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Mockito Made Clear

Java Unit Testing with Mocks, Stubs, and Spies

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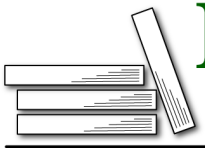

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To Ginger and Xander, the people that matter most to me in the world.

Using Mocks and Stubs in the Astro Project

In Counting Astronauts by Spaceship, on page ?, we introduced a project that processed the number of astronauts in space and returned how many were aboard each spacecraft. The examples there showed an integration test for the AstroService class and how to create a unit test using our own FakeGateway. Now we can use Mockito instead to mock the Gateway<T> interface.

As a reminder, AstroService retrieves the data from a Gateway<T>, reproduced here:

Gateway.java
```
public interface Gateway<T> {
    T getResponse();
}
```

The class that implements this interface is called AstroGateway, and it returns an AstroResponse that could possibly be null. If we're going to isolate the AstroService, we need to ask Mockito to return either that AstroResponse or throw a RuntimeException if it's null.

Let's use JUnit 5 along with the Mockito annotations. The test class for the AstroService now starts with this:

AstroServiceTest.java
```
@ExtendWith(MockitoExtension.class)
class AstroServiceTest {

    @Mock
    private Gateway<AstroResponse> gateway;

    @InjectMocks
    private AstroService service;
```

We'll rely on Mockito to create the mock of the gateway and then inject it into the service because we've provided a constructor to the AstroService class that takes a Gateway as an argument.

One test then looks like this:

AstroServiceTest.java
```
@Test
void testAstroData_usingInjectedMockGateway() {
    // Mock Gateway created and injected into AstroService using
    //    @Mock and @InjectMock annotations
    //
    // Set the expectations on the mock
    when(gateway.getResponse())
        .thenReturn(mockAstroResponse);

    // Call the method under test
```

```
    Map<String, Long> astroData = service.getAstroData();

    // Check the results from the method under test
    assertThat(astroData)
        .containsEntry("Babylon 5", 2L)
        .containsEntry("Nostromo", 1L)
        .containsEntry("USS Cerritos", 4L);
    astroData.forEach((craft, number) -> {
        System.out.println(number + " astronauts aboard " + craft);
        assertAll(
            () -> assertThat(number).isPositive(),
            () -> assertThat(craft).isNotBlank()
        );
    });

    // Verify the stubbed method was called
    verify(gateway).getResponse();
}
```

The annotations take care of two of our steps: creating the mock and injecting into the service. We still need to set the expectations, which we can do with the when/thenReturn pair. After calling the method under test getAstroData in AstroService, we can then verify that the results are correct. At the end, we can optionally check that the service did indeed invoke the getResponse method on the gateway exactly once.

Testing for a failure is similar and uses the thenThrow method:

AstroServiceTest.java

```
// Check network failure
@Test
void testAstroData_usingFailedGateway() {
    when(gateway.getResponse()).thenThrow(
        new RuntimeException(new IOException("Network problems")));

    assertThatExceptionOfType(RuntimeException.class)
        .isThrownBy(() -> service.getAstroData())
        .withCauseInstanceOf(IOException.class)
        .withMessageContaining("Network problems");
}
```

Since the getResponse method on the gateway returns a Failure that wraps the exception, we don't have to use the doThrow/when construct, which is required when the method we're mocking returns void.

Another advantage of using Mockito is you can test for the case of network failure without disabling the network. I bet the astronauts would be happy about that.

Congratulations. You've successfully used Mockito to mock the Gateway, and that concludes round one of the Mockito API game.

Wrapping Up

You can either create your mocks manually and insert them into your class under test or you can use Mockito's annotation support to inject them automatically. Mockito doesn't provide a full injection framework, like Spring or Guice, but it does make a good faith effort to plug in your mocks via either constructor injection, setter injection, or even field injection.

You now have the mechanisms for telling your mocks (or stubs, in this case) what to return when methods are called. Chained methods made the process much simpler, and you can use multiple arguments to respond to each invocation with different results. You also now know about the special handling required to mock methods that return `void`.

In the next chapter, we'll talk about generalizing the arguments to mocked methods so you don't have to give explicit values every time. Mockito has a class that contains factory methods for that purpose—we'll also use Java lambdas to implement custom argument matchers.