Cucumber With Java

Beginner’s Guide

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About the Author

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His hobbies include travelling to new tourist places, watching basketball, cricket, Soccer and learning latest technological stuff.
Who is this book for

This book is for software developers, automation testers, Devops and engineers working on IT project. Whether you are a beginner or an experienced developer, this book will help you master the skills on Cucumber.

The book starts with introduction of Cucumber and then dives into key concepts like creating project in IntelliJ IDEA, using tags, plugins, integration with Junit, executing selenium tests, using picocontainer and lamda expressions.
Preface

This book is for those who are new to Cucumber. It will help you understand what is Cucumber and how you can use it in your software project.

In this book, you will learn below topics.

1. **Introduction to Cucumber**
2. **Installation of Cucumber**
3. **Writing feature files using Gherkin**
4. **Adding Cucumber dependency to Java project**
5. **Cucumber Test**
6. **Executing Cucumber tests using Cucumber class**
7. **Cucumber options**
8. **Filtering scenarios**
9. **Passing parameters to steps**
   10. Passing the data table to steps
   11. Feature file variations
   12. **Running multiple feature files in Cucumber**
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1. **Introduction**

Cucumber is the BDD (Behavior driven development) testing framework.

Key things to note about Cucumber are -

1. Open source BDD testing framework.
2. Cross platform framework.
3. Tests are written in various languages like English, French, German and many more using Gherkin Syntax.
4. We can write the tests in various programming languages like Ruby, JRuby, PHP, Java, Jython, Groovy, Javascript, Clojure, Gosu, Lua, .Net, PHP, C++ and TCL
5. Integrates very well with CI servers like Jenkins and TeamCity
6. Reports can be generated in HTML, JSON, JUnit style
7. Capybara - the testing framework - is a part of Cucumber
8. Integrates very well with frameworks like Selenium, Appium, Spring, Watir, Ruby on Rails etc.
2. **Installation of Cucumber**

Setting up Cucumber is very simple. You will need to install below tools.

1. Java JDK
2. Java IDE - IntelliJ IDEA or Eclipse
3. Cucumber library
4. Build tools like Maven or gradle
5. IntelliJ IDEA Plugins - Gherkin and cucumber for Java

Below image shows the IntelliJ plugins that you need.

![Cucumber and Gherkin plugins in IntelliJ IDEA](image)

Create a simple Maven or gradle project and add below dependency.

```xml
<dependency>
    <groupId>info.cukes</groupId>
    <artifactId>cucumber-java</artifactId>
</dependency>
```
For writing the test steps using lambda expression in Java 8, you will have to add below dependency.

```xml
<dependency>
  <groupId>info.cukes</groupId>
  <artifactId>cucumber-java8</artifactId>
  <version>1.2.4</version>
  <scope>test</scope>
</dependency>
```

You also need below JUnit dependencies to integrate Cucumber with JUnit.

```xml
<dependency>
  <groupId>junit</groupId>
  <artifactId>junit</artifactId>
  <version>4.12</version>
  <scope>test</scope>
</dependency>
```
3. Writing feature files using Gherkin

BDD is an emerging software development model used along with agile methodologies.

Some of the key things to know about BDD are -

1. Dan North created first BDD framework - Jbehave
2. Other BDD frameworks are Rbehave, Rspec, Cucumber, Behat
3. The tests are written in plain text in the form of stories or features
4. The Domain specific language (Gherkin) is used for writing the tests.

What is Gherkin?

Gherkin is the plain text language used to write feature files (also called as story files) in BDD frameworks like cucumber. Gherkin is implemented in most of languages in the world like English, German, French….many more. This means that any project stakeholder can write, read and understand the tests written in Gherkin. That’s the crux of the Gherkin language.

Key points to note about feature file

1. Each feature file can contain one or more scenarios and optionally outline and background.
2. Each scenario has steps like given, when, and, then, but

What are the keywords in Gherkin?

Gherkin has reserved some keywords which have specific meaning in the context of feature files.

Below is the list of keywords in Gherkin.

1. Given - used to specify the precondition of the scenario
2. When - used to specify the action
3. And - used to specify additional preconditions and actions
4. Then - used to specify the result of the action
5. Feature - Used to specify the description of the feature
6. Scenario - Used to specify the description of the scenario
7. Outline and Examples
8. Background - Used to specify the action to be taken before each scenario in the feature file is executed.
9. """" - used to pass data in multi-line format
10. | - used to pass data in table format
11. @ - used to tag scenarios and features
12. # - used to comment the line in feature file

Below feature file will make you understand most of the syntax of Gherkin language.
Basic Sample feature file

Now let us take a look at simplest feature file that we can have in gherkin.

Feature: ATM Card authentication

   User should be asked for the PIN once ATM card is inserted into the ATM machine.
   User should be given warning message if PIN number entered is wrong.
User should be authenticated successfully if PIN number entered is correct.

Scenario: Enter wrong PIN at ATM

   Given I insert the ATM card in ATM machine
   And I am asked to enter the PIN
   When I enter the correct PIN
   Then I should be able to see option to withdraw money

Sample feature file with Outline and Examples keyword

Scenario outline are used in cases where we need to repeat same set of actions but with different combination of data. For instance, In below scenario outline, we need to test the login functionality with different combinations of user id and password. In such cases, we use <VariableData> syntax to specify the varying data and it is supplied through examples keyword. So in below scenario, all steps will be executed 4 times - one for each user.

Scenario Outline: Password rules

   Given that we are on login page
   When we enter user id <ID> and password <PASSWORD>
   Then the login should be <OUTCOME>

Examples:

<table>
<thead>
<tr>
<th>ID</th>
<th>PASSWORD</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sagar</td>
<td>12$9#</td>
<td>Fail</td>
</tr>
<tr>
<td>Amol</td>
<td>9$jdg</td>
<td>PASS</td>
</tr>
<tr>
<td>Shaun</td>
<td>js$h9</td>
<td>PASS</td>
</tr>
<tr>
<td>Ben</td>
<td>KON()%</td>
<td>FAIL</td>
</tr>
</tbody>
</table>
Sample feature file with Background

Background keyword is used when we want to execute certain number of steps before each scenario. For example, suppose you want to clear browser cookies before execution of each scenario, then we can use background keyword with step to clear cookies.

Passing input data to the step

Each scenario can have multiple steps and each step is the user action. A step is like specific operation in the system. A steps may need the input data to be processed. We can pass the input to the step using 3 ways.

1. In-line Variables
2. Multi-line string
3. Tables

Grouping the scenarios and features with tags

We use tags to group similar scenarios and features together in Gherkin. @ symbol is used for tagging the scenarios and features.
4. **Adding Cucumber dependency to Java project**

To write the tests using cucumber, we need to add 2 types of dependencies.

1. cucumber-java
2. junit

If you are using Maven build management system, you can use below XML block in POM.XML

```xml
<dependency>
  <groupId>info.cukes</groupId>
  <artifactId>cucumber-java</artifactId>
  <version>1.2.4</version>
</dependency>

<dependency>
  <groupId>junit</groupId>
  <artifactId>junit</artifactId>
  <version>4.12</version>
  <scope>test</scope>
</dependency>
```
5. Cucumber Test

5.1 Writing first cucumber test

Just follow below steps to write first cucumber test in IntelliJ IDEA.

1. Create a maven project.
2. Add feature file containing scenarios in Test Resources directory.
3. Add the maven dependency for Cucumber.
4. Write step definitions and execute the tests from feature file.

Here is the feature file that we created and put in the test resources folder.

```java
@selenium
Feature: My feature

Scenario: Verify title
    Given I am on the www.softpost.org home page
    Then I verify that title contains tutorials
```

Note that we have not added the step definitions for above steps in feature file. When you execute the feature file, you will see below errors.

You can implement missing steps with the snippets below:

```java
@Given("^I am on the www\.softpost\.org home page$")
public void i_am_on_the_www_softpost_org_home_page() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}

@Then("^I verify that title contains tutorials$")
public void i_verify_that_title_contains_tutorials() throws Throwable {
    // Write code here that turns the phrase above into concrete actions
    throw new PendingException();
}
```

Undefined step: Given I am on the www.softpost.org home page

Undefined step: Then I verify that title contains tutorials

**Writing the step definitions**

You can copy above method snippets and write your own code inside it. Alternatively, if you have cucumber for Java and Gherkin plugin installed in IntelliJ IDEA, then you can create the step definitions by pressing alt + enter on the steps in Feature file as shown in below image.
Creating cucumber step definitions in IntelliJ IDEA

Here is the class with step definitions.

```java
package org.softpost;
import cucumber.api.java.After;
import cucumber.api.java.Before;
import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import junit.framework.Assert;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;

/**
 * Created by Sagar on 12-07-2016.
 */
@SuppressWarnings("ALL")
public class seleniumsteps
{
    WebDriver driver;

    @Before
    public void launchBrowser(){
        driver = new FirefoxDriver();
    }

    @Given("^I am on the www.softpost.org home page$")
    public void i_am_on_the_www_softpost_org_home_page() throws Throwable
    {
        driver.get("http://www.softpost.org");
    }

    @Then("^I verify that title contains tutorials$")
    public void i_verify_that_title_contains_tutorials() throws Throwable
    {
    }
```
Assert.assertTrue(driver.getTitle().toLowerCase().contains("tutorials"));

@After
public void killBrowser()
{
    driver.close();
    driver.quit();
}

After writing the step definitions, you can create the run configuration for feature file as shown in below image. Note that Glue property is very important. You should specify the package name that contains step definitions in the Glue.

```
glue in Cucumber run configuration
```

Then you can right click on feature file and run the test as shown in below image.
Running cucumber feature file in IntelliJ IDEA

If everything is ok, tests will run successfully.

Cucumber Reports in IntelliJ IDEA

You can view report of execution as shown in below images.
Viewing cucumber execution report in IntelliJ IDEA

HTML report of cucumber tests
6. Executing Cucumber tests using Cucumber class

To write the tests using JUnit @RunWith annotation, we need below dependencies.
cucumber.api.junit.Cucumber - This class is present in the cucumber-junit artifact library.

```xml
<dependency>
  <groupId>junit</groupId>
  <artifactId>junit</artifactId>
  <version>4.12</version>
  <scope>test</scope>
</dependency>

<dependency>
  <groupId>info.cukes</groupId>
  <artifactId>cucumber-junit</artifactId>
  <version>1.2.4</version>
</dependency>
```

Then you can add below test class. After running the below test, cucumber generates the report at target/selenium-reports. Cucumber.class contains main method that reads the feature file and executes scenario in it.

```java
package org.softpost;

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

@RunWith(Cucumber.class)
@CucumberOptions(
    features = "classpath:abc.feature",
    glue = "classpath:org.softpost",
    plugin = "html:target/selenium-reports"
)
public class MyTests
{

}
```
7. **Cucumber options**

When executing the cucumber scenarios, we can pass various options as mentioned below.

1. features - path of the features files
2. glue - path of the step definition classes
3. dry run - used to check that all step definitions are desinged
4. monochrome - true/false It controls the readability of the output
5. strict - false means that undefined steps are skipped. Test does not fail
6. name - used to filter the features and scenarios
7. plugin - json, html, junit, pretty
8. snippets - Snippet style can be Camel case or Underscore

Here is the sample test class showing all these options.

```java
package org.softpost;

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

@RunWith(Cucumber.class)
@CucumberOptions(
    features = "classpath:abc.feature",
    glue = "classpath:org.softpost",
    tags = "~@blocked",
    plugin = "html:target/selenium-reports",
    dryRun = false,
    monochrome = true,
    strict = true,
    snippets = SnippetType.CAMELCASE
)
```
public class MyTests
{
}
}
8. Filtering scenarios

8.1 Tagging the scenarios

We can tag scenarios using @ symbol in Feature files as shown in below example. Note that we can also tag all the scenarios in a feature file by writing the tag at the beginning of the feature file. We can also associate multiple tags with the same scenario as well. In below example, we have tagged the scenario with 4 tags - selenium, regression, sanity and critical.

```plaintext
@selenium
Feature: My feature
    @regression @sanity @critical
Scenario: Verify title
    Given I am on the www.softpost.org home page
    Then I verify that title contains tutorials
```

To execute the scenarios with 2 tags say regression and critical, we can use below syntax.
```plaintext
tags = ["@regression","@critical"]
```

To execute the scenarios with 2 tags say regression or critical, we can use below syntax
```plaintext
tags = ["@regression,@critical"]
```

To skip the scenarios tagged with tag say sanity, we can use below syntax
```plaintext
Negative tags = ["~@sanity"]
```

We can also tie the @Before and @After methods with scenarios tagged with specific names.
For example, below before method will be executed only before the scenarios tagged with selenium
```plaintext
@Before("@selenium")
```

Here is the example showing the usage of tags in Cucumber.

Consider below feature file.
```plaintext
@selenium
Feature: My feature
    @regression @sanity @critical
    Scenario: Verify softpost title
        Given I am on the www.softpost.org home page
        Then I verify that title contains tutorials
    @sanity
    Scenario: Verify yahoo title
        Given I am on the www.yahoo.com home page
        Then I verify that title contains tutorials
```
Now take a look at below Test Class. After executing below test class, only first scenario will be executed because that scenario is tagged with @sanity and @regression

```java
package org.softpost;
import cucumber.api.CucumberOptions;
import cucumber.api.SnippetType;
import cucumber.api.junit.Cucumber;
import org.junit.runner.RunWith;

@RunWith(Cucumber.class)
@cucumberOptions(
    features = "classpath:abc.feature",
    glue = "classpath:org.softpost",
    tags = {"@sanity","@regression"},
    plugin = "html:target/selenium-reports",
    dryRun = false,
    monochrome = true,
    strict = true,
    snippets = SnippetType.CAMELCASE
)

public class MyTest
{
    
}
```

Now take a look at below test class. After executing below test, both scenarios will be executed as both are tagged with @sanity tag.

```java
package org.softpost;
import cucumber.api.CucumberOptions;
import cucumber.api.SnippetType;
import cucumber.api.junit.Cucumber;
import org.junit.runner.RunWith;

@RunWith(Cucumber.class)
@cucumberOptions(
    features = "classpath:abc.feature",
    glue = "classpath:org.softpost",
    tags = {"@sanity"},
    plugin = "html:target/selenium-reports",
    dryRun = false,
    monochrome = true,
    strict = true,
    snippets = SnippetType.CAMELCASE
)
```
public class MyTest {

Now take a look at below test class. After executing below test class, none of the scenarios will be executed as tag is prefixed with ~.

package org.softpost;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;
import org.junit.runner.RunWith;
@RunWith(Cucumber.class)
@CucumberOptions(  
    features = "classpath:abc.feature",
    glue = "classpath:org.softpost",
    tags = {"~@sanity"},
    plugin = "html:target/selenium-reports"
)
8.2 Using name option

We can execute the specific scenarios with their names matching typical pattern.

For example - Consider below feature file.

@selenium

Feature: My feature

@regression @sanity @critical

Scenario: Verify softpost title

Given I am on the www.softpost.org home page

Then I verify that title contains tutorials

@sanity

Scenario: Verify yahoo title

Given I am on the www.yahoo.com home page

Then I verify that title contains tutorials

To execute only those scenarios with name containing “softpost”, we can use below test class. Note that we can also use regular expression as well to specify the value of scenario name.

```java
package org.softpost;

import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;
import org.junit.runner.RunWith;
@RunWith(Cucumber.class)
@CucumberOptions(
  features = “classpath:abc.feature”,
  glue = “classpath:org.softpost”,
  name = (“softpost”),
  plugin = “html:target/selenium-reports”
)

public class MyTest
{
}
```
9. **Passing parameters to steps**

We can pass the parameters to the step methods from feature file as shown in below scenario. In below scenario, we have passed the name of website in Given step. The main advantage of passing the parameters is that we can re-use same step method in different scenarios with different parameters.

@selenium

Feature: Simple feature

Scenario: Test web title
   Given I am on “www.yahoo.com” page
   Then I verify that the title is “yahoo”

Scenario: Test web title
   Given I am on “www.softpost.org” page
   Then I verify that the title is “tutorials”

Here are the step definitions for above steps. Note that both scenarios re-use same step definitions with different parameters.

```java
package org.softpost;

import com.google.common.primitives.Bytes;
import cucumber.api.Scenario;
import cucumber.api.java.After;
import cucumber.api.java.Before;
import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import junit.framework.Assert;
import org.openqa.selenium.OutputType;
import org.openqa.selenium.TakesScreenshot;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;

public class seleniumsteps
{
    WebDriver driver;
```
Scenario scenario;

@Before("@selenium")
public void launchBrowser(Scenario scenario)
{
    driver = new FirefoxDriver();
    this.scenario = scenario;
    System.out.println("Executing scenario " + scenario.getName());
}

@After("@selenium")
public void killBrowser()
{
    scenario.write("Finished scenario");
    if (scenario.isFailed())
    {
        scenario.embed(((TakesScreenshot)driver).getScreenshotAs(OutputType.BYTES), "image/png");
    }
    driver.close();
    driver.quit();
}

@Given("^I am on "([^\"]*)" page$")
public void i_am_on_page(String arg1) throws Throwable
{
    driver.get("http://" + arg1);
}

@Then("^I verify that the title is "([^\"]*)"$")
public void i_verify_that_the_title_is(String arg1) throws Throwable
{
    Assert.assertTrue(driver.getTitle().toLowerCase().contains(arg1));
}
}
10. Passing the data table to steps

10.1 Key - Value pair Datatable

We can pass the Data table with key and value as shown in below example.

Feature: Simple Datatable feature
Scenario: Test web title
   Given I am on home page of xyz site
   And I submit the form with below details
   |name     | sagar |
   |id       | 98989 |
   |address   | mumbai|
   Then I see that form submission is successful

Here is the step definition class for above scenario. Note how we have converted the data table to map and accessed the keys and values.

```java
package org.softpost;

import cucumber.api.DataTable;
import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import java.util.List;
import java.util.Map;

/**
 * Created by Sagar on 13-07-2016.
 */
public class DatatableSteps {

    @Given("^I am on home page of xyz site$")
    public void i_am_on_home_page_of_xyz_site() throws Throwable {
        System.out.println("Navigate to home page
    ");
    }

    @Given("^I submit the form with below details$")
    public void i_submit_the_form_with_below_details(DataTable arg1) throws Throwable {
        
    }
```
Map<\texttt{String,String}> m = arg1.asMap(String.class,String.class);

\texttt{System.out.println("Filling form with below data\n");}

\texttt{for (String k : m.keySet())}
{
\texttt{System.out.println("Key -> " + k + " Value -> " + m.get(k));}
}

\texttt{@Then("I see that form submission is successful")}

\texttt{public void i_see_that_form_submission_is_successful() throws Throwable}
{
\texttt{System.out.println("Verify form success message");}
}

\texttt{Here is the output of execution of above feature file.}

Navigate to home page

Filling form with below data

Key -> name Value -> sagar
Key -> id Value -> 98989
Key -> address Value -> mumbai

Verify form success message
1 Scenarios (1 passed)
3 Steps (3 passed)
0m0.525s
10.2 **Multiple column datatable in Cucumber**

Now let us look at how to pass the data table with multiple columns in Cucumber.

Feature: Multiple column data table

Scenario: Create new student records

Given We have below list of students

<table>
<thead>
<tr>
<th>name</th>
<th>id</th>
<th>address</th>
</tr>
</thead>
<tbody>
<tr>
<td>sagar</td>
<td>288345</td>
<td>Brisbane</td>
</tr>
<tr>
<td>watson</td>
<td>38829</td>
<td>London</td>
</tr>
<tr>
<td>paul</td>
<td>34223</td>
<td>Chicago</td>
</tr>
</tbody>
</table>

Now take a look at below Student Class. This class is mapped with the data table.

```java
package org.softpost;

/**
 * Created by Sagar on 13-07-2016.
 */

public class Student {
    private String name;
    private String address;
    private int id;

    public Student(String name, int id, String address) {
        this.name = name;
        this.id = id;
        this.address = address;
    }

    public void printStudent() {
        System.out.println("Student -> "+name +", "+id +", "+address);
    }
}
```

Now look at the step definition class. Note how we have converted the Data table to the list of student objects.

```java
package org.softpost;
```
import cucumber.api.DataTable;
import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import java.util.List;
import java.util.Map;

/**
 * Created by Sagar on 13-07-2016.
 */

public class DatatableSteps {

    @Given("^We have below list of students$")
    public void we_have_below_list_of_students(DataTable arg1) throws Throwable {
        List<Student> students = arg1.asList(Student.class);
        for (Student s : students) {
            s.printStudent();
        }
    }

    Here is the output of above code.

    Testing started at 19:48 …
    Student -> sagar, 288345, Brisbane
    Student -> watson, 38829, London
    Student -> paul, 34223, Chicago
    1 Scenarios (1 passed)
    1 Steps (1 passed)
    0m0.635s
11. Feature file variations

11.1 Scenario Background

Sometimes, we need to execute certain steps, before every scenario in the same feature file. Backgrounds allow you to reuse same steps across multiple scenarios. For example - to test some feature, we might need to filter records before every scenario. So we can put the steps required to filter the records inside Background. These steps would be executed every time each scenario in the same feature file is executed.

In below feature file, we have one step in the background (Given I filter some records). This step will be executed before every scenario in this feature file.

Feature: Simple background feature

   Background: Execute before every scenario
      Given I filter some records

Scenario: Verify delete functionality

   Given I click on the delete button of the first record
   Then I verify that record is removed from the table

Scenario: Verify Update functionality

   Given I click on update button of the first record
   Then I verify that record opens in new window and we can modify it

Here is the step definition class.

```java
package org.softpost;

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

/**
   * Created by Sagar on 13-07-2016.
   */

public class backgroundsteps {

   @Given("^I filter some records$")
   public void i_filter_some_records() throws Throwable {
```
System.out.println("Background - Filtering some records\n");

@Given("^I click on the delete button of the first record$")
public void i_click_on_the_delete_button_of_the_first_record() throws Throwable {
    System.out.println("Click delete button\n");
}

@Then("^I verify that record is removed from the table$")
public void i_verify_that_record_is_removed_from_the_table() throws Throwable {
    System.out.println("Verify deleted record\n");
}

@Given("^I click on update button of the first record$")
public void i_click_on_update_button_of_the_first_record() throws Throwable {
    System.out.println("Click update button\n");
}

@Then("^I verify that record opens in new window and we can modify it$")
public void i_verify_that_record_opens_in_new_window_and_we_can_modify_it() throws Throwable {
    System.out.println("Verify modified record\n");
}

Here is the output of execution of above feature file.
Background - Filtering some records
Click delete button
Verify deleted record

Background - Filtering some records
Click update button
Verify modified record

2 Scenarios (2 passed)
6 Steps (6 passed)
0m0.578s
11.2 Scenario outline

Sometimes, we need to execute the same scenario but with different test data. In such cases, we can use the concept called as scenario outline. In below example, same scenario will be executed twice. First time with 99 and 100. Second time with 11 and 200.

Feature: Outline feature

Scenario Outline: Addition of numbers

   When I add integers \(<i1>\) and \(<i2>\)

   Then I see the result as \(<sum>\)

Examples:

<table>
<thead>
<tr>
<th>(i1)</th>
<th>(i2)</th>
<th>(sum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>100</td>
<td>199</td>
</tr>
<tr>
<td>11</td>
<td>200</td>
<td>211</td>
</tr>
</tbody>
</table>

Here is the step definitions class.

```java
package org.softpost;

import cucumber.api.java.en.Then;
import cucumber.api.java.en.When;
import junit.framework.Assert;

/**<*
 * Created by Sagar on 13-07-2016.
 */

public class outlinesteps
{
    int result = 0;

    @When("^I add integers \(\d+\) and \(\d+\)$")
    public void i_add_integers_and(int arg1, int arg2) throws Throwable
    {
        result = arg1 + arg2;
        System.out.println("Adding \(\d+\) and \(\d+\)\n\n");
    }

    @Then("^I see the result as \(\d+\)$")
    public void i_see_the_result_as(int arg1) throws Throwable
    {
        Assert.assertEquals(result, arg1);
    }
}
```
Here is the output of execution of above feature file.

Testing started at 19:18 …

Adding 99 and 100

Adding 11 and 200

2 Scenarios (2 passed)
4 Steps (4 passed)
0m0.595s
12. **Running multiple feature files in Cucumber**

We can execute scenarios in multiple feature files as shown in below example. We are running 2 feature files - multicolumn and outline. Note that to execute all feature files, we can also use * operator.

```java
package org.softpost;
import cucumber.api.CucumberOptions;
import cucumber.api.junit.Cucumber;
import org.junit.runner.RunWith;
@RunWith(Cucumber.class)
@cucumberOptions(features = {"classpath:multicolumn.feature","classpath:outline.feature"},
glue = "classpath:org.softpost",
plugin = "html:target/selenium-reports"
)
public class MultipleFeatureTest {
}
```

Here is the HTML report generated after execution of above test class.

![Feature: Multiple column data table](image)

<table>
<thead>
<tr>
<th>Given</th>
<th>We have below list of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>id</td>
</tr>
<tr>
<td>sagar</td>
<td>288345</td>
</tr>
<tr>
<td>watson</td>
<td>38829</td>
</tr>
<tr>
<td>paul</td>
<td>34223</td>
</tr>
</tbody>
</table>

![Feature: Outline feature](image)

- **Scenario Outline**: Addition of numbers
- **Scenario Outline**: Addition of numbers
- **Scenario Outline**: Addition of numbers

---

*Multiple feature files in Cucumber*
13. **Sharing selenium Webdriver instance using PicoContainer**

In Selenium automation, we create a WebDriver instance. But we can not use the same driver instance in different step definition classes in Cucumber.

We can share the same Webdriver instance in 2 ways.

1. By creating a static Webdriver
2. By using PicoContainer (Dependency Injection)

First method is very simple. Just create a class with Static WebDriver field.

Now let us take a look at how we can share the same driver using Dependency Injection. For this, you will need below dependencies.

```xml
<dependency>
  <groupId>org.seleniumhq.selenium</groupId>
  <artifactId>selenium-java</artifactId>
  <version>2.42.2</version>
</dependency>

<dependency>
  <groupId>info.cukes</groupId>
  <artifactId>cucumber-picocontainer</artifactId>
  <version>1.2.4</version>
  <scope>test</scope>
</dependency>
```

Next, we need to create a class where we will create a Webdriver instance as shown in below example. Note that we instantiates the driver only once. We have got a method getDriver to get the driver.

```java
package org.softpost;

import cucumber.api.java.After;
import cucumber.api.java.Before;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;

public class SharedClass
{

    private static boolean startBrowser = false;
```
private WebDriver driver;
public String title = "";

@Before("@sharedselenium")
public void init() throws Exception
{
if (!startBrowser)
{

driver = new FirefoxDriver();

//To stop launching browser after every scenario, assign below variable with true value
startBrowser = false;
}
}

public WebDriver getDriver()
{
return driver;
}

@After("@sharedselenium")
public void cleanUp()
{

driver.close();
driver.quit();
}

Next in the step definition classes, we can pass the instance of above class as shown in below example. Note that we are using getDriver() method to access the driver instance. So similarly you can pass the instance of SharedClass to any step definition class that wants to use the driver. PicoContainer is used internally to wire up dependent classes.
package org.softpost;

import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import junit.framework.Assert;

public class ShareSeleniumSteps {

    SharedClass sharedClass;

    public ShareSeleniumSteps(SharedClass sharedClass) {
        this.sharedClass = sharedClass;
    }

    @Given("^I am on the www\.softpost\.org home page$")
    public void i_am_on_the_www_softpost_org_home_page() throws Throwable {
        sharedClass.getDriver().get("http://www.softpost.org");
    }

    @Then("^I verify that title contains tutorials$")
    public void i_verify_that_title_contains_tutorials() throws Throwable {
        Assert.assertTrue(sharedClass.getDriver().getTitle().toLowerCase().contains("tutorials"));
    }

    @Then("^I verify that title contains tutoorials$")
    public void i_verify_that_title_contains_tutoorials() throws Throwable {
        Assert.assertTrue(sharedClass.getDriver().getTitle().toLowerCase().contains("tutoorials"));
    }
}

14. Reports in Cucumber

14.1 Embedding the screenshot

When working in a selenium automation project, we often need to take a screenshot on test failure. Selenium API provides a way to take screenshot with the help of takesScreenshot interface.

Cucumber allows you to embed that screenshot in the Cucumber reports.

Here is the simple code.

```java
@After("@selenium")
    public void killBrowser(Scenario scenario)
    {
        if (scenario.isFailed())
        {
            scenario.embed(((TakesScreenshot)driver).getScreenshotAs(OutputType.BYTES), "image/png");
        }
        driver.close();
        driver.quit();
    }
```

Below image shows where to find the HTML report in Maven project.
Cucumber report location in Maven project

Here is the sample HTML report showing the captured screenshot.
Embeding the screenshot in Cucumber report
14.2 **Writing to Cucumber HTML reports**

We can write to Cucumber HTML report using write method of Scenario class. 

Below step definition class illustrates how to write to HTML report. Note how we have passed scenario object to Before method.

```java
package org.softpost;

import com.google.common.primitives.Bytes;
import cucumber.api.Scenario;
import cucumber.api.java.Scenario;
import cucumber.api.java.After;
import cucumber.api.java.Before;
import cucumber.api.java.en.Given;
import cucumber.api.java.en.Then;
import junit.framework.Assert;
import org.openqa.selenium.OutputType;
import org.openqa.selenium.TakesScreenshot;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;

/**
 * Created by Sagar on 12-07-2016.
 */
@SuppressWarnings("ALL")
public class seleniumsteps
{

    WebDriver driver;
    Scenario scenario;

    @Before("@selenium")
    public void launchBrowser(Scenario scenario)
    {
        driver = new FirefoxDriver();
        this.scenario = scenario;
    }

    @Given("^I am on the www\.softpost\.org home page$")
    public void i_am_on_the_www_softpost_org_home_page() throws Throwable
    {
        driver.get("http://www.softpost.org");
    }
```

---

**Package: org.softpost**

**Import Statements:**

- com.google.common.primitives.Bytes
- cucumber.api.Scenario
- cucumber.api.java.After
- cucumber.api.java.Before
- cucumber.api.java.en.Given
- cucumber.api.java.en.Then
- junit.framework.Assert
- org.openqa.selenium.OutputType
- org.openqa.selenium.TakesScreenshot
- org.openqa.selenium.WebDriver
- org.openqa.selenium.firefox.FirefoxDriver

---

**Class: seleniumsteps**

**Methods:**

- `public static void launchBrowser(Scenario scenario)`
  - Set the WebDriver instance to a new instance of FirefoxDriver.
  - Assign the scenario object to this scenario.

- `public static void i_am_on_the_www_softpost_org_home_page() throws Throwable`
Here is the sample HTML report.

Writing to cucumber HTML report
15. Cucumber using Lambda Expressions

15.1 Cucumber dependency for using Lambda expressions in Java 8

In Java 8, Lambda expressions were introduced. Cucumber allows you to write step
definitions using Lambda expressions.

You need to add below dependency to write tests using Lambda expressions.

```xml
<dependency>
  <groupId>info.cukes</groupId>
  <artifactId>cucumber-java8</artifactId>
  <version>1.2.4</version>
  <scope>test</scope>
</dependency>
```

Ensure that JDK version is 1.8.0_51. Otherwise you will get below error.

Exception in thread “main” cucumber.runtime.CucumberException: Failed to instantiate
class ……CucumberException: java.lang.IllegalArgumentException: Wrong type at
constant pool index
15.2 Cucumber test using Lambda expressions

Now let us write sample cucumber step definitions using Lambda expressions.

Here is the sample feature file.

Feature: Lambda feature
Scenario: Verify sum
  Given I add 1 and 2
  Then I verify that sum is 3

Here is the sample Test Class using Lambda expressions to write the step definitions. Note that StepClass must implement cucumber.api.java8.En interface and step methods should be inside the constructor of test class. You also need to ensure that Java language level should be 1.8.

```java
package org.softpost;

import cucumber.api.java8.En;

public class StepClass8 implements En {
    public StepClass8() {
        Given("^I add 1 and 2$", () -> {
            System.out.println("Adding 1 and 2");
        });

        Then("^I verify that sum is 3$", () -> {
            System.out.println("Checking that sum is 3");
        });
    }
}
```

If you are using Maven, you can specify the Java language level using below XML section in POM.XML

```xml
<build>
    <plugins>
        <plugin>
            <groupId>org.apache.maven.plugins</groupId>
            <artifactId>maven-compiler-plugin</artifactId>
            <version>2.3.2</version>
        </plugin>
    </plugins>
    <source>1.8</source>
</build>
```
<target>1.8</target>
<encoding>UTF-8</encoding>
</configuration>
</plugin>
</plugins>
</build>