineMetaClassChanges:

@Stepwise

**class** **FooSpec** **extends** Specification {

@ConfineMetaClassChanges([String])

**def** "I run first"() {

when:

String.metaClass.someMethod = { delegate }

then:

String.metaClass.hasMetaMethod('someMethod')

}

**def** "I run second"() {

when:

"Foo".someMethod()

then:

thrown(MissingMethodException)

}

}

When applied to a spec class, the meta classes are restored to the state that they were in before setupSpec was executed, after cleanupSpec is executed.

When applied to a feature method, the meta classes are restored to as they were after setup was executed, before cleanup is executed.

|  |  |
| --- | --- |
| **CAUTION** | Temporarily changing the meta classes is only safe when specs are run in a single thread per JVM. Even though many execution environments do limit themselves to one thread per JVM, keep in mind that Spock cannot enforce this. |

[RestoreSystemProperties](http://spockframework.org/spock/docs/1.3/all_in_one.html#_restoresystemproperties)

Saves system properties before the annotated feature method (including any setup and cleanup methods) gets run, and restores them afterwards.

Applying this annotation to a spec class has the same effect as applying it to all its feature methods.

@RestoreSystemProperties

**def** "determines family based on os.name system property"() {

given:

System.setProperty('os.name', 'Windows 7')

expect:

OperatingSystem.current.family == OperatingSystem.Family.WINDOWS

}

|  |  |
| --- | --- |
| **CAUTION** | Temporarily changing the values of system properties is only safe when specs are run in a single thread per JVM. Even though many execution environments do limit themselves to one thread per JVM, keep in mind that Spock cannot enforce this. |

[AutoAttach](http://spockframework.org/spock/docs/1.3/all_in_one.html#_autoattach)

Automatically attaches a detached mock to the current Specification. Use this if there is no direct framework support available. Spring and Guice dependency injection is automatically handled by the [Spring Module](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spring_module) and [Guice Module](http://spockframework.org/spock/docs/1.3/all_in_one.html#_guice_module) respectively.

[AutoCleanup](http://spockframework.org/spock/docs/1.3/all_in_one.html#_autocleanup)

Automatically clean up a field or property at the end of its lifetime by using spock.lang.AutoCleanup.

By default, an object is cleaned up by invoking its parameterless close() method. If some other method should be called instead, override the annotation’s value attribute:

*// invoke foo.dispose()*

@AutoCleanup("dispose")

**def** foo

If multiple fields or properties are annotated with AutoCleanup, their objects are cleaned up sequentially, in reverse field/property declaration order, starting from the most derived class class and walking up the inheritance chain.

If a cleanup operation fails with an exception, the exception is reported by default, and cleanup proceeds with the next annotated object. To prevent cleanup exceptions from being reported, override the annotation’s quiet attribute:

@AutoCleanup(quiet = true)

**def** ignoreMyExceptions

[Title and Narrative](http://spockframework.org/spock/docs/1.3/all_in_one.html#_title_and_narrative)

To attach a natural-language name to a spec, use spock.lang.Title:

@Title("This is easy to read")

**class** **ThisIsHarderToReadSpec** **extends** Specification {

...

}

Similarly, to attach a natural-language description to a spec, use spock.lang.Narrative:

@Narrative("""

As a user

I want foo

So that bar

""")

**class** **GiveTheUserFooSpec**() { ... }

[See](http://spockframework.org/spock/docs/1.3/all_in_one.html#_see)

To link to one or more references to external information related to a specification or feature, use spock.lang.See:

@See("http://spockframework.org/spec")

**class** **MoreInformationAvailableSpec** **extends** Specification {

@See(["http://en.wikipedia.org/wiki/Levenshtein\_distance", "http://www.levenshtein.net/"])

**def** "Even more information is available on the feature"() { ... }

}

[Issue](http://spockframework.org/spock/docs/1.3/all_in_one.html#_issue)

To indicate that a feature or spec relates to one or more issues in an external tracking system, use spock.lang.Issue:

@Issue("http://my.issues.org/FOO-1")

**class** **MySpec** {

@Issue("http://my.issues.org/FOO-2")

**def** "Foo should do bar"() { ... }

@Issue(["http://my.issues.org/FOO-3", "http://my.issues.org/FOO-4"])

**def** "I have two related issues"() { ... }

}

If you have a common prefix URL for all issues in a project, you can use the [Spock Configuration File](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spock_configuration_file) to set it up for all at once. If it is set, it is prepended to the value of the @Issue annotation when building the URL.

If the issueNamePrefix is set, it is prepended to the value of the @Issue annotation when building the name for the issue.

*Issue Configuration*

report {

issueNamePrefix 'Bug '

issueUrlPrefix 'http://my.issues.org/'

}

[Subject](http://spockframework.org/spock/docs/1.3/all_in_one.html#_subject)

To indicate one or more subjects of a spec, use spock.lang.Subject:

@Subject([Foo, Bar]) { ... }

Additionally, Subject can be applied to fields and local variables:

@Subject

Foo myFoo

Subject currently has only informational purposes.

[Rule](http://spockframework.org/spock/docs/1.3/all_in_one.html#_rule)

Spock understands @org.junit.Rule annotations on non-@Shared instance fields. The according rules are run at the iteration interception point in the Spock lifecycle. This means that the rules before-actions are done before the execution of setup methods and the after-actions are done after the execution of cleanup methods.

[ClassRule](http://spockframework.org/spock/docs/1.3/all_in_one.html#_classrule)

Spock understands @org.junit.ClassRule annotations on @Shared fields. The according rules are run at the specification interception point in the Spock lifecycle. This means that the rules before-actions are done before the execution of setupSpec methods and the after-actions are done after the execution of cleanupSpec methods.

[Include and Exclude](http://spockframework.org/spock/docs/1.3/all_in_one.html#_include_and_exclude)

Spock is capable of including and excluding specifications according to their classes, super-classes and interfaces and according to annotations that are applied to the specification. Spock is also capable of including and excluding individual features according to annotations that are applied to the feature method. The configuration for what to include or exclude is done according to the [Spock Configuration File](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spock_configuration_file) section.

*Include / Exclude Configuration*

**import** some.pkg.Fast

**import** some.pkg.IntegrationSpec

runner {

include Fast *// could be either an annotation or a (base) class*

exclude {

annotation some.pkg.Slow

baseClass IntegrationSpec

}

}

[Optimize Run Order](http://spockframework.org/spock/docs/1.3/all_in_one.html#_optimize_run_order)

Spock can remember which features last failed and how often successively and also how long a feature needed to be tested. For successive runs Spock will then first run features that failed at last run and first features that failed more often successively. Within the previously failed or non-failed features Spock will run the fastest tests first. This behaviour can be enabled according to the [Spock Configuration File](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spock_configuration_file) section. The default value is false.

*Optimize Run Order Configuration*

runner {

optimizeRunOrder true

}

[Report Log](http://spockframework.org/spock/docs/1.3/all_in_one.html#_report_log)

Spock can create a report log of the executed tests in JSON format. This report contains also things like [@Title](http://spockframework.org/spock/docs/1.3/all_in_one.html#_title_and_narrative), [@Narrative](http://spockframework.org/spock/docs/1.3/all_in_one.html#_title_and_narrative), [@See](http://spockframework.org/spock/docs/1.3/all_in_one.html#_see) and [@Issue](http://spockframework.org/spock/docs/1.3/all_in_one.html#_issue) values or [block descriptors](http://spockframework.org/spock/docs/1.3/all_in_one.html#_blocks). This report can be enabled according to the [Spock Configuration File](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spock_configuration_file) section. The default is to not generate this report.

For the report to be generated, you have to enable it and set at least the logFileDir and logFileName. enabled can also be set via the system property spock.logEnabled, logFileDir can also be set via the system property spock.logFileDir and logFileName can also be set via the system property spock.logFileName.

If a logFileSuffix is set (or the system property spock.logFileSuffix), it is appended to the base filename, separated by a dash. If the suffix contains the string #timestamp, this is replaced by the current date and time in UTC automatically. If you instead want to have your local date and time, you can use the setting from the example below.

*Report Log Configuration*

report {

enabled true

logFileDir '.'

logFileName 'spock-report.json'

logFileSuffix **new** Date().format('yyyy-MM-dd\_HH\_mm\_ss')

}

[Third-Party Extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_third_party_extensions)

You can find a list of third-party extensions in the [Spock Wiki](https://github.com/spockframework/spock/wiki/Third-Party-Extensions).

[Writing Custom Extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_writing_custom_extensions)

There are two types of extensions that can be created for usage with Spock. These are global extensions and annotation driven local extensions. For both extension types you implement a specific interface which defines some callback methods. In your implementation of those methods you can set up the magic of your extension, for example by adding interceptors to various interception points that are described below.

Which type of annotation you create depends on your use case. If you want to do something once during the Spock run - at the start or end - or want to apply something to all executed specifications without the user of the extension having to do anything besides including your extension in the classpath, then you should opt for a global extension. If you instead want to apply your magic only by choice of the user, then you should implement an annotation driven local extension.

[Global Extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_global_extensions)

To create a global extension you need to create a class that implements the interface IGlobalExtension and put its fully-qualified class name in a file META-INF/services/org.spockframework.runtime.extension.IGlobalExtension in the class path. As soon as these two conditions are satisfied, the extension is automatically loaded and used when Spock is running. For convenience there is also the class AbstractGlobalExtension, which provides empty implementations for all methods in the interface, so that only the needed ones need to be overridden.

IGlobalExtension has the following three methods:

start()

This is called once at the very start of the Spock execution.

visitSpec(SpecInfo spec)

This is called once for each specification. In this method you can prepare a specification with your extension magic, like attaching interceptors to various interception points as described in the chapter [Interceptors](http://spockframework.org/spock/docs/1.3/all_in_one.html#_interceptors).

stop()

This is called once at the very end of the Spock execution.

[Annotation Driven Local Extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_annotation_driven_local_extensions)

To create an annotation driven local extension you need to create a class that implements the interface IAnnotationDrivenExtension. As type argument to the interface you need to supply an annotation class that has @Retention set to RUNTIME, @Target set to one or more of FIELD, METHOD and TYPE - depending on where you want your annotation to be applicable - and @ExtensionAnnotation applied, with the IAnnotationDrivenExtension class as argument. Of course the annotation class can have some attributes with which the user can further configure the behaviour of the extension for each annotation application. For convenience there is also the class AbstractAnnotationDrivenExtension, which provides empty implementations for all methods in the interface, so that only the needed ones need to be overridden.

Your annotation can be applied to a specification, a feature method, a fixture method or a field. On all other places like helper methods or other places if the @Target is set accordingly, the annotation will be ignored and has no effect other than being visible in the source code.

IAnnotationDrivenExtension has the following five methods, where in each you can prepare a specification with your extension magic, like attaching interceptors to various interception points as described in the chapter [Interceptors](http://spockframework.org/spock/docs/1.3/all_in_one.html#_interceptors):

visitSpecAnnotation(T annotation, SpecInfo spec)

This is called once for each specification where the annotation is applied with the annotation instance as first parameter and the specification info object as second parameter.

visitFeatureAnnotation(T annotation, FeatureInfo feature)

This is called once for each feature method where the annotation is applied with the annotation instance as first parameter and the feature info object as second parameter.

visitFixtureAnnotation(T annotation, MethodInfo fixtureMethod)

This is called once for each fixture method where the annotation is applied with the annotation instance as first parameter and the fixture method info object as second parameter.

visitFieldAnnotation(T annotation, FieldInfo field)

This is called once for each field where the annotation is applied with the annotation instance as first parameter and the field info object as second parameter.

visitSpec(SpecInfo spec)

This is called once for each specification within which the annotation is applied to at least one of the supported places like defined above. It gets the specification info object as sole parameter. This method is called after all other methods of this interface for each applied annotation are processed.

[Configuration Objects](http://spockframework.org/spock/docs/1.3/all_in_one.html#_configuration_objects)

You can add own sections in the [Spock Configuration File](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spock_configuration_file) for your extension by creating POJOs or POGOs that are annotated with @ConfigurationObject and have a default constructor (either implicitly or explicitly). The argument to the annotation is the name of the top-level section that is added to the Spock configuration file syntax. The default values for the configuration options are defined in the class by initializing the fields at declaration time or in the constructor. In the Spock configuration file those values can then be edited by the user of your extension.

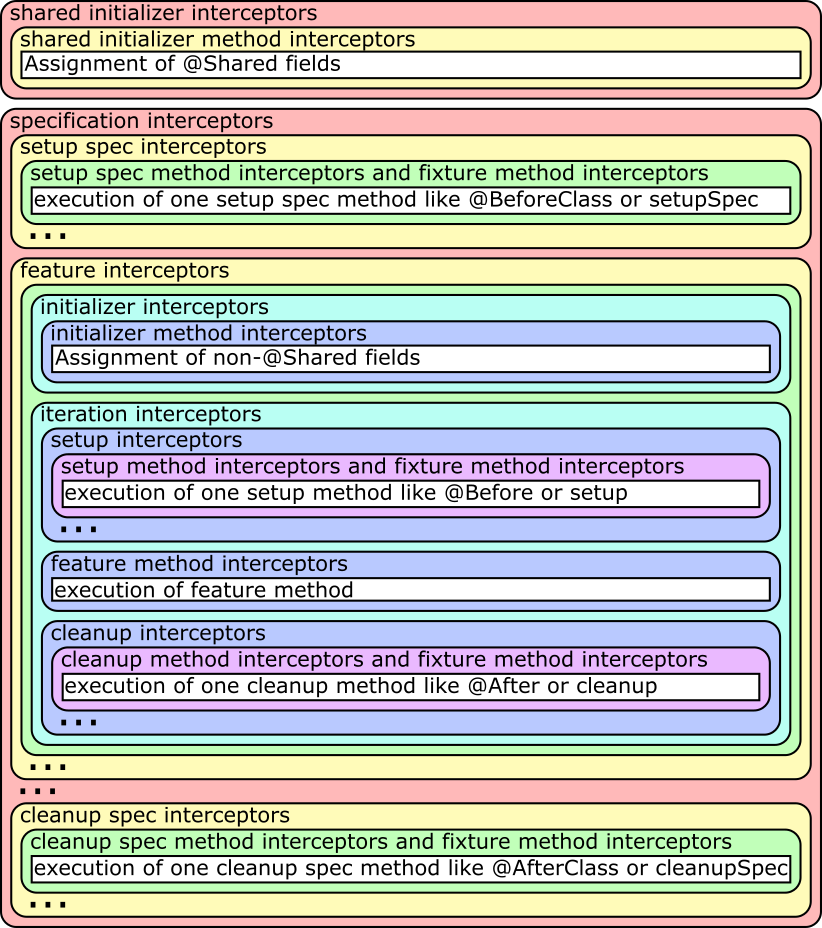
|  |  |
| --- | --- |
| **NOTE** | It is an error to have multiple configuration objects with the same name, so choose wisely if you pick one and probably prefix it with some package-like name to minimize the risk for name clashes with other extensions or the core Spock code. |

To use the values of the configuration object in your extension, just define an uninitialized instance field of that type. Spock will then automatically create exactly one instance of the configuration object per Spock run, apply the settings from the configuration file to it (before the start() methods of global extensions are called) and inject that instance into the extension class instances.

A configuration object cannot be used exclusively in an annotation driven local extension, but it has to be used in at least one global extension to properly get initialized and populated with the settings from the configuration file. But if the configuration object is used in a global extension, you can also use it just fine in an annotation driven local extension. If the configuration object is only used in an annotation driven local extension, you will get an exception when then configuration object is to be injected into the extension and you will also get an error when the configuration file is evaluated and it contains the section, as the configuration object is not properly registered yet.

[Interceptors](http://spockframework.org/spock/docs/1.3/all_in_one.html#_interceptors)

For applying the magic of your extension, there are various interception points, where you can attach interceptors from the extension methods described above to hook into the Spock lifecycle. For each interception point there can of course be multiple interceptors added by arbitrary Spock extensions (shipped or 3rd party). Their order is currently depending on the order they are added, but there should not be made any order assumptions within one interception point.



*Figure 1. Spock Interceptors*

An ellipsis in the figure means that the block before it can be repeated an arbitrary amount of times.

The …​ method interceptors are of course only run if there are actual methods of this type to be executed (the white boxes) and those can [inject parameters](http://spockframework.org/spock/docs/1.3/all_in_one.html#_injecting_method_parameters) to be given to the method that will be run.

The difference between shared initializer interceptor and shared initializer method interceptor and between initializer interceptor and initializer method interceptor - as there can be at most one of those methods each - is, that there are only the two methods if there are @Shared, respectively non-@Shared, fields that get values assigned at declaration time. The compiler will put those initializations in a generated method and call it at the proper place in the lifecycle. So if there are no such initializations, no method is generated and thus the method interceptor is never called. The non-method interceptors are always called at the proper place in the lifecycle to do work that has to be done at that time.

To create an interceptor to be attached to an interception point, you need to create a class that implements the interface IMethodInterceptor. This interface has the sole method intercept(IMethodInvocation invocation). The invocation parameter can be used to get and modify the current state of execution. Each interceptor **must** call the method invocation.proceed(), which will go on in the lifecycle, except you really want to prevent further execution of the nested elements like shown in the figure above. But this should be a very rare use case.

If you write an interceptor that can be used at different interception points and should do different work at different interception points, there is also the convenience class AbstractMethodInterceptor, which you can extend and which provides various methods for overriding that are called for the various interception points. Most of these methods have a double meaning, like interceptSetupMethod which is called for the setup interceptor and the setup method interceptor. If you attach your interceptor to both of them and need a differentiation, you can check for invocation.method.reflection, which will be set in the method interceptor case and null otherwise. Alternatively you can of course build two different interceptors or add a parameter to your interceptor and create two instances, telling each at addition time whether it is attached to the method interceptor or the other one.

*Add All Interceptors*

**class** **I** **extends** AbstractMethodInterceptor { I(**def** s) {} }

specInfo.addSharedInitializerInterceptor **new** I('shared initializer')

specInfo.sharedInitializerMethod?.addInterceptor **new** I('shared initializer method')

specInfo.addInterceptor **new** I('specification')

specInfo.addSetupSpecInterceptor **new** I('setup spec')

specInfo.setupSpecMethods\*.addInterceptor **new** I('setup spec method')

specInfo.allFeatures\*.addInterceptor **new** I('feature')

specInfo.addInitializerInterceptor **new** I('initializer')

specInfo.initializerMethod?.addInterceptor **new** I('initializer method')

specInfo.allFeatures\*.addIterationInterceptor **new** I('iteration')

specInfo.addSetupInterceptor **new** I('setup')

specInfo.setupMethods\*.addInterceptor **new** I('setup method')

specInfo.allFeatures\*.featureMethod\*.addInterceptor **new** I('feature method')

specInfo.addCleanupInterceptor **new** I('cleanup')

specInfo.cleanupMethods\*.addInterceptor **new** I('cleanup method')

specInfo.addCleanupSpecInterceptor **new** I('cleanup spec')

specInfo.cleanupSpecMethods\*.addInterceptor **new** I('cleanup spec method')

specInfo.allFixtureMethods\*.addInterceptor **new** I('fixture method')

[Injecting Method Parameters](http://spockframework.org/spock/docs/1.3/all_in_one.html#_injecting_method_parameters)

If your interceptor should support custom method parameters for wrapped methods, this can be done by modifying invocation.arguments. Two use cases for this would be a mocking framework that can inject method parameters that are annotated with a special annotation or some test helper that injects objects of a specific type that are created and prepared for usage automatically.

invocation.arguments may be an empty array or an array of arbitrary length, depending on what interceptors were run before that maybe also have manipulated this array for parameter injection. So if you for example investigated the method parameters with invocation.method.reflection.parameters and found that you want to inject the fifth parameter, you should first check whether the arguments array is at least five elements long. If not, you should assign it a new array that is at least five elements long and copy the contents of the old array into the new one. Then you can assign your objects to be injected.

*Inject Method Parameters*

*// create a map of all MyInjectable parameters with their parameter index*

Map<Parameter, Integer> parameters = [:]

invocation.method.reflection.parameters.eachWithIndex { parameter, i ->

parameters << [(parameter): i]

}

parameters = parameters.findAll { MyInjectable.equals it.key.type }

*// enlarge arguments array if necessary*

**def** lastMyInjectableParameterIndex = parameters\*.value.max()

lastMyInjectableParameterIndex = lastMyInjectableParameterIndex == null ?

0 :

lastMyInjectableParameterIndex + 1

**if**(invocation.arguments.length < lastMyInjectableParameterIndex) {

**def** newArguments = **new** Object[lastMyInjectableParameterIndex]

System.arraycopy invocation.arguments, 0, newArguments, 0, invocation.arguments.length

invocation.arguments = newArguments

}

parameters.each { parameter, i ->

invocation.arguments[i] = **new** MyInjectable(parameter)

}

|  |  |
| --- | --- |
| **NOTE** | When using data driven features (methods with a where: block), the user of your extension has to follow some restrictions, if parameters should be injected by your extension:   * all data variables and all to-be-injected parameters have to be defined as method parameters * all method parameters have to be assigned a value in the where: block * the order of the method parameters has to be identical to the order of the data variables in the where: block * the to-be-injected parameters have to be set to any value in the where: block, for example null   of course you can also make your extension only inject a value if none is set already, as the where: block assignments happen before the method interceptor is called  for this simply check whether invocation.arguments[i] is null or not  *Data Driven Feature with Injected Parameter*  **def** 'test parameter injection'(a, b, MyInjectable myInjectable) {  expect: myInjectable  where:  a | b  'a1' | 'b1'  'a2' | 'b2'  and:  myInjectable = null  } |

[Modules](http://spockframework.org/spock/docs/1.3/all_in_one.html#_modules)

[Guice Module](http://spockframework.org/spock/docs/1.3/all_in_one.html#_guice_module)

Integration with the [Guice](http://code.google.com/p/google-guice/) IoC container. For examples see the specs in the [codebase](https://github.com/spockframework/spock/tree/master/spock-guice/src/test/groovy/org/spockframework/guice).

With Spock 1.2 detached mocks are automatically attached to the Specification if they are injected via @Inject.

[Spring Module](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spring_module)

The Spring module enables integration with [Spring TestContext Framework](http://docs.spring.io/spring/docs/4.1.5.RELEASE/spring-framework-reference/html/testing.html#testcontext-framework). It supports the following spring annotations @ContextConfiguration and @ContextHierarchy. Furthermore, it supports the meta-annotation @BootstrapWith and so any annotation that is annotated with @BootstrapWith will also work, such as @SpringBootTest, @WebMvcTest.

[Mocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_mocks)

Spock 1.1 introduced the DetachedMockFactory and the SpockMockFactoryBean which allow the creation of Spock mocks outside of a specification.

|  |  |
| --- | --- |
| **NOTE** | Although the mocks can be created outside of a specification, they only work properly inside the scope of a specification. All interactions with them until they are attached to one, are handled by the default behavior and not recorded. Furthermore, mocks can only be attached to one Specification instance at a time so keep that in mind when using multi-threaded executions |

[Java Config](http://spockframework.org/spock/docs/1.3/all_in_one.html#_java_config)

**class** **DetachedJavaConfig** {

**def** mockFactory = **new** DetachedMockFactory()

@Bean

GreeterService serviceMock() {

**return** mockFactory.Mock(GreeterService)

}

@Bean

GreeterService serviceStub() {

**return** mockFactory.Stub(GreeterService)

}

@Bean

GreeterService serviceSpy() {

**return** mockFactory.Spy(GreeterServiceImpl)

}

@Bean

FactoryBean<GreeterService> alternativeMock() {

**return** **new** SpockMockFactoryBean(GreeterService)

}

}

[XML](http://spockframework.org/spock/docs/1.3/all_in_one.html#_xml)

Spock has spring namespace support, so if you declare the spock namespace with xmlns:spock="http://www.spockframework.org/spring" you get access to the convenience functions for creating mocks.

<?xml version="1.0" encoding="UTF-8"?>

<beans xmlns="http://www.springframework.org/schema/beans"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xmlns:spock="http://www.spockframework.org/spring"

xsi:schemaLocation="http://www.springframework.org/schema/beans

http://www.springframework.org/schema/beans/spring-beans.xsd

http://www.spockframework.org/spring http://www.spockframework.org/spring/spock.xsd">

<spock:mock id="serviceMock" class="org.spockframework.spring.docs.GreeterService"/> **(1)**

<spock:stub id="serviceStub" class="org.spockframework.spring.docs.GreeterService"/> **(2)**

<spock:spy id="serviceSpy" class="org.spockframework.spring.docs.GreeterServiceImpl"/> **(3)**

<bean id="someExistingBean" class="java.util.ArrayList"/> **(4)**

<spock:wrapWithSpy ref="someExistingBean"/> **(4)**

<bean id="alternativeMock" class="org.spockframework.spring.xml.SpockMockFactoryBean"> **(5)**

<constructor-arg value="org.spockframework.spring.docs.GreeterService"/>

<property name="mockNature" value="MOCK"/> **(6)**

</bean>

</beans>

1. Creates a Mock
2. Creates a Stub
3. Creates a Spy
4. Wraps an existing bean with a Spy. Fails fast if referenced bean is not found.
5. If you don’t want to use the special namespace support you can create the beans via the SpockMockFactoryBean
6. The mockNature can be MOCK, STUB, or SPY and defaults to MOCK if not declared.

[Usage](http://spockframework.org/spock/docs/1.3/all_in_one.html#_usage)

To use the mocks just inject them like any other bean and configure them as usual.

@Autowired @Named('serviceMock')

GreeterService serviceMock

@Autowired @Named('serviceStub')

GreeterService serviceStub

@Autowired @Named('serviceSpy')

GreeterService serviceSpy

@Autowired @Named('alternativeMock')

GreeterService alternativeMock

**def** "mock service"() {

when:

**def** result = serviceMock.greeting

then:

result == 'mock me'

1 \* serviceMock.getGreeting() >> 'mock me'

}

**def** "sub service"() {

given:

serviceStub.getGreeting() >> 'stub me'

expect:

serviceStub.greeting == 'stub me'

}

**def** "spy service"() {

when:

**def** result = serviceSpy.greeting

then:

result == 'Hello World'

1 \* serviceSpy.getGreeting()

}

**def** "alternatice mock service"() {

when:

**def** result = alternativeMock.greeting

then:

result == 'mock me'

1 \* alternativeMock.getGreeting() >> 'mock me'

}

[Annotation driven](http://spockframework.org/spock/docs/1.3/all_in_one.html#_annotation_driven)

Spock 1.2 adds support for exporting mocks from a Specification into an ApplicationContext. This was inspired by Spring Boot’s @MockBean(realised via Mockito) but adapted to fit into Spock style. It does not require any Spring Boot dependencies, however it requires Spring Framework 4.3.5 or greater to work.

[Using @SpringBean](http://spockframework.org/spock/docs/1.3/all_in_one.html#_using_code_springbean_code)

Registers mock/stub/spy as a spring bean in the test context.

To use @SpringBean you have to use a strongly typed field def or Object won’t work. You also need to directly assign the Mock/Stub/Spy to the field using the standard Spock syntax. You can even use the initializer blocks to define common behavior, however they are only picked up once they are attached to the Specification.

@SpringBean definitions can replace existing Beans in your ApplicationContext.

|  |  |
| --- | --- |
| **NOTE** | Spock’s @SpringBean actually creates a proxy in the ApplicationContext which forwards everything to the current mock instance. The type of the proxy is determined by the type of the annotated field. The proxy attaches itself to the current mock in the setup phase, that is why the mock must be created when the field is initialized. |

@SpringBean

Service1 service1 = Mock()

@SpringBean

Service2 service2 = Stub() {

generateQuickBrownFox() >> "blubb"

}

**def** "injection with stubbing works"() {

expect:

service2.generateQuickBrownFox() == "blubb"

}

**def** "mocking works was well"() {

when:

**def** result = service1.generateString()

then:

result == "Foo"

1 \* service1.generateString() >> "Foo"

}

|  |  |
| --- | --- |
| **CAUTION** | As with Spring’s own @MockBean this will modify your ApplicationContext, and will create an unique context for your Specification preventing it from being reused by Spring’s [Context Caching](https://docs.spring.io/spring/docs/current/spring-framework-reference/testing.html#testcontext-ctx-management-caching) outside of the current Specification. If you are using a small context this won’t matter much, but if it is a heavy context you might want to use the other approaches, e.g., using the DetachedMockFactory. |

[Using @SpringSpy](http://spockframework.org/spock/docs/1.3/all_in_one.html#_using_code_springspy_code)

If you want to spy on an existing bean, you can use the @SpringSpy annotation to wrap the bean in a spy. As with @SpringBean the field must be of the type you want to spy on, however you cannot use an initializer.

@SpringSpy

Service2 service2

@Autowired

Service1 service1

**def** "default implementation is used"() {

expect:

service1.generateString() == "The quick brown fox jumps over the lazy dog."

}

**def** "mocking works was well"() {

when:

**def** result = service1.generateString()

then:

result == "Foo"

1 \* service2.generateQuickBrownFox() >> "Foo"

}

[Using @StubBeans](http://spockframework.org/spock/docs/1.3/all_in_one.html#_using_code_stubbeans_code)

@StubBeans registers plain Stub instances in an ApplicationContext. Use this if you just need to satisfy some dependencies without actually doing anything with these stubs. If you need to control the stubs, e.g., configure return values then use @SpringBean instead. Like @SpringBean @StubBeans also replaced existing BeanDefinitions,so you can use it to remove real beans from an ApplicationContext. @StubBeans can be replaced by @SpringBean, this can be useful if you need to replace some @StubBeans defined in a parent class.

@StubBeans(Service2)

@ContextConfiguration(classes = DemoMockContext)

**class** **StubBeansExamples** **extends** Specification {

[Spring Boot](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spring_boot)

The recommended way to use Spock mocks in @WebMvcTest or other @SpringBootTest-style tests, is to use the @SpringBean and @SpringSpy annotations as shown above.

Alternatively you can use an embedded config annotated with @TestConfiguration and to create the mocks using the DetachedMockFactory.

@WebMvcTest

**class** **WebMvcTestIntegrationSpec** **extends** Specification {

@Autowired

MockMvc mvc

@Autowired

HelloWorldService helloWorldService

**def** "spring context loads for web mvc slice"() {

given:

helloWorldService.getHelloMessage() >> 'hello world'

expect: "controller is available"

mvc.perform(MockMvcRequestBuilders.get("/"))

.andExpect(status().isOk())

.andExpect(content().string("hello world"))

}

@TestConfiguration

**static** **class** **MockConfig** {

**def** detachedMockFactory = **new** DetachedMockFactory()

@Bean

HelloWorldService helloWorldService() {

**return** detachedMockFactory.Stub(HelloWorldService)

}

}

}

For more examples see the specs in the [codebase](https://github.com/spockframework/spock/tree/master/spock-spring/src/test/groovy/org/spockframework/spring) and [boot examples](https://github.com/spockframework/spock/tree/master/spock-spring/boot-test/src/test/groovy/org/spockframework/boot).

[Scopes](http://spockframework.org/spock/docs/1.3/all_in_one.html#_scopes)

Spock ignores bean that is not a singleton (in the singleton scope) by default. To enable mocks to work for scoped beans you need to add @ScanScopedBeans to the spec and make sure that the scope allows access to the bean during the setup phase.

|  |  |
| --- | --- |
| **NOTE** | The request and session scope will throw exceptions by default, if there is no active request/session. |

You can limit the scanning to certain scopes by using the value property of @ScanScopedBeans.

[Tapestry Module](http://spockframework.org/spock/docs/1.3/all_in_one.html#_tapestry_module)

Integration with the [Tapestry5](http://tapestry.apache.org/tapestry5/) IoC container. For examples see the specs in the [codebase](https://github.com/spockframework/spock/tree/master/spock-tapestry/src/test/groovy/org/spockframework/tapestry).

[Unitils Module](http://spockframework.org/spock/docs/1.3/all_in_one.html#_unitils_module)

Integration with the [Unitils](http://www.unitils.org/) library. For examples see the specs in the [codebase](https://github.com/spockframework/spock/tree/master/spock-unitils/src/test/groovy/org/spockframework/unitils).

[Grails Module](http://spockframework.org/spock/docs/1.3/all_in_one.html#_grails_module)

The Grails plugin has moved to its own [GitHub project](https://github.com/spockframework/spock-grails).

|  |  |
| --- | --- |
| **NOTE** | Grails 2.3 and higher have built-in Spock support and do not require a plugin. |

[Release Notes](http://spockframework.org/spock/docs/1.3/all_in_one.html#_release_notes)

[1.3 (2019-03-05)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_3_2019_03_05)

No functional changes

[1.3-RC1 (2019-01-22)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_3_rc1_2019_01_22)

The theme for this release is to increase the information that is provided when an assertion failed.

[Potential breaking changes](http://spockframework.org/spock/docs/1.3/all_in_one.html#_potential_breaking_changes)

[code argument constraints are treated as implicit assertions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_code_argument_constraints_are_treated_as_implicit_assertions)

Before this release the code argument constrains worked by returning a boolean result. This was fine if you just wanted to do a simple comparison, but it breaks down if you need to do 5 comparisons. Users also often assumed that it worked like the assertions in then blocks and didn’t add && to chain multiple assertions together, so their constraint ignored all before the next line.

1 \* mock.foo( { it.size() > 1

it[0].length == 2 })

This would only use the length comparison, to make it work you had to add &&. Another problem arises by having more than one comparison inside the constraints, you don’t know which of the 5 comparisons failed. If you just expected one method call you could use an explicit assert as a workaround, but since it immediately breaks, you can’t use it if you want to have multiple different calls to the same mock.

With 1.3 the above code will actually work as intended, and even more important it will give actual feedback what didn’t match.

So what can break?

If you used the code argument constraint as a way of capturing the argument value, then this will most likely not work anymore, since assignments to already declared variables are forbidden in implicit assertion block. If you still need access to the argument, you can use the response generator closure instead.

**def** extern = null

1 \* mock.foo( { extern = it; it.size() > 0 }) *// old*

1 \* mock.foo( { it.size() > 0 }) >> { extern = it[0] } *// new*

The added benefit of this changes is, that it clearly differentiates the condition from the capture.

Another consequence of the change is, that the empty {} assertion block will now pass instead of fail, since no assertion error is being treated as passing, while it required a true result beforehand.

It is advised, that if you have multiple conditions joined by &&, that you remove it to get individual assertions reports instead of a large joined block.

[assertions with explicit messages now include power assertions output.](http://spockframework.org/spock/docs/1.3/all_in_one.html#_assertions_with_explicit_messages_now_include_power_assertions_output)

*Given*

**def** a = 1

**def** b = 2

**assert** a == b : "Additional message"

*Before*

a == b

Additional message

*Now*

a == b

| | |

1 | 2

false

Additional message

If you relied on this behavior to hide some output, or to prevent a stack overflow due to a self referenceing data structure, then you need to move the condition into a separate method that just returns the boolean result.

[What’s New In This release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release)

* Add implicit assertions for CodeArgument constraints (#956)
* Add power assertion output to asserts with explicit message (#928)
* Add support for mixed named and positional arguments in mocks (#919)
* Add NamedParam support for groovy-2.5 with backport to 2.4 (#921)
* Add special rendering for Set comparisons (#925)
* Add identity hash code to type hints in comparison failures if they are identical
* Fix erroneous regex where an optional colon was defined instead of a non-capturing group (#931)
* Improve CodeArgumentConstraint by supporting assertions (#918)
* Improve IDE type inference in MockingApi (#920)
* Improve reporting of TooFewInvocationsError (#912)
* Improve render class loader for classes in comparison failures (#932)
* Improve record class literal values to display FQCN in comparison failures (#935)
* Improve filter Java 9+ reflection stack frames
* Improve show stacktrace of throwables in comparison failure result
* Improve use canonical class name in comparison failure results if present
* Improve render otherwise irrelevant expressions if they get a type hint in comparison failure (#936)
* Fix do not convert implicit "this" expression like when calling the constructor of a non-static inner class (#930)
* Fix class expression recording when there are comments with dots in the same line (#937)

Thanks to all the contributors to this release: Björn Kautler, Marc Philipp, Marcin Zajączkowski, Martin Vseticka, Michael Kutz, Kacper Bublik

[1.2 (2018-09-23)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_2_2018_09_23)

Breaking Changes: Spock 1.2 drops support for Java 6, Groovy 2.0 and Groovy 2.3

[What’s New In This release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release_2)

* Add support for Java 11+ ([#895](https://github.com/spockframework/spock/issues/895), [#902](https://github.com/spockframework/spock/issues/902), [#903](https://github.com/spockframework/spock/issues/903))
* Add Groovy 2.5.0 Variant for better Java 10+ Support
* Add @SpringBean and @SpringSpy inspired by @MockBean, Also add @StubBeans ([Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_annotation_driven))
* Add @UnwrapAopProxy to make automatically unwrap SpringAopProxie
* Add @AutoAttach extension ([Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_autoattach))
* Add @Retry extension ([Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_retry))
* Add flag to UnrollNameProvider to assert unroll expressions (set the system property spock.assertUnrollExpressions to true) ([#767](https://github.com/spockframework/spock/issues/767))
* Add automatic module name descriptors for Java 9
* Add configurable condition to @Retry extension to allow for customizing when retries should be attempted ([Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_retry))
* Improve @PendingFeature to now have an optional reason attribute ([#907](https://github.com/spockframework/spock/issues/907))
* Improve @Retry to be declarable on a spec class which will apply it to all feature methods in that class and subclasses ([Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_retry))
* Improve StepwiseExtension mark only subsequent features as skipped in case of failure ([#893](https://github.com/spockframework/spock/issues/893))
* Improve in assertions Spock now uses DefaultGroovyMethods.dump instead of toString if a class doesn’t override the default Object.toString.
* Improve verifyAll can now also have a target same as with
* Improve static type hints for verifyAll and with
* Improve reporting of exceptions during cleanup, they are now properly reported as suppressed exceptions instead of hiding the real exception
* Improve default responses for stubs, Java 8 types like Optional and Streams now return empty, CompleteableFuture completes with null result
* Improve support for builder pattern, stubs now return themselves if the return type matches the type of the stub
* Improve tapestry support with by supporting @ImportModule
* Improve constructorArgs for spies can now accept a map directly without the need to wrap it in a list
* Improve [Guice Module](http://spockframework.org/spock/docs/1.3/all_in_one.html#_guice_module) now automatically attaches detached mocks
* Improve unmatched mock messages by using dump instead of inspect for classes which don’t provide a custom toString
* Improve spying on concrete instances to enable partial mocking
* Fix use String renderer for Class instances ([#909](https://github.com/spockframework/spock/issues/909))
* Fix mark new Spring extensions as @Beta ([#890](https://github.com/spockframework/spock/issues/890))
* Fix exclude groovy-groovysh from compile dependencies ([#882](https://github.com/spockframework/spock/issues/882))
* Fix Retry.Mode.FEATURE and Retry.Mode.SETUP\_FEATURE\_CLEANUP to make a test pass if a retry was successful.
* Fix issue with @SpringBean mocks throwing InvocationTargetException instead of actual declared exceptions ([#878](https://github.com/spockframework/spock/issues/878), [#887](https://github.com/spockframework/spock/issues/887))
* Fix void methods with implicit targets failing in with and verifyAll ([#886](https://github.com/spockframework/spock/issues/886))
* Fix SpockAssertionErrors and its subclasses now are properly Serializeable
* Fix Spring injection of JUnit Rules, due to the changes in 1.1 the rules where initialized before Spring could inject them, this has been fixed by performing the injection earlier in the process
* Fix SpringMockTestExecutionListener initializes lazy beans
* Fix OSGi Import-Package header
* Fix re-declare recorder variables ([#783](https://github.com/spockframework/spock/issues/783)), this caused annotations such as @Slf4j to break Specifications
* Fix MissingFieldException in DiffedObjectAsBeanRenderer
* Fix problems with nested with and verifyAll method calls
* Fix assertion of mock invocation order with nested invocations ([#475](https://github.com/spockframework/spock/issues/475))
* Fix ignore inferred type for Spies on existing instance
* General dependency update

Thanks to all the contributors to this release: Marc Philipp, Rob Elliot, jochenberger, Jan Papenbrock, Paul King, Marcin Zajączkowski, mrb-twx, Alexander Kazakov, Serban Iordache, Xavier Fournet, timothy-long, John Osberg, AlexElin, Benjamin Muschko, Andreas Neumann, geoand, Burk Hufnagel, signalw, Martin Vseticka, Tilman Ginzel

[1.2-RC3 (2018-09-16)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_2_rc3_2018_09_16)

[What’s New In This release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release_3)

* Add support for Java 11+ (#895, #902, #903)
* Improve @PendingFeature to now have an optional reason attribute (#907)
* Fix use String renderer for Class instances (#909)
* Fix mark new Spring extensions as @Beta (#890)
* Fix exclude groovy-groovysh from compile dependencies (#882)

Thanks to all the contributors to this release: Marc Philipp, Marcin Zajączkowski, signalw

[1.2-RC2 (2018-09-04)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_2_rc2_2018_09_04)

[What’s New In This release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release_4)

* Add configurable condition to @Retry extension to allow for customizing when retries should be attempted ([Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_retry))
* Fix Retry.Mode.FEATURE and Retry.Mode.SETUP\_FEATURE\_CLEANUP to make a test pass if a retry was successful.
* Improve @Retry to be declarable on a spec class which will apply it to all feature methods in that class and subclasses ([Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_retry))
* Improve StepwiseExtension mark only subsequent features as skipped in case of failure (#893)
* Fix issue with @SpringBean mocks throwing InvocationTargetException instead of actual declared exceptions (#878, #887)
* Fix void methods with implicit targets failing in with and verifyAll (#886)

Thanks to all the contributors to this release: Marc Philipp, Tilman Ginzel, Marcin Zajączkowski, Martin Vseticka

[1.2-RC1 (2018-08-14)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_2_rc1_2018_08_14)

Breaking Changes: Spock 1.2 drops support for Java 6, Groovy 2.0 and Groovy 2.3

[What’s New In This release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release_5)

* Add Groovy 2.5.0 Variant for better Java 10 Support
* Add @SpringBean and @SpringSpy inspired by @MockBean, Also add @StubBeans
* Add @UnwrapAopProxy to make automatically unwrap SpringAopProxie
* Add flag to UnrollNameProvider to assert unroll expressions (set the system property spock.assertUnrollExpressions to true) [#767](https://github.com/spockframework/spock/issues/767)
* Add automatic module name descriptors for Java 9
* Add @AutoAttach extension ([Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_autoattach))
* Add @Retry extension ([Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_retry))
* Fix SpockAssertionErrors and its subclasses now are properly Serializeable
* Fix Spring injection of JUnit Rules, due to the changes in 1.1 the rules where initialized before Spring could inject them, this has been fixed by performing the injection earlier in the process
* Fix SpringMockTestExecutionListener initializes lazy beans
* Fix OSGi Import-Package header
* Fix re-declare recorder variables (#783), this caused annotations such as @Slf4j to break Specifications
* Fix MissingFieldException in DiffedObjectAsBeanRenderer
* Fix problems with nested with and verifyAll method calls
* Fix assertion of mock invocation order with nested invocations (#475)
* Fix ignore inferred type for Spies on existing instance
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* Improve verifyAll can now also have a target same as with
* Improve static type hints for verifyAll and with
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* Improve default responses for stubs, Java 8 types like Optional and Streams now return empty, CompleteableFuture completes with null result
* Improve support for builder pattern, stubs now return themselves if the return type matches the type of the stub
* Improve tapestry support with by supporting @ImportModule
* Improve constructorArgs for spies can now accept a map directly without the need to wrap it in a list
* Improve [Guice Module](http://spockframework.org/spock/docs/1.3/all_in_one.html#_guice_module) now automatically attaches detached mocks
* Improve unmatched mock messages by using dump instead of inspect for classes which don’t provide a custom toString
* Improve spying on concrete instances to enable partial mocking
* General dependency update

Thanks to all the contributors to this release: Rob Elliot, jochenberger, Jan Papenbrock, Paul King, Marcin Zajączkowski, mrb-twx, Alexander Kazakov, Serban Iordache, Xavier Fournet, timothy-long, John Osberg, AlexElin, Benjamin Muschko, Andreas Neumann, geoand, Burk Hufnagel

[Known Issues](http://spockframework.org/spock/docs/1.3/all_in_one.html#_known_issues)

* Groovy 2.4.10 introduced a bug that interfered with the way verifyAll works, it has been fixed in 2.4.12

[1.1 (2017-05-01)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_1_2017_05_01)

[What’s New In This release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release_6)

* Update docs to include info/examples for Spying instantiated objects
* Fix integer overflow that could occur when the OutOfMemoryError protection while comparing huge strings kicked in
* Improve rendering for OutOfMemoryError protection

[1.1-rc-4 (2017-03-28)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_1_rc_4_2017_03_28)

This should be the last rc for 1.1

[What’s New In This release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release_7)

* 15 merged pull requests
* Spies can now be created with an already existing target
* Fix for scoped Spring Beans
* Fix incompatibility with Spring 2/3 that was introduced in 1.1-rc-1
* Fix groovy compatibility
* Fix ByteBuddy compatibility
* Fix OutOfMemoryError when comparing huge strings
* Improve default response for java.util.Optional<T>, will now return empty optional
* Improve detection of Spring Boot tests
* Improve documentation for global extensions

Thanks to all the contributors to this release: Taylor Wicksell, Rafael Winterhalter, Marcin Zajączkowski, Eduardo Grajeda, Paul King, Andrii, Björn Kautler, Libor Rysavy

Known issues with groovy 2.4.10 which breaks a smoke test, but should have little impact on normal use (#709).

[1.1-rc-3 (released 2016-10-17)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_1_rc_3_released_2016_10_17)

Adds compatibility with ByteBuddy as an alternative to cglib for generating mocks and stubs for classes.

[1.1-rc-2 (released 2016-08-22)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_1_rc_2_released_2016_08_22)

1.1 should be here soon but in the meantime there’s a new release candidate.

[What’s New In This release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release_8)

* Support for the new test annotations in Spring Boot 1.4.
* Fixed the integration of JUnit method rules which now correctly happen "outside" the setup / cleanup methods.

Thanks to all the contributors to this release: Jochen Berger, Leonard Brünings, Mariusz Gilewicz, Tomasz Juchniewicz, Gamal Mateo, Tobias Schulte, Florian Wilhelm, Kevin Wittek

[1.1-rc-1 (released 2016-06-30)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_1_rc_1_released_2016_06_30)

A number of excellent pull requests have been integrated into the 1.1 stream. Currently some features are incubating. We encourage users to try out these new features and provide feedback so we can finalize the content for a 1.1 release.

[What’s New In This release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release_9)

* 44 merged pull requests
* The verifyAll method can be used to assert multiple boolean expressions *without* short-circuiting those after a failure. For example:

then:

verifyAll {

a == b

b == c

}

* Detached mocks via the DetachedMockFactory and SpockMockFactoryBean classes see the [Spring Module Docs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spring_module).
* Cells in a data table can refer to the current value for a column to the left.
* Spy can be used to create partial mocks for Java 8 interfaces with default methods just as it can for abstract classes.
* Improved power assert output when an exception occurs evaluating an assertion.
* A new @PendingFeature annotation to distinguish incomplete functionality from features with @Ignore.

Special thanks to all the contributors to this release: Dmitry Andreychuk, Aseem Bansal, Daniel Bechler, Fedor Bobin, Leonard Brünings, Leonard Daume, Marcin Erdmann, Jarl Friis, Søren Berg Glasius, Serban Iordache, Michal Kordas, Pap Lőrinc, Vlad Muresan, Etienne Neveu, Glyn Normington, David Norton, Magnus Palmér, Gus Power, Oliver Reissig, Kevin Wittek and Marcin Zajączkowski

[1.0 (released 2015-03-02)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_0_released_2015_03_02)

1.0 has arrived! Finally (and some years late) the version number communicates what [Spock users](https://code.google.com/p/spock/wiki/WhoIsUsingSpock) have known for ages - that Spock isn’t only useful and fun, but also reliable, mature, and here to stay. So please, go out and tell everyone who hasn’t been assimilated that now is the time to join the party!

A special thanks goes to all our tireless speakers and supporters, only a few of which are listed here: Andres Almiray, Cédric Champeau, David Dawson, Rob Fletcher, Sean Gilligan, Ken Kousen, Guillaume Laforge, [NFJS Tour](http://www.nofluffjuststuff.com/home/main), Graeme Rocher, Baruch Sadogursky, Odin Hole Standal, Howard M. Lewis Ship, Ken Sipe, Venkat Subramaniam, Russel Winder.

[What’s New In This Release](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_new_in_this_release_10)

* [17 contributors](http://spockframework.org/spock/docs/1.3/all_in_one.html#_contributors), [21 resolved issues](http://spockframework.org/spock/docs/1.3/all_in_one.html#_resolved_issues), [18 merged pull requests](http://spockframework.org/spock/docs/1.3/all_in_one.html#_merged_pull_requests), [some ongoing work](http://spockframework.org/spock/docs/1.3/all_in_one.html#_ongoing_work). No ground-breaking new features, but significant improvements and fixes across the board.
* Minimum runtime requirements raised to JRE 1.6 and Groovy 2.0.
* Improved and restyled reference documentation at [http://docs.spockframework.org](http://docs.spockframework.org/). Generated with [Asciidoctor](http://asciidoctor.org/) (what else?).
* Maven plugin removed. Just let Maven Surefire run your Spock specs like your JUnit tests (see [spock-example](http://examples.spockframework.org/) project).
* Official support for Java 1.8, Groovy 2.3 and Groovy 2.4. Make sure to pick the groovy-2.0 binaries for Groovy 2.0/2.1/2.2, groovy-2.3 binaries for Groovy 2.3, and groovy-2.4 binaries for Groovy 2.4 and higher.
* Improved infrastructure to allow for easier community involvement: Switch to [GitHub issue tracker](http://issues.spockframework.org/), [Windows](http://winbuilds.spockframework.org/) and [Linux](http://builds.spockframework.org/) CI builds, pull requests automatically tested, all development on master branch (bye-bye groovy-x.y branches!).

[Other News](http://spockframework.org/spock/docs/1.3/all_in_one.html#_other_news)

* Follow our new [Twitter account](http://twitter.spockframework.org/)
* Try these [new third-party extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_new_third_party_extensions)
* Check out the upcoming [Java Testing with Spock](http://manning.com/kapelonis/) book from Manning

[What’s Up Next?](http://spockframework.org/spock/docs/1.3/all_in_one.html#_what_s_up_next)

With a revamped build/release process and a reforming core team, we hope to release much more frequently from now on. Another big focus will be to better involve the community and their valuable contributions. Last but not least, we are finally shooting for a professional logo and website. Stay tuned for announcements!

Test Long And Prosper,

The Spock Team

[Contributors](http://spockframework.org/spock/docs/1.3/all_in_one.html#_contributors)

17 awesome people contributed to this release:

* [Jordan Black](https://github.com/jblack10101)
* [Fedor Bobin](https://github.com/Fuud)
* [Leonard Brünings](https://github.com/leonard84)
* [cetnar](https://github.com/cetnar)
* [Luke Daley](https://github.com/ldaley)
* [David Dawson](https://github.com/daviddawson)
* [Scott G](https://github.com/selenium34)
* [Sean Gilligan](https://github.com/msgilligan)
* [Taha Hafeez](https://github.com/tawus)
* [Lari Hotari](https://github.com/lhotari)
* [Nicklas Lindgren](https://github.com/niligulmohar)
* [David W Millar](https://github.com/david-w-millar)
* [Peter Niederwieser](https://github.com/pniederw)
* [Jean-Baptiste Nallet](https://github.com/palmplam)
* [Opalo](https://github.com/Opalo)
* [Magda Stożek](https://github.com/magdzikk)
* [Ramazan VARLIKLI](https://github.com/rvarlikli)

[Resolved Issues](http://spockframework.org/spock/docs/1.3/all_in_one.html#_resolved_issues)

21 burning issues were fixed:

* [Create a example which uses ConfineMetaClassChanges](https://code.google.com/p/spock/issues/detail?id=221)
* [Mistakes in PollingConditions sphinx docs](https://code.google.com/p/spock/issues/detail?id=273)
* [Closure used as data value in where-block can’t be called with method syntax](https://code.google.com/p/spock/issues/detail?id=274)
* [old() expression blows up when part of failing condition](https://code.google.com/p/spock/issues/detail?id=276)
* [Reflect subsequent filtering/sorting in a spec’s JUnit description](https://code.google.com/p/spock/issues/detail?id=278)
* [After/AfterClass/Before/BeforeClass methods from superclass should not be called if they have been overrided in the derived class](https://code.google.com/p/spock/issues/detail?id=282)
* [Data values in where-block are not resolved in nested closures](https://code.google.com/p/spock/issues/detail?id=286)
* [spock-maven:0.7-groovy-2.0 has an invalid descriptor (and a workaround for this)](https://code.google.com/p/spock/issues/detail?id=290)
* [PollingConditions doesn’t report failed assertion](https://code.google.com/p/spock/issues/detail?id=291)
* [Provide a Specification.with() overload that states the expected target type](https://code.google.com/p/spock/issues/detail?id=292)
* [Problem with array arguments to mock methods](https://code.google.com/p/spock/issues/detail?id=294)
* [spock-tapestry should support @javax.inject.Inject and @InjectService](https://code.google.com/p/spock/issues/detail?id=296)
* [Compilation error when using multi assignment](https://code.google.com/p/spock/issues/detail?id=297)
* [Groovy mocks should allow to mock final classes/methods](https://code.google.com/p/spock/issues/detail?id=302)
* [Better generics support for mocks and stubs](https://code.google.com/p/spock/issues/detail?id=307)
* [GC calls to finalize() on mocks cause strict interaction specifications (0 \* \_) to fail intermittently](https://code.google.com/p/spock/issues/detail?id=338)
* [Multiple Assignment in when: and anything in cleanup:](https://code.google.com/p/spock/issues/detail?id=371)
* [Move OptimizeRunOrderSuite from spock-core to spock-maven to solve a problem with Android’s test runner](https://code.google.com/p/spock/issues/detail?id=385)
* [Support running on JDK 8](https://code.google.com/p/spock/issues/detail?id=391)
* [Release binary variants for Groovy 2.3 and Groovy 2.4](https://code.google.com/p/spock/issues/detail?id=392)
* [Port reference documentation to Asciidoc](https://code.google.com/p/spock/issues/detail?id=393)

[Merged Pull Requests](http://spockframework.org/spock/docs/1.3/all_in_one.html#_merged_pull_requests)

18 hand-crafted pull requests were merged or cherry-picked:

* [Update extensions.rst](https://github.com/spockframework/spock/pull/51)
* [allow one column data-table to be passed as parameter](https://github.com/spockframework/spock/pull/48)
* [Use https:// link to Maven Central](https://github.com/spockframework/spock/pull/45)
* [Change Snapshot Repository to use https:// URL](https://github.com/spockframework/spock/pull/44)
* [Fix incorrect code listing in docs](https://github.com/spockframework/spock/pull/43)
* [Minor documentation corrections: spelling, code examples. README.md corr…​](https://github.com/spockframework/spock/pull/41)
* [added manifest to core.gradle to allow spock core to work in OSGi land](https://github.com/spockframework/spock/pull/40)
* [Allow Build on Windows](https://github.com/spockframework/spock/pull/38)
* [Small typo fixed](https://github.com/spockframework/spock/pull/33)
* [Update interaction\_based\_testing.rst](https://github.com/spockframework/spock/pull/32)
* [Closure used as data value in where-block can’t be called with method syntax](https://github.com/spockframework/spock/pull/31)
* [Added docs for Stepwise, Timeout, Use, ConfineMetaClassChanges, AutoClea…​](https://github.com/spockframework/spock/pull/30)
* [Spring @ContextHierarchy support](https://github.com/spockframework/spock/pull/16)
* [Add groovy console support for the specs project, to ease debugging of the AST.](https://github.com/spockframework/spock/pull/14)
* [Update spock-report/src/test/groovy/org/spockframework/report/sample/Fig…​](https://github.com/spockframework/spock/pull/13)
* [spock-tapestry: added support for @InjectService, @javax.inject.Inject](https://github.com/spockframework/spock/pull/12)
* [missing code](https://github.com/spockframework/spock/pull/11)
* [Support overriding Junit After\*/Before\* methods in the derived class](https://github.com/spockframework/spock/pull/10)(

[New Third Party Extensions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_new_third_party_extensions)

These awesome extensions have been published or updated:

* [Spock Subjects-Collaborators Extension](https://github.com/marcingrzejszczak/spock-subjects-collaborators-extension)
* [Spock Reports Extension](https://github.com/renatoathaydes/spock-reports)

[Ongoing Work](http://spockframework.org/spock/docs/1.3/all_in_one.html#_ongoing_work)

These great features didn’t make it into this release (but hopefully the next!):

* [Spock reports](http://spockframework.github.io/spock/sampleReports/Ninja%20Commander.html)
* [Render exceptions in conditions as condition failure](https://github.com/spockframework/spock/pull/49)
* [Soft asserts: check all then throw all failures](https://github.com/spockframework/spock/pull/50)
* [Detached mocks](https://github.com/spockframework/spock/pull/17)

[0.7 (released 2012-10-08)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_0_7_released_2012_10_08)

[Snapshot Repository Moved](http://spockframework.org/spock/docs/1.3/all_in_one.html#_snapshot_repository_moved)

Spock snapshots are now available from <https://oss.sonatype.org/content/repositories/snapshots/org/spockframework/>.

[New Reference Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#_new_reference_documentation)

The new Spock reference documentation is available at [http://docs.spockframework.org](http://docs.spockframework.org/). It will gradually replace the documentation at [http://wiki.spockframework.org](http://wiki.spockframework.org/). Each Spock version is documented separately (e.g. <http://docs.spockframework.org/en/spock-0.7-groovy-1.8>). Documentation for the latest Spock snapshot is at <http://docs.spockframework.org/en/latest>. As of Spock 0.7, the chapters on [Data Driven Testing](http://spockframework.org/spock/docs/1.3/all_in_one.html) and [Interaction Based Testing](http://spockframework.org/spock/docs/1.3/all_in_one.html) are complete.

[Improved Mocking Failure Message for TooManyInvocationsError](http://spockframework.org/spock/docs/1.3/all_in_one.html#_improved_mocking_failure_message_for_code_toomanyinvocationserror_code)

The diagnostic message accompanying a TooManyInvocationsError has been greatly improved. Here is an example:

Too many invocations for:

3 \* person.sing(\_) (4 invocations)

Matching invocations (ordered by last occurrence):

2 \* person.sing("do") <-- this triggered the error

1 \* person.sing("re")

1 \* person.sing("mi")

[Reference Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#_verification_of_interactions)

[Improved Mocking Failure Message for TooFewInvocationsError](http://spockframework.org/spock/docs/1.3/all_in_one.html#_improved_mocking_failure_message_for_code_toofewinvocationserror_code)

The diagnostic message accompanying a TooFewInvocationsError has been greatly improved. Here is an example:

Too few invocations for:

1 \* person.sing("fa") (0 invocations)

Unmatched invocations (ordered by similarity):

1 \* person.sing("re")

1 \* person.say("fa")

1 \* person2.shout("mi")

[Reference Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#_verification_of_interactions)

[Stubs](http://spockframework.org/spock/docs/1.3/all_in_one.html#_stubs)

Besides mocks, Spock now has explicit support for stubs:

**def** person = Stub(Person)

A stub is a restricted form of mock object that responds to invocations without ever demanding them. Other than not having a cardinality, a stub’s interactions look just like a mock’s interactions. Using a stub over a mock is an effective way to communicate its role to readers of the specification.

[Reference Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#Stubs)

[Spies](http://spockframework.org/spock/docs/1.3/all_in_one.html#_spies)

Besides mocks, Spock now has support for spies:

**def** person = Spy(Person, constructorArgs: ["Fred"])

A spy sits atop a real object, in this example an instance of class Person. All invocations on the spy that don’t match an interaction are delegated to that object. This allows to listen in on and selectively change the behavior of the real object. Furthermore, spies can be used as partial mocks.

[Reference Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#Spies)

[Declaring Interactions at Mock Creation Time](http://spockframework.org/spock/docs/1.3/all_in_one.html#_declaring_interactions_at_mock_creation_time)

Interactions can now be declared at mock creation time:

**def** person = Mock(Person) {

sing() >> "tra-la-la"

3 \* eat()

}

This feature is particularly attractive for [Stubs](http://spockframework.org/spock/docs/1.3/all_in_one.html#Stubs).

[Reference Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#Stubs)

[Groovy Mocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_groovy_mocks)

Spock now offers specialized mock objects for spec’ing Groovy code:

**def** mock = GroovyMock(Person)

**def** stub = GroovyStub(Person)

**def** spy = GroovySpy(Person)

A Groovy mock automatically implements groovy.lang.GroovyObject. It allows stubbing and mocking of dynamic methods just like for statically declared methods. When a Groovy mock is called from Java rather than Groovy code, it behaves like a regular mock.

[Reference Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#GroovyMocks)

[Global Mocks](http://spockframework.org/spock/docs/1.3/all_in_one.html#_global_mocks)

A Groovy mock can be made *global*:

GroovySpy(Person, global: true)

A global mock can only be created for a class type. It effectively replaces all instances of that type and makes them amenable to stubbing and mocking. (You may know this behavior from Groovy’s MockFor and StubFor facilities.) Furthermore, a global mock allows mocking of the type’s constructors and static methods.

[Reference Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#MockingAllInstancesOfAType)

[Grouping Conditions with Same Target Object](http://spockframework.org/spock/docs/1.3/all_in_one.html#_grouping_conditions_with_same_target_object)

Inspired from Groovy’s Object.with method, the Specification.with method allows to group conditions involving the same target object:

**def** person = **new** Person(name: "Fred", age: 33, sex: "male")

expect:

with(person) {

name == "Fred"

age == 33

sex == "male"

}

[Grouping Interactions with Same Target Object](http://spockframework.org/spock/docs/1.3/all_in_one.html#_grouping_interactions_with_same_target_object)

The with method can also be used for grouping interactions:

**def** service = Mock(Service)

app.service = service

when:

app.run()

then:

with(service) {

1 \* start()

1 \* act()

1 \* stop()

}

[Reference Documentation](http://spockframework.org/spock/docs/1.3/all_in_one.html#_grouping_interactions_with_same_target)

[Polling Conditions](http://spockframework.org/spock/docs/1.3/all_in_one.html#_polling_conditions)

spock.util.concurrent.PollingConditions joins AsyncConditions and BlockingVariable(s) as another utility for testing asynchronous code:

**def** person = **new** Person(name: "Fred", age: 22)

**def** conditions = **new** PollingConditions(timeout: 10)

when:

Thread.start {

sleep(1000)

person.age = 42

sleep(5000)

person.name = "Barney"

}

then:

conditions.within(2) {

**assert** person.age == 42

}

conditions.eventually {

**assert** person.name == "Barney"

}

[Experimental DSL Support for Eclipse](http://spockframework.org/spock/docs/1.3/all_in_one.html#_experimental_dsl_support_for_eclipse)

Spock now ships with a DSL descriptor that lets Groovy Eclipse better understand certain parts of Spock’s DSL. The descriptor is automatically detected and activated by the IDE. Here is an example:

*// currently need to type variable for the following to work*

Person person = **new** Person(name: "Fred", age: 42)

expect:

with(person) {

name == "Fred" *// editor understands and auto-completes 'name'*

age == 42 *// editor understands and auto-completes 'age'*

}

Another example:

**def** person = Stub(Person) {

getName() >> "Fred" *// editor understands and auto-completes 'getName()'*

getAge() >> 42 *// editor understands and auto-completes 'getAge()'*

}

DSL support is activated for Groovy Eclipse 2.7.1 and higher. If necessary, it can be deactivated in the Groovy Eclipse preferences.

[Experimental DSL Support for IntelliJ IDEA](http://spockframework.org/spock/docs/1.3/all_in_one.html#_experimental_dsl_support_for_intellij_idea)

Spock now ships with a DSL descriptor that lets Intellij IDEA better understand certain parts of Spock’s DSL. The descriptor is automatically detected and activated by the IDE. Here is an example:

**def** person = **new** Person(name: "Fred", age: 42)

expect:

with(person) {

name == "Fred" *// editor understands and auto-completes 'name'*

age == 42 *// editor understands and auto-completes 'age'*

}

Another example:

**def** person = Stub(Person) {

getName() >> "Fred" *// editor understands and auto-completes 'getName()'*

getAge() >> 42 *// editor understands and auto-completes 'getAge()'*

}

DSL support is activated for IntelliJ IDEA 11.1 and higher.

[Splitting up Class Specification](http://spockframework.org/spock/docs/1.3/all_in_one.html#_splitting_up_class_specification)

Parts of class spock.lang.Specification were pulled up into two new super classes: spock.lang.MockingApi now contains all mocking-related methods, and org.spockframework.lang.SpecInternals contains internal methods which aren’t meant to be used directly.

[Improved Failure Messages for notThrown and noExceptionThrown](http://spockframework.org/spock/docs/1.3/all_in_one.html#_improved_failure_messages_for_code_notthrown_code_and_code_noexceptionthrown_code)

Instead of just passing through exceptions, Specification.notThrown and Specification.noExceptionThrown now fail with messages like:

Expected no exception to be thrown, but got 'java.io.FileNotFoundException'

Caused by: java.io.FileNotFoundException: ...

[HamcrestSupport.expect](http://spockframework.org/spock/docs/1.3/all_in_one.html#_code_hamcrestsupport_expect_code)

Class spock.util.matcher.HamcrestSupport has a new expect method that makes [Hamcrest](http://code.google.com/p/hamcrest/) assertions read better in then-blocks:

when:

**def** x = computeValue()

then:

expect x, closeTo(42, 0.01)

[@Beta](http://spockframework.org/spock/docs/1.3/all_in_one.html#_beta)

Recently introduced classes and methods may be annotated with @Beta, as a sign that they may still undergo incompatible changes. This gives us a chance to incorporate valuable feedback from our users. (Yes, we need your feedback!) Typically, a @Beta annotation is removed within one or two releases.

[Fixed Issues](http://spockframework.org/spock/docs/1.3/all_in_one.html#_fixed_issues)

See the [issue tracker](https://code.google.com/p/spock/issues/list?can=1&q=label%3AMilestone-0.7) for a list of fixed issues.

[0.6 (released 2012-05-02)](http://spockframework.org/spock/docs/1.3/all_in_one.html#_0_6_released_2012_05_02)

[Mocking Improvements](http://spockframework.org/spock/docs/1.3/all_in_one.html#_mocking_improvements)

The mocking framework now provides better diagnostic messages in some cases.

Multiple result declarations can be chained. The following causes method bar to throw an IOException when first called, return the numbers one, two, and three on the next calls, and throw a RuntimeException for all subsequent calls:

foo.bar() >> { **throw** **new** IOException() } >>> [1, 2, 3] >> { **throw** **new** RuntimeException() }

It’s now possible to match any argument list (including the empty list) with foo.bar(\*\_).

Method arguments can now be constrained with [Hamcrest](http://code.google.com/p/hamcrest/) matchers:

**import** static spock.util.matcher.HamcrestMatchers.closeTo

...

1 \* foo.bar(closeTo(42, 0.001))

[Extended JUnit Rules Support](http://spockframework.org/spock/docs/1.3/all_in_one.html#_extended_junit_rules_support)

In addition to rules implementing org.junit.rules.MethodRule (which has been deprecated in JUnit 4.9), Spock now also supports rules implementing the new org.junit.rules.TestRule interface. Also supported is the new @ClassRule annotation. Rule declarations are now verified and can leave off the initialization part. I that case Spock will automatically initialize the rule by calling the default constructor. The @TestName rule, and rules in general, now honor the @Unroll annotation and any defined naming pattern.

See [Issue 240](https://code.google.com/p/spock/issues/detail?id=240) for a known limitation with Spock’s TestRule support.

[Condition Rendering Improvements](http://spockframework.org/spock/docs/1.3/all_in_one.html#_condition_rendering_improvements)

When two objects are compared with the == operator, they are unequal, but their string representations are the same, Spock will now print the objects' types:

enteredNumber == 42

| |

| false

42 (java.lang.String)

[JUnit Fixture Annotations](http://spockframework.org/spock/docs/1.3/all_in_one.html#_junit_fixture_annotations)

Fixture methods can now be declared with JUnit’s @Before, @After, @BeforeClass, and @AfterClass annotations, as an addition or alternative to Spock’s own fixture methods. This was particularly needed for Grails 2.0 support.

[Tapestry 5.3 Support](http://spockframework.org/spock/docs/1.3/all_in_one.html#_tapestry_5_3_support)

Thanks to a contribution from [Howard Lewis Ship](http://howardlewisship.com/), the Tapestry module is now compatible with Tapestry 5.3. Older 5.x versions are still supported.

[IBM JDK Support](http://spockframework.org/spock/docs/1.3/all_in_one.html#_ibm_jdk_support)

Spock now runs fine on IBM JDKs, working around a bug in the IBM JDK’s verifier.

[Improved JUnit Compatibility](http://spockframework.org/spock/docs/1.3/all_in_one.html#_improved_junit_compatibility)

org.junit.internal.AssumptionViolatedException is now recognized and handled as known from JUnit. @Unrolled methods no longer cause "yellow" nodes in IDEs.

[Improved @Unroll](http://spockframework.org/spock/docs/1.3/all_in_one.html#improved-unroll-0.6)

The @Unroll naming pattern can now be provided in the method name, instead of as an argument to the annotation:

@Unroll

**def** "maximum of #a and #b is #c"() {

expect:

Math.max(a, b) == c

where:

a | b | c

1 | 2 | 2

}

The naming pattern now supports property access and zero-arg method calls:

@Unroll

**def** "#person.name.toUpperCase() is #person.age years old"() { ... }

The @Unroll annotation can now be applied to a spec class. In this case, all data-driven feature methods in the class will be unrolled.

[Improved @Timeout](http://spockframework.org/spock/docs/1.3/all_in_one.html#_improved_code_timeout_code)

The @Timeout annotation can now be applied to a spec class. In this case, the timeout applies to all feature methods (individually) that aren’t already annotated with @Timeout. Timed methods are now executed on the regular test framework thread. This can be important for tests that rely on thread-local state (like Grails integration tests). Also the interruption behavior has been improved, to increase the chance that a timeout can be enforced.

The failure exception that is thrown when a timeout occurs now contains the stacktrace of test execution, allowing you to see where the test was “stuck” or how far it got in the allocated time.

[Improved Data Table Syntax](http://spockframework.org/spock/docs/1.3/all_in_one.html#_improved_data_table_syntax)

Table cells can now be separated with double pipes. This can be used to visually set apart expected outputs from provided inputs:

...

where:

a | b || sum

1 | 2 || 3

3 | 1 || 4

[Groovy 1.8/2.0 Support](http://spockframework.org/spock/docs/1.3/all_in_one.html#_groovy_1_8_2_0_support)

Spock 0.6 ships in three variants for Groovy 1.7, 1.8, and 2.0. Make sure to pick the right version - for example, for Groovy 1.8 you need to use spock-core-0.6-groovy-1.8 (likewise for all other modules). The Groovy 2.0 variant is based on Groovy 2.0-beta-3-SNAPSHOT and only available from [http://m2repo.spockframework.org](http://m2repo.spockframework.org/). The Groovy 1.7 and 1.8 variants are also available from Maven Central. The next version of Spock will no longer support Groovy 1.7.

[Grails 2.0 Support](http://spockframework.org/spock/docs/1.3/all_in_one.html#_grails_2_0_support)

Spock’s Grails plugin was split off into a separate project and now lives at <http://github.spockframework.org/spock-grails>. The plugin supports both Grails 1.3 and 2.0.

The Spock Grails plugin supports all of the new Grails 2.0 test mixins, effectively deprecating the existing unit testing classes (e.g. UnitSpec). For integration testing, IntegrationSpec must still be used.

[IntelliJ IDEA Integration](http://spockframework.org/spock/docs/1.3/all_in_one.html#_intellij_idea_integration)

The folks from [JetBrains](http://www.jetbrains.com/) have added a few handy features around data tables. Data tables will now be layed out automatically when reformatting code. Data variables are no longer shown as "unknown" and have their types inferred from the values in the table (!).

[GitHub Repository](http://spockframework.org/spock/docs/1.3/all_in_one.html#_github_repository)

All source code has moved to <http://github.spockframework.org/>. The [Grails Spock plugin](http://github.spockframework.org/spock-grails), [Spock Example](http://github.spockframework.org/spock-example) project, and [Spock Web Console](http://github.spockframework.org/spockwebconsole) now have their own GitHub projects. Also available are slides and code for various Spock presentations (such as [this one](http://github.spockframework.org/smarter-testing-with-spock)).

[Gradle Build](http://spockframework.org/spock/docs/1.3/all_in_one.html#_gradle_build)

Spock is now exclusively built with Gradle. Building Spock yourself is as easy as cloning the [Github repo](http://github.spockframework.org/spock) and executing gradlew build. No build tool installation is required; the only prerequisite for building Spock is a JDK installation (1.5 or higher).

[Fixed Issues](http://spockframework.org/spock/docs/1.3/all_in_one.html#_fixed_issues_2)

See the [issue tracker](https://code.google.com/p/spock/issues/list?can=1&q=label%3AMilestone-0.6) for a list of fixed issues.

[Migration Guide](http://spockframework.org/spock/docs/1.3/all_in_one.html#_migration_guide)

This page explains incompatible changes between successive versions and provides suggestions on how to deal with them.

[1.0](http://spockframework.org/spock/docs/1.3/all_in_one.html#_1_0)

Specs, Spec base classes and third-party extensions may have be recompiled in order to work with Spock 1.0.

JRE 1.5 and Groovy versions below 2.0 are no longer supported.

Make sure to pick the right binaries for your Groovy version of choice: groovy-2.0 for Groovy 2.0/2.1/2.2, groovy-2.3 for Groovy 2.3, and groovy-2.4 for Groovy 2.4 and higher. Spock won’t let you run with a "wrong" version.

No known source incompatible changes.

[0.7](http://spockframework.org/spock/docs/1.3/all_in_one.html#_0_7)

Client code must be recompiled in order to work with Spock 0.7. This includes third-party Spock extensions and base classes.

No known source incompatible changes.

[0.6](http://spockframework.org/spock/docs/1.3/all_in_one.html#_0_6)

[Class initialization order](http://spockframework.org/spock/docs/1.3/all_in_one.html#_class_initialization_order)

|  |  |
| --- | --- |
| **NOTE** | This only affects cases where one specification class inherits from another one. |

Given these specifications:

**class** **Base** **extends** Specification {

**def** base1 = "base1"

**def** base2

**def** **setup**() { base2 = "base2" }

}

**class** **Derived** **extends** Base {

**def** derived1 = "derived1"

**def** derived2

**def** **setup**() { derived2 = "derived2" }

}

In 0.5, above assignments happened in the order base1, base2, derived1, derived2. In other words, field initializers were executed right before the setup method in the same class. In 0.6, assignments happen in the order base1, derived1, base2, derived2. This is a more conventional order that solves a few problems that users faced with the previous behavior, and also allows us to support JUnit’s new TestRule. As a result of this change, the following will no longer work:

**class** **Base** **extends** Specification {

**def** base

**def** **setup**() { base = "base" }

}

**class** **Derived** **extends** Base {

**def** derived = base + "derived" *// base is not yet set*

}

To overcome this problem, you can either use a field initializer for base, or move the assignment of derived into a setup method.

[@Unroll naming pattern syntax](http://spockframework.org/spock/docs/1.3/all_in_one.html#_code_unroll_code_naming_pattern_syntax)

|  |  |
| --- | --- |
| **NOTE** | This is not a change from 0.5, but a change compared to 0.6-SNAPSHOT. |
| **NOTE** | This only affects the Groovy 1.8 and 2.0 variants. |

In 0.5, the naming pattern was string based:

@Unroll("maximum of #a and #b is #c")

**def** "maximum of two numbers"() {

expect:

Math.max(a, b) == c

where:

a | b | c

1 | 2 | 2

}

In 0.6-SNAPSHOT, this was changed to a closure returning a GString:

@Unroll({"maximum of $a and $b is $c"})

**def** "maximum of two numbers"() { ... }

For various reasons, the new syntax didn’t work out as we had hoped, and eventually we decided to go back to the string based syntax. See [Improved @Unroll](http://spockframework.org/spock/docs/1.3/all_in_one.html#improved-unroll-0.6) for recent improvements to that syntax.

[Hamcrest matcher syntax](http://spockframework.org/spock/docs/1.3/all_in_one.html#_hamcrest_matcher_syntax)

|  |  |
| --- | --- |
| **NOTE** | This only affects users moving from the Groovy 1.7 to the 1.8 or 2.0 variant. |

Spock offers a very neat syntax for using [Hamcrest](http://code.google.com/p/hamcrest/) matchers:

**import** static spock.util.matcher.HamcrestMatchers.closeTo

...

expect:

answer closeTo(42, 0.001)

Due to changes made between Groovy 1.7 and 1.8, this syntax no longer works in as many cases as it did before. For example, the following will no longer work:

expect:

object.getAnswer() closeTo(42, 0.001)

To avoid such problems, use HamcrestSupport.that:

**import** static spock.util.matcher.HamcrestSupport.that

...

expect:

that answer, closeTo(42, 0.001)

A future version of Spock will likely remove the former syntax and strengthen the latter one.