Cucumber Tutorial

Welcome to this journey to learn Cucumber (Cucumber Tutorial). Cucumber is a buzz word these days. Every body is talking about how fun it is to use Cucumber. So lets understand more on Cucumber and Software development model it follows.

Cucumber is a testing framework which supports Behavior Driven Development (BDD). It lets us define application behavior in plain meaningful English text using a simple grammar defined by a language called Gherkin. Cucumber itself is written in Ruby, but it can be used to "test" code written in Ruby or other languages including but not limited to Java, C# and Python.

In this series of tutorials we will be covering

Test Driven Development (TDD)

Test Driven Development

TDD is an iterative development process. Each iteration starts with a set of tests written for a new piece of functionality. These tests are supposed to fail during the start of iteration as there will be no application code corresponding to the tests. In the next phase of the iteration Application code is written with an intention to pass all the tests written earlier in the iteration. Once the application code is ready tests are run.

Any failures in the test run are marked and more Application code is written/re-factored to make these tests pass. Once application code is added/re-factored the tests are run again. This cycle keeps on happening till all the tests pass. Once all the tests pass we can be sure that all the features for which tests were written have been developed.

Benefits of TDD

1. Unit test proves that the code actually works
2. Can drive the design of the program
3. Refactoring allow to improve the design of the code
4. Low Level regression test suite
5. Test first reduce the cost of the bugs

Drawbacks of TDD

1. Developer can consider it as a waste of time
2. The test can be targeted on verification of classes and methods and not on what the code really should do
3. Test become part of the maintenance overhead of a project
4. Rewrite the test when requirements change

If we were to summarize this as phases in development process we can write as

Phase 1 (Requirement Definition)

We will take a simple example of a calculator application and we will define the requirements based on the basic features of calculator. For further simplicity we will condense the calculator application to a simple java class named

public class Calculator{

}

In phase 1 application requirements are gathered and defined. Taking the example of a simple calculator we can say that in iteration 1 we would like to implement

1. The ability to add two numbers

2. The ability to subtract two numbers

3. The ability to multiply two numbers

At this time we will open Eclipse or any Java IDE of your choice and create a Java project called ***Calculator***. In the project we will create two folders (***Src & Tests***). Src will contain all the application code which is the code of calculator application and *Tests* folder will contain all the tests. We will be using Junit tests here. If you are not familiar with Junit already. Take a look at our ***Junit tutorial*** .

So as said earlier TDD starts with defining requirements in terms of tests. Lets refine our first requirement in terms of tests

Requirement 1: *Calculator should have the ability to add two numbers.*

Test 1: *Given two numbers positive numbers (10 and 20) calculator should be able to add the two numbers and give us correct result (30)*

Test 2: *Given two negative numbers (-10 and -20) calculator should be able to add the two numbers and give us correct result (-30)*

This list of tests will go on and also for each requirement. In phase 1 all we have to do is to write tests for all the requirements. At this point in time, in the Calculator application we will just have a class called Calculator.

```
package source;

public class Calculator {

}
```

We will write all our tests against this class. Here is how our Test 1 will look like. We will put all our Adding tests in a class called ***AddingNumbersTests***

```
package AppTests;

import org.junit.Assert;
import org.junit.Test;

import source.Calculator;

public class AddingNumbersTests {

 private Calculator myCalculator = new Calculator();

 @Test
 public void addTwoPositiveNumbers()
 {
 int expectedResult = 30;
 int ActuaResult = myCalculator.Add(10, 20);
 Assert.assertEquals("The the sum of two positive numbers is correct" ,
expectedResult, ActuaResult);
 }

 @Test
 public void addTwoNegativeNumbers()
 {
 int expectedResult = -30;
 int ActuaResult = myCalculator.Add(-10, -20);
 Assert.assertEquals("The the sum of two negative numbers is correct" ,
expectedResult, ActuaResult);
 }
}
```

Now the very first thing that will come to our mind is that Calculator class doesn't have any methods and in our tests we have used a method named Add() on calculator class. This will give us compilation error.
Well, that's the whole point of writing the tests first. This will force us to add only the code that's necessary. Ignoring the compilation error, lets just move on to the next step.

Phase 2: Executing Tests

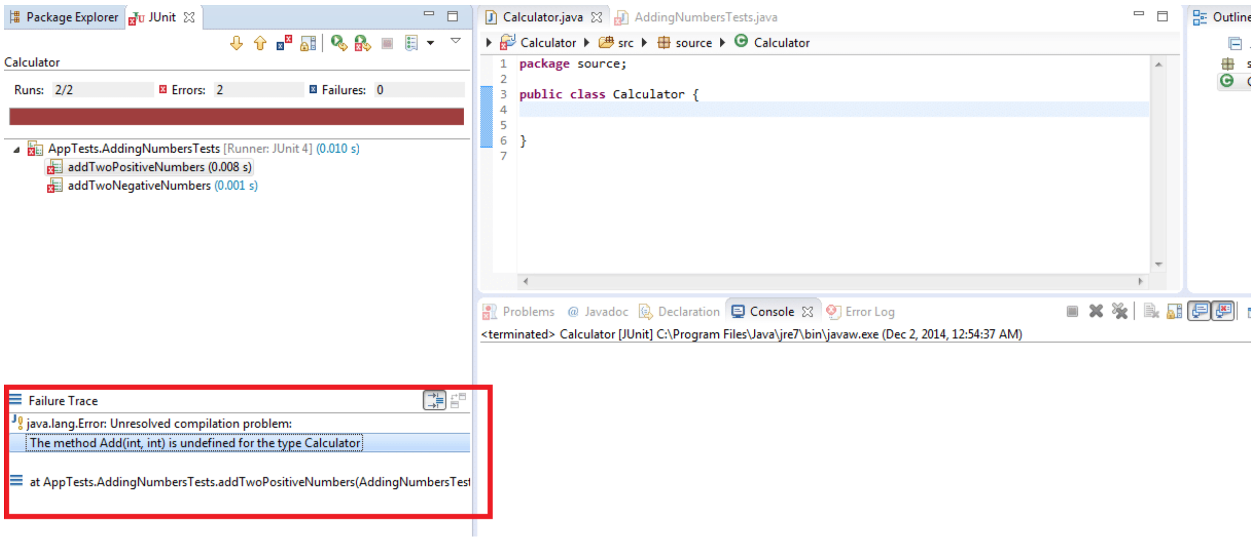
In this phase we will simply run our tests. Lets do it one by one

Attempt 1: When we run our tests for the first time we will get this error message

java.lang.Error: Unresolved compilation problem:

The method Add(int, int) is undefined for the type Calculator

This error clearly states that Add method is not present in the Calculator class. In details you can see in this screenshot



Calculator

Runs: 2/2 Errors: 2 Failures: 0

```
AppTests.AddingNumbersTests [Runner: JUnit 4] (0.010 s)
    addTwoPositiveNumbers (0.008 s)
    addTwoNegativeNumbers (0.001 s)
```

```java
package source;

public class Calculator {


}
```

```
<terminated> Calculator [JUnit] C:\Program Files\Java\jre7\bin\javaw.exe (Dec 2, 2014, 12:54:37 AM)
```

```
java.lang.Error: Unresolved compilation problem:
    The method Add(int, int) is undefined for the type Calculator

at AppTests.AddingNumbersTests.addTwoPositiveNumbers(AddingNumbersTest
```

Phase 3: Adding/Refactoring code

After the test failure in the previous step, we will take a logical action and we will simply add a method called Add in our Calculator class and make it return 0 for the time being. Now our Calculator class will look something like this

```java
package source;

public class Calculator {
 public int Add(int number1, int number2)
 {
 return 0;
 }
}
```

With this change we will move to the next step that is rerun our tests. Which is nothing but Phase 2 mentioned earlier. Lets see what is the test result that we get this time.

Results from the two tests is

java.lang.AssertionError: The the sum of two positive numbers is incorrect expected:<30> but was:<0>
at

org.eclipse.jdt.internal.junit.runner.RemoteTestRunner.main(RemoteTestRunner.java:192)

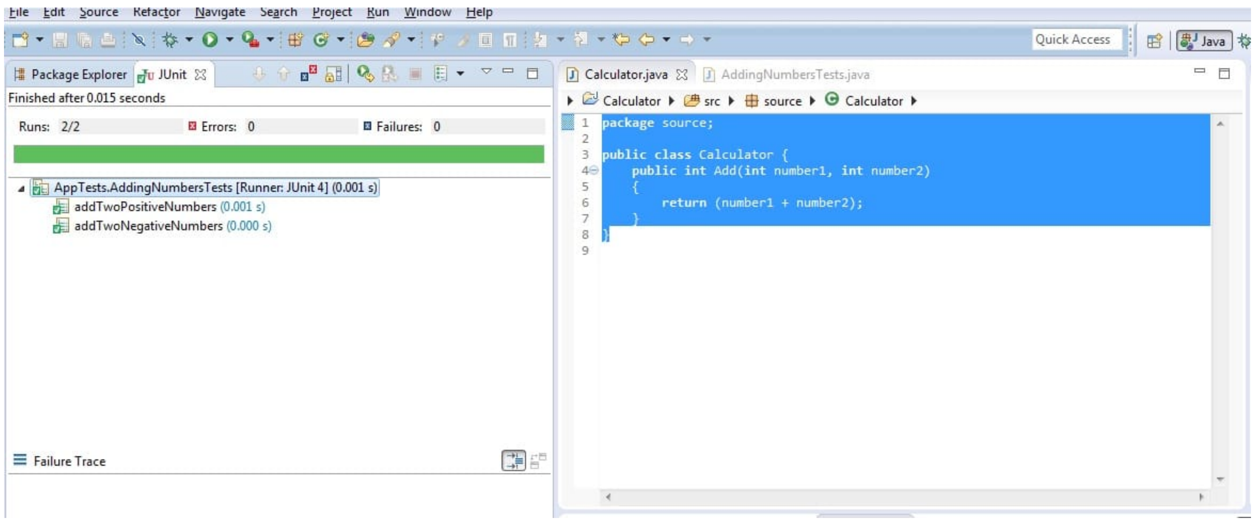
And

*java.lang.AssertionError: The the sum of two negative numbers is incorrect expected:<-30> but was:<0>
at org.junit.Assert.fail(Assert.java:88)*

Now with this test failure we conclude that addition of two positive and negative numbers is not happening properly. Based on the test failure we will add just enough code that these two tests pass. As we do this we move to the next phase which is Phase 3. This phase is already describer earlier. I will just show you how the code of our Calculator will look like after this phase

```java
package source;

public class Calculator {
 public int Add(int number1, int number2)
 {
 return (number1 + number2);
 }
}
```

Now we will run our tests Phase 2. The test results after this change will make all our tests pass. Once all the tests will pass we will conclude that our Iteration has been completed. Tests results:

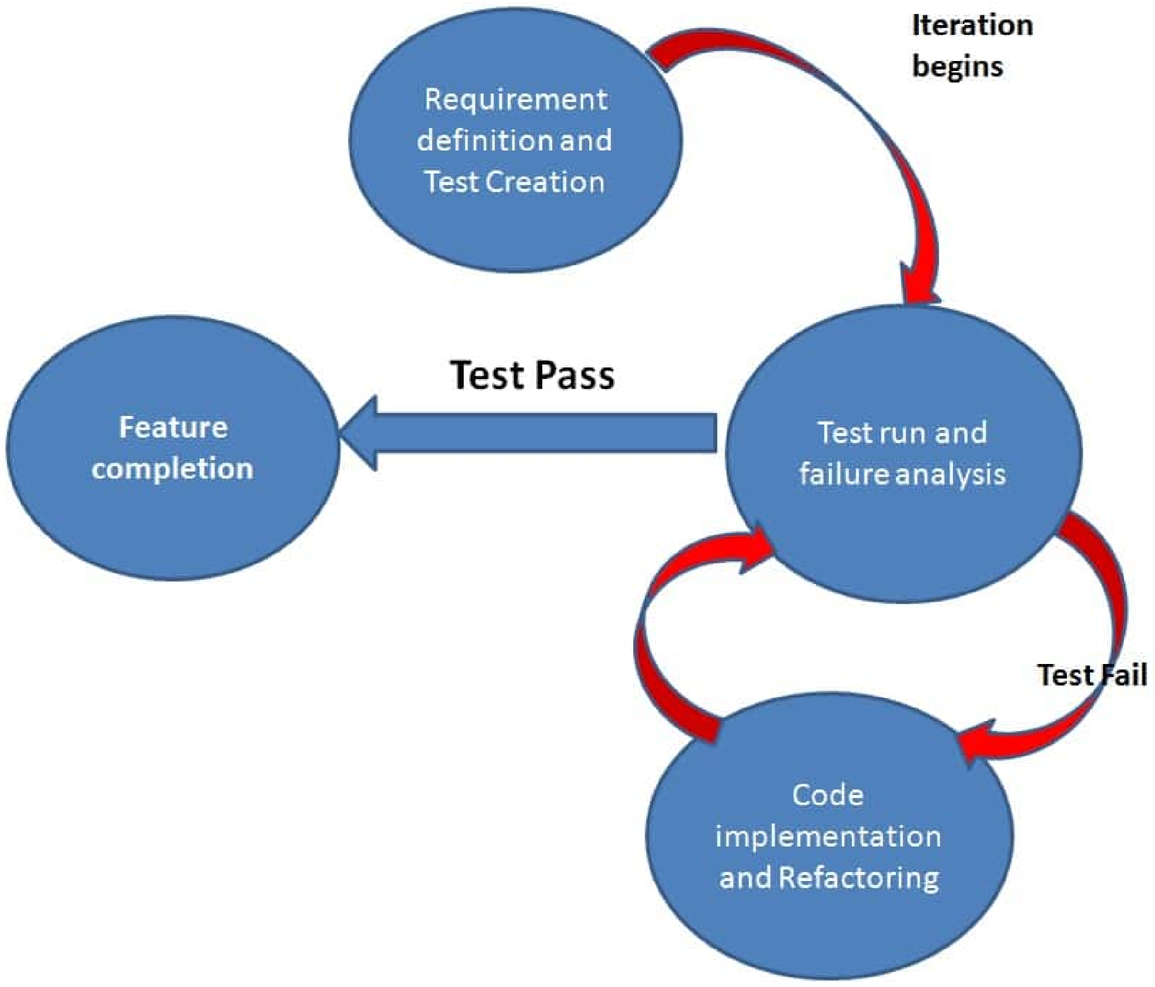

File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access
Java
Package Explorer
JUnit
Calculator.java
AddingNumbersTests.java
Calculator ▸ src ▸ source ▸ Calculator ▸
Failure Trace

```
Finished after 0.015 seconds
Runs: 2/2    Errors: 0    Failures: 0

AppTests.AddingNumbersTests [Runner: JUnit 4] (0.001 s)
    addTwoPositiveNumbers (0.001 s)
    addTwoNegativeNumbers (0.000 s)
```

```java
package source;

public class Calculator {
    public int Add(int number1, int number2)
    {
        return (number1 + number2);
    }
}
```

Once all the tests pass it signals the end of iteration. If there are more features that needs to be implemented in your product, product will go through the same phases again but this time with new feature set and more tests.

Summarizing it in a figure can be done like this


Requirement definition and Test Creation
Iteration begins
Test Pass
Feature completion
Test run and failure analysis
Test Fail
Code implementation and Refactoring

With this understanding of TDD we will move to BDD. Which will form the basis of understanding Gherkin and eventually Cucumber.

Join me in the next tutorial to learn more.

Behavior Driven Development

In the last section we discussed what TDD is. We discussed how TDD is test centered development process in which we start writing tests firsts. Initially these tests fails but as we add more application code these tests pass. This helps us in many ways

- *We write application code based on the tests. This gives a test first environment for development and the generated application code turns out to be bug free.*
- *With each iteration we write tests and as a result with each iteration we get an automated regression pack. This turns out to be very helpful because with every iteration we can be sure that earlier features are working.*
- *These tests serve as documentation of application behavior and reference for future iterations.*

Behavior Driven Development

Behavior Driven testing is an extension of TDD. Like in TDD in BDD also we write tests first and the add application code. The major difference that we get to see here are

- *Tests are written in plain descriptive English type grammar*
- *Tests are explained as behavior of application and are more user focused*
- *Using examples to clarify requirements*

This difference brings in the need to have a language which can define, in an understandable format.

Features of BDD

1. *Shifting from thinking in “tests” to thinking in “behavior”*
2. *Collaboration between Business stakeholders, Business Analysts, QA Team and developers*
3. *Ubiquitous language, it is easy to describe*
4. *Driven by Business Value*
5. *Extends Test Driven Development (TDD) by utilizing natural language that non technical stakeholders can understand*
6. *BDD frameworks such as Cucumber or JBehave are an enabler, acting a “bridge” between Business & Technical Language*

BDD is popular and can be utilised for ***Unit level*** test cases and for ***UI level*** test cases. Tools like ***RSpec*** (for Ruby) or in .NET something like ***MSpec*** or ***SpecUnit*** is popular for Unit Testing following BDD approach. Alternatively, you can write BDD-style specifications about ***UI interactions***. Assuming you're building a web application, you'll probably use a browser automation library like ***WatiR/WatiN or Selenium***, and script it either using one of the frameworks I just mentioned, or a given/when/then tool such as ***Cucumber (for Ruby)*** or ***SpecFlow (for .NET)***.

BDD Tools Cucumber & SpecFlow

What is Cucumber?

Cucumber is a testing framework which supports ***Behavior Driven Development (BDD).*** It lets us define application behavior in plain meaningful English text using a simple grammar defined by a language called ***Gherkin***. Cucumber itself is written in ***Ruby***, but it can be used to "test" code written in *Ruby* or other languages including but not limited to *Java*, *C#* and *Python.*

What is SpecFlow?

SpecFlow is inspired by *Cucumber* framework in the Ruby on Rails world. *Cucumber* uses plain English in the Gherkin format to express user stories. Once the user stories and their expectations are written, the Cucumber gem is used to execute those stores. ***SpecFlow brings the same concept to the .NET world*** and allows the developer to express the feature in plain English language. It also allows to write specification in human readable ***Gherkin format***.

Why BDD Framework?

Let's assume there is a requirement from a client for an E-Commerce website to increase the sales of the product with implementing some new features on the website. The only challenge of the development team is to convert the client idea in to something that actually delivers the benefits to client.

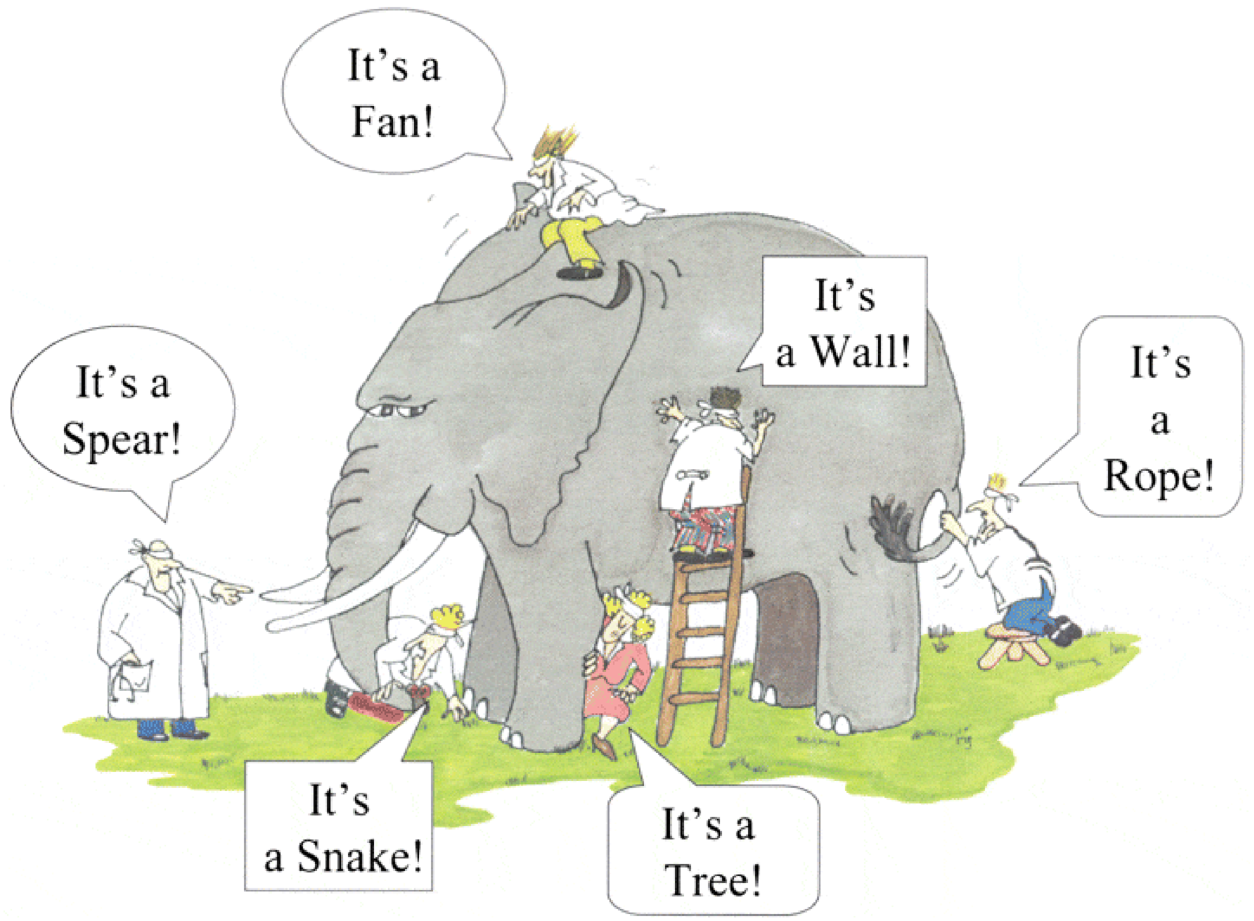
The original idea is awesome. But the only challenge here is that the person who is developing the idea is not the same person who has this idea. If the person who has the idea happens to be a talented software developer, then we might be in luck: the idea could be turned into working software without ever needing to be explained to anyone else. Now the idea needs to be communicated and has to travel from Business

Owners(Client) to the development teams or many other people.

Most software projects involve teams of several people working collaboratively together, so high-quality communication is critical to their success. As you probably know, good communication isn't just about eloquently describing your ideas to others; you also need to solicit feedback to ensure you've been understood correctly. This is why agile software teams have learned to work in small increments, using the software that's built incrementally as the feedback that says to the stakeholders "Is this what you mean?"

Below image is the example of what clients have in their mind and communicated to the team of developers and how developers understands it and work on it.

Wrong Perception



With the help of Gherkin language cucumber helps facilitate the discovery and use of a ubiquitous language within the team. Tests written in cucumber directly interact with the development code, but the tests are written in a language that is quite easy to understand by the business stakeholders. Cucumber test removes many misunderstandings long before they create any ambiguities in to the code.

Example of a Cucumber/SpecFlow/BDD Test:

The main feature of the Cucumber is that it focuses on Acceptance testing. It made it easy for anyone in the team to read and write test and with this feature it brings business users in to the test process, helping teams to explore and understand requirements.

***Feature*: Sign up**

Sign up should be quick and friendly.

***Scenario*: Successful sign up**
New users should get a confirmation email and be greeted personally by the site once signed in.

***Given* I have chosen to sign up**
***When* I sign up with valid details**
***Then* I should receive a confirmation email**
***And* I should see a personalized greeting message**

***Scenario*: Duplicate email**

Where someone tries to create an account for an email address that already exists.

***Given* I have chosen to sign up**
***But* I enter an email address that has already registered**
***Then* I should be told that the email is already registered**
***And* I should be offered the option to recover my password**

Now after a look on the above example code anybody can understand the working of the test and what it is intend to do. It gives an unexpected powerful impact by enabling people to visualize the system before it has been built. Any of the business user would read and understand the test and able to give you the feedback that whether it reflects their understanding of what the system should do, and it can even leads to thinking of other scenarios that needs to be consider too.

Gherkin

In this tutorial we introduce you to ***Gherkin – BDD Language (Business Driven Development)***. We will try to answer these questions in details

1. ***What is Gherkin?***
2. ***What is the use of Gherkin?***

Let’s start with some details

What is ***Gherkin – BDD Language***?

Before diving in to Gherkin, it is necessary to understand the importance and need of a common language across different domains of project. By different domains I By different domains I mean ***Clients***, ***Developers***, ***Testers***, ***Business analysts*** and the ***Managerial***team. Let’s start with talking about usual problems of a development project first and then we will move to a solution, while doing so we will come across the need for a common language.

Assume you are a part of a technical team (Developer and Tester) and you have a task of collaborating with the business team (*Business owners and Business analysts*). You have to come up with the requirements of your project, these requirements will be what your development team will be implementing and test team will be testing. Also, that you have to make a small search feature on your E-Commerce platform. This feature will allow users to search for a product on your website.

As we all might have faced in our experience that requirement given by business team are very crude and basic. For example, in this scenario we may get following requirements:

3. Functional Requirements

3.1 Search Functionality

3.1.1 User should be able to search for a product

3.1.2 Only the products related to search string should be displayed.

Questions raised from the above requirements

As we can see these requirements are good and useful but are not accurate. They describe a broad behavior of the system but do not specify concrete behavior of the system. Let me illustrate it by dissecting the first requirement, first requirement says that user should be able to search for a product but it fails to specify following

– What is the maximum searchable length of search string?

– What should be the search results if user searches for an invalid product?

– What are the valid characters that can be used to search?

*and similarly a few more detailed behavior of the application.

Usually in a project we end up asking above questions with the business team and we get replies, most of the replies reach the project documentation but the unfortunate ones are lost in emails and telephonic conversations. Also these replies are open to interpretation, for example:

Question to Business Owner : *What should be the search results if user searches for an invalid product?*

Reply from Business Owner : *Invalid product searches should show following text on the search page:* ***No product found***

Answers of the Questions result in to more Doubts and Interpretation

We get the answers of the questions asked from the Business team but it opens for interpretation or doubts in following ways:

– Definition of invalid product is ambiguous and different team members will interpret it in different ways. One may consider that an invalid product is one which is not present in the inventory and other team member might consider an invalid product to be one which is a spelling mistake.

– The answer by the business team says that "No product found" text should be displayed on the page. Does it says that a new search option should be present for the user? or may be related/similar search options should be displayed for the user?

These are exact points where error is introduced in the system. Also, if we analyze the second doubt we would see that user Business team would love to have a new search option and related/similar searches option presented to the user. However, they were not able to think of this scenario when the question was asked. As a result what happened in the above example is

1. *Business team and the technical teams are communicating at two different levels, business team being vague and technical team trying to be precise.*

2. *Ambiguity being introduced in the system, here by the definition of "invalid product".*
3. *Not enough insight being given to the Business team, so that they could have come up with new scenarios.*
4. *Some details of project being lost in emails and telephonic conversations.*

How to Improve the Requirement?

Now let's improve the first requirement given by the business team and try to make it more precise:

"When a user searches, without spelling mistake, for a product name present in the inventory. All the products with similar name should be displayed"

"When a user searches, without spelling mistake, for a product name present in the inventory. Search results should be displayed with exact matches first and then similar matches"

Here we can see that how clear the requirements have become and with these clear requirements we are able to think more about the system. For eg. In the case of second requirement, after reading it we may think of other scenarios like:

- *What should happen when there no exact and similar matches?*
- *Should the user be given an error message?*
- *Or the user is given a message stating when the product is expected to arrive in inventory.*

What have we achieved here?

We have forced the client to think in terms of details. With this improved thinking Business teams are coming with more refined requirements. This in turn with reduces the ambiguity in the project and will make developers and testers life easy by reducing the number of incorrect implementations. Also, you can see that each requirement now documents one exact behavior of the application. This means that it can be considered as a requirement document in itself.

What's the conclusion?

Well, with the above example or exercise we can conclude the followings:

1. *Different teams in the project need a common language to express requirements. This language should be simple enough to be understood by Business team members and should be explicit enough to remove most of the ambiguities for developers and testers.*
2. *This language should open up the thinking of team members to come up with more scenarios. As you express more details you try to visualize the system more and hence you end up making more user scenarios.*
3. *This language should be good enough to be used as project documentation.*

To answer these problems ***Gherkin*** was created. *Gherkin* is a simple, lightweight and structured language which uses regular spoken language to describe requirements and scenarios. By regular spoken language we mean English, French and around 30 more languages.

Example of Gherkin

As Gherkin is a structured language it follows some syntax let us first see a simple scenario described in gherkin.

***Feature:* Search feature for users**
This feature is very important because it will allow users to filter products

***Scenario:* When a user searches, without spelling mistake, for a product name present in inventory. All the products with similar name should be displayed**

***Given* User is on the main page of www.myshopingsite.com**
***When* User searches for laptops**
***Then* search page should be updated with the lists of laptops**

Gherkin contains a set of keywords which define different premise of the scenario. As we can see above the colored parts are the keywords. We will discuss about the gherkin test structure in details later but the key points to note are:

- *– The test is written in plain English which is common to all the domains of your project team.*
- *– This test is structured that makes it capable of being read in an automated way. There by creating automation tests at the same time while describing the scenario.*

Getting Started with Cucumber BDD for Testing in Agile Teams

Introduction

The Agile software methodology is recently becoming popular among software development teams in the fast-moving market. However, this increasing trend also imposes testing teams to manage and maintain their test cases and test scripts following changing requirements. Thus, an appropriate testing method should be chosen right from the beginning to smoothly implement any Agile software project.

Cucumber and its outstanding features

As yet there have been many Agile software projects succeeded thanks to the Behavior-Driven Development (BDD) method using Cucumber tool. So, what is Cucumber?

Cucumber is a tool used to run automated acceptance tests created in a BDD format. One of its most outstanding features of the tool is the ability to carry out plain-text functional descriptions (*written in the language called **Gherkin***) as automated tests. Let's take a look at the below example:

```
Feature: Update password

 Scenario: Admin user can update the user password

Given I am in the HR system with an Admin account
When I update password of another user
Then I receive a message for updating password successfully
And user password is updated to the new password
```

This incredible feature of ***Behavior-Driven Development (BDD)*** approach with the advantages as below:

– Writing BDD tests in an omnipresent language, a language structured around the domain model and widely used by all team members comprising of developers, testers, BAs, and customers.
– Connecting technical with nontechnical members of a software team.
– Allowing direct interaction with the developer's code, but BDD tests are written in a language which can also be made out by business stakeholders.

– Last but not least, acceptance tests can be executed automatically, while it is performed manually by business stakeholders.

Cucumber helps improve communication

Cucumber helps improve communication between technical and non-technical members in the same project. Let’s have a look at the below requirement and its automation tests:

```
As an Admin User,
I would like to change the password of other user's accounts.
Feature: Update password
 Scenario: Admin user can update the user password
   Given I am in the HR system with an Admin account
   When I update password of another user
   Then I receive a message for updating password successfully
   And user's password is updated to the new password
```

With TestNG, the above test scenario can be implemented as below:

```
@test
public void testAdminUserCanUpdateUserAccountPassword() {
 // create users
 User userAdmin = new User(UserRole.ADMIN, username, password);
 User user = new User(UserRole.VIEWER, user_username, user_password);

 // use Admin user to update another user password
  String message = userAdmin.updatePassword(user, user_new_password);


// verify password changed
  Assert.assertEquals(message, "Password changed successfully");
  Assert.assertEquals(user.getPassword(), user_new_password);
}
```

The same test case can be written using Cucumber:

```
Feature: Update password
 Scenario: Admin user can update the user password
   Given I am in the HR system with an Admin account
   When I update password of another user
   Then I receive a message for updating password successfully
   And user's password is updated to the new password
```

Both automation test scripts above perform well to complete the test automatically. But do all testers of your team make out these tests? Can other business analysts and other stakeholders use these tests again at the acceptance testing (AT) stage?

The automation test with TestNG may be difficult for most manual testers and BAs to catch up with. Moreover, it is impossible to use this test again for AT. As a result, based on these flaws mentioned before, this can not be considered as a suitable method.

In contrast, the automation test using Cucumber is created in a business domain language or in natural language, which can be easily made out by all members of the software project team. Communication is crucial for any development team, especially in the Agile team. There are usually many continuous chats, discussions, or even arguments happening among developers and testers to figure out what the correct behavior of a feature is. By using Cucumber, the same feature specification is now used for developing by developers, for testing by testers. It is considered to be a powerful tool because it can help lower the risk for misunderstanding as well as the communication breakdown.

Cucumber is an Automated Acceptance Testing Tool

The acceptance test typically is carried out by BAs/customers to make sure that the development team has built specific features. Typical activity in this testing stage is verifying the system against the original requirements with specific, real data from production. Cucumber testing not only follows the requirements as its test scenarios but also helps BAs or Product Manager to adjust test data easily. Here is a demonstration with a little adjustment:

```
As an Admin User,
I would like to change the password of other user's accounts.
Feature: Update password
 Scenario: Admin user can update the user password
   Given I am in the HR system with an Admin account
   When I update password of another user
   Then I receive a message for updating password successfully
   And user's password is updated to the new password
```

The automation test is written in Cucumber framework:

```
Scenario Outline: Verify Updating user password feature
 Given I am in the HR system with "<account_type>" account
 And there is another user with "<old_password>" password
 When I update password of the user to "<new_password>"
 Then I got the message "<message>"
 And the user password should be "<final_password>"
Examples:
|account_type  |old_password |new_password |message                |final_password |
|Admin         |$Test123  |@Test123     |Password changed.. |@Test123        |
|Viewer        |$Test123  |@Test123     |Invalid right access.. |$Test123        |
```

All testers can take part in automation test with Cucumber BDD

In addition to improving communication among members of the same testing team, Cucumber also helps leverage tester's skills efficiently. Expertise gap always exists in every organization. In other words, some testers have high technical expertise in programming utilizing automated testing, while others are performing manual testing with limited programming skills in the same team. Thanks to Cucumber, all testers, no matter what their skill levels are, can participate in the process of performing automation tests.

Let's take a look at the above example:
– Any tester who is aware of the business logic and workflow can write feature files, add more scenarios, and test datasets.
– Any tester who has a basic knowledge of programming and know how to create objects, access properties, call methods, can generate step definitions.
– Any tester with higher programming skill level can take part in the process of making a framework, define data source connection and so on.

There are still a few potential issues when implementing Cucumber:

Cucumber helps run test scenarios specified in a plain text file using business domain knowledge. Thus, the usage of languages and the perception of the one who creates the test might directly influence the test scenarios, leading to the risk of misunderstanding. Test scenarios should be presented clearly, and their implementation should perform accurately for each step. For instance, when you want to verify the Search feature on Google, the test should be:

```
Scenario: performing a search on google
Given I am on "www.google.com" site
When I search for "Cucumber and BDD"
Then ...
```

These steps may be incorporated to have the following test:

```
Scenario: performing a search on google
When I search for "Cucumber and BDD"
Then ...
```

The stages of the Cucumber tool are performed in an ordinary language. They can be used again in various test scenarios. This helps reduce the effort to create tests. However, maintaining the test to be both readable and reusable is a big challenge. If the test is written at a very high level for any stakeholders to make out; few steps (bold) can be reused:Both the above scripts are correct; however, the second one is not apparent because it does too much more than expected: opening Google's website and searching with the specified text. Imagine if you want to extend the test to search more texts, you may repeat the above step, and the Google site is consequently opened twice. If you do not strictly follow the requirement, the Cucumber testing tool will cause misunderstanding sooner or later and be so difficult to maintain when being extended.

```
Feature: Update password

 Scenario: Admin user can update the user password
   Given I am in the HR system with an Admin account
   When I update password of another user
   Then I receive a message for updating password successfully
   And user's password is updated to the new password

 Scenario: Viewer user cannot update the user password
   Given I am in the HR system with a Viewer account
    When I update password of another user
    Then I receive a message for not able to update the user password
    And user's password remains the same
```

In contrast, if the test is generic and can be reused, i.e., verifying updating user's Last Name, non-technical stakeholders will have difficulty in catching up with and performing Acceptance Tests:

```
Scenario: Admin user can update user password:
 Given I am in the "$System.HR_Page" with "admin@test.com" username
and "$Test123" password
 And there is another user in "$System.HR_Page" with "user@test.com"
username and "$Test123" password
 When I update "$UserTemplate.Password" of "user@test.com" user to"@Test123"
 And I save the response message as "response_message"
 Then "$response_message" should be "Password changed successfully"
 And the  "user@test.com" user's "$UserTemplate.Password" should be"@Test123"
```

During the testing process, you have to adjust test scenarios regularly until they reach entirely an acceptable balance where all members can understand and reuse.

```
Scenario: Verify Updating user password feature
 Given I am in the HR system with "Admin" account
 And there is another user with "$Test123" password
 When I update password of the user to "@Test123"
 Then I got the message "Password changed successfully."
 And the user password should be "@Test123"
```

Or with some more test data:

```
Scenario Outline: Verify Updating user password feature
 Given I am in the HR system with "<account_type>" account
 And there is another user with "<old_password>" password
 When I update password of the user to "<new_password>"
 Then I got the message "<message>"
 And the user password should be "<final_password>"

Examples:
|account_type |old_password |new_password |message            |final_password |
|Admin        |$Test123 |@Test123      |Password changed.. |@Test123   |
|Viewer        |$Test123 |@Test123      |Invalid right access.. |$Test123   |
```

Important notes for the testing team who wants to get started with Cucumber

– Consider automation tests as essential as a real project. The code should follow coding practice, convention, etc.

*– An appropriate editor tool should be considered. This editor should help debug and edit feature files in standard text format. Aptana (free editor), RubyMine (commercial editor) and **Katalon Studio** are suitable options which completely support BDD-based Cucumber.*

– Last but not least, make feature files an actual “communication” layer where you can store received test data and format test data. Domain business logic is not contained.

All things considered, Cucumber is one of the most powerful tools to offer us the real communication layer on top of a robust testing framework. The tool can help run automation tests on a wide-ranging testing needs from backend to frontend. Moreover, Cucumber creates deep connections among members of the testing team which is hardly found in other testing frameworks. With many years of automation testing experience, I recommend that Cucumber for Web UI and Web service testing should be implemented to help Agile software projects to be operated successfully.

First Cucumber Selenium Java Test

Till now we have understood what ***Cucumber*** is and what development model it follows. Now let's try to create first Cucumber Selenium Java test and I assume that you have some basic understanding of ***Selenium WebDriver*** and its basic commands.

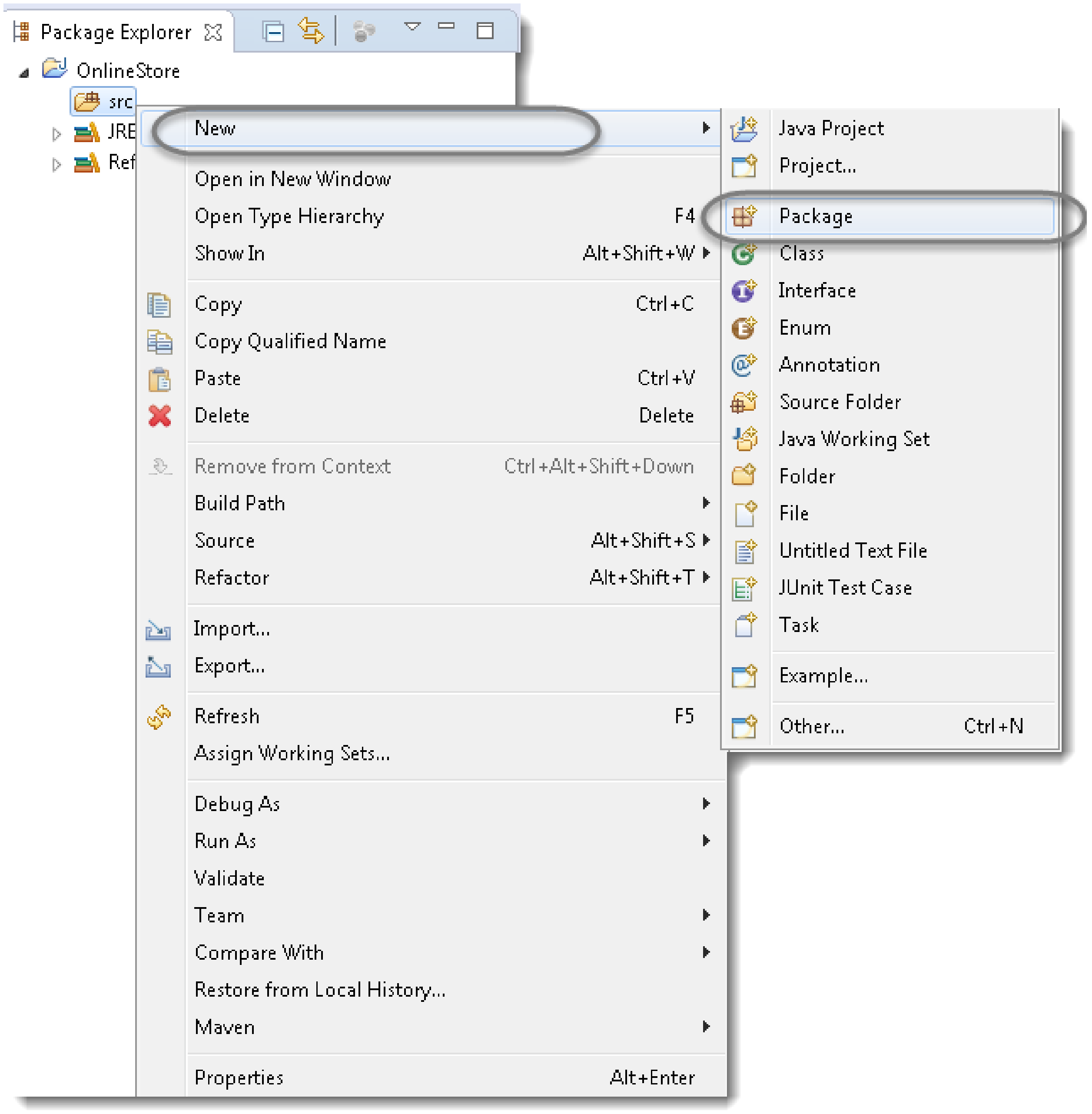
I hope you have been following the complete tutorial and I expect that by now you have completed the following steps, which are the prerequisite for writing Cucumber Selenium test:

1. ***Download & Install Java***
2. ***Download and Install Eclipse***
3. ***Install Cucumber Eclipse Plug-in***
4. ***Download Cucumber***
5. ***Download Selenium WebDriver Client***
6. ***Configure Eclipse with Selenium & Cucumber***

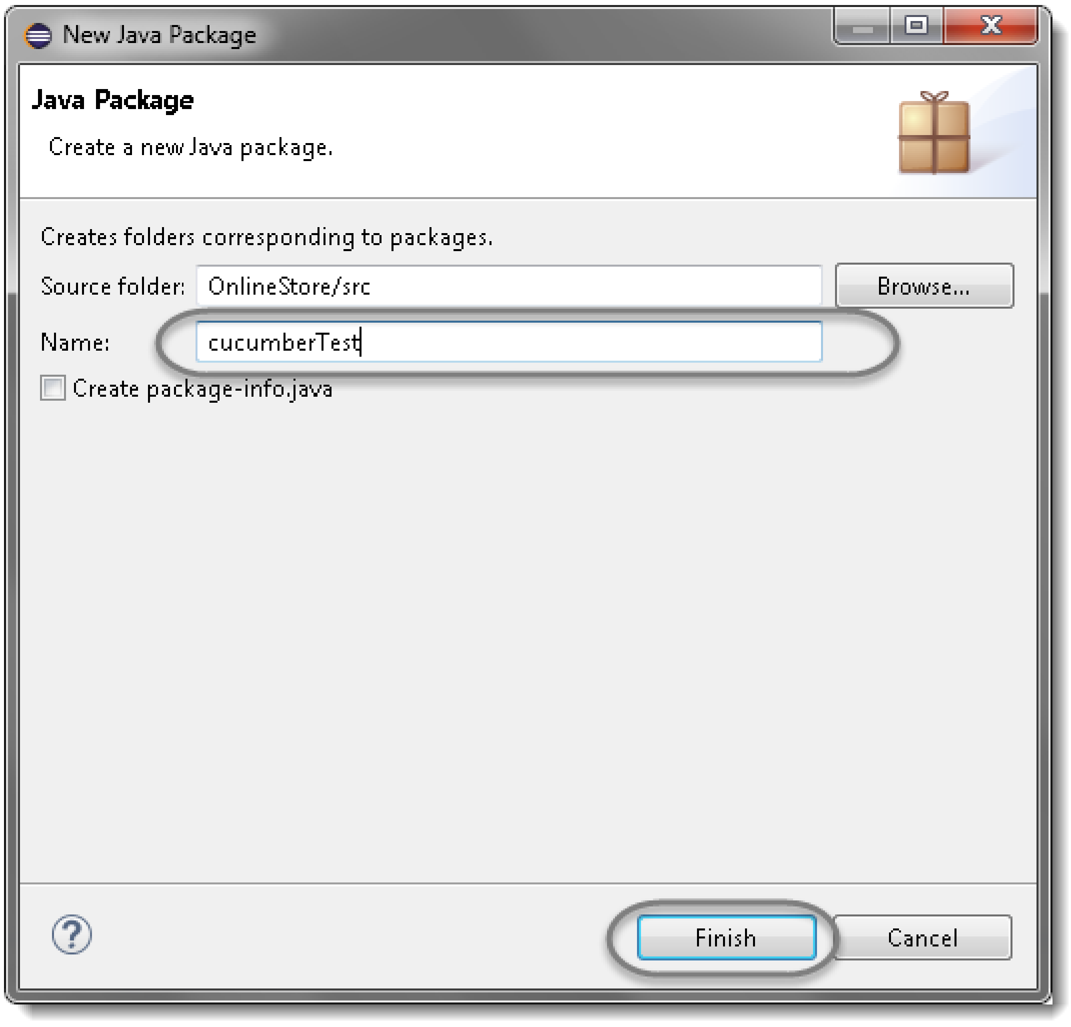
Create Folder Structure

Before moving head for writing the first script, let's create a nice folder structure of the project.

1) Create a new ***Package*** by *right click* on the '***src***' folder and select *New > Package*.



2) Name it as ‘***cucumberTest***’ and click on *Finish* button.



Creates folders corresponding to packages.

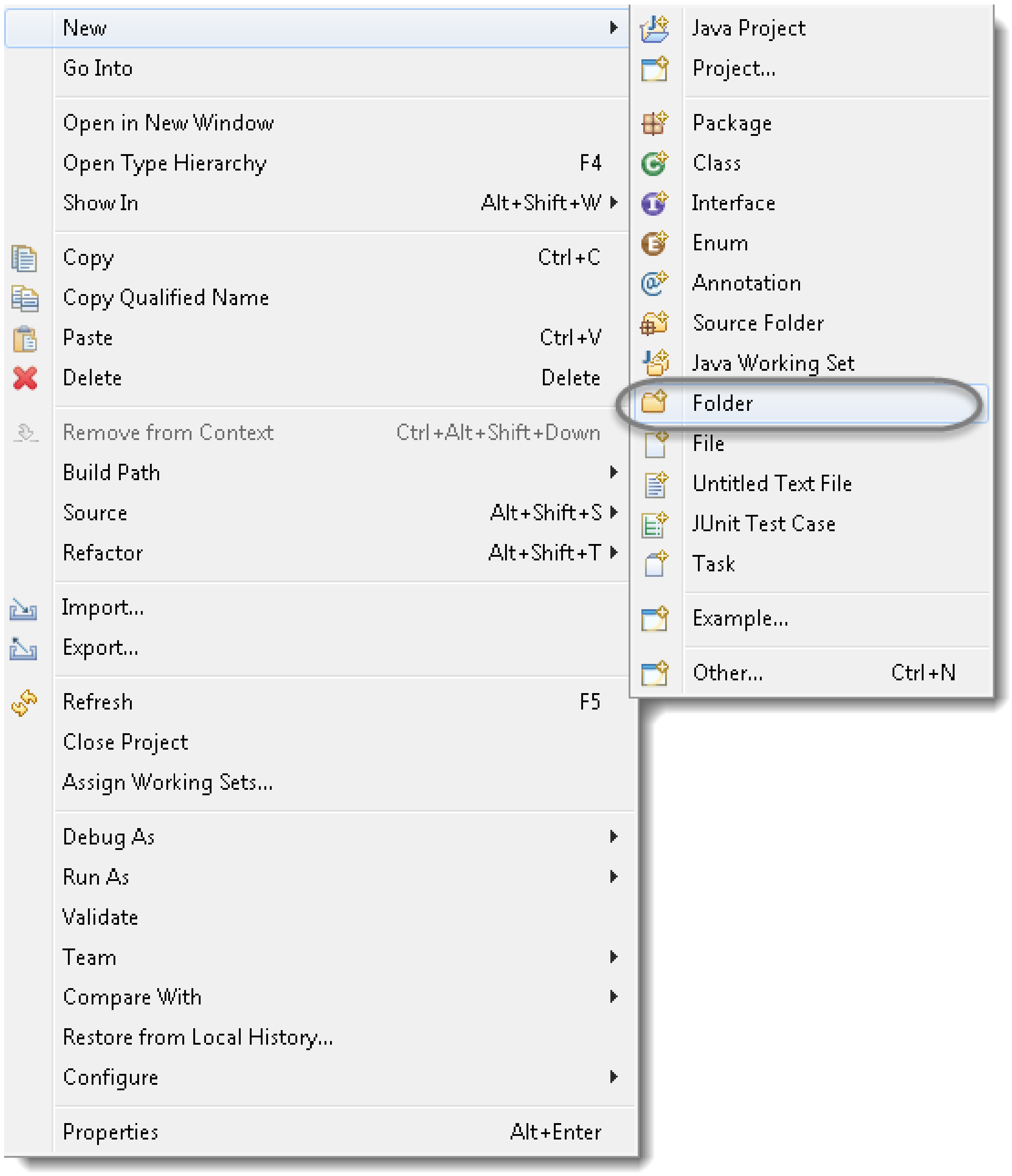
Source folder: OnlineStore/src

Name: cucumberTest

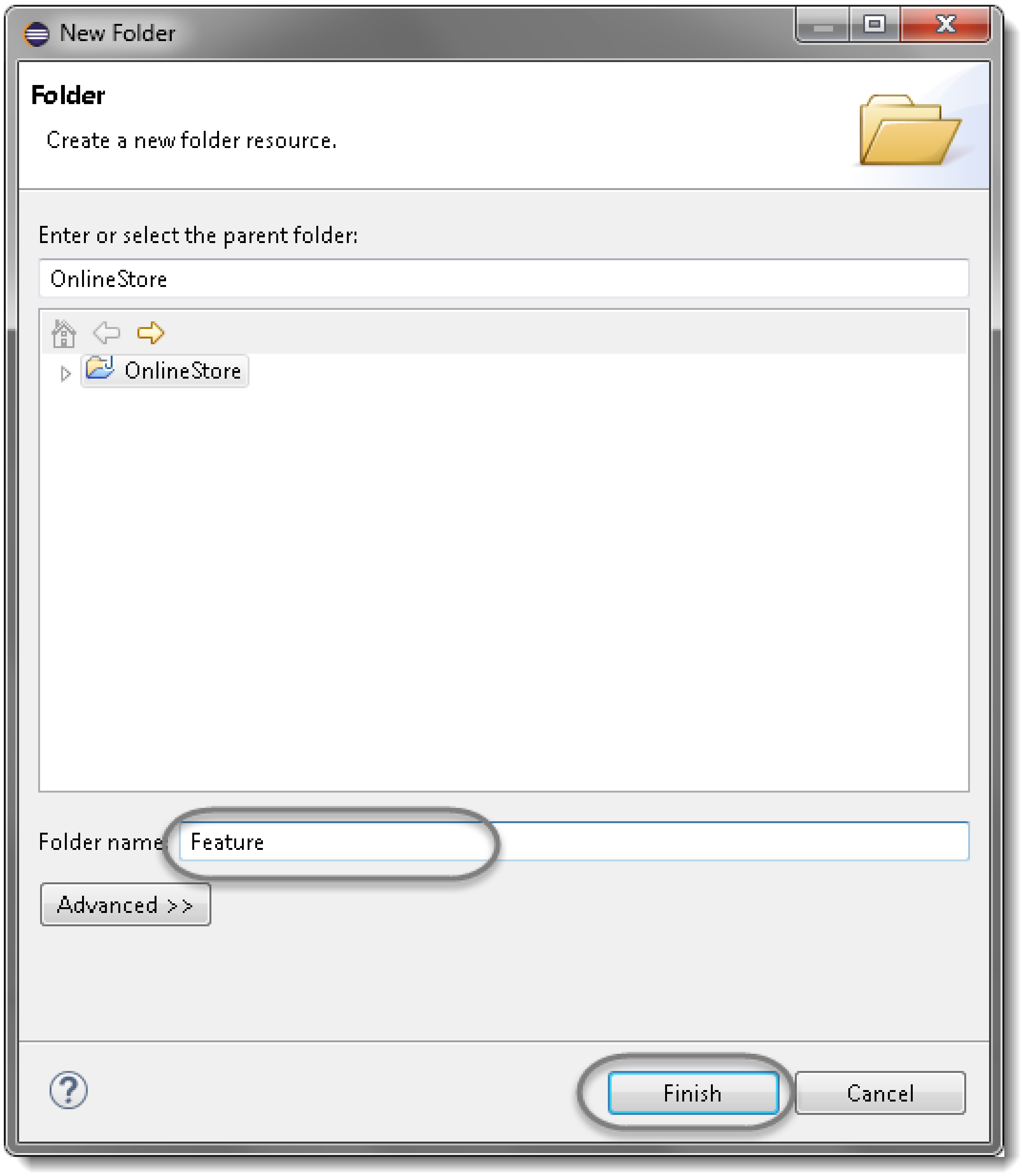
Create package-info.java

3) Create another ***Package*** and name it as ‘***stepDefinition***’, by *right click* on the ‘***src***‘ folder and select *New > Package*.

4) Create a new ***Folder*** this time by *right click* on the *project* ‘**OnlineStore**‘ and *select New > Folder*.



5) Name it as ‘***Feature***’ and click on *Finish* button.

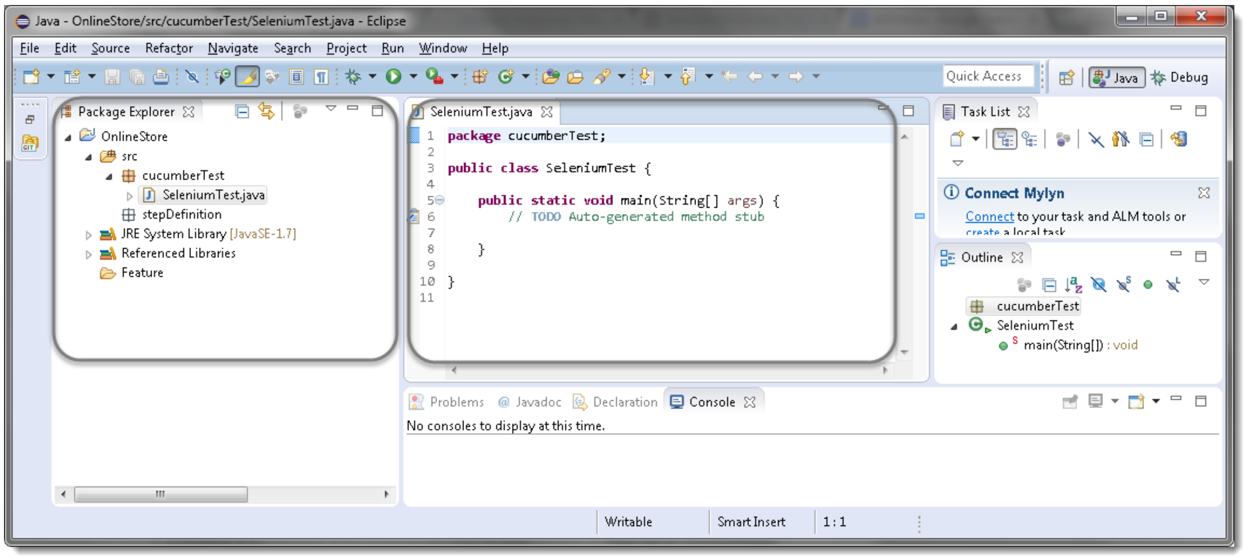


Selenium Java Test

Lets first write a simple ***Selenium Test script*** for ***LogIn*** functionality and then convert that script in to *Cucumber* script to understand it better.

1) Create a new ***Class*** file in the '***cucumberTest***' package and name it as '***SeleniumTest***', by right click on the *Package* and select **New** > **Class**. Check the option '***public static void main***' and click on ***Finish*** button.

Now the Eclipse Window must look like this:



```
package cucumberTest;

public class SeleniumTest {

    public static void main(String[] args) {
        // TODO Auto-generated method stub

    }

}
```

```
No consoles to display at this time.
```

Selenium Test Script

Now write a simple script performing the following steps in Selenium.

1. *Launch the Browser*
2. *Navigate to Home Page*
3. *Click on the LogIn link*
4. *Enter UserName and Password*
5. *Click on Submit button*
6. *Print a successful message*
7. *LogOut from the application*
8. *Print a successful message*
9. *Close the Browser*

Selenium Test Script

```java
package cucumberTest;

import java.util.concurrent.TimeUnit;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;

public class SeleniumTest {
 private static WebDriver driver = null;
 public static void main(String[] args) {
 // Create a new instance of the Firefox driver

        driver = new FirefoxDriver();

        //Put a Implicit wait, this means that any search for elements on the page could take the time the implicit wait is set for before throwing exception

        driver.manage().timeouts().implicitlyWait(10, TimeUnit.SECONDS);

        //Launch the Online Store Website

        driver.get("http://www.store.demoqa.com");

        // Find the element that's ID attribute is 'account'(My Account)

        driver.findElement(By.xpath(".//*[@id='account']/a")).click();

        // Find the element that's ID attribute is 'log' (Username)

        // Enter Username on the element found by above desc.

        driver.findElement(By.id("log")).sendKeys("testuser_1");

        // Find the element that's ID attribute is 'pwd' (Password)

        // Enter Password on the element found by the above desc.

        driver.findElement(By.id("pwd")).sendKeys("Test@123");

        // Now submit the form. WebDriver will find the form for us from the element

        driver.findElement(By.id("login")).click();

        // Print a Log In message to the screen
        System.out.println("Login Successfully");

        // Find the element that's ID attribute is 'account_logout' (Log
Out)

        driver.findElement
(By.xpath(".//*[@id='account_logout']/a")).click();

        // Print a Log In message to the screen

        System.out.println("LogOut Successfully");

        // Close the driver

        driver.quit();

 }

}
```

Note**: If the Selenium version is less than 3.0, above test will work for you. If the version is above 3.0, in that case please look at the chapter **How to Use Gecko Driver in Selenium 3

Now, to start the test just select ***Run*** > ***Run As*** > ***Java Application*** Or *Right Click* on Eclipse code and Click ***Run As*** > ***Java Application.*** After a few Seconds a Mozilla browser will open and you will see that with the help of your script, Selenium will *Launch* the *Online Store demo application*, perform ***Sign in.***

The above Selenium test will be converted in to a ***Cucumber Feature File*** in the next chapter.

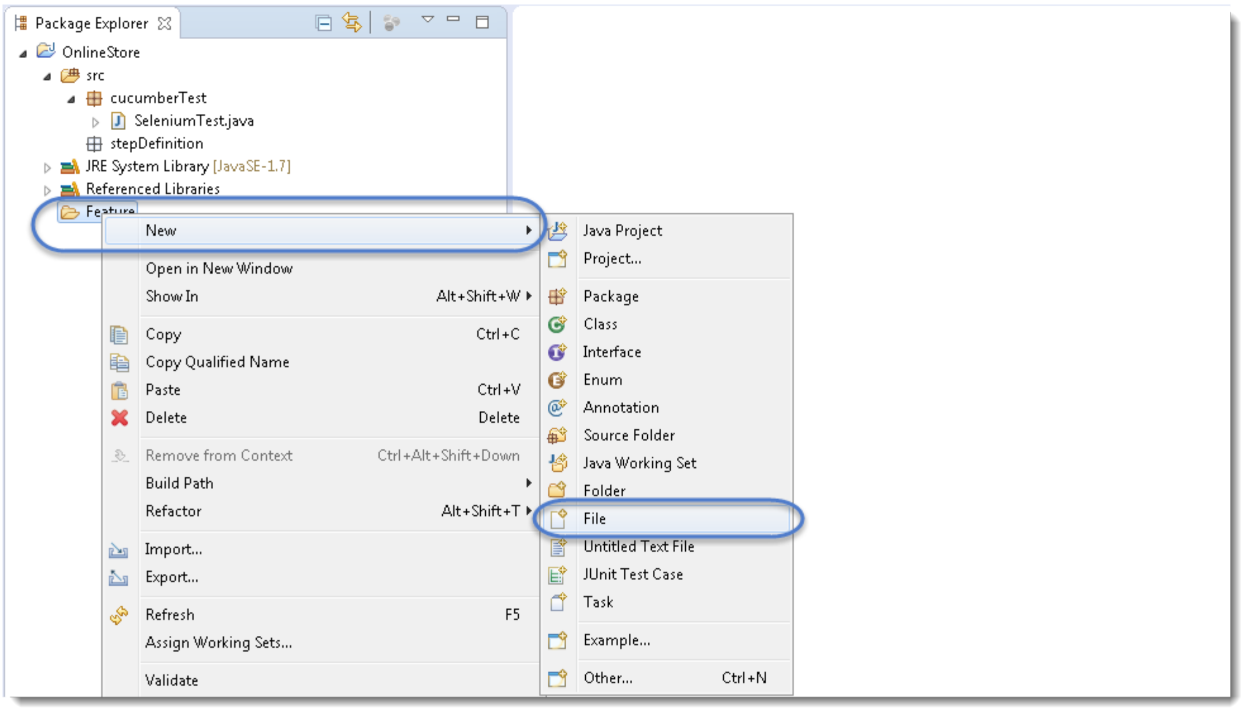
Cucumber Feature File

Cucumber proposes to write scenario in the ***Given/When/Then*** format. In the last chapter of ***Cucumber Selenium Java*** test we decided on the LogIn scenario on ***Store.DemoQA.com***. In this chapter we will write a test in *Cucumber Format (Feature File)*.

What is Cucumber Feature File?

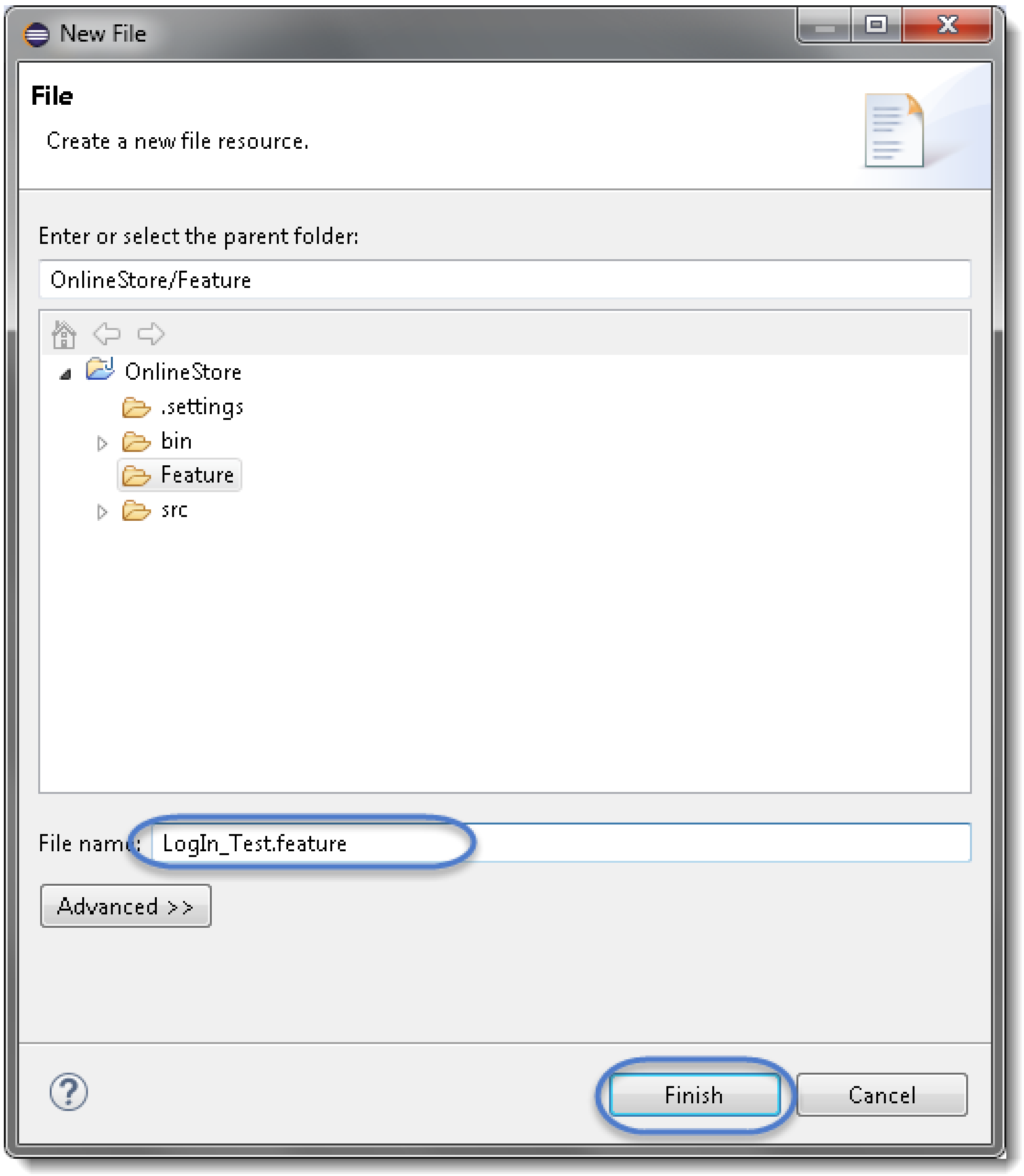
A ***Feature File*** is an entry point to the *Cucumber* tests. This is a file where you will describe your tests in Descriptive language (Like English). It is an essential part of Cucumber, as it serves as an automation test script as well as live documents. A feature file can contain a scenario or can contain many scenarios in a single feature file but it usually contains a list of scenarios. Let's create one such file.

1) On the ***Feature*** folder *Right click* and select ***New > File***



2) In order for Cucumber to automatically detect the stories (or ***features***, as they're known in *Cucumber*), you need to make sure that they carry the '***.feature***' file

extension. For example, in this case, I've named my user story '***LogIn_Test.feature***'. Every '*.feature*' file conventionally consists of a single feature.



Note*: In case you get a pop up from Eclipse which suggest you to install the better Editor for BDD files, please go ahead and install that. At the botttom of the chapter, steps to install the better editor is given.*

3) Write the first cucumber script. In BDD terms the scenario would look like the following.

Cucumber Test Script

```
Feature: Login Action

Scenario: Successful Login with Valid Credentials
 Given User is on Home Page
 When User Navigate to LogIn Page
 And User enters UserName and Password
 Then Message displayed Login Successfully

Scenario: Successful LogOut
 When User LogOut from the Application
 Then Message displayed LogOut Successfully
```

Note:*This is a simple test in Cucumber. Don't worry about the syntax if you don't understand it. Ideally you should be able to understand the intent of the test just by reading a test in feature file. We will discuss this in more details in next chapter.*

Keywords

Now moving forward we have just defined a test. You will notice colored part of the tests (***Feature, Scenario, Given, When, And and Then***). These are keywords defined by ***Gherkin***. *Gherkin* has more keywords and we will discuss those in following tutorials. But to start off we can quickly explain some of the keywords in one line. Note this is not complete listing of Keywords:

***Feature**: Defines what feature you will be testing in the tests below*

***Given**: Tells the pre-condition of the test*

***And**: Defines additional conditions of the test*

***Then**: States the post condition. You can say that it is expected result of the test.*

Gherkin

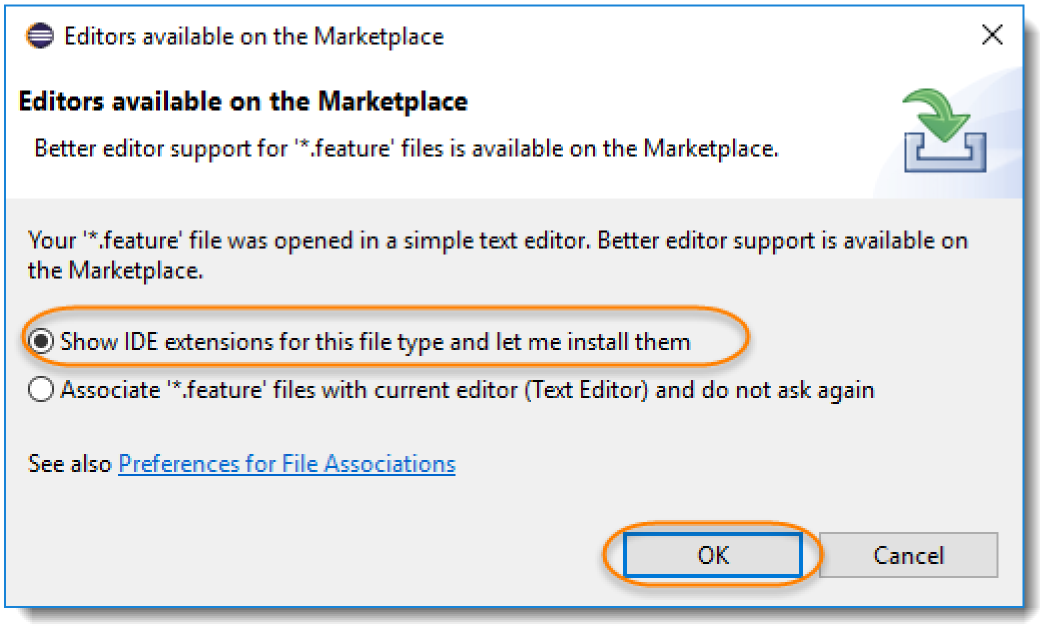
A language above is called ***Gherkin*** and it implements the principles of ***Business readable domain specific language(BRDSL)***. Domain specific language gives you the ability to describe your application behavior without getting into details of implementation. What does that mean? If we go back to our tutorial in ***TDD*** we saw that we wrote test code before writing any application code. In a way we described what is the expected behavior of our application in terms of tests. On *TDD* those tests were pure Java tests, in your case those might be a C++ or C# tests. But the basic idea is that those are core technical tests.

If we now come back to ***BDD/BRDSL*** we will see that we are able to describe tests in a more readable format. In the above test it's quite clear and evident, just by reading, what test would do. At the same time of being a test it also documents the behavior of application. This is the true power of *BDD/BRDSL* and it will become the power of cucumber eventually because cucumber works on the same principles.

Steps to install the Natural Eclipse Editor for Gherkin

You get this option automatically when try to create a new file with .feature ext. But if you do not get that one, you can anytime go to Eclipse Marketplace and look for the same to install it.

1)Just select the first option of ***Show IDE extensions*** if it is not pre-selected and click OK.


Editors available on the Marketplace

Editors available on the Marketplace

Better editor support for '*.feature' files is available on the Marketplace.

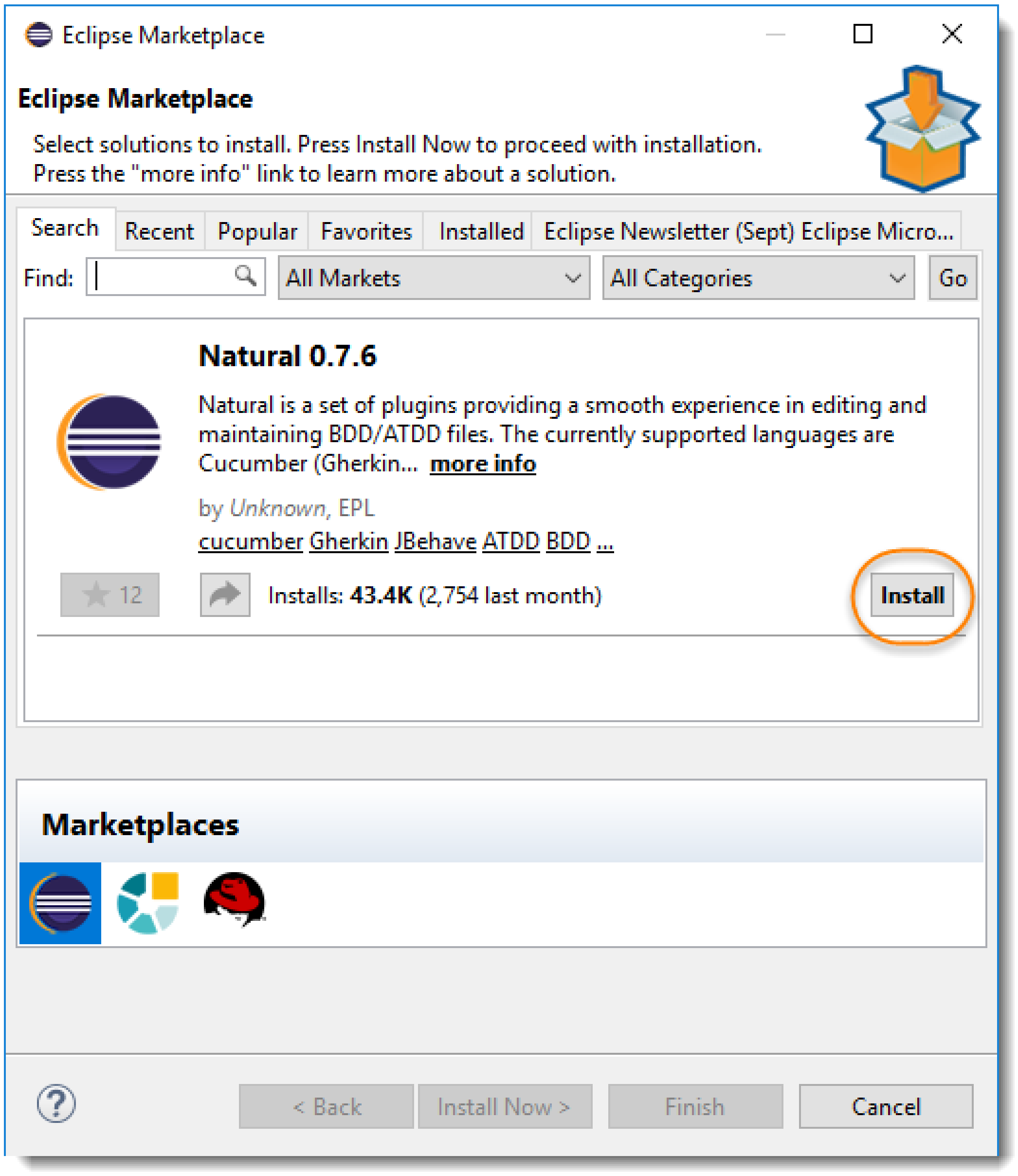
Your '*.feature' file was opened in a simple text editor. Better editor support is available on the Marketplace.

● Show IDE extensions for this file type and let me install them

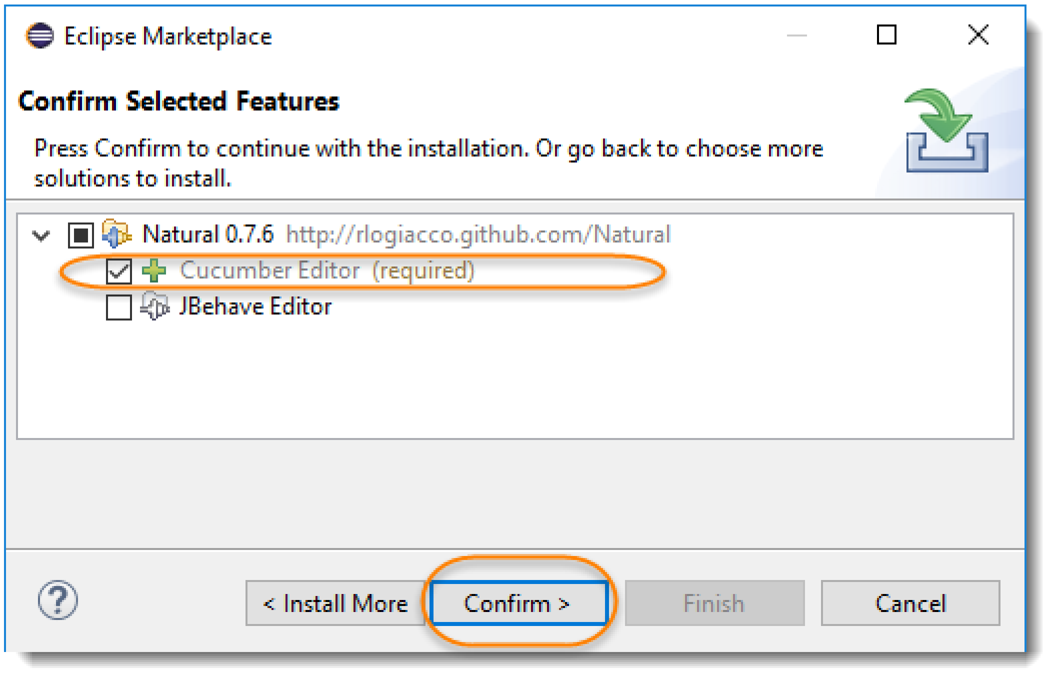
○ Associate '*.feature' files with current editor (Text Editor) and do not ask again

See also Preferences for File Associations

2) Natural is the name of the plugin, so this can also be found ***Eclipse Marketplace***. Just click Install.


Eclipse Marketplace
Eclipse Marketplace
Select solutions to install. Press Install Now to proceed with installation.
Press the "more info" link to learn more about a solution.
Search
Recent
Popular
Favorites
Installed
Eclipse Newsletter (Sept) Eclipse Micro...
Find:
All Markets
All Categories
Go
Natural 0.7.6
Natural is a set of plugins providing a smooth experience in editing and maintaining BDD/ATDD files. The currently supported languages are Cucumber (Gherkin... more info
by Unknown, EPL
cucumber Gherkin JBehave ATDD BDD ...
12
Installs: 43.4K (2,754 last month)
Install
Marketplaces
< Back
Install Now >
Finish
Cancel

3) This will give you an option to select, whether you like to use it for Cucumber or JBehave(Another BDD Framework). Go for Cucumber.



Eclipse Marketplace

Confirm Selected Features

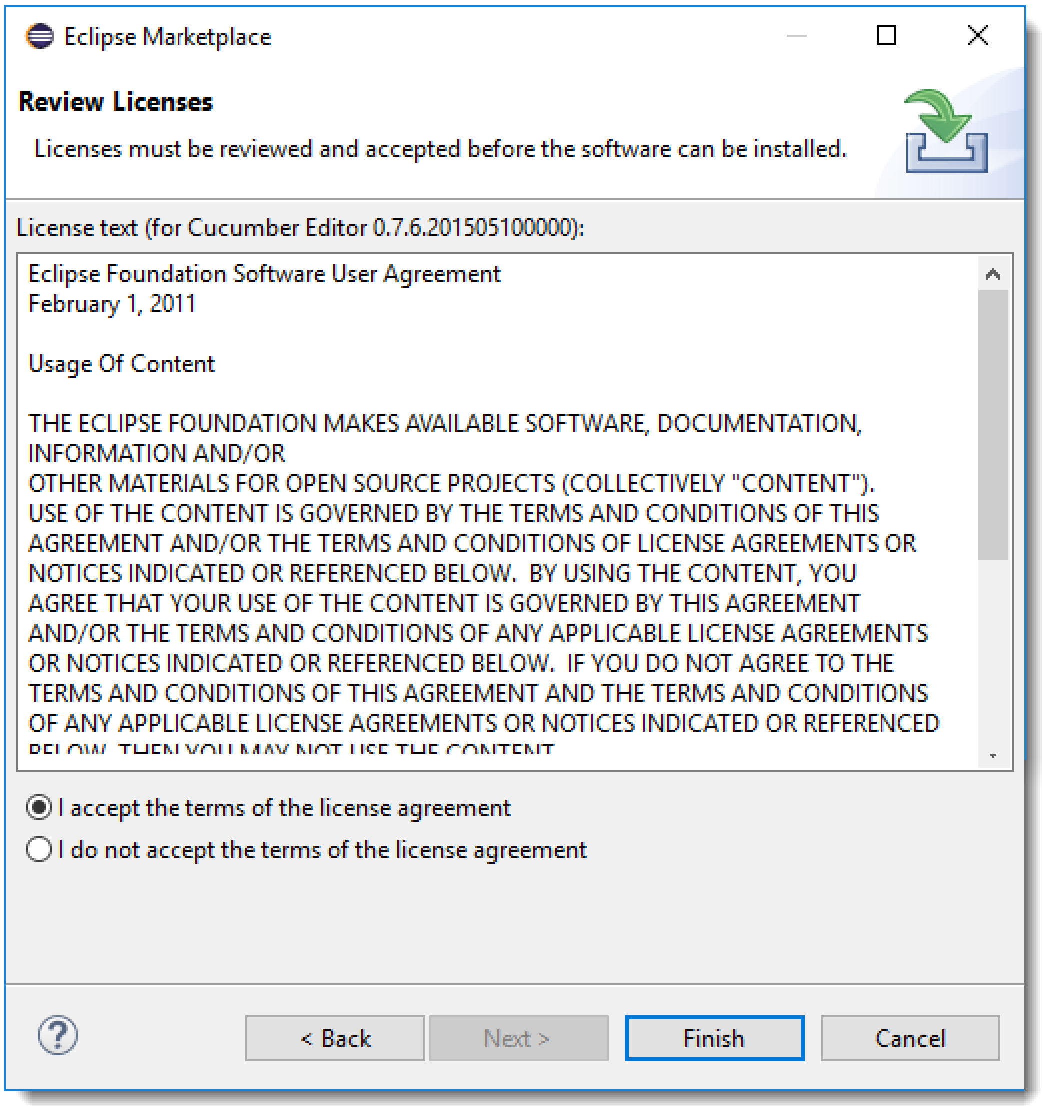
Press Confirm to continue with the installation. Or go back to choose more solutions to install.

Natural 0.7.6 http://rlogiacco.github.com/Natural

☑ Cucumber Editor (required)

☐ JBehave Editor

4) Last step is to accept the Terms and Conditions.


Eclipse Marketplace

Review Licenses

Licenses must be reviewed and accepted before the software can be installed.

License text (for Cucumber Editor 0.7.6.201505100000):

Eclipse Foundation Software User Agreement
February 1, 2011

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[✓ I accept the terms of the license agreement]
I do not accept the terms of the license agreement

***Note**: Once done, it may ask you to restart the Eclipse, if not then it is suggested to restart the eclipse after installing any plugins.*

JUnit Test Runner Class

Now that we have defined the test its time to run our test. But before we do that we have to add a class for running our tests. *Cucumber*uses ***Junit framework*** to run. If you are not familiar with *JUnit* read our tutorials ***here***. As *Cucumber* uses *Junit* we need to have a ***Test Runner class***. This class will use the *Junit annotation* **@RunWith(),** which tells *JUnit* what is the *test runner class*. It more like a starting point for Junit to start executing your tests. In the src folder create a class called ***TestRunner*.**

JUnit Test Runner Class

Create a new ***Class*** file in the '***cucumberTest***' package and name it as '***TestRunner***', by right click on the *Package* and select ***New > Class.*** This class just need *annotations* to understand that *cucumber features* would be run through it and you can specify feature files to be picked up plus the steps package location. There are bunch of other parameters that it can take, to be discussed later in ***Cucumber Options***.

Test Runner Class

```
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
 features = "Feature"
 ,glue={"stepDefinition"}
 )

public class TestRunner {

}
```

For the curios minds, I will explain this code. Note that it is covered in details in coming tutorials. Consider this as a limited description.

Import Statements

First import statement ‘***org.junit.runner.RunWith***‘ imports *@RunWith annotation* from the Junit class. *@RunWith annotation* tells *JUnit*that tests should run using ***Cucumber class*** present in ‘***Cucumber.api.junit***‘ package.

Second import statement ‘***cucumber.api.CucumberOptions***‘ imports the **@CucumberOptions** annotation. This annotation tells Cucumber a lot of things like where to look for feature files, what reporting system to use and some other things also. But as of now in the above test we have just told it for the Feature file folder.

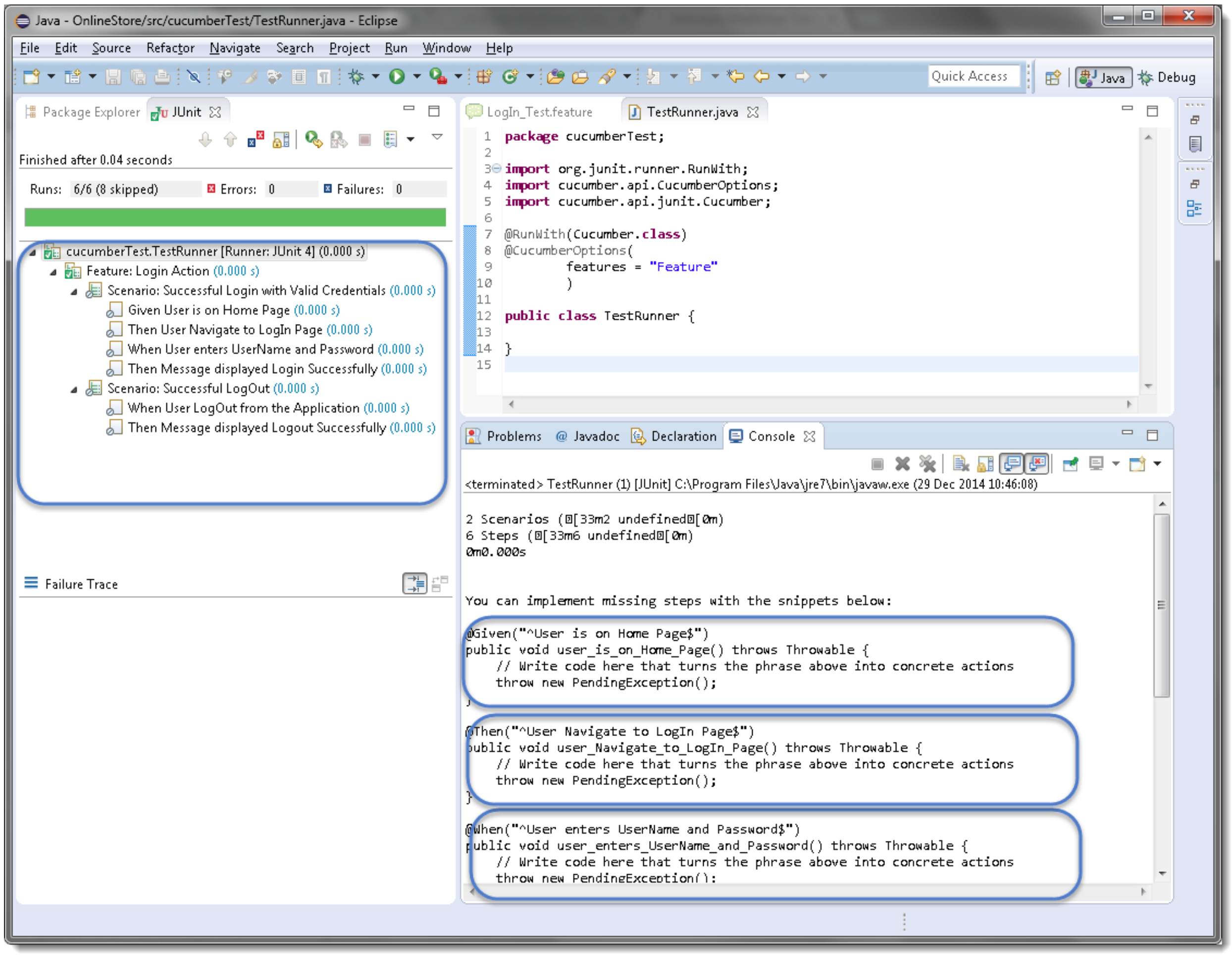
Run the Cucumber Test

Now we are all set to run the first Cucumber test. There are multiple ways and runners to use when it comes to cucumber feature files. We would try to understand how to run it from the IDE first and then from a command line at a later point.

Even from the IDE, there are a couple of ways to run these feature files.

- *Click on the **Run** button on eclipse and you have your test run*
- *Right Click on **TestRunner** class and Click **Run As** > **JUnit Test Application***

You will think where is the java code that will execute for these tests? Well don’t worry about that at this moment. Let’s just see what we have on the console window. Here is the text that I got on my console. Look how Cucumber has suggested that you should implement these methods so that the Steps mentioned in the Feature file can be traced to Java methods, which can be executed while executing the feature file.



Java - OnlineStore/src/cucumberTest/TestRunner.java - Eclipse

Finished after 0.04 seconds

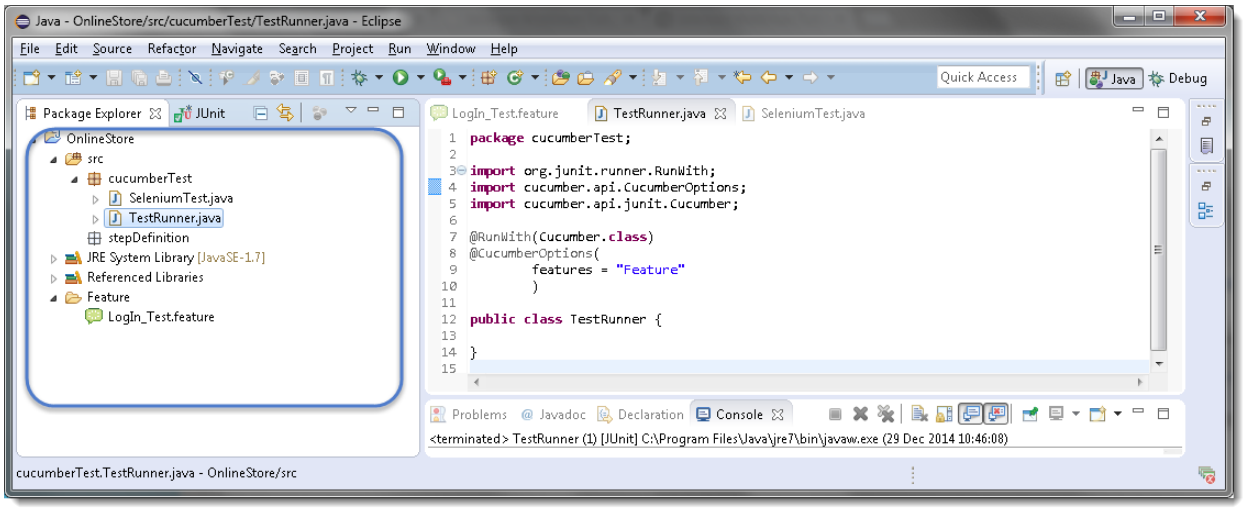
Runs: 6/6 (8 skipped)   Errors: 0   Failures: 0

```
cucumberTest.TestRunner [Runner: JUnit 4] (0.000 s)
  Feature: Login Action (0.000 s)
    Scenario: Successful Login with Valid Credentials (0.000 s)
      Given User is on Home Page (0.000 s)
      Then User Navigate to LogIn Page (0.000 s)
      When User enters UserName and Password (0.000 s)
      Then Message displayed Login Successfully (0.000 s)
    Scenario: Successful LogOut (0.000 s)
      When User LogOut from the Application (0.000 s)
      Then Message displayed Logout Successfully (0.000 s)
```

```java
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
        features = "Feature"
        )

public class TestRunner {

}
```

```
<terminated> TestRunner (1) [JUnit] C:\Program Files\Java\jre7\bin\javaw.exe (29 Dec 2014 10:46:08)

2 Scenarios (⊡[33m2 undefined⊡[0m)
6 Steps (⊡[33m6 undefined⊡[0m)
0m0.000s


You can implement missing steps with the snippets below:

@Given("^User is on Home Page$")
public void user_is_on_Home_Page() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}

@Then("^User Navigate to LogIn Page$")
public void user_Navigate_to_LogIn_Page() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}

@When("^User enters UserName and Password$")
public void user_enters_UserName_and_Password() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
```

Now your project should look like this in Eclipse IDE:



Java - OnlineStore/src/cucumberTest/TestRunner.java - Eclipse

```
OnlineStore
  src
    cucumberTest
      SeleniumTest.java
      TestRunner.java
    stepDefinition
  JRE System Library [JavaSE-1.7]
  Referenced Libraries
  Feature
    LogIn_Test.feature
```

```java
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
        features = "Feature"
        )

public class TestRunner {

}
```

```
<terminated> TestRunner (1) [JUnit] C:\Program Files\Java\jre7\bin\javaw.exe (29 Dec 2014 10:46:08)
```

cucumberTest.TestRunner.java - OnlineStore/src

Errors on running Cucumber Feature

Exception in thread “main” cucumber.runtime.CucumberException: No backends were found. Please make sure you have a backend module on your CLASSPATH.

Solution

*Most probably this means that your **cucumber-java** version and **java** version on your machine is not compatible with each other. First check Java Version on your machine by going through this article **How to check Java/JDK Version Installed on your Machine.***

*On my machine I have Java 1.8.0 with **cucumber-Java8-1.2.5** and it did not work. When I degraded my cucumber java version to **cucumber-Java-1.2.5,** it worked fine for me. Just make sure that first you remove the cucumber-java which did not work for you from **Project build path >> Libraries** and than add new. Keeping both may create further issues for you.*

Exception in thread “main” java.lang.NoClassDefFoundError: gherkin/formatter/Formatter

Solution

*This means that Gherkin version you are using is not compatible with other Cucumber libraries. I tried using the latest **gherkin3-3.0.0** but it did not work for me, so I degraded it to **gherkin-2.12.2***

I got below versions on Oct’17 for Cucumber

- *cobertura-2.1.1*
- *cucumber-core-1.2.5*
- *cucumber-java-1.2.5*
- *cucumber-junit-1.2.5*
- *cucumber-jvm-deps-1.0.5*
- *cucumber-reporting-3.10.0*
- *gherkin-2.12.2*
- *junit-4.12*
- *mockito-all-2.0.2-beta*

With this understanding let’s move on the next topic where we will talk about ***Gherkin Keywords*** and the syntax it provided to write application tests/behaviour.

Gherkin Keywords

Gherkin is not necessarily used to write automated tests. *Gherkin* is primarily used to write ***structured*** tests which can later be used as project documentation. The property of being *structured* gives us the ability to automate them. This automation is done by ***Cucumber/SpecFlow***. In the ***Gherkin – Business Driven Development*** we saw a simple Gherkin Keyword test and why *Gherkin* is important to use.

Note: *Cucumber/SpecFlow understands Gherkin hence we can say that this is a Cucumber/SpecFlow test.*

Feature: *LogIn Action Test*
Description: This feature will test a LogIn and LogOut functionality

Scenario: *Successful Login with Valid Credentials*
  Given *User is on Home Page*
  When *User Navigate to LogIn Page*
  And *User enters UserName and Password*
  Then *Message displayed Login Successfully*

You will quickly notice that there are some colored words. These words are *Gherkin keywords* and each keyword holds a meaning. Now we will discuss these keywords one by one. Here is the list of keywords that *Gherkin* supports:

- ***Feature***
- ***Background***
- ***Scenario***
- ***Given***
- ***When***
- ***Then***
- ***And***
- ***But***
- *******

Feature: Keyword

Each *Gherkin* file begins with a ***Feature*** keyword. *Feature* defines the logical test functionality you will test in this feature file. For e.g if you are testing a payment gateway your *Feature* will become *Payment Gateway* or if you are testing the *LogIn* functionality then the *Feature* will become *Login*. The idea of having a feature file is to put down a summary of what you will be testing. This will serve as the documentation for your tests as well as a good point to start for a new team member. Note that a feature keyword is present at the starting of the feature file.

Feature*: LogIn Action Test*

Or

Feature*: LogIn Action Test*
Description: This feature will test a LogIn and LogOut functionality

Or

Feature*: LogIn Action Test*
This feature will test a LogIn and LogOut functionality

Notice that whatever comes after the ***Feature: keyword,*** will be considered as the feature description. Feature description can span across multiple lines like shown above in second example. Everything after *Feature:* till the next Keyword is encountered is considered as feature description.

Note: *Description is not a keyword of Gherkin.*

Take a look at the example of ***Cucumber Feature*** file and ***SpecFlow Feature*** file

Background: Keyword

Background keyword is used to define steps which are common to all the tests in the feature file. For example to purchase a product, you need to do following steps:

- *Navigate to Home Page*
- *Click on the LogIn link*
- *Enter UserName and Password*
- *Click on Submit button*

After these steps only you will be able to add a product to your *cart/basket* and able to perform the payment. Now as we are in a feature file where we will be testing only the *Add to Cart* functionality, these tests become common for all tests. So instead of writing them again and again for all tests we can move it under the background keyword. This is how it will look like:

Feature: *Add to Cart*
This feature will test functionality of adding different products to the User basket from different flow

Background: *User is Logged In*

Scenario: *Search a product and add the first result/product to the User basket*
Given *User searched for Lenovo Laptop*
When *Add the first laptop that appears in the search result to the basket*
Then *User basket should display with 1 item*

Take a look at the example of ***Cucumber Background***

Scenario: Keyword

Each Feature will contain some number of tests to test the feature. Each test is called a ***Scenario*** and is described using the *Scenario:*keyword.

Scenario: *Search a product and add the first result/product to the User basket*

Or

Scenario: *Successful LogIn with Valid Credentials*

A scenario is equivalent to a test in our regular development process. Each scenario/test can be basically broken down into three parts:

- ***Precondition*** *to the test, which represent with (**Given**) keyword*
- ***Test step*** *execution, which represent with (**When**) keyword*
- ***Verification*** *of the output with expected result, which represent with (**Then**)*

Given Keyword

Given defines a precondition to the test. For e.g. In shopping website, assume that the *LogIn page link* is only present on the Home Page, so the precondition for clicking the *LogIn link* is that the user is at the Home Page. If user is not at the Home Page, user would not be able to enter *Username* & *Password*. This precondition can be expressed in *Gherkin* like this:

Scenario: *Successful LogIn with Valid Credentials*

> ***Given*** *User is on Home Page*
> ***When*** *User Navigate to LogIn Page*

When Keyword

When keyword defines the test action that will be executed. By test action we mean the user input action.

Scenario*: Successful LogIn with Valid Credentials*

> ***Given*** *User is on Home Page*
> ***When*** *User Navigate to LogIn Page*

Here user is performing some action using *When* keyword, clicking on the LogIn link. We can see that when defines the action taken by the user. It’s the event that will cause the actual change in state of the application.

Then Keyword

Then keyword defines the Outcome of previous steps. We can understand it best by looking at the test above and adding a Then step there.

Feature*: LogIn Action Test*
Description: This feature will test a LogIn and LogOut functionality

Scenario*: Successful Login with Valid Credentials*
> ***Given*** *User is on Home Page*
> ***When*** *User Navigate to LogIn Page*
> ***And*** *User enters UserName and Password*
> ***Then*** *Message displayed LogIn Successfully*

Here we can see that ***Then*** is the outcome of the steps above. The reader of this test would easily be able to relate to *Then* step and would understand that when the above conditions are fulfilled then the *Then* step will be executed.

And Keyword

And keyword is used to add conditions to your steps. Let’s look at it by modifying our example a little

Feature*: LogIn Action Test*
Description: This feature will test a LogIn and LogOut functionality

Scenario*: Successful Login with Valid Credentials*
> ***Given*** *User is on Home Page*

When *User Navigate to LogIn Page*
And *User enters UserName and Password*
Then *Message displayed Login Successfully*

Or

Feature: *LogIn Action Test*
Description: This feature will test a LogIn and LogOut functionality

Scenario: *Successful Login with Valid Credentials*
Given *User is on Home Page*
And *LogIn Link displayed*
When *User Navigate to LogIn Page*
And *User enters UserName and Password*
Then *Message displayed Login Successfully*
And *LogOut Link displayed*

Here you would see that *And* is being used to add more details to the *Given* step, it's simply adding more conditions. We have just added three conditions. Use it when you have specified more than one condition. *And* is used to add more conditions to *Given*, *When*and *Then* statements.

But Keyword

But keyword is used to add negative type comments. It is not a hard & fast rule to use but only for negative conditions. It makes sense to use *But* when you will try to add a condition which is opposite to the premise your test is trying to set. Take a look at the example below:

Feature: *LogIn Action Test*
Description: This feature will test a LogIn and LogOut functionality

Scenario: *Unsuccessful Login with InValid Credentials*
Given *User is on Home Page*
When *User Navigate to LogIn Page*
And *User enters UserName and Password*
But *The user credentials are wrong*
Then *Message displayed Wrong UserName & Password*

Here you can see how adding ***But*** has helped define a negative test, in this test we will try to test failure conditions. Where a wrong credentials are a failure condition.

* Keyword

This keyword is very special. This keyword defies the whole purpose of having Given, When, Then and all the other keywords. Basically Cucumber doesn't care about what Keyword you use to define test steps, all it cares about what code it needs to execute for each step. That code is called a ***step definition*** and we will discuss about it in the next section. At this time just remember that all the keywords can be replaced by the **** keyword*** and your test will just work fine. Let's see with example, we had this test earlier:

Feature: *LogIn Action Test*
Description: This feature will test a LogIn and LogOut functionality

Scenario: *Successful Login with Valid Credentials*
   Given *User is on Home Page*
   When *User Navigate to LogIn Page*
   And *User enters UserName and Password*
   Then *Message displayed Login Successfully*

Using * Keyword

Feature: *LogIn Action Test*
Description: This feature will test a LogIn and LogOut functionality

Scenario: *Successful Login with Valid Credentials*
   ******* *User is on Home Page*
   ******* *User Navigate to LogIn Page*
   ******* *User enters UserName and Password*
   ******* *Message displayed Login Successfully*

Here we conclude the tutorial on different keywords of Cucumber. I hope you like it. Let's now jump deep into how to execute these steps with the help of Step Definition file.

Step Definition

The next target is to test or run the feature file and in order to test the feature file, we need to write the implementation or step definition for each step in the feature file in java. When Cucumber executes a Step in a Scenario it will look for a matching *Step Definition* to execute.

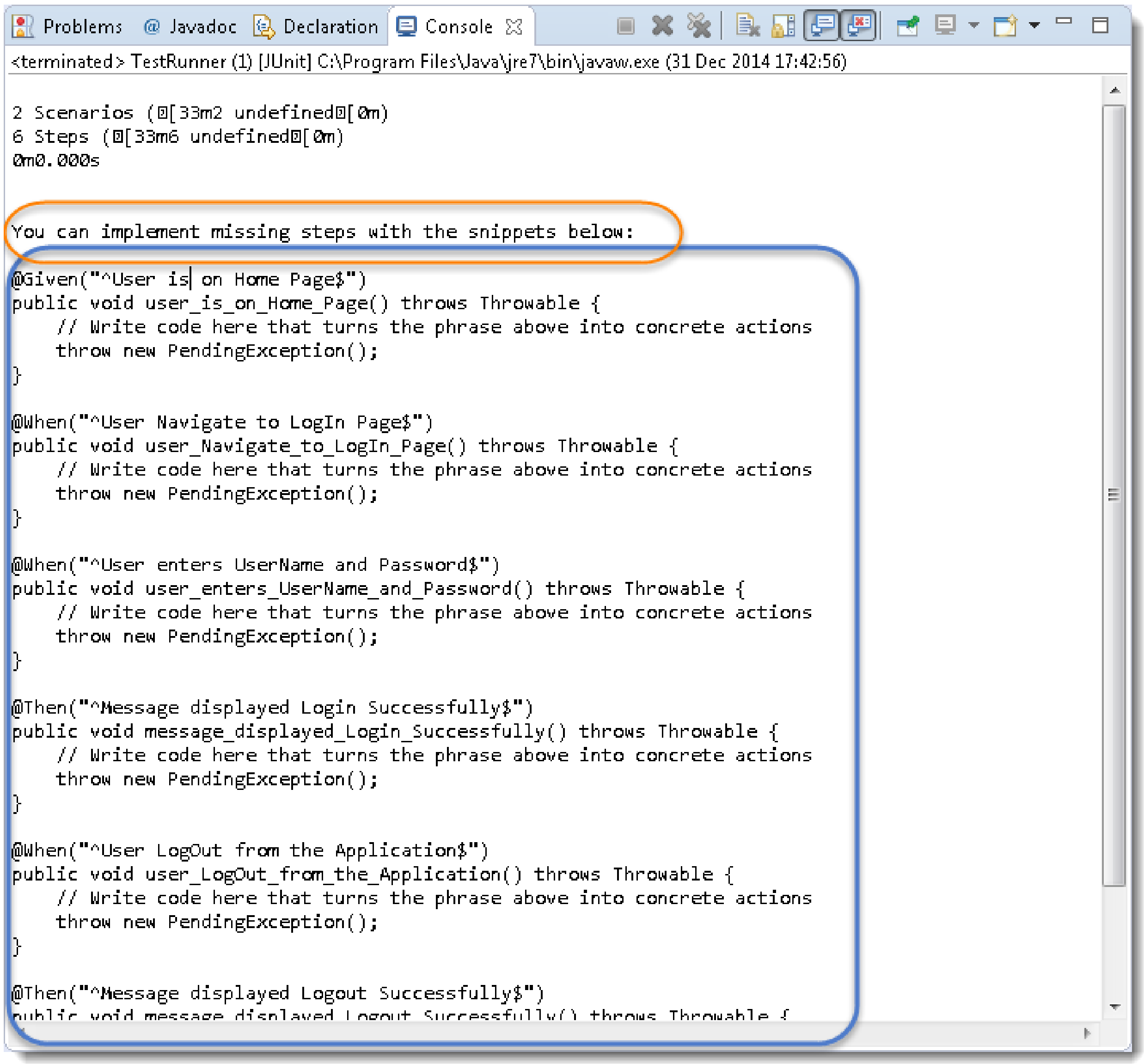
What is Step Definition?

A Step Definition is a small piece of *code* with a *pattern* attached to it or in other words a Step Definition is a java method in a class with an annotation above it. An annotation followed by the pattern is used to link the *Step Definition* to all the matching *Steps*, and the *code* is what *Cucumber* will execute when it sees a *Gherkin Step*. *Cucumber* finds the *Step Definition* file with the help of Glue code in ***Cucumber Options***. We will cover different *Cucumber Options* in next chapter.

Add a Step Definition file

1) Create a new ***Class*** file in the '***stepDefinition***' package and name it as '***Test_Steps***', by right click on the *Package* and select *New* > *Class*. Do not check the option for '***public static void main***' and click on ***Finish*** button.

2) Take a look at the message in the console window. This message was displayed, when we ran the ***Test_Runner*** class.

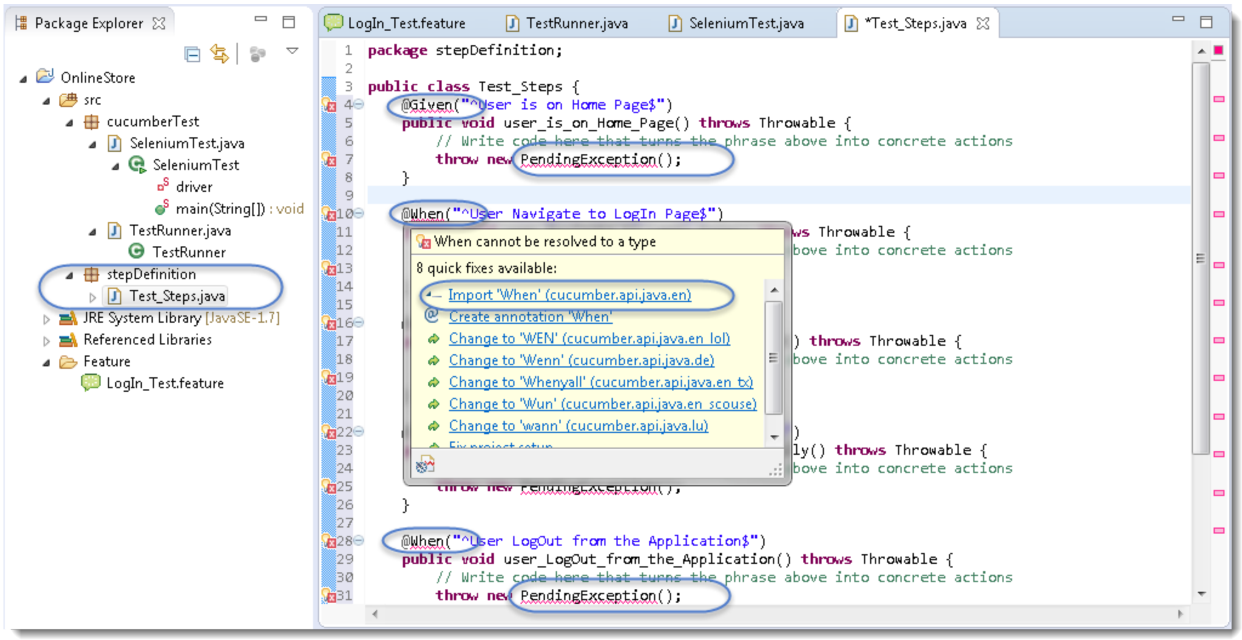


```
<terminated> TestRunner (1) [JUnit] C:\Program Files\Java\jre7\bin\javaw.exe (31 Dec 2014 17:42:56)

2 Scenarios ([33m2 undefined[0m)
6 Steps ([33m6 undefined[0m)
0m0.000s


You can implement missing steps with the snippets below:

@Given("^User is on Home Page$")
public void user_is_on_Home_Page() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}

@When("^User Navigate to LogIn Page$")
public void user_Navigate_to_LogIn_Page() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}

@When("^User enters UserName and Password$")
public void user_enters_UserName_and_Password() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}

@Then("^Message displayed Login Successfully$")
public void message_displayed_Login_Successfully() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}

@When("^User LogOut from the Application$")
public void user_LogOut_from_the_Application() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}

@Then("^Message displayed Logout Successfully$")
public void message_displayed_Logout_Successfully() throws Throwable {
```

***Note:** Please go through the chapter of **First Cucumber Selenium Test** to understand the above message.*

2) Notice, the eclipse console window says '***You can implement missing steps with the snippets below:***'. It is very easy to implement all the steps, all you need to do is to copy the complete text marked in a blue box and paste it in to the above created ***Test_Steps*** class.

3) As of now the test will show many errors on '@' ***annotations***. Mouse hover at the annotations and import the '***cucumber.api.java.en***' for all the annotations.



```
package stepDefinition;

public class Test_Steps {
    @Given("^User is on Home Page$")
    public void user_is_on_Home_Page() throws Throwable {
        // Write code here that turns the phrase above into concrete actions
        throw new PendingException();
    }

    @When("^User Navigate to LogIn Page$")
                                    ws Throwable {
                                    bove into concrete actions

                                    ) throws Throwable {
                                    bove into concrete actions

                                    )
                                    ly() throws Throwable {
                                    bove into concrete actions

    }

    @When("^User LogOut from the Application$")
    public void user_LogOut_from_the_Application() throws Throwable {
        // Write code here that turns the phrase above into concrete actions
        throw new PendingException();
```

```
When cannot be resolved to a type
8 quick fixes available:
Import 'When' (cucumber.api.java.en)
Create annotation 'When'
Change to 'WEN' (cucumber.api.java.en_lol)
Change to 'Wenn' (cucumber.api.java.de)
Change to 'Whenyall' (cucumber.api.java.en_tx)
Change to 'Wun' (cucumber.api.java.en_scouse)
Change to 'wann' (cucumber.api.java.lu)
Fix project setup...
```

Add Selenium Java code in the Step Definition methods

1) Now take out the Selenium Java code of the following steps from the '***SeleniumTest***' and paste it in to the first method '***@Given("^User is on Home Page$")***'.

- Launch the Browser
- Navigate to Home Page

Method will look like this now:

```
@Given("^User is on Home Page$")
public void user_is_on_Home_Page() throws Throwable {
driver = new FirefoxDriver();
        driver.manage().timeouts().implicitlyWait(10, TimeUnit.SECONDS);
        driver.get("http://www.store.demoqa.com");
}
```

2) Take out the code take out the Selenium Java code of the following steps from the '***SeleniumTest***' and paste it in to the second method '***@When("^User Navigate to LogIn Page$")***'.

- Click on the LogIn link

Method will look like this now:

```
@When("^User Navigate to LogIn Page$")
public void user_Navigate_to_LogIn_Page() throws Throwable {
driver.findElement(By.xpath(".//*[@id='account']/a")).click();
}
```

3) Take out the code take out the Selenium Java code of the following steps from the '***SeleniumTest***' and paste it in to the second method '***@When("^User enters UserName and Password$")***'.

- Enter UserName and Password
- Click on Submit button

Method will look like this now:

```
@When("^User enters UserName and Password$")
public void user_enters_UserName_and_Password() throws Throwable {
driver.findElement(By.id("log")).sendKeys("testuser_1");
    driver.findElement(By.id("pwd")).sendKeys("Test@123");
    driver.findElement(By.id("login")).click();
}
```

4) Do the same steps for rest of the methods as well and complete Test_Steps class will look like this:

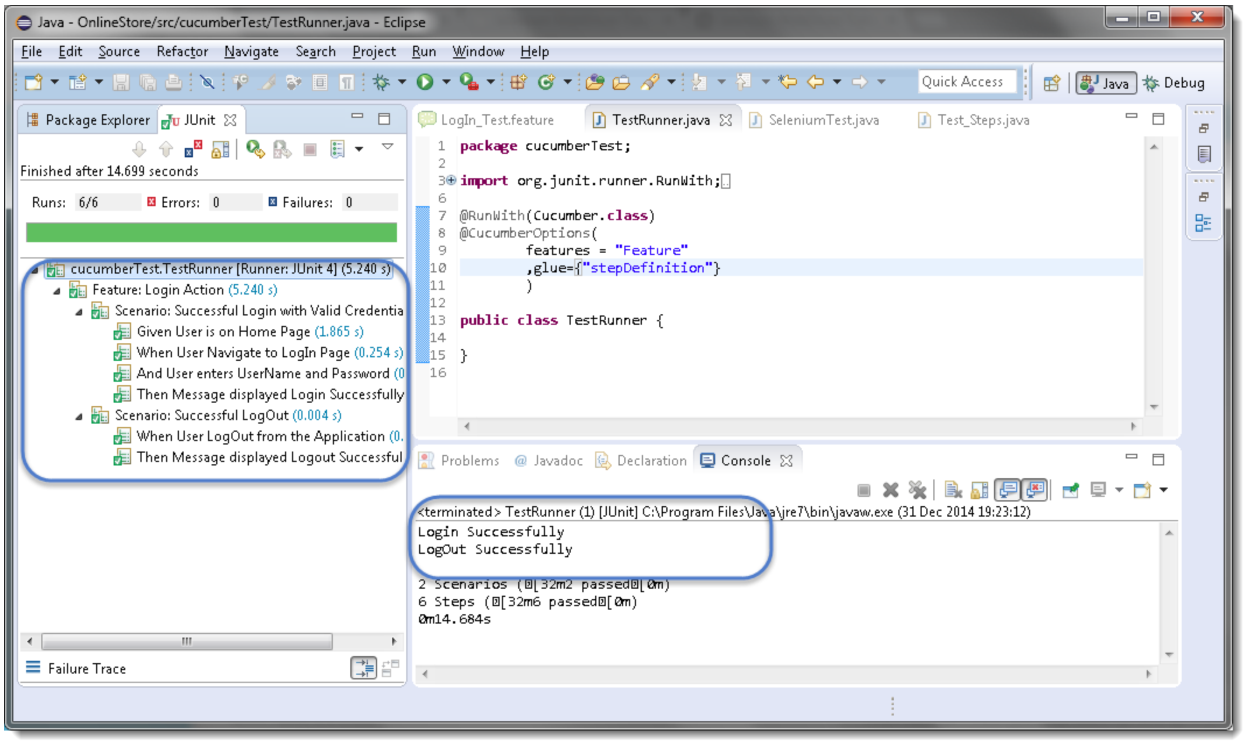
<u>Step Definition: Test_Steps Class</u>

```
package stepDefinition;

import java.util.concurrent.TimeUnit;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;

import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import cucumber.api.java.en.When;

public class Test_Steps {
 public static WebDriver driver;
 @Given("^User is on Home Page$")
 public void user_is_on_Home_Page() throws Throwable {
        driver = new FirefoxDriver();
        driver.manage().timeouts().implicitlyWait(10, TimeUnit.SECONDS);
        driver.get("http://www.store.demoqa.com");
 }

 @When("^User Navigate to LogIn Page$")
 public void user_Navigate_to_LogIn_Page() throws Throwable {
 driver.findElement(By.xpath(".//*[@id='account']/a")).click();
 }

 @When("^User enters UserName and Password$")
 public void user_enters_UserName_and_Password() throws Throwable {
 driver.findElement(By.id("log")).sendKeys("testuser_1");
     driver.findElement(By.id("pwd")).sendKeys("Test@123");
     driver.findElement(By.id("login")).click();
 }

 @Then("^Message displayed Login Successfully$")
 public void message_displayed_Login_Successfully() throws Throwable {
 System.out.println("Login Successfully");
 }

 @When("^User LogOut from the Application$")
 public void user_LogOut_from_the_Application() throws Throwable {
 driver.findElement (By.xpath(".//*[@id='account_logout']/a")).click();
 }

 @Then("^Message displayed Logout Successfully$")
 public void message_displayed_Logout_Successfully() throws Throwable {
        System.out.println("LogOut Successfully");
 }

}
```

***Note**: Make sure to create your own Username and Password for the test and do not attempt to login with wrong credentials, as you will be blocked for few hours then on demo website.*

Run the Cucumber Test

Now we are all set to run the first Cucumber test. *Right Click* on ***TestRunner*** class and Click ***Run As*** > ***JUnit Test.*** *Cucumber* will run the script the same way it runs in *Selenium WebDriver* and the result will be shown in the left hand side *project explorer window* in *JUnit*tab.



Finished after 14.699 seconds

Runs: 6/6 Errors: 0 Failures: 0

```
cucumberTest.TestRunner [Runner: JUnit 4] (5.240 s)
  Feature: Login Action (5.240 s)
    Scenario: Successful Login with Valid Credentia
      Given User is on Home Page (1.865 s)
      When User Navigate to LogIn Page (0.254 s)
      And User enters UserName and Password (0
      Then Message displayed Login Successfully
    Scenario: Successful LogOut (0.004 s)
      When User LogOut from the Application (0.
      Then Message displayed Logout Successful
```

```java
package cucumberTest;

import org.junit.runner.RunWith;

@RunWith(Cucumber.class)
@CucumberOptions(
		features = "Feature"
		,glue={"stepDefinition"}
		)

public class TestRunner {

}
```

```
<terminated> TestRunner (1) [JUnit] C:\Program Files\Java\jre7\bin\javaw.exe (31 Dec 2014 19:23:12)
Login Successfully
LogOut Successfully

2 Scenarios (?[32m2 passed?[0m)
6 Steps (?[32m6 passed?[0m)
0m14.684s
```

Cucumber starts it's execution by reading the *feature file steps*. As soon as *Cucumber* reaches to the first step for e.g. *Given* statement of *Scenario*, it looks for the same statement in the *Step Definition* file, the moment it find the statement, it executes the piece of code written inside the function.

Cucumber Options

So far in the series of Cucumber tutorial we have covered *Feature files, Gherkins, Step Definitions, Annotations, Test Runner Class* and many other things. There is no doubt that you cannot set up *BDD framework* until you know all the concepts but there are still few more areas which are very important to know in the life of Cucumber Automation such as *Cucumber Options, Regular Expressions, Page Object factory* and few others. Let's start with *Cucumber Options*.

What is Cucumber Options ?

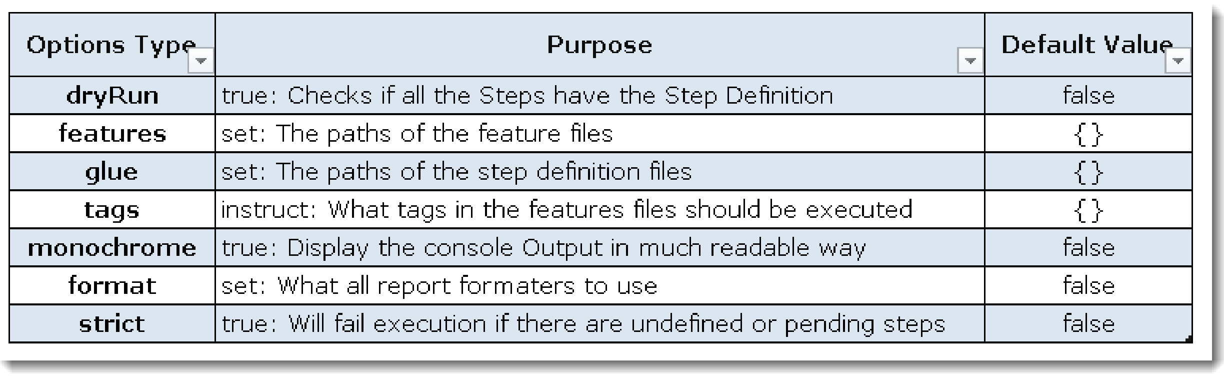
In layman language ***@CucumberOptions*** are like property file or settings for your test. Basically *@CucumberOptions* enables us to do all the things that we could have done if we have used cucumber command line. This is very helpful and of utmost importance if we are using IDE such eclipse only to execute our project. You must have noticed that we set few options in the '***TestRunner'*** class in the previous chapter.

TestRunner Class

```
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
 features = "Feature"
 ,glue={"stepDefinition"}
 )

public class TestRunner {

}
```

So in the above example we have just set two different *Cucumber Options*. One is for *Feature File* and other is for *Step Definition* file. We will talk about it in detail now but with this we can say that *@CucumberOptions* are used to set some specific properties for the *Cucumber* test.

Following Main Options are available in Cucumber:



Options Type	Purpose	Default Value
dryRun	true: Checks if all the Steps have the Step Definition	false
features	set: The paths of the feature files	{}
glue	set: The paths of the step definition files	{}
tags	instruct: What tags in the features files should be executed	{}
monochrome	true: Display the console Output in much readable way	false
format	set: What all report formaters to use	false
strict	true: Will fail execution if there are undefined or pending steps	false

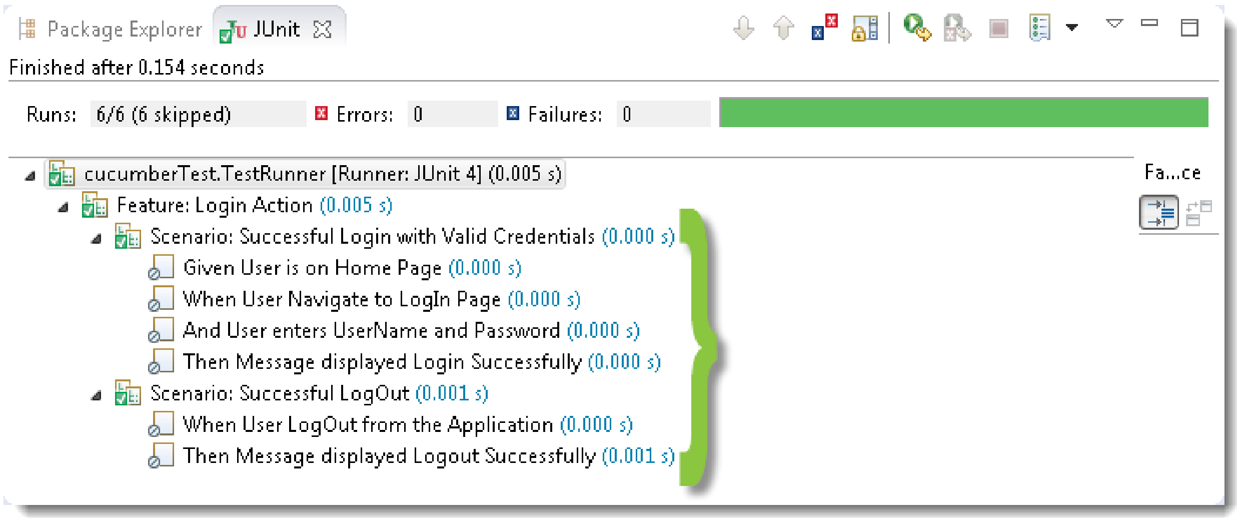
Dry Run

dryRun option can either set as ***true*** or ***false***. If it is set as *true*, it means that *Cucumber* will only checks that every *Step* mentioned in the *Feature File* have corresponding code written in *Step Definition* file or not. So in case any of the function is missed in the *Step Definition* for any *Step* in *Feature File*, it will give us the message. For practice just add the code '***dryRun = true***' in ***TestRunner*** class:

<u>TestRunner Class</u>

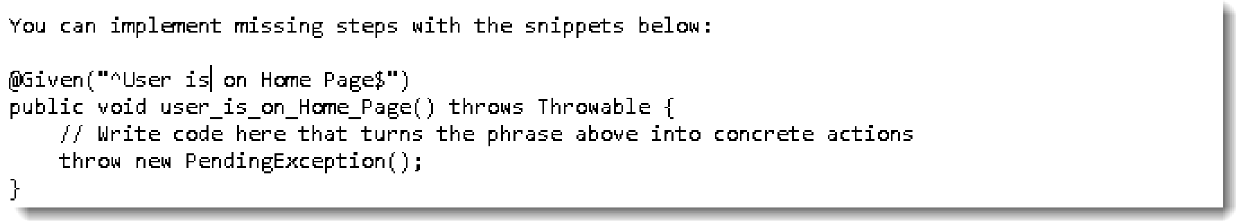
```
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
 features = "Feature"
 ,glue={"stepDefinition"}
 ,dryRun = true
 )

public class TestRunner {

}
```

Now give it a run by Right Click on ***TestRunner*** class and Click ***Run As*** > ***JUnit Test.*** *Cucumber* will run the script and the result will be shown in the left hand side *project explorer window* in *JUnit* tab.



```
Finished after 0.154 seconds
Runs: 6/6 (6 skipped)   Errors: 0   Failures: 0

cucumberTest.TestRunner [Runner: JUnit 4] (0.005 s)
  Feature: Login Action (0.005 s)
    Scenario: Successful Login with Valid Credentials (0.000 s)
      Given User is on Home Page (0.000 s)
      When User Navigate to LogIn Page (0.000 s)
      And User enters UserName and Password (0.000 s)
      Then Message displayed Login Successfully (0.000 s)
    Scenario: Successful LogOut (0.001 s)
      When User LogOut from the Application (0.000 s)
      Then Message displayed Logout Successfully (0.001 s)
```

Take a look at the time duration at the end of the every *Steps*, it is (***0.000s***). It means none of the *Step* is executed but still *Cucumber*has made sure that every Step have the corresponding method available in the *Step Definition* file. Give it a try, remove the '***@Given("^User is on Home Page$")***' statement from the ***Test_Steps*** class and run the ***TestRunner*** class again. You would get the following message:



```
You can implement missing steps with the snippets below:

@Given("^User is on Home Page$")
public void user_is_on_Home_Page() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}
```

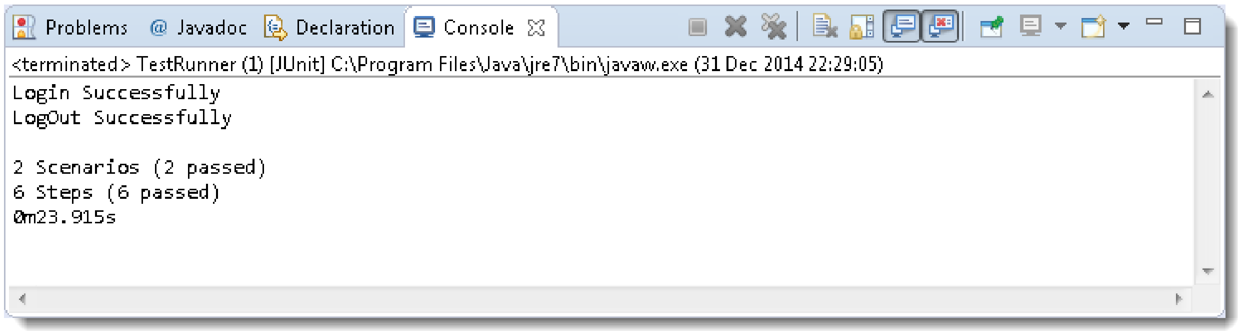
Monochrome

This option can either set as ***true*** or ***false***. If it is set as *true*, it means that the *console output* for the *Cucumber test* are much more readable. And if it is set as *false*, then the *console output* is not as readable as it should be. For practice just add the code '***monochrome = true***' in ***TestRunner*** class:

TestRunner Class

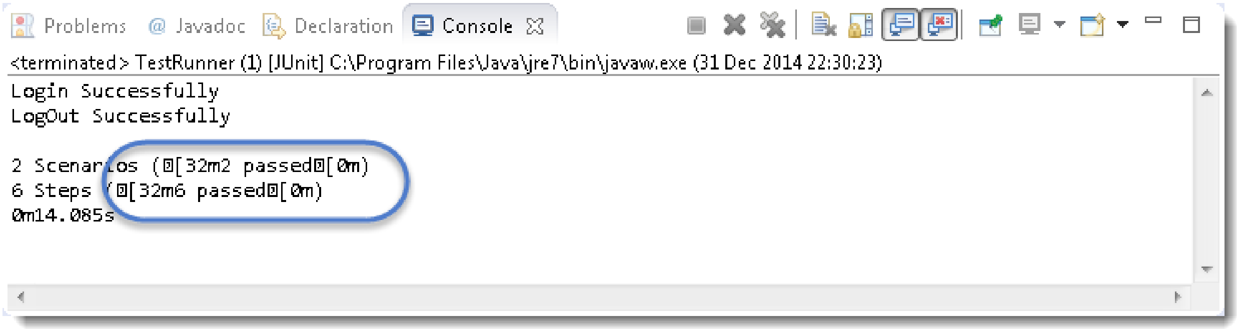
```java
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
 features = "Feature"
 ,glue={"stepDefinition"}
 ,monochrome = false
 )

public class TestRunner {

}
```

Now give it a run by Right Click on ***TestRunner*** class and Click ***Run As*** > ***JUnit Test.*** *Cucumber* will run the script and Console Output will display like this:



```
<terminated> TestRunner (1) [JUnit] C:\Program Files\Java\jre7\bin\javaw.exe (31 Dec 2014 22:29:05)
Login Successfully
LogOut Successfully

2 Scenarios (2 passed)
6 Steps (6 passed)
0m23.915s
```

This time change the value from *true* to *false* and run the ***TestRunner*** class again. This time the *Console Output* will look like this:



```
<terminated> TestRunner (1) [JUnit] C:\Program Files\Java\jre7\bin\javaw.exe (31 Dec 2014 22:30:23)
Login Successfully
LogOut Successfully

2 Scenarios (□[32m2 passed□[0m)
6 Steps (□[32m6 passed□[0m)
0m14.085s
```

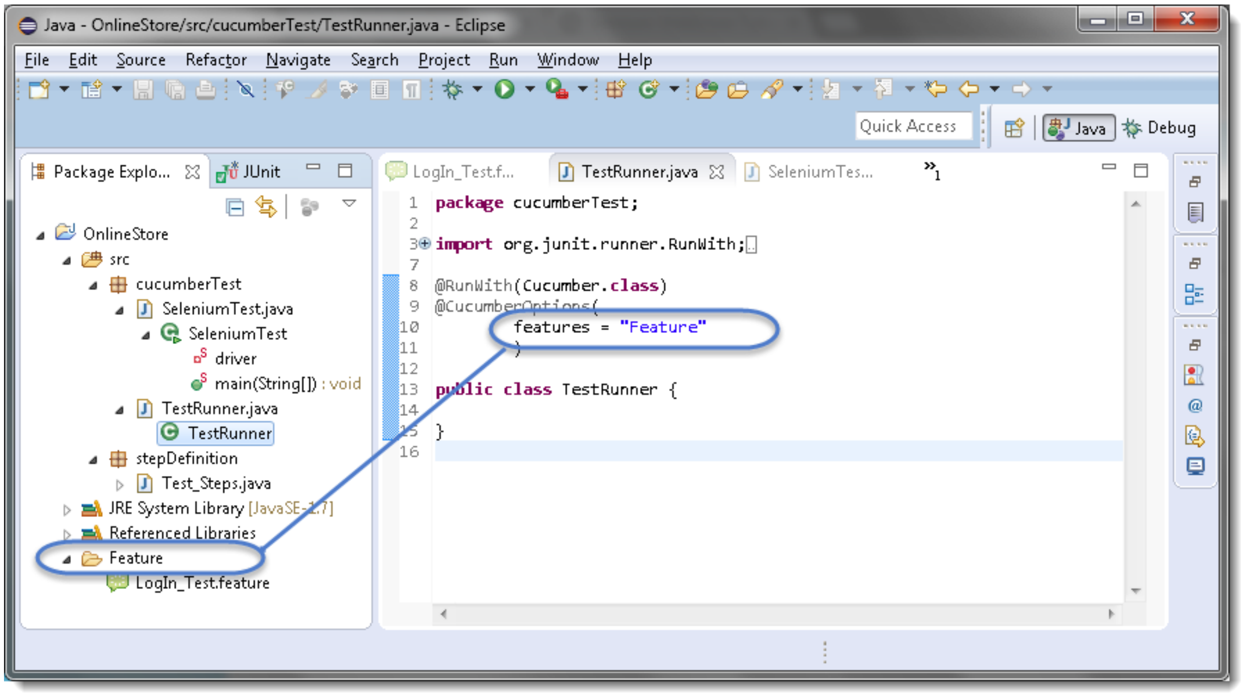
Features

Features Options helps *Cucumber* to locate the *Feature file* in the project folder structure. You must have notices that we have been specifying the *Feature Option* in the ***TestRunner*** class since the first chapter. All we need to do is to specify the folder path and *Cucumber* will automatically find all the '***.features***' extension files in the folder. It can be specified like:

features = "Feature"

Or if the Feature file is in the deep folder structure

features = "src/test/features"



```
package cucumberTest;

import org.junit.runner.RunWith;

@RunWith(Cucumber.class)
@CucumberOptions(
        features = "Feature"
        )

public class TestRunner {

}
```

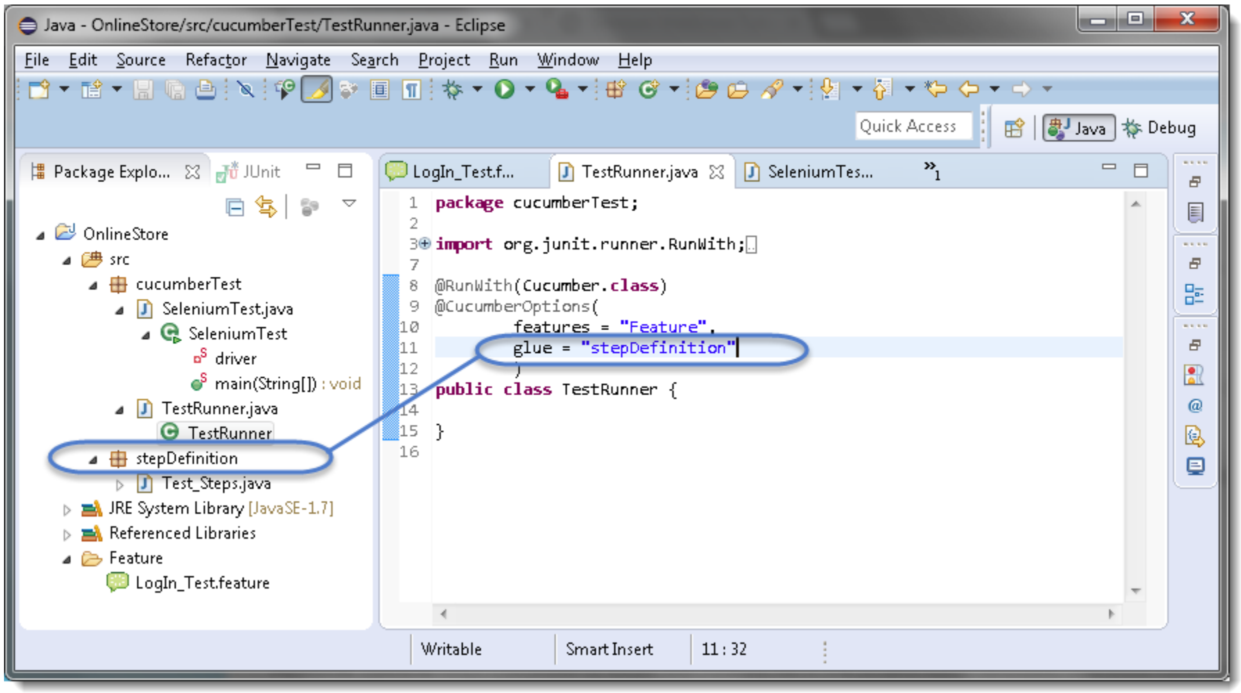
Glue

It is almost the same think as *Features Option* but the only difference is that it helps *Cucumber* to locate the ***Step Definition file.*** Whenever *Cucumber* encounters a *Step*, it looks for a *Step Definition* inside all the files present in the folder mentioned in ***Glue Option***. It can be specified like:

glue = "stepDefinition"

Or if the Step Definition file is in the deep folder structure

glue = “src/test/stepDeinition“



```
package cucumberTest;

import org.junit.runner.RunWith;

@RunWith(Cucumber.class)
@CucumberOptions(
        features = "Feature",
        glue = "stepDefinition"
        )
public class TestRunner {

}
```

Format

Format Option is used to specify different formatting options for the output reports. Various options that can be used as for-matters are:

Pretty: Prints the *Gherkin* source with additional colours and stack traces for errors. Use below code:

format = {“pretty“}

HTML: This will generate a HTML report at the location mentioned in the for-matter itself. Use below code:

format = {“html:Folder_Name“}

JSON: This report contains all the information from the gherkin source in JSON Format. This report is meant to be post-processed into another visual format by 3rd party tools such as Cucumber Jenkins. Use the below code:

format = {“json:Folder_Name/cucumber.json“}

JUnit: This report generates XML files just like Apache Ant's JUnit report task. This XML format is understood by most Continuous Integration servers, who will use it to generate visual reports. use the below code:

format = { "junit:Folder_Name/cucumber.xml"}

Data Driven Testing in Cucumber

Most commercial automated software tools on the market support some sort of ***Data Driven Testing***, which allows to automatically run a test case multiple times with different input and validation values. As *Selenium WebDriver* is more an automated testing framework than a ready-to-use tool. It takes extra efforts to support *data driven testing* in automated tests.

This is a very often requirement in any automated test to pass data or to use same test again with different data set. And the good part is that the ***Cucumber*** inherently supports ***Data Driven Testing using Scenario Outline***. There are different ways to use the data insertion with in the *Cucumber* and outside the *Cucumber* with external files.

Data Driven Testing in Cucumber

- *Parameterization without Example Keyword*

Data Driven Testing in Cucumber using Scenario Outline

- *Parameterization with Example Keyword*
- *Parameterization using Tables*

Data Driven Testing in Cucumber using External Files

- *Parameterization using Excel Files*
- *Parameterization using Json*
- *Parameterization using XML*

Scenario Outline – This is used to run the same scenario for 2 or more different set of test data. ***E.g***. In our scenario, if you want to register another user you can data drive the same scenario twice.

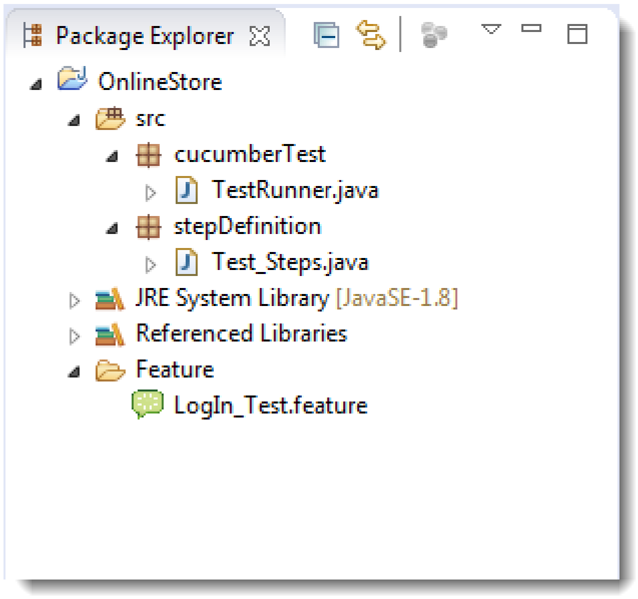
Examples – All scenario outlines have to be followed with the Examples section. This contains the data that has to be passed on to the scenario.

Data Driven Testing in Cucumber

In the series of previous chapters, we are following the LogIn scenario. To demonstrate how parametrizing works, I am taking the same scenario again. It is important for you to be on the same page in term of project code, else you may get confused. Let's take a look at the current state of the project. In case you find it confusing, I would request you to go through the previous tutorial of ***Feature File***, ***Test Runner*** **&** ***Step Definition***.

The project folder structure and code should be in the below state.

Package Explorer



LogIn_Test.fetaure

```
Feature: Login Action

Scenario: Successful Login with Valid Credentials
 Given User is on Home Page
 When User Navigate to LogIn Page
 And User enters UserName and Password
 Then Message displayed Login Successfully

Scenario: Successful LogOut
 When User LogOut from the Application
 Then Message displayed LogOut Successfully
```

Test_Steps.java

```java
package stepDefinition;

import java.util.concurrent.TimeUnit;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;

import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import cucumber.api.java.en.When;

public class Test_Steps {
 public static WebDriver driver;
 @Given("^User is on Home Page$")
 public void user_is_on_Home_Page() throws Throwable {
 driver = new FirefoxDriver();
     driver.manage().timeouts().implicitlyWait(10, TimeUnit.SECONDS);
     driver.get("http://www.store.demoqa.com");
 }

 @When("^User Navigate to LogIn Page$")
 public void user_Navigate_to_LogIn_Page() throws Throwable {
 driver.findElement(By.xpath(".//*[@id='account']/a")).click();
 }

 @When("^User enters UserName and Password$")
 public void user_enters_UserName_and_Password() throws Throwable {
 driver.findElement(By.id("log")).sendKeys("testuser_1");
     driver.findElement(By.id("pwd")).sendKeys("Test@123");
     driver.findElement(By.id("login")).click();
 }

 @Then("^Message displayed Login Successfully$")
 public void message_displayed_Login_Successfully() throws Throwable {
 System.out.println("Login Successfully");
 }

 @When("^User LogOut from the Application$")
 public void user_LogOut_from_the_Application() throws Throwable {
 driver.findElement (By.xpath(".//*[@id='account_logout']/a")).click();
 }

 @Then("^Message displayed LogOut Successfully$")
 public void message_displayed_LogOut_Successfully() throws Throwable {
 System.out.println("LogOut Successfully");
 }
}
```

TestRunner.java

```
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
 features = "Feature"
 ,glue={"stepDefinition"}
 )

public class TestRunner {

}
```

Parameterizing without Example Keyword

Now the task is to ***Parameterizing the UserName and Password***. Which is quite logical, why would anybody want to hardcode the *UserName* & *Password* of the application. As there is a high probability of changing both.

1) Go to the ***Feature File*** and change the statement where passing *Username & Password* as per below:

And User enters "testuser_1" and "Test@123"

In the above statement, we have passed *Username & Password* from the *Feature File* which will feed in to *Step Definition* of the above statement automatically. *Cucumber* will do the trick for us. After the above changes, the code will look like this:

LogIn_Test.feature

```
Feature: Login Action

Scenario: Successful Login with Valid Credentials
 Given User is on Home Page
 When User Navigate to LogIn Page
 And User enters "testuser_1" and "Test@123"
 Then Message displayed Login Successfully

Scenario: Successful LogOut
 When User LogOut from the Application
 Then Message displayed LogOut Successfully
```

2) Changes in *Step Definition* file is also required to make it understand the *Parameterization of the feature file*. So, it is required to update the *Test Step* in the *Step Definition* file which is linked with the above changed *Feature* file statement. Use the below code:

@When("^User enters \"(.*)\" and \"(.*)\"$")

The same can be achieved by using the below code as well:

@When("^User enters \"([^\"]*)\" and \"([^\"]*)\"$")

With the help of the above statements, *Cucumber* will understand that the associated *Test_Step* is expecting some parameters.

3) Same parameters should also go in to the associated *Test_Step*. As the Test step is nothing but a simple Java method, syntax to accept the parameter in the Java method is like this:

public void user_enters_UserName_and_Password(String username, String password) throws Throwable {

}

4) Now the last step is to feed the parameters in the actual core statements of *Selenium WebDriver*. Use the below code:

driver.findElement(By.id("log")).sendKeys(username);
driver.findElement(By.id("pwd")).sendKeys(password);
driver.findElement(By.id("login")).click();

After making above changes, the method will look like this:

```
 @When("^User enters \"(.*)\" and \"(.*)\"$")
 public void user_enters_UserName_and_Password(String username, String password)
throws Throwable {
 driver.findElement(By.id("log")).sendKeys(username);
     driver.findElement(By.id("pwd")).sendKeys(password);
     driver.findElement(By.id("login")).click();
 }
```

5) Run the test by *Right Click* on ***TestRunner class*** and Click ***Run As > JUnit Test*** Application. You would notice that the *Cucumber*will open the Website in the browser and enter *username & password* which is passed from the *Feature File*.

The next chapter is about doing ***Parameterization using Example Keyword in Cucumber***.

Data Driven Testing Using Examples Keyword

In the last chapter of ***Parameterization in Cucumber***, we learned how to *parameterize* data. But with that trick only limited functionality can be achieved of Data Driven. As the test can be run multiple times. But by now that you know the anatomy of a *Data-Driven test*, here's a trick that simplifies the process of ***Data Driven testing using Cucumber***. *Cucumber* inherently supports *Data Driven testing* by the use of the ***Scenario Outline*** and ***Examples*** section. It is with these keywords that *Cucumber* allows for easy *Data Driven testing* to be completed where no changes need to be made to the Java file. In this tutorial we learn, How to ***Implement Scenario Outline in Data Driven testing using Examples Keyword?***

Example keyword can only be used with the *Scenario Outline* Keyword.

- ***Scenario Outline*** *– This is used to run the same scenario for 2 or more different set of test data. E.g. In our scenario, if you want to register another user you can data drive the same scenario twice.*
- ***Examples*** *– All scenario outlines have to be followed with the Examples section. This contains the data that has to be passed on to the scenario.*

Data Driven Testing Using Examples Keyword

If you understood the concept of ***Parameterization in Cucumber***, you would find this one very easy. In this tutorial as well I am taking the same *LogIn test* scenario.

1) Enter the ***Example Data*** just below the *LogIn* Scenario of the *Feature* File.

```
Examples:
    | username   | password  |
    | testuser_1 | Test@153 |
    | testuser_2 | Test@153 |
```

Note*: The table must have a header row corresponding to the variables in the Scenario Outline steps.*

The Examples section is a table where each argument variable represents a column in the table, separated by "**|**". Each line below the header represents an individual run of the test case with the respective data. As a result if there are 3 lines below the header in the Examples table, the script will run 3 times with its respective data.

2) Need to update the Statement in the *feature* file, which tells *Cucumber* to enter *username & Password*.

And User enters <username> and <password>

Cucumber understands the above statement syntax and look for the ***Examples*** Keyword in the test to read the *Test Data*.

The complete code will look like this:

```
Feature: Login Action

Scenario Outline: Successful Login with Valid Credentials
 Given User is on Home Page
 When User Navigate to LogIn Page
 And User enters "<username>" and "<password>"
 Then Message displayed Login Successfully
Examples:
    | username    | password |
    | testuser_1 | Test@153 |
    | testuser_2 | Test@153 |
```

3) There are no changes in ***TestRunner*** class.

```
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
 features = "Feature"
 ,glue={"stepDefinition"}
 )

public class TestRunner {

}
```

4) There are no changes in ***Test_Steps*** file from the previous chapter.

```
package stepDefinition;

import java.util.concurrent.TimeUnit;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;

import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import cucumber.api.java.en.When;

public class Test_Steps {
 public static WebDriver driver;
 @Given("^User is on Home Page$")
 public void user_is_on_Home_Page() throws Throwable {
 driver = new FirefoxDriver();
     driver.manage().timeouts().implicitlyWait(10, TimeUnit.SECONDS);
     driver.get("http://www.store.demoqa.com");
 }

 @When("^User Navigate to LogIn Page$")
 public void user_Navigate_to_LogIn_Page() throws Throwable {
 driver.findElement(By.xpath(".//*[@id='account']/a")).click();
 }

 @When("^User enters \"(.*)\" and \"(.*)\"$")
 public void user_enters_UserName_and_Password(String username, String password)
throws Throwable {
 driver.findElement(By.id("log")).sendKeys(username);
     driver.findElement(By.id("pwd")).sendKeys(password);
     //driver.findElement(By.id("login")).click();
 }

 @Then("^Message displayed Login Successfully$")
 public void message_displayed_Login_Successfully() throws Throwable {
 System.out.println("Login Successfully");
 }

 @When("^User LogOut from the Application$")
 public void user_LogOut_from_the_Application() throws Throwable {
 driver.findElement (By.xpath(".//*[@id='account_logout']/a")).click();
 }

 @Then("^Message displayed LogOut Successfully$")
 public void message_displayed_LogOut_Successfully() throws Throwable {
```

```
System.out.println("LogOut Successfully");
 }

}
```

5) Run the test by *Right Click* on ***TestRunner class*** and Click ***Run As > JUnit Test*** Application.

This takes the *parameterization* one step further: now our scenario has "***variables***" and they get filled in by the values in each row. To be clear: by defining this, the scenario will run two times, passing in one row at a time. This makes it very easy to define a lot of examples, edge cases and special outcomes. Instead of hardcoding the test data, variables are defined in the Examples section and used in *Scenario Outline* section.

Note*: Please create your own username & password for the test, if you supply wrong* ***UserName & Password 3 times****, your IP will get blocked.*

Data Tables in Cucumber

Data Tables in Cucumber are quite interesting and can be used in many ways. *DataTables* are also used to handle large amount of data. They are quite powerful but not the most intuitive as you either need to deal with a ***list of maps*** or a ***map of lists***. Most of the people gets confused with Data tables & Scenario outline, but these two works completely differently.

Difference between Scenario Outline & Data Table

Scenario Outline:

- *This uses Example keyword to define the test data for the Scenario*
- *This works for the whole test*
- *Cucumber automatically run the complete test the number of times equal to the number of data in the Test Set*

Test Data:

- *No keyword is used to define the test data*
- *This works only for the single step, below which it is defined*
- *A separate code is need to understand the test data and then it can be run single or multiple times but again just for the single step, not for the complete test*

As I said above, that the *Data Tables* can be used in many ways because it has provided many different methods to use. Let's just go through few most popular methods. I will choose a simple scenario to illustrate the working of the *Data Table* but we will make effective use of this when we will do ***Cucumber Framework*** in the next series of this ***Cucumber Tutorial***.

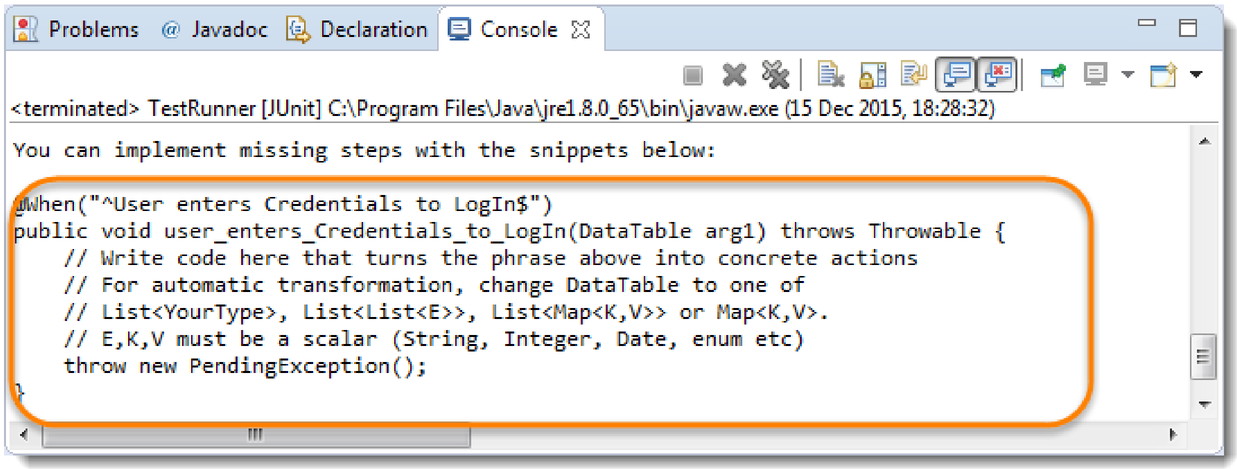
Data Tables in Cucumber

In this example, we will pass the test data using *data table* and handle it with using ***Raw()*** method.

```
Scenario: Successful Login with Valid Credentials
 Given User is on Home Page
 When User Navigate to LogIn Page
 And User enters Credentials to LogIn
     | testuser_1 | Test@153 |
 Then Message displayed Login Successfully
```

The complete scenario is same as what we have done earlier. But the only difference is in this, we are not passing parameters in the step line and even we are not using Examples test data. We declared the data under the step only. So we are using Tables as arguments to Steps.

If you run the above scenario without implementing the step, you would get the following error in the Eclipse console window.



```
<terminated> TestRunner [JUnit] C:\Program Files\Java\jre1.8.0_65\bin\javaw.exe (15 Dec 2015, 18:28:32)
You can implement missing steps with the snippets below:

@When("^User enters Credentials to LogIn$")
public void user_enters_Credentials_to_LogIn(DataTable arg1) throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    // For automatic transformation, change DataTable to one of
    // List<YourType>, List<List<E>>, List<Map<K,V>> or Map<K,V>.
    // E,K,V must be a scalar (String, Integer, Date, enum etc)
    throw new PendingException();
}
```

Copy the above hint in the *Step Definition file* and complete the implementation.

The implementation of the above step will be like this:

```
The implementation of the above step will belike this:
 @When("^User enters Credentials to LogIn$")
 public void user_enters_testuser__and_Test(DataTable usercredentials) throws
Throwable {

 //Write the code to handle Data Table
 List<List<String>> data = usercredentials.raw();

 //This is to get the first data of the set (First Row + First Column)
 driver.findElement(By.id("log")).sendKeys(data.get(0).get(0));

 //This is to get the first data of the set (First Row + Second Column)
     driver.findElement(By.id("pwd")).sendKeys(data.get(0).get(1));

     driver.findElement(By.id("login")).click();
 }
```

The complete test Implementation

Test Runner Class

```
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
 features = "Feature"
 ,glue={"stepDefinition"}
 )

public class TestRunner {

}
```

Feature File

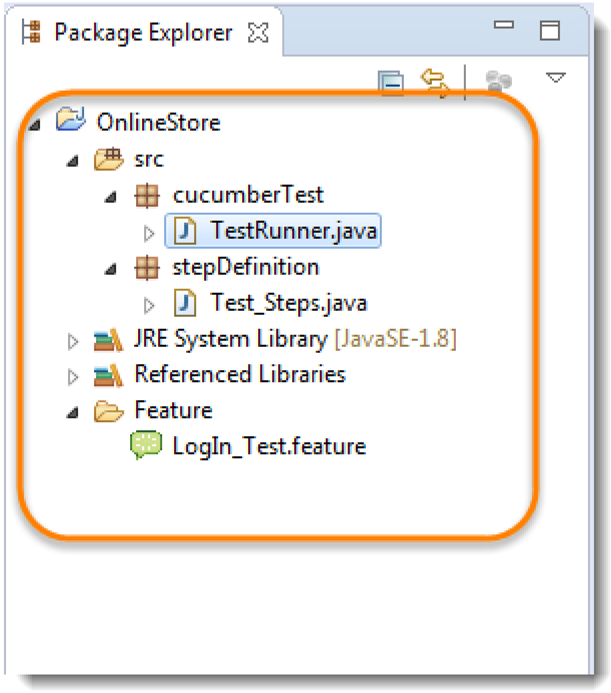
```
Feature: Login Action

Scenario: Successful Login with Valid Credentials
 Given User is on Home Page
 When User Navigate to LogIn Page
 And User enters Credentials to LogIn
    | testuser_1 | Test@153 |
 Then Message displayed Login Successfully

Scenario: Successful LogOut
 When User LogOut from the Application
 Then Message displayed LogOut Successfully
```

Step Definition

```
package stepDefinition;

import java.util.List;
import java.util.concurrent.TimeUnit;
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;
import cucumber.api.DataTable;
import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import cucumber.api.java.en.When;

public class Test_Steps {
 public static WebDriver driver;
 @Given("^User is on Home Page$")
 public void user_is_on_Home_Page() throws Throwable {
 driver = new FirefoxDriver();
     driver.manage().timeouts().implicitlyWait(10, TimeUnit.SECONDS);
     driver.get("http://www.store.demoqa.com");
 }

 @When("^User Navigate to LogIn Page$")
 public void user_Navigate_to_LogIn_Page() throws Throwable {
 driver.findElement(By.xpath(".//*[@id='account']/a")).click();
 }

 @When("^User enters Credentials to LogIn$")
 public void user_enters_testuser__and_Test(DataTable usercredentials) throws
Throwable {
 List<List<String>> data = usercredentials.raw();
 driver.findElement(By.id("log")).sendKeys(data.get(0).get(0));
     driver.findElement(By.id("pwd")).sendKeys(data.get(0).get(1));
```

```
    driver.findElement(By.id("login")).click();
}

@Then("^Message displayed Login Successfully$")
public void message_displayed_Login_Successfully() throws Throwable {
System.out.println("Login Successfully");
}

@When("^User LogOut from the Application$")
public void user_LogOut_from_the_Application() throws Throwable {
driver.findElement (By.xpath(".//*[@id='account_logout']/a")).click();
}

@Then("^Message displayed LogOut Successfully$")
public void message_displayed_LogOut_Successfully() throws Throwable {
System.out.println("LogOut Successfully");
}
}
```

Project Explorer



```
OnlineStore
  src
    cucumberTest
      TestRunner.java
    stepDefinition
      Test_Steps.java
  JRE System Library [JavaSE-1.8]
  Referenced Libraries
  Feature
    LogIn_Test.feature
```

Run the test by *Right Click* on ***TestRunner class*** and Click ***Run As > JUnit Test*** Application. you will notice that Cucumber will automatically figure out, what to provide in the Username and Password field.

In the next chapter of ***Data Tables in Cucumber using Maps***, we will handle little complex data .

Maps in Data Tables

In the previous chapter of ***Data Tables in Cucumber***, we consider a very simple example of passing *UserName* and *Password* in the step. Let’s take a little complex scenario where a good amount of data is required to pass in the step. Or what is there are multiple columns of test data is present. *How would you handle it?* The answer is to make a Use of ***Maps in Data Tables***.

Maps in Data Tables

Maps in Data Tables can be used if different ways. ***Headers*** can also be defined for the *data tables.* A same step can be executed multiple times with different set of test data using ***Maps***.

Maps in Data Tables with Header

In the previous chapter of ***Data Tables in Cucumber***, we pass *Username & Password* without Header, due to which the test was not much readable. What if there will be many columns. The basic funda of BDD test is to make the Test in Business readable format, so that business users can understand it easily. Setting Header in Test data is not a difficult task in Cucumber. take a look at a below Scenario.

Feature File Scenario

```
Scenario: Successful Login with Valid Credentials
 Given User is on Home Page
 When User Navigate to LogIn Page
 And User enters Credentials to LogIn
 | Username    | Password |
    | testuser_1 | Test@153 |
 Then Message displayed Login Successfully
```

The implementation of the above step will be like this:

```
 @When("^User enters Credentials to LogIn$")
 public void user_enters_testuser_and_Test(DataTable usercredentials) throws Throwable {

 //Write the code to handle Data Table
 List<Map<String,String>> data = usercredentials.asMaps(String.class,String.class);
 driver.findElement(By.id("log")).sendKeys(data.get(0).get("Username"));
     driver.findElement(By.id("pwd")).sendKeys(data.get(0).get("Password"));
     driver.findElement(By.id("login")).click();
           }
```

Maps in Data Tables with Multiple Test Data

In this test we will pass *Username and Password* two times to the test step. So our test should enter *Username & Password* once, click on *LogIn* button and repeat the same steps again.

Feature File Scenario

```
Scenario: Successful Login with Valid Credentials
 Given User is on Home Page
 When User Navigate to LogIn Page
 And User enters Credentials to LogIn
 | Username    | Password |
    | testuser_1 | Test@153 |
    | testuser_2 | Test@154 |
 Then Message displayed Login Successfully
```

The implementation of the above step will be like this:

```
 @When("^User enters Credentials to LogIn$")
 public void user_enters_testuser_and_Test(DataTable usercredentials) throws Throwable
{

 //Write the code to handle Data Table
 for (Map<String, String> data : usercredentials.asMaps(String.class, String.class))
{
 driver.findElement(By.id("log")).sendKeys(data.get("Username"));
     driver.findElement(By.id("pwd")).sendKeys(data.get("Password"));
     driver.findElement(By.id("login")).click();
 }

 }
```

Map Data Tables to Class Objects

Luckily there are easier ways to access your data than *DataTable*. For instance you can create a *Class-Object* and have Cucumber map the data in a table to a list of these.

Feature File Scenario

```
Scenario: Successful Login with Valid Credentials
 Given User is on Home Page
 When User Navigate to LogIn Page
 And User enters Credentials to LogIn
 | Username    | Password |
    | testuser_1 | Test@153 |
    | testuser_2 | Test@154 |
 Then Message displayed Login Successfully
```

The implementation of the above step will be like this:

```
 @When("^User enters Credentials to LogIn$")
 public void user_enters_testuser_and_Test(List<Credentials>  usercredentials) throws
Throwable {

 //Write the code to handle Data Table
 for (Credentials credentials : usercredentials) {
 driver.findElement(By.id("log")).sendKeys(credentials.getUsername());
     driver.findElement(By.id("pwd")).sendKeys(credentials.getPassword());
     driver.findElement(By.id("login")).click();
 }
 }
```

Class Credentials

```
package stepDefinition;

public class Credentials {
 private String username;
 private String password;

 public String getUsername() {
        return username;
    }
 public String getPassword() {
        return password;
    }
}
```

Cucumber Tags

So far we are good just because we have only a few couple of scenarios in the feature file. However, when you work on any real life project, you would have many scenarios in one feature file and there will be many other feature files full of scenarios. As the name suggest ***Feature***, we tend to create a separate feature file for every other feature or functionality in an application. We also try to keep all the related scenarios with in the same feature file and this is the reason we end up having many scenarios in it. Every scenario comes with it's own prerequisites. To handle the same cucumber gives us many useful functionalities:

- ***Tags***
- ***Hooks***
- ***Tagged Hooks***
- ***Execution Order of Hooks***
- ***Background***

Things works absolutely fine till the time we run every feature and all the scenarios under it as all together. But what if you do not want to run all the scenarios together and like to run few selected scenarios from different feature files together. In this chapter we will be covering the following:

- ***What are Cucumber Tags?***
- ***How to run Cucumber Tests in Groups with Cucumber Tags***
- ***How to ignore Cucumber Tests***
- ***Logically ANDing and ORing Tags***

What are Cucumber Tags?

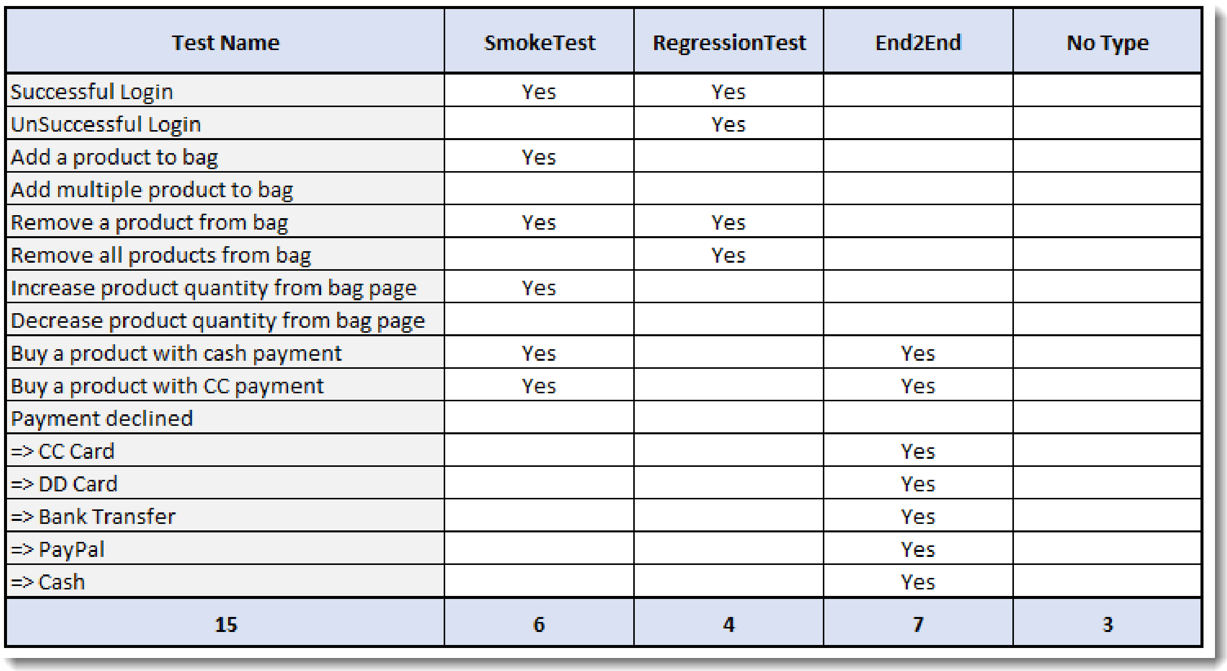
Let's say you have got many different feature files which cover all the different functionality of the application. Now there can be certain situation in the project where you like to execute just a ***SmokeTests*** or ***End2EndTests*** or may be ***RegressionTests***. One approach is that you start creating new feature files with the name of the type like ***SmokeTests.features*** or ***End2EndTests.feature*** and copy paste your existing tests in the same. But this would make the project filthy and would require more maintenance in future. So how to manage execution in such cases?

*For this, Cucumber has already provided a way to organize your scenario execution by using **tags** in feature file. We can define each scenario with a useful tag. Later, in the runner file, we can decide which specific tag (and so as the scenario(s)) we want Cucumber to execute. Tag starts with "@". After "@" you can have any relevant text to define your tag like **@SmokeTests** just above the scenarios you like to mark. Then to target these tagged scenarios just specify the tags names in the **CucumberOptions** as **tags = {"@SmokeTests"}.***

*Tagging not just specifically works with Scenarios, it also works with **Features**. Means you can also tag your features files. **Any tag that exists on a Feature will be inherited by Scenario, Scenario Outline or Examples.***

How to run Cucumber Tests in Groups using Cucumber Tags?

Let's understand this with an example. Below is a excel sheet containing a list of scenarios of a single feature.



Test Name	SmokeTest	RegressionTest	End2End	No Type
Successful Login	Yes	Yes		
UnSuccessful Login		Yes		
Add a product to bag	Yes			
Add multiple product to bag				
Remove a product from bag	Yes	Yes		
Remove all products from bag		Yes		
Increase product quantity from bag page	Yes			
Decrease product quantity from bag page				
Buy a product with cash payment	Yes		Yes	
Buy a product with CC payment	Yes		Yes	
Payment declined				
=> CC Card			Yes	
=> DD Card			Yes	
=> Bank Transfer			Yes	
=> PayPal			Yes	
=> Cash			Yes	
15	6	4	7	3

Things to Note:

- *Few scenarios are part of Smoke Test, Regression Test and End2End Test.*
- *Few scenarios are part of two or more Test Types. For example the first test is*

considered as Smoke as well as Regression.

- *Few scenarios are not at all tagged*
- *Last scenario of Payment Declined, it is a single scenario but has five different test data. So this will be considered as five different scenarios.*

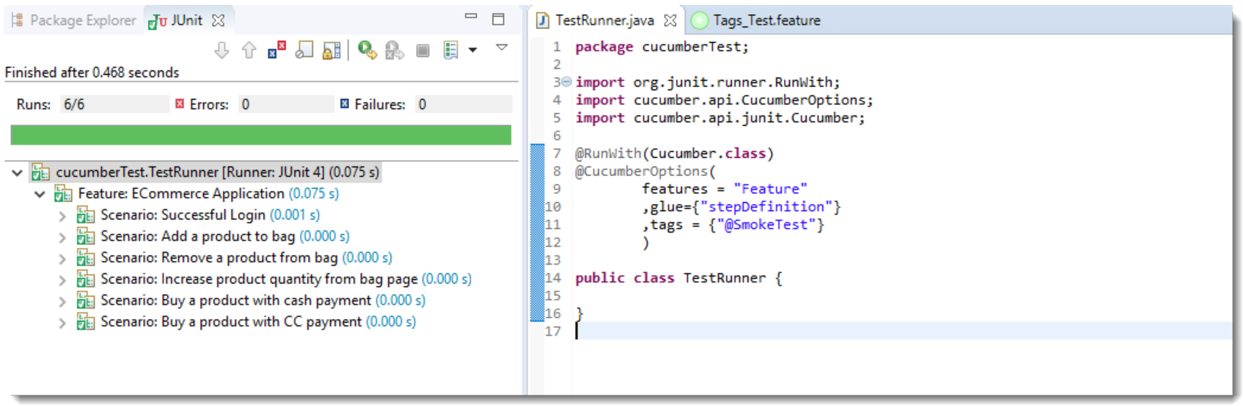
Feature file will look like this

```
@FunctionalTest
Feature: ECommerce Application

@SmokeTest @RegressionTest
Scenario: Successful Login
Given This is a blank test

@RegressionTest
Scenario: UnSuccessful Login
Given This is a blank test

@SmokeTest
Scenario: Add a product to bag
Given This is a blank test

Scenario: Add multiple product to bag
Given This is a blank test

@SmokeTest @RegressionTest
Scenario: Remove a product from bag
Given This is a blank test

@RegressionTest
Scenario: Remove all products from bag
Given This is a blank test

@SmokeTest
Scenario: Increase product quantity from bag page
Given This is a blank test

Scenario: Decrease product quantity from bag page
Given This is a blank test

@SmokeTest @End2End
Scenario: Buy a product with cash payment
Given This is a blank test

@SmokeTest @End2End
Scenario: Buy a product with CC payment
Given This is a blank test
```

```

@End2End
Scenario Outline: Payment declined
Given This is a blank test
Examples:
|PaymentMethod|
|CC Card|
|DD Card|
|Bank Transfer|
|PayPal|
|Cash|
```

Running single Cucumber Feature file or single Cucumber Tag

Execute all tests tagged as @SmokeTests

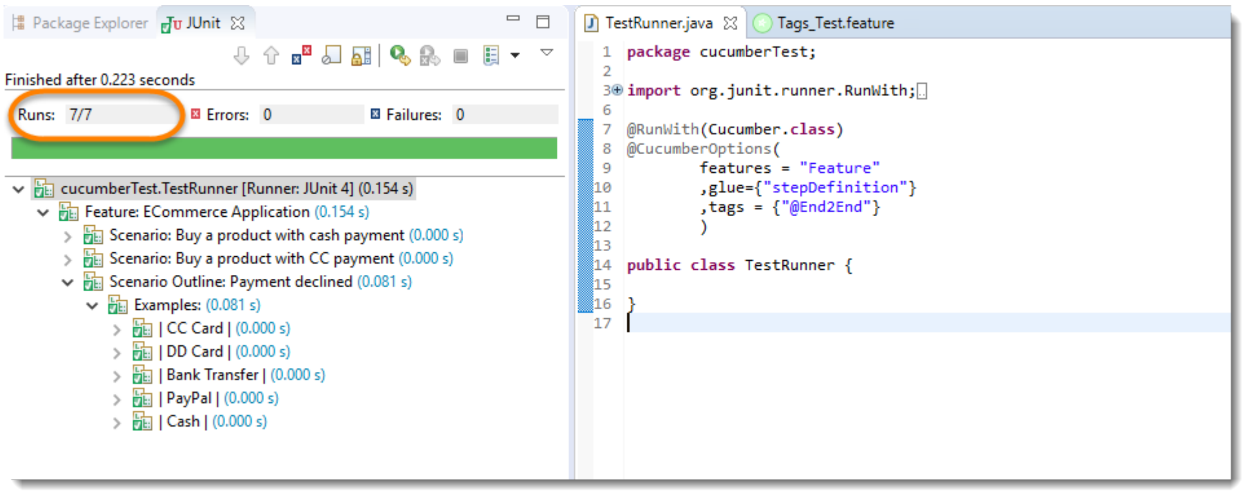


```
Finished after 0.468 seconds
Runs: 6/6    Errors: 0    Failures: 0

cucumberTest.TestRunner [Runner: JUnit 4] (0.075 s)
  Feature: ECommerce Application (0.075 s)
    Scenario: Successful Login (0.001 s)
    Scenario: Add a product to bag (0.000 s)
    Scenario: Remove a product from bag (0.000 s)
    Scenario: Increase product quantity from bag page (0.000 s)
    Scenario: Buy a product with cash payment (0.000 s)
    Scenario: Buy a product with CC payment (0.000 s)
```

```java
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
        features = "Feature"
        ,glue={"stepDefinition"}
        ,tags = {"@SmokeTest"}
        )

public class TestRunner {

}
```

***Note**: In the excel sheet and in the feature file paste above if you count the scenarios which are tagged as @SmokeTests, you will find the count is 6 and the same count is also displayed under Junit tab.*

Execute all tests tagged as @End2End


Finished after 0.223 seconds

Runs: 7/7 Errors: 0 Failures: 0

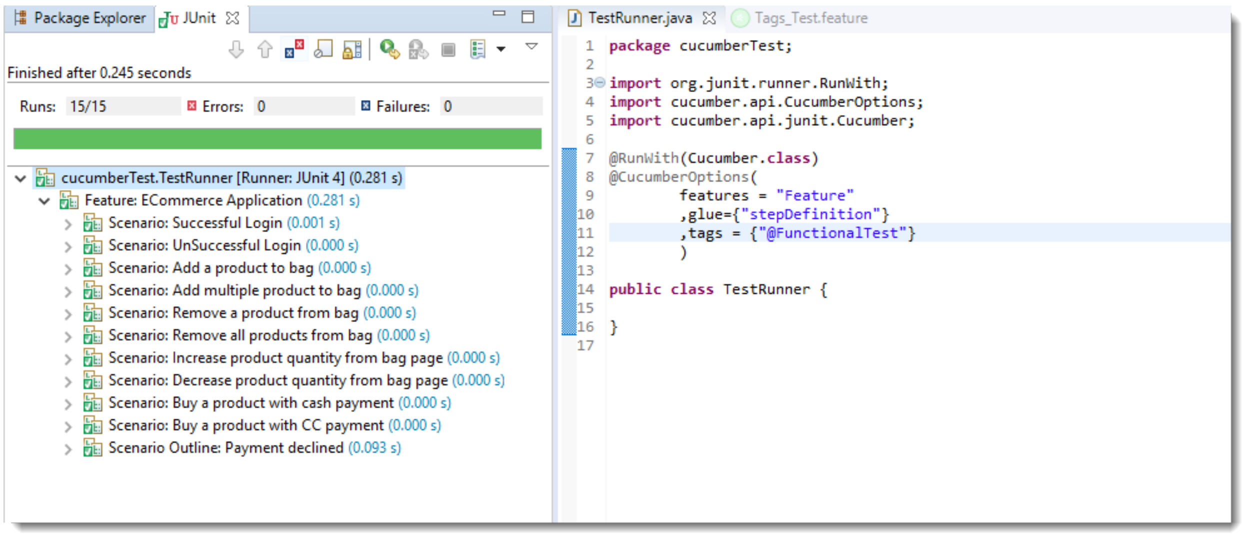
```
cucumberTest.TestRunner [Runner: JUnit 4] (0.154 s)
  Feature: ECommerce Application (0.154 s)
    Scenario: Buy a product with cash payment (0.000 s)
    Scenario: Buy a product with CC payment (0.000 s)
    Scenario Outline: Payment declined (0.081 s)
      Examples: (0.081 s)
        | CC Card | (0.000 s)
        | DD Card | (0.000 s)
        | Bank Transfer | (0.000 s)
        | PayPal | (0.000 s)
        | Cash | (0.000 s)
```

```java
package cucumberTest;

import org.junit.runner.RunWith;

@RunWith(Cucumber.class)
@CucumberOptions(
		features = "Feature"
		,glue={"stepDefinition"}
		,tags = {"@End2End"}
		)

public class TestRunner {

}
```

***Note**: A special thing to note here is that, the last scenario **Payment declined** has five different data examples. So every example is considered as a separate test. Due to which the total test number is 7.*

Execute all tests of a Feature tagged as @FunctionalTest : Feature Tagging

Not only tags work with Scenario, tags work with Feature Files as well. Feature files pasted above is also tagged as ***@FunctionTests***. Let's just see how to executes all the tests in this feature.


Finished after 0.245 seconds

Runs: 15/15 Errors: 0 Failures: 0

```
cucumberTest.TestRunner [Runner: JUnit 4] (0.281 s)
  Feature: ECommerce Application (0.281 s)
    Scenario: Successful Login (0.001 s)
    Scenario: UnSuccessful Login (0.000 s)
    Scenario: Add a product to bag (0.000 s)
    Scenario: Add multiple product to bag (0.000 s)
    Scenario: Remove a product from bag (0.000 s)
    Scenario: Remove all products from bag (0.000 s)
    Scenario: Increase product quantity from bag page (0.000 s)
    Scenario: Decrease product quantity from bag page (0.000 s)
    Scenario: Buy a product with cash payment (0.000 s)
    Scenario: Buy a product with CC payment (0.000 s)
    Scenario Outline: Payment declined (0.093 s)
```

```java
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
		features = "Feature"
		,glue={"stepDefinition"}
		,tags = {"@FunctionalTest"}
		)

public class TestRunner {

}
```

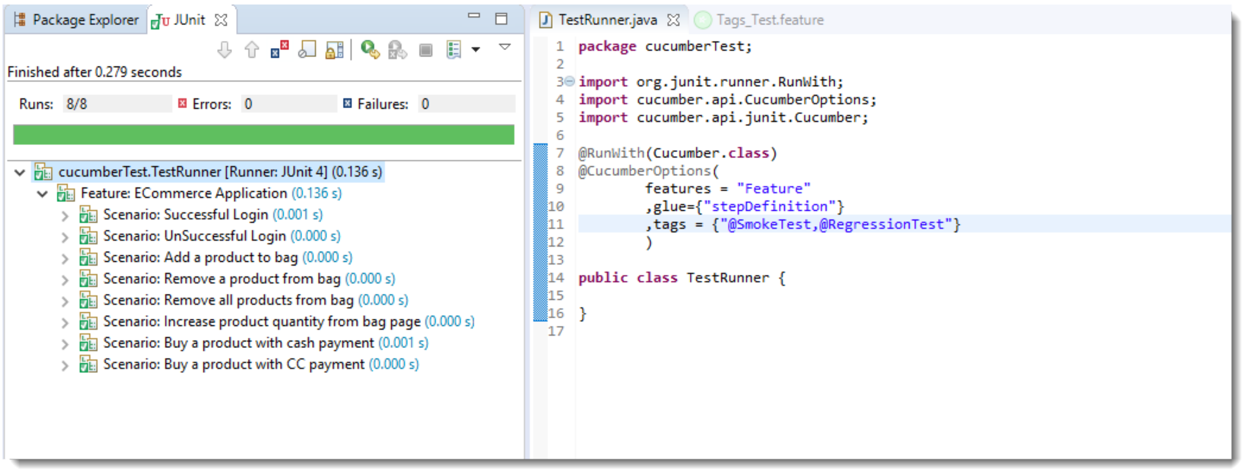
***Note**: All the test exists in the feature file are executed.*

Logically ANDing and ORing Tags

Requirements are complicated, it will not always simple like executing a single tag. It can be complicated like executing scenarios which are tagged either as *@SmokeTest* or *@RegressionTest*. It can also be like executing scenarios which are tagged both as *@SmokeTest*and *@RegressionTest*. Cucumber tagging gives us the capability to choose what we want with the help of *ANDing* and *ORing*.

Execute all tests tagged as @SmokeTest OR @RegressionTest

Tags which are ***comma*** separated are ORed.



Package Explorer | JUnit

Finished after 0.279 seconds

Runs: 8/8 Errors: 0 Failures: 0

```
cucumberTest.TestRunner [Runner: JUnit 4] (0.136 s)
  Feature: ECommerce Application (0.136 s)
    Scenario: Successful Login (0.001 s)
    Scenario: UnSuccessful Login (0.000 s)
    Scenario: Add a product to bag (0.000 s)
    Scenario: Remove a product from bag (0.000 s)
    Scenario: Remove all products from bag (0.000 s)
    Scenario: Increase product quantity from bag page (0.000 s)
    Scenario: Buy a product with cash payment (0.001 s)
    Scenario: Buy a product with CC payment (0.000 s)
```

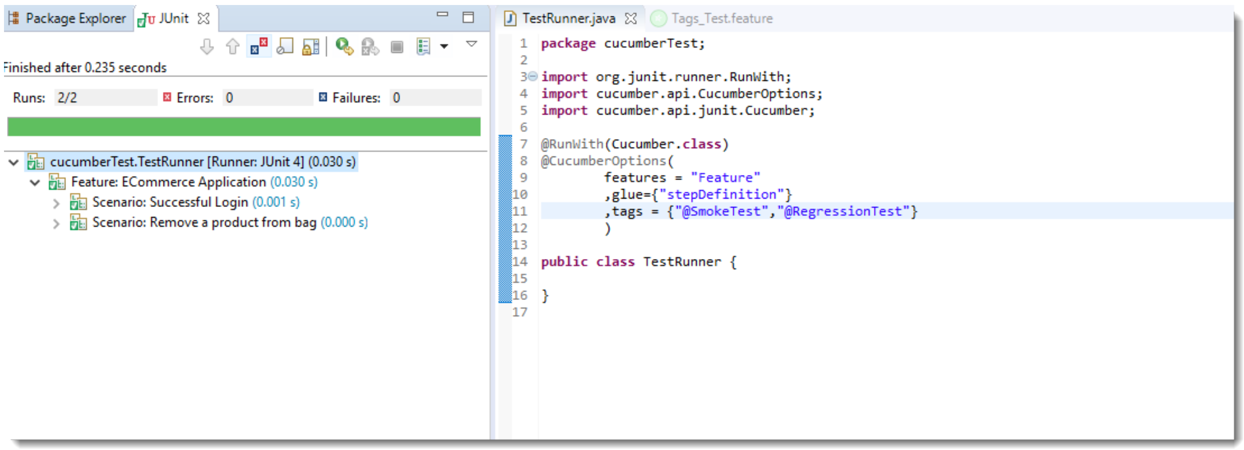
TestRunner.java | Tags_Test.feature

```java
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
        features = "Feature"
        ,glue={"stepDefinition"}
        ,tags = {"@SmokeTest,@RegressionTest"}
        )

public class TestRunner {

}
```

***Note**: OR means scenarios which are tagged either as @SmokeTest OR @RegressionTest.*

Execute all tests tagged as @SmokeTest AND @RegressionTest

Tags which are passed in separate ***quotes*** are ANDed



```
Finished after 0.235 seconds
Runs: 2/2   Errors: 0   Failures: 0

cucumberTest.TestRunner [Runner: JUnit 4] (0.030 s)
  Feature: ECommerce Application (0.030 s)
    Scenario: Successful Login (0.001 s)
    Scenario: Remove a product from bag (0.000 s)
```

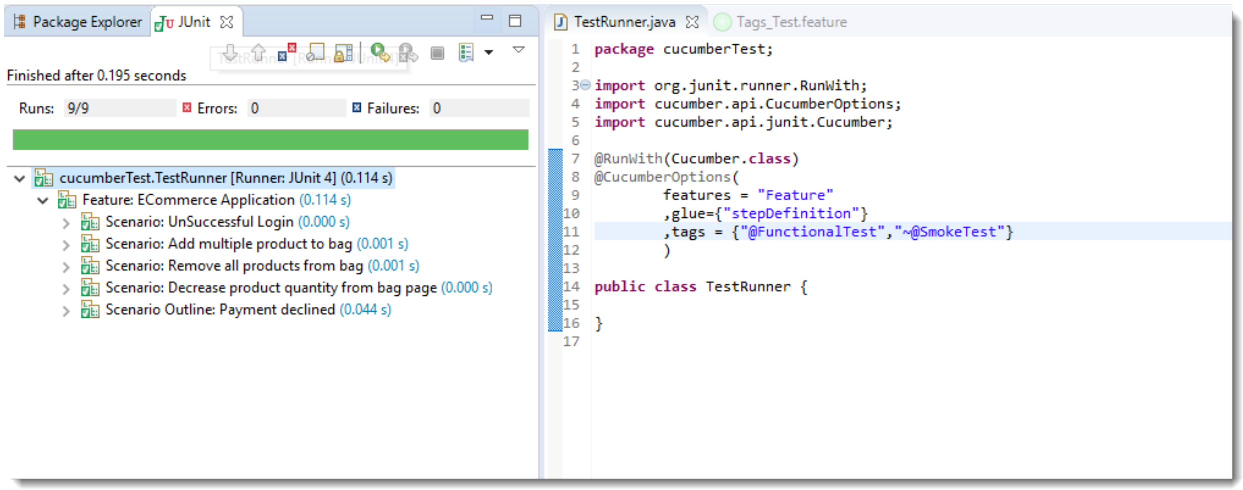
```java
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
		features = "Feature"
		,glue={"stepDefinition"}
		,tags = {"@SmokeTest","@RegressionTest"}
		)

public class TestRunner {

}
```

***Note**: There are only two scenarios in our feature file which have both tags together.*

How to Ignore Cucumber Tests

This is again a good feature of Cucumber Tags that you can even skip tests in the group execution. Special Character ~ is used to skip the tags. This also works both for *Scenarios* and *Features*. And this can also works in conjunction with AND or OR.

Execute all tests of the feature tagged as @FunctionalTests but skip scenarios tagged as @SmokeTest

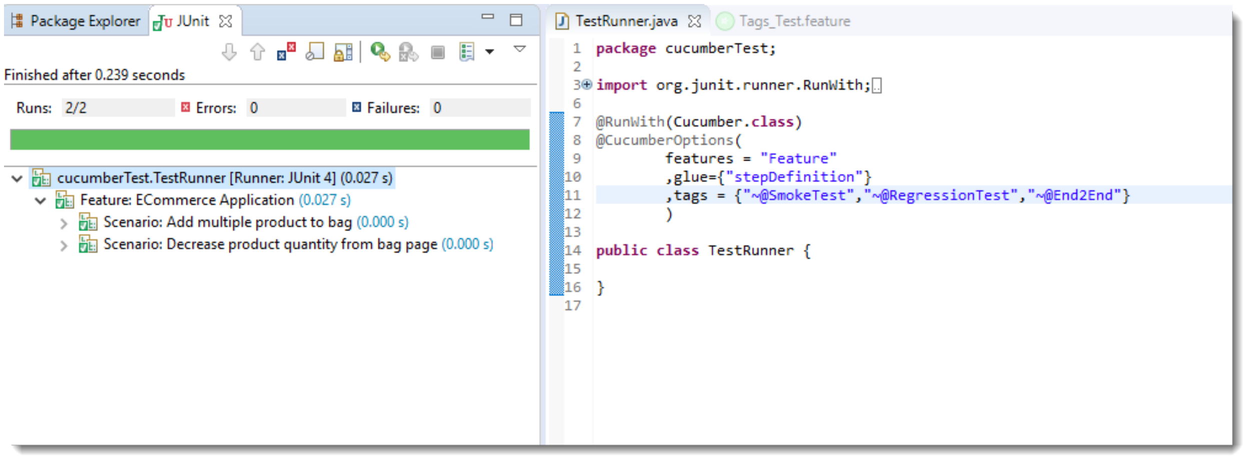


```
Finished after 0.195 seconds
Runs: 9/9   Errors: 0   Failures: 0

cucumberTest.TestRunner [Runner: JUnit 4] (0.114 s)
  Feature: ECommerce Application (0.114 s)
    Scenario: UnSuccessful Login (0.000 s)
    Scenario: Add multiple product to bag (0.001 s)
    Scenario: Remove all products from bag (0.001 s)
    Scenario: Decrease product quantity from bag page (0.000 s)
    Scenario Outline: Payment declined (0.044 s)
```

```java
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
		features = "Feature"
		,glue={"stepDefinition"}
		,tags = {"@FunctionalTest","~@SmokeTest"}
		)

public class TestRunner {

}
```

Note: This is AND condition, which means all the scenario tagged as @FunctionalTest but not @SmokeTest. So total tests are 15 and smoke tests are 6, so it ran just 9 tests.

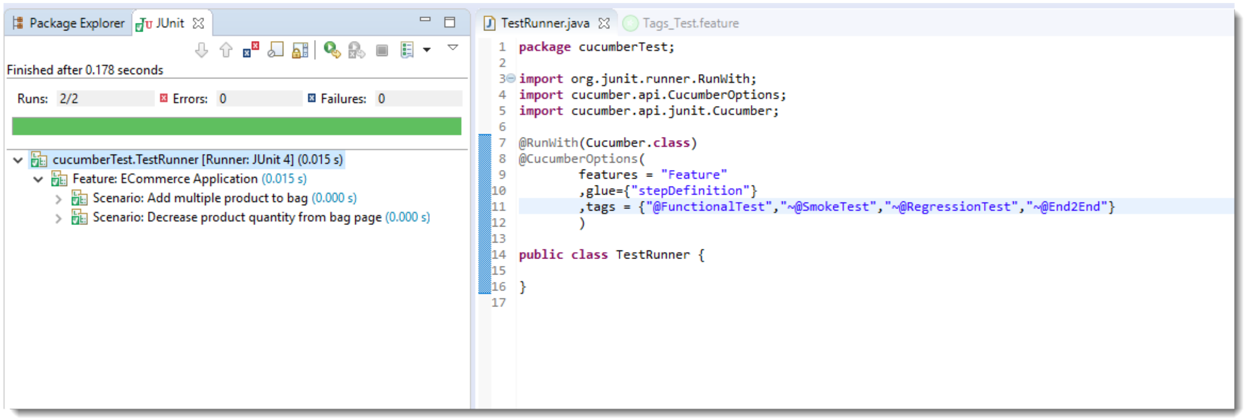
Execute all tests which are not at all tagged in all the Features



```
Finished after 0.239 seconds
Runs: 2/2    Errors: 0    Failures: 0

cucumberTest.TestRunner [Runner: JUnit 4] (0.027 s)
  Feature: ECommerce Application (0.027 s)
    Scenario: Add multiple product to bag (0.000 s)
    Scenario: Decrease product quantity from bag page (0.000 s)
```

```java
package cucumberTest;

import org.junit.runner.RunWith;

@RunWith(Cucumber.class)
@CucumberOptions(
        features = "Feature"
        ,glue={"stepDefinition"}
        ,tags = {"~@SmokeTest","~@RegressionTest","~@End2End"}
        )

public class TestRunner {

}
```

Execute all tests which are not at all tagged in Single Feature



```
Finished after 0.178 seconds
Runs: 2/2    Errors: 0    Failures: 0

cucumberTest.TestRunner [Runner: JUnit 4] (0.015 s)
  Feature: ECommerce Application (0.015 s)
    Scenario: Add multiple product to bag (0.000 s)
    Scenario: Decrease product quantity from bag page (0.000 s)
```

```java
package cucumberTest;

import org.junit.runner.RunWith;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;

@RunWith(Cucumber.class)
@CucumberOptions(
        features = "Feature"
        ,glue={"stepDefinition"}
        ,tags = {"@FunctionalTest","~@SmokeTest","~@RegressionTest","~@End2End"}
        )

public class TestRunner {

}
```

It is fun to play with tags, specially when you have many features files with multiple scenarios.

Cucumber Hooks

What are Hooks in Cucumber?

Cucumber supports ***hooks***, which are blocks of code that run ***before*** or ***after*** each scenario. You can define them anywhere in your project or step definition layers, using the methods ***@Before*** and ***@After***. ***Cucumber Hooks*** allows us to better manage the code workflow and helps us to reduce the code redundancy. We can say that it is an unseen step, which allows us to perform our scenarios or tests.

Why Cucumber Hooks?

In the world of testing, you must have encountered the situations where you need to perform the prerequisite steps before testing any test scenario. This prerequisite can be anything from:

- *Starting a webdriver*
- *Setting up DB connections*
- *Setting up test data*
- *Setting up browser cookies*
- *Navigating to certain page*
- *or anything before the test*

In the same way there are always after steps as well of the tests like:

- *Killing the webdriver*
- *Closing DB connections*
- *Clearing the test data*
- *Clearing browser cookies*
- *Logging out from the application*
- *Printing reports or logs*
- *Taking screenshots on error*
- *or anything after the test*

To handle these kind of situations, cucumber hooks are the best choice to use. Unlike ***TestNG Annotaions***, cucumber supports only two hooks (*Before & After*) which works at the *start* and the *end* of the test scenario. As the name suggests, @*before* hook gets executed well before any other *test scenario*, and *@after* hook gets executed after executing the scenario.

How to implement Hooks in Cucumber Test

Let's do some easy and small example of Cucumber Hooks just to understand the concept. I will bring the intelligent usage of Hooks in my later tutorial series of ***Designing Framework with Cucumber***.

Test Hooks with Single Scenario

Feature File

```
Feature: Test Hooks

Scenario: This scenario is to test hooks functionality
 Given this is the first step
 When this is the second step
 Then this is the third step
```

Step Definitions

```java
package stepDefinition;

import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import cucumber.api.java.en.When;

public class Hooks_Steps {

 @Given("^this is the first step$")
 public void This_Is_The_First_Step(){
 System.out.println("This is the first step");
 }

 @When("^this is the second step$")
 public void This_Is_The_Second_Step(){
 System.out.println("This is the second step");
 }

 @Then("^this is the third step$")
 public void This_Is_The_Third_Step(){
 System.out.println("This is the third step");
 }

}
```

***Note**: There is no logic used in the step definitions. Just printing the step summary log.*

Hooks

```java
package utilities;
import cucumber.api.java.After;
import cucumber.api.java.Before;

public class Hooks {

 @Before
    public void beforeScenario(){
        System.out.println("This will run before the Scenario");
    }

 @After
    public void afterScenario(){
        System.out.println("This will run after the Scenario");
    }
}
```

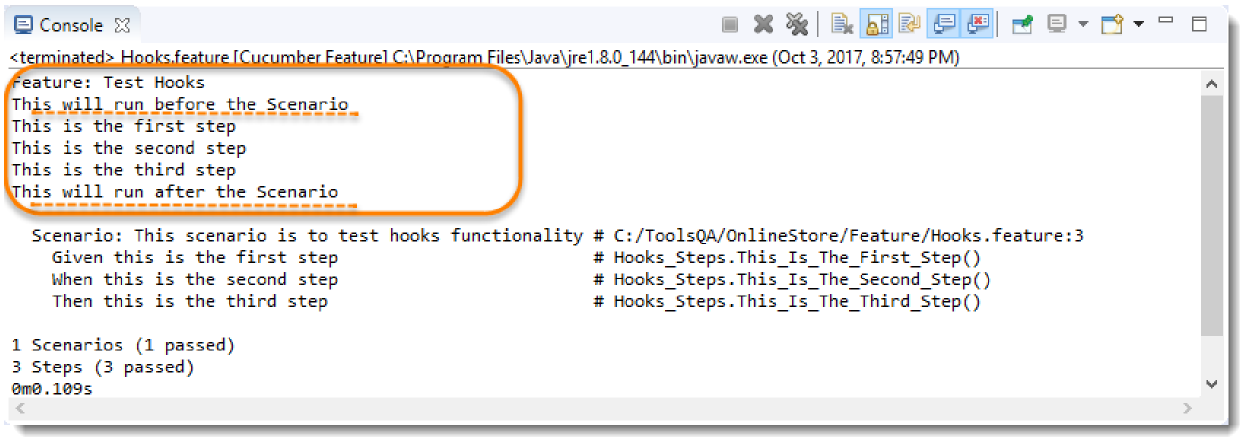
Things to note

- *An important thing to note about the after hook is that even in case of test fail,* *after hook will execute for sure.*

- *Method name can be anything, need not to be beforeScenario() or afterScenario(). can also be named as setUp() and tearDown().*
- *Make sure that the package import statement should be* ***import cucumber.api.java.After; & import cucumber.api.java.Before;***

Often people mistaken and import Junit Annotations, so be careful with this.

Output

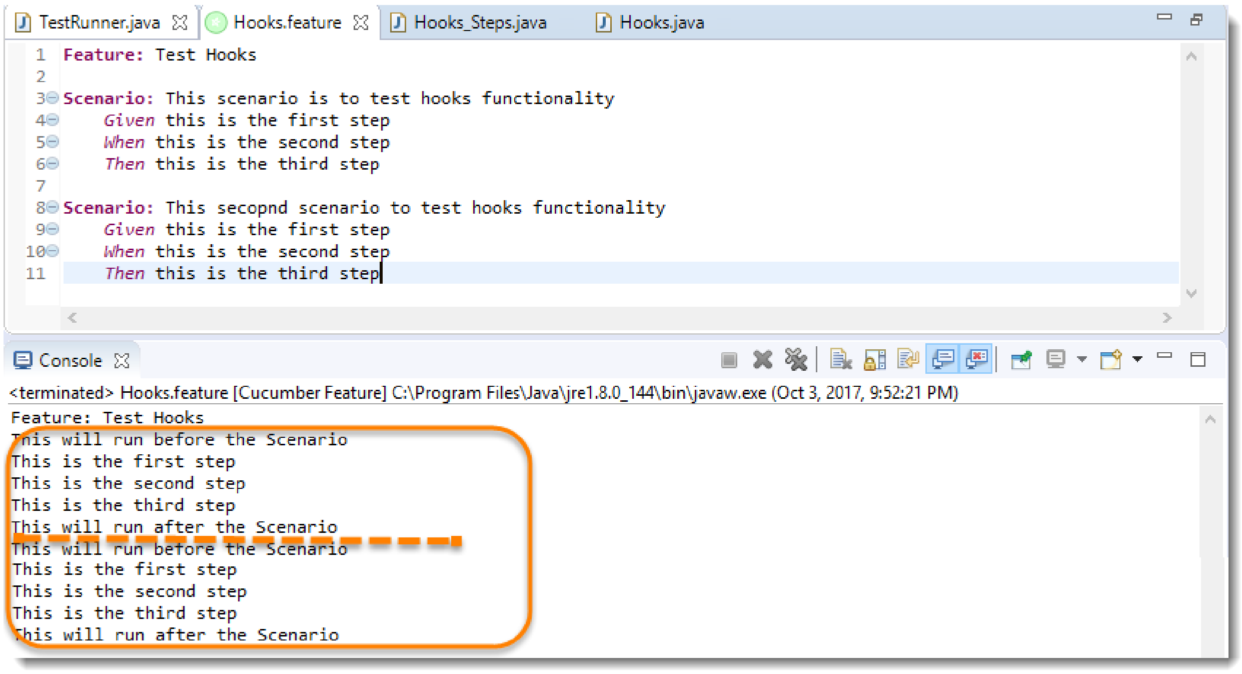


```
<terminated> Hooks.feature [Cucumber Feature] C:\Program Files\Java\jre1.8.0_144\bin\javaw.exe (Oct 3, 2017, 8:57:49 PM)
Feature: Test Hooks
This will run before the Scenario
This is the first step
This is the second step
This is the third step
This will run after the Scenario

  Scenario: This scenario is to test hooks functionality # C:/ToolsQA/OnlineStore/Feature/Hooks.feature:3
    Given this is the first step                         # Hooks_Steps.This_Is_The_First_Step()
    When this is the second step                         # Hooks_Steps.This_Is_The_Second_Step()
    Then this is the third step                          # Hooks_Steps.This_Is_The_Third_Step()

1 Scenarios (1 passed)
3 Steps (3 passed)
0m0.109s
```

No need of explanation, it is self explanatory

Test Hooks with Multiple Scenarios

I just wanted to show you the reaction of Hooks with the multiple scenarios. Let’s just add one more Test Scenario in the feature file and run the feature again.



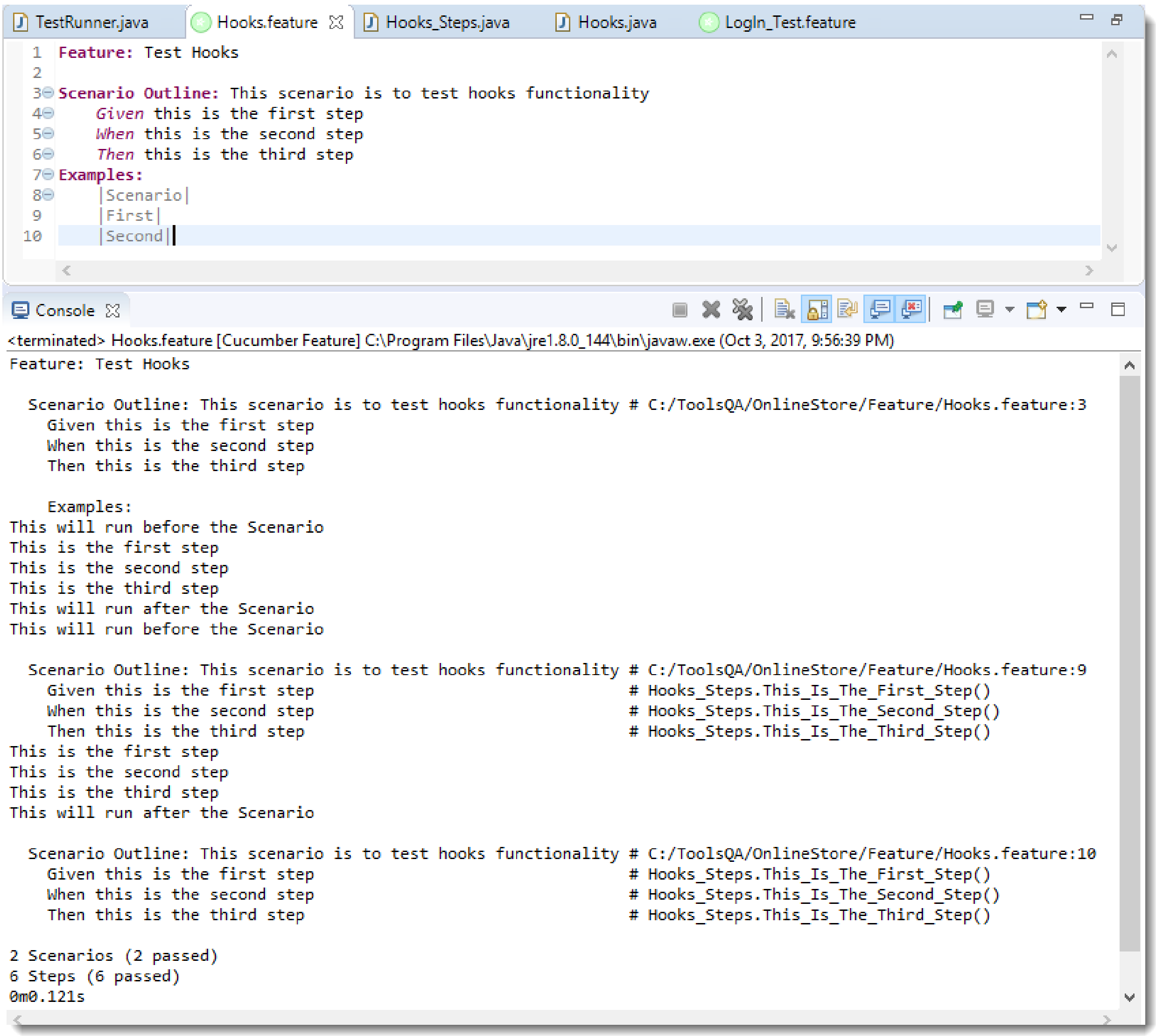
```
Feature: Test Hooks

Scenario: This scenario is to test hooks functionality
    Given this is the first step
    When this is the second step
    Then this is the third step

Scenario: This secopnd scenario to test hooks functionality
    Given this is the first step
    When this is the second step
    Then this is the third step
```

```
<terminated> Hooks.feature [Cucumber Feature] C:\Program Files\Java\jre1.8.0_144\bin\javaw.exe (Oct 3, 2017, 9:52:21 PM)
Feature: Test Hooks
This will run before the Scenario
This is the first step
This is the second step
This is the third step
This will run after the Scenario
This will run before the Scenario
This is the first step
This is the second step
This is the third step
This will run after the Scenario
```

***Note**: Scenario Hooks execute before and after every scenario. In the above example, executed two times for two scenarios.*

Test Hooks with Example Scenarios

Lets take a look when we have Scenario Outline with Examples.



```
Feature: Test Hooks

Scenario Outline: This scenario is to test hooks functionality
    Given this is the first step
    When this is the second step
    Then this is the third step
Examples:
    |Scenario|
    |First|
    |Second|
```

<terminated> Hooks.feature [Cucumber Feature] C:\Program Files\Java\jre1.8.0_144\bin\javaw.exe (Oct 3, 2017, 9:56:39 PM)

```
Feature: Test Hooks

  Scenario Outline: This scenario is to test hooks functionality # C:/ToolsQA/OnlineStore/Feature/Hooks.feature:3
    Given this is the first step
    When this is the second step
    Then this is the third step

    Examples:
This will run before the Scenario
This is the first step
This is the second step
This is the third step
This will run after the Scenario
This will run before the Scenario

  Scenario Outline: This scenario is to test hooks functionality # C:/ToolsQA/OnlineStore/Feature/Hooks.feature:9
    Given this is the first step                                 # Hooks_Steps.This_Is_The_First_Step()
    When this is the second step                                 # Hooks_Steps.This_Is_The_Second_Step()
    Then this is the third step                                  # Hooks_Steps.This_Is_The_Third_Step()
This is the first step
This is the second step
This is the third step
This will run after the Scenario

  Scenario Outline: This scenario is to test hooks functionality # C:/ToolsQA/OnlineStore/Feature/Hooks.feature:10
    Given this is the first step                                 # Hooks_Steps.This_Is_The_First_Step()
    When this is the second step                                 # Hooks_Steps.This_Is_The_Second_Step()
    Then this is the third step                                  # Hooks_Steps.This_Is_The_Third_Step()

2 Scenarios (2 passed)
6 Steps (6 passed)
0m0.121s
```

***Note**: Again, in cucumber every example is considered as a separate scenario. So the output is same as the second example above.*

Tagged Hooks in Cucumber

In the last chapters of ***Cucumber Hooks*** & ***Cucumber Tags*** , we learned that how what are Hooks & Tags and their importance and their usage in Cucumber tests. In this chapter we will look at the concept of ***Tagged Hook in Cucumber.***

Now we know that if we need to do anything before of after the test, we can use *@Before & @After hooks*. But this scenario works till the time our prerequisites are same for all the scenarios. For example till the time prerequisite for any test is to start the browser, hooks can solve our purpose. But what if we have different perquisites for different scenarios. And we need to have different hooks for different scenarios.

Again, Cucumbers has given feature of *Tagged Hooks* to solve the above situation where we need to perform different tasks before and after scenarios.

Tagged Hooks in Cucumber

Lets again start with doing an simple exercise to get the concept straight. Just keep three different scenarios in the feature file with the same *Given, When & Then* steps.

1)-First step is to annotate required scenarios using **@ + *AnyName*** at the top of the Scenario. For this example, i just annotate each scenario with the sequence order of it, like ***@First, @Second & @Third***.

Feature File

```
Feature: Test Tagged Hooks

@First
Scenario: This is First Scenario
 Given this is the first step
 When this is the second step
 Then this is the third step

@Second
Scenario: This is Second Scenario
 Given this is the first step
 When this is the second step
 Then this is the third step

@Third
Scenario: This is Third Scenario
 Given this is the first step
```

```
When this is the second step
Then this is the third step
```

2) Create a Step definition file and just print the execution order of the steps in the console.

Step Definitions

```java
package stepDefinition;

 import cucumber.api.java.en.Given;
 import cucumber.api.java.en.Then;
 import cucumber.api.java.en.When;

 public class Hooks_Steps {

 @Given("^this is the first step$")
 public void This_Is_The_First_Step(){
 System.out.println("This is the first step");
 }

 @When("^this is the second step$")
 public void This_Is_The_Second_Step(){
 System.out.println("This is the second step");
 }

 @Then("^this is the third step$")
 public void This_Is_The_Third_Step(){
 System.out.println("This is the third step");
 }

 }
```

3) Define *tagged hooks* in Hooks class file. Hooks can be used like ***@Before("@TagName")***. Create before and after hooks for every scenario. I have also added normal before and after hooks, in case you are not aware, please go to the previous chapter of ***Hooks in Cucumber***.

Hooks

```java
package utilities;

import cucumber.api.java.After;
import cucumber.api.java.Before;

public class Hooks {

 @Before
    public void beforeScenario(){
        System.out.println("This will run before the every Scenario");
    }

 @After
    public void afterScenario(){
        System.out.println("This will run after the every Scenario");
    }

 @Before("@First")
    public void beforeFirst(){
        System.out.println("This will run only before the First Scenario");
    }

 @Before("@Second")
    public void beforeSecond(){
        System.out.println("This will run only before the Second Scenario");
    }

 @Before("@Third")
    public void beforeThird(){
        System.out.println("This will run only before the Third Scenario");
    }

 @After("@First")
    public void afterFirst(){
        System.out.println("This will run only after the First Scenario");
    }

 @After("@Second")
    public void afterSecond(){
        System.out.println("This will run only after the Second Scenario");
    }

 @After("@Third")
    public void afterThird(){
        System.out.println("This will run only after the Third Scenario");
    }
}
```

***Note**: We learned that @Before & @After hooks runs before & after every Scenario. But **@Before("@First")** will run only before the first scenario and like wise other tagged hooks. Again, these tags names can be anything and no need to be first, second and third.*

4) Run the feature file and observe the output.

Output

```
Feature: Test Tagged Hooks
This will run only before the First Scenario
This will run before the every Scenario
This is the first step
This is the second step
This is the third step
This will run after the every Scenario
This will run only after the First Scenario
This will run only before the Second Scenario
This will run before the every Scenario
This is the first step
This is the second step
This is the third step
This will run after the every Scenario
This will run only after the Second Scenario
This will run before the every Scenario
This will run only before the Third Scenario
This is the first step
This is the second step
This is the third step
This will run only after the Third Scenario
This will run after the every Scenario
```

Common Tagged Hooks for Multiple Scenarios

We can have common tagged hooks for multiple scenarios as well. In the below example, I just combined the ***@Before("First")*** and ***@Before("Third")*** by ***@Before("@First, @Third").*** So in this way we do not need have two different hooks logic.

Hooks

```java
package utilities;

import cucumber.api.java.After;
import cucumber.api.java.Before;

public class Hooks {

 @After
    public void afterScenario(){
        System.out.println("This will run after the every Scenario");
    }
 @Before
    public void beforeScenario(){
        System.out.println("This will run before the every Scenario");
    }

 @Before("@Second")
    public void beforeSecond(){
        System.out.println("This will run only before the Second Scenario");
    }
 @Before("@First,@Third")
    public void beforeFirstAndThird(){
        System.out.println("This will run before both First & Third Scenario");
    }

 @After("@First")
    public void afterFirst(){
        System.out.println("This will run only after the First Scenario");
    }
 @After("@Second")
    public void afterSecond(){
        System.out.println("This will run only after the Second Scenario");
    }
 @After("@Third")
    public void afterThird(){
        System.out.println("This will run only after the Third Scenario");
    }

}
```

Output

```
Feature: Test Tagged Hooks
This will run before the every Scenario
This will run before both First & Third Scenario
This is the first step
This is the second step
This is the third step
This will run only after the First Scenario
This will run after the every Scenario

This will run before the every Scenario
This will run only before the Second Scenario
This is the first step
This is the second step
This is the third step
This will run only after the Second Scenario
This will run after the every Scenario

This will run before the every Scenario
This will run before both First & Third Scenario
This is the first step
This is the second step
This is the third step
This will run only after the Third Scenario
This will run after the every Scenario
```

Execution Order of Hooks

In this chapter we will learn about ***Execution Order of Hooks***. If you ever have worked with ***TestNG***, you must know that it perform the execution in certain order. The same way ***Cucumber*** also execute the hooks in certain order. But there are ways to change the order of the executing according to the need of the test or the framework.

Before moving to this chapter, you must know about the ***Cucumber Tags***, ***Cucumber Hooks*** and ***Tagged Hooks in Cucumber***.

Execution Order of Hooks

Order hooks to run in a particular sequence is easy to do. As we already know the way to specify hooks in cucumber like putting an annotation just above the scenario. *Ordering also works the same way but the only difference is that it required an extra parameter. This extra parameter decides the order of execution of the certain hook.*

For example* @Before**, and if you want to specify the order it will become ***@Before(value = 1).

Same goes with any ***Tags*** or ***Hooks*** available in Cucumber including ***Tagged Hooks*** as well.

Exercise on Order Hooks

Lets take a different approach this time and do an exercise with the multiple hooks without any ordering value. Later we will bring *order value* and see the difference in output.

Feature File

```
Feature: Test Order Hooks

Scenario: First scenario to test Order Hooks functionality
 Given this is the first step
 When this is the second step
 Then this is the third step

Scenario: Second scenario to test Order Hooks functionality
 Given this is the first step
 When this is the second step
 Then this is the third step
```

This is the same plain feature file which we used in previous chapters on Tags, Hooks and Tagged Hooks.

Step Definitions

```java
package stepDefinition;
import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import cucumber.api.java.en.When;

public class Hooks_Steps {
 @Given("^this is the first step$")
 public void This_Is_The_First_Step(){
 System.out.println("This is the first step");
 }
 @When("^this is the second step$")
 public void This_Is_The_Second_Step(){
 System.out.println("This is the second step");
 }
 @Then("^this is the third step$")
 public void This_Is_The_Third_Step(){
 System.out.println("This is the third step");
 }
}
```

Again, steps definitions are also same as previous chapters.

Hooks

```java
package utilities;
import cucumber.api.java.After;
import cucumber.api.java.Before;

public class Hooks {

 @Before
    public void beforeScenario(){
        System.out.println("This will run before the every Scenario");
    }
 @Before
    public void beforeScenarioStart(){
        System.out.println("-----------------Start of Scenario-----------------");
    }
 @After
    public void afterScenarioFinish(){
        System.out.println("-----------------End of Scenario-----------------");
    }
 @After
    public void afterScenario(){
        System.out.println("This will run after the every Scenario");
    }

}
```

Above we mentioned two before and two after hooks. Execute the feature file as a whole and see the output below.

Output

```
Feature: Test Order Hooks
-----------------Start of Scenario-----------------
This will run before the every Scenario
This is the first step
This is the second step
This is the third step
-----------------End of Scenario-----------------
This will run after the every Scenario
-----------------Start of Scenario-----------------
This will run before the every Scenario
This is the first step
This is the second step
This is the third step
-----------------End of Scenario-----------------
This will run after the every Scenario
```

I would say that I want *—-End of Scenario——* to be printed after the *This will run after the every Scenario.*

How to set the Order or Priority of Cucumber Hooks?

The very important thing to note here is:

- ***@Before(order = int) :*** *This runs in increment order, means value 0 would run first and 1 would be after 0.*
- ***@After(order = int) :*** *This runs in decrements order, means apposite of @Before. Value 1 would run first and 0 would be after 1.*

So, as per the logic above the Hooks file will looks like below.

Hooks

```
package utilities;

import cucumber.api.java.After;
import cucumber.api.java.Before;

public class Hooks {

 @Before(order=1)
    public void beforeScenario(){
        System.out.println("This will run before the every Scenario");
    }
 @Before(order=0)
    public void beforeScenarioStart(){
        System.out.println("-----------------Start of Scenario-----------------");
    }


 @After(order=0)
    public void afterScenarioFinish(){
        System.out.println("-----------------End of Scenario-----------------");
    }
 @After(order=1)
    public void afterScenario(){
        System.out.println("This will run after the every Scenario");
    }

}
```

Output

```
Feature: Test Order Hooks
-----------------Start of Scenario-----------------
This will run before the every Scenario
This is the first step
This is the second step
This is the third step
This will run after the every Scenario
-----------------End of Scenario-----------------
-----------------Start of Scenario-----------------
This will run before the every Scenario
This is the first step
This is the second step
This is the third step
This will run after the every Scenario
-----------------End of Scenario-----------------
```

Now just play around with the Hooks + Order, also try to figure out how it behaves when you use the Ordering with Tagged Hooks.

Background in Cucumber

Background in Cucumber is used to define a step or series of steps which are common to all the tests in the feature file. It allows you to add some context to the scenarios for a feature where it is defined. A Background is much like a scenario containing a number of steps. But it runs before each and every scenario where for a feature in which it is defined.

For example to purchase a product on any E-Commerce website, you need to do following steps:

- *Navigate to Login Page*
- *Submit UserName and Password*

After these steps only you will be able to add a product to your *cart/basket* and able to perform the payment. Now as we are in a feature file where we will be testing only the *Add to Cart* or *Add to Bag* functionality, these tests become common for all tests. So instead of writing them again and again for all tests we can move it under the *Background* keyword.

Background in Cucumber

Lets start with a simple exercise to build the understanding of Background usage in Cucumber test. If we create a feature file of the scenario we explained above, this is how it will look like:

Feature File

```
Feature: Test Background Feature
Description: The purpose of this feature is to test the Background keyword

Background: User is Logged In
 Given I navigate to the login page
 When I submit username and password
 Then I should be logged in

Scenario: Search a product and add the first product to the User basket
 Given User search for Lenovo Laptop
 When Add the first laptop that appears in the search result to the basket
 Then User basket should display with added item

Scenario: Navigate to a product and add the same to the User basket
```

```
Given User navigate for Lenovo Laptop
When Add the laptop to the basket
Then User basket should display with added item
```

In the above example, we have two different scenarios where user is adding a product from search and directly from product page. But the common step is to log In to website for both the scenario. *This is why we creates another Scenario for Log In but named it as Background rather then a Scenario.* So that it executes for both the Scenarios

Step Definitions

```
package stepDefinition;

import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import cucumber.api.java.en.When;

public class BackGround_Steps {

 @Given("^I navigate to the login page$")
 public void i_navigate_to_the_login_page() throws Throwable {
 System.out.println("I am at the LogIn Page");
 }

 @When("^I submit username and password$")
 public void i_submit_username_and_password() throws Throwable {
 System.out.println("I Submit my Username and Password");
 }

 @Then("^I should be logged in$")
 public void i_should_be_logged_in() throws Throwable {
 System.out.println("I am logged on to the website");
 }

 @Given("^User search for Lenovo Laptop$")
 public void user_searched_for_Lenovo_Laptop() throws Throwable {
 System.out.println("User searched for Lenovo Laptop");
 }

 @When("^Add the first laptop that appears in the search result to the basket$")
 public void add_the_first_laptop_that_appears_in_the_search_result_to_the_basket()
throws Throwable {
 System.out.println("First search result added to bag");
 }

 @Then("^User basket should display with added item$")
 public void user_basket_should_display_with_item() throws Throwable {
```

```
System.out.println("Bag is now contains the added product");
}

@Given("^User navigate for Lenovo Laptop$")
public void user_navigate_for_Lenovo_Laptop() throws Throwable {
System.out.println("User navigated for Lenovo Laptop");
}

@When("^Add the laptop to the basket$")
public void add_the_laptop_to_the_basket() throws Throwable {
System.out.println("Laptop added to the basket");
}

}
```

Just printing the appropriate logs in the steps. But we would bring the advance usage of the same in our next series of ***Designing Automation Framework with Cucumber.***

Output

```
Feature: Test Background Feature
  Description: The purpose of this feature is to test the Background keyword

I am at the LogIn Page
I Submit my Username and Password
I am logged on to the website
User searched for Lenovo Laptop
First search result added to bag
Bag is now contains the added product

I am at the LogIn Page
I Submit my Username and Password
I am logged on to the website
User navigated for Lenovo Laptop
Laptop added to the basket
Bag is now contains the added product
```

Note*: Hope you noticed the impact. The background ran two times in the feature before each scenario.*

Background with Hooks

This is so interesting to see the working of *Background with Hooks*. *The background is run before each of your scenarios but after any of your **@Before hook***.

To get it straight, let's assign a task to the *Before & After Hook* in the same test.

- *@Before: Print the starting logs*
- *@Before: Start browser and Clear the cookies*
- *@After: Close the browser*
- *@After: Print the closing logs*

Hooks File

```java
package utilities;

import cucumber.api.java.After;
import cucumber.api.java.Before;

public class Hooks {

 @Before(order=1)
    public void beforeScenario(){
        System.out.println("Start the browser and Clear the cookies");
    }
 @Before(order=0)
    public void beforeScenarioStart(){
        System.out.println("-----------------Start of Scenario-----------------");
    }


 @After(order=0)
    public void afterScenarioFinish(){
        System.out.println("-----------------End of Scenario-----------------");
    }
 @After(order=1)
    public void afterScenario(){
        System.out.println("Log out the user and close the browser");
    }

}
```

Output

```
Feature: Test Background Feature
  Description: The purpose of this feature is to test the Background keyword

  -----------------Start of Scenario-----------------
Start the browser and Clear the cookies
I am at the LogIn Page
I Submit my Username and Password
I am logged on to the website
User searched for Lenovo Laptop
First search result added to bag
Bag is now contains the added product
Log out the user and close the browser
-----------------End of Scenario-----------------

-----------------Start of Scenario-----------------
Start the browser and Clear the cookies
I am at the LogIn Page
I Submit my Username and Password
I am logged on to the website
User navigated for Lenovo Laptop
Laptop added to the basket
Bag is now contains the added product
Log out the user and close the browser
-----------------End of Scenario-----------------
```

Good practices for using Background

It is really necessary to understand the right usage of *Background*. As *hooks* as well gives similar kind of functionality and more over almost all the task can be done by *hooks* as well. This is why it is critical to use the *background* at the right place in the test.

Feature Dependency

Any feature level dependency should be tie with the background and any scenario level dependency should be tie with hooks.

Keep Background short.

You're expecting the user to actually remember this stuff when reading your scenarios. If the background is more than 4 lines long, can you move some of the irrelevant details into high-level steps? See Calling Steps from Step Definitions.

Make your Background section vivid.

You should use colorful names and try to tell a story, because the human brain can keep track of stories much better than it can keep track of names like "User A", "User B", *“Site 1”, and so on.*