Webdriver | Selenium (testing framework) | How Things Work

How does the Selenium WebDriver work?

32 Answers

Prashant Singh, Software Engineer at Mphasis (2013-present)
Answered Sep 17 2017 Â· Author has **453** answers and **358k** answer views

The first question that must come to your mind is what is Selenium Webdriver? It is nothing but a web automation framework that allows you to execute test cases across different browsers. If you remember Selenium IDE you already know how it only allowed us to work on Firefox browser alone. With Selenium Webdriver you can run your tests all across different browsers like Chrome, Internet Explorer, Safari, Opera etc.

If that werenâ€™t enough Selenium Webdriver also allows you to use a programming language of your choice. So, our coding will not be limited to Selenese that we had been using with Selenium IDE. The horizon has just gotten bigger!

Using a programming language opens possibilities for using conditional operations like if-else. You can also make use of loops now which wasnâ€™t possible hitherto.

Letâ€™s skip to learning what is Selenium Webdriver first.

What is Selenium Webdriver

Selenium Webdriver is nothing but a set of libraries or APIs which interacts with a web application. It helps in automating browsers and testing them to check if they are working as expected. Even background processes (API testing) can be automated with the help of Selenium Webdriver.

As we had already seen in the chapter about evolution and components of Selenium, Selenium Webdriver had emanated from Selenium RC which was also known as Selenium â€“ 1.

Selenium RC had a lot of limitations and a complex structure that was overcome with the advent of Selenium Webdriver. We are going to see what is Selenium Webdriver in here and prepare a simple script in Eclipse IDE to see how we can achieve what we were so easily able to using Selenium IDE.

Answering the most daunting question of what is Selenium Webdriver and why we use it:

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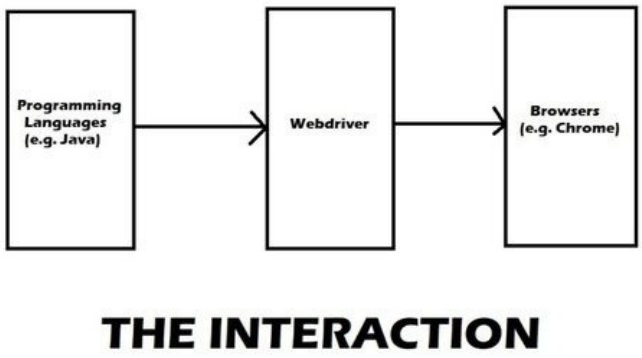
1. Fast
2. Lets you use a programming language of your choice
3. Directly talks to the browser
4. API is concise
5. Can use HTMLUnit

In order to get started, you need to have Eclipse IDE installed on your system, Java installed and Selenium libraries integrated, all of which you can go and learn from this chapter.

Different Driver Servers

To learn what is selenium webdriver you must know about driver servers. To run a test case on a particular browser you have to have its respective programs on your system. These programs are called **Driver Servers**.

A language helps in making your system understand that you wish to communicate with a browser. Webdriver is a set of APIs responsible for establishing that communication with the browser.



THE INTERACTION

So all you are supposed to have is a Driver Server for a browser you wish to test/automate in, and provide the path for it for Eclipse to understand where it is located to start interpreting things.

HTMLUnit and Firefox browsers are some of those browsers that Webdriver can automate directly. You donâ€™t need to provide a separate component for these two. For the rest of the browsers you need to have their respective driver servers.

Selenium Dudes have packed up their Driver Server names smartly. Named them after their Browser names.

- For Firefox 35 and above you need to have MozillaGeckoDriver (Selenium 3)
- For Chrome, you should have ChromeDriver
- InternetExplorerDriver Server for IE.
- For Opera, OperaDriver
- For Safari, SafariDriver

and so on.

If you are working with **Selenium 2**, just remember these points:

- Firefox version should be 46 or below. Others are not stable. You donâ€™t need to have any driver server.

If you are working with **Selenium 3**, remember these points:

- Firefox version can be 46 and above. Here you are supposed to use GeckoDriver.
- Java 8 should be installed in your system. Previous versions donâ€™t work with Selenium 3.

Read the full article here: What is Selenium Webdriver | A Simple Selenium Test | Dumb IT Dude

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Alex Siminiuc, enjoys writing about Selenium test automation and labradors

Updated Oct 17 2016 Â· Author has **167** answers and **651.5k** answer views

There are 2 ways of explaining how Selenium WebDriver works:

- easy
- technical

Lets see how easy is the first one.

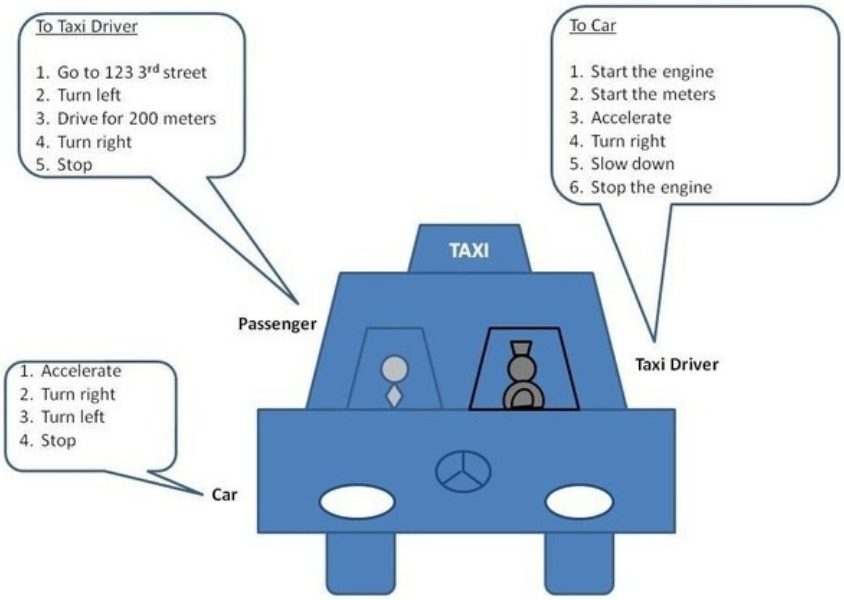
It uses an analogy with taxi driving.

Selenium WebDriver drives a browser the same way a taxi driver drives a cab.

In taxi driving, there are typically 3 actors:

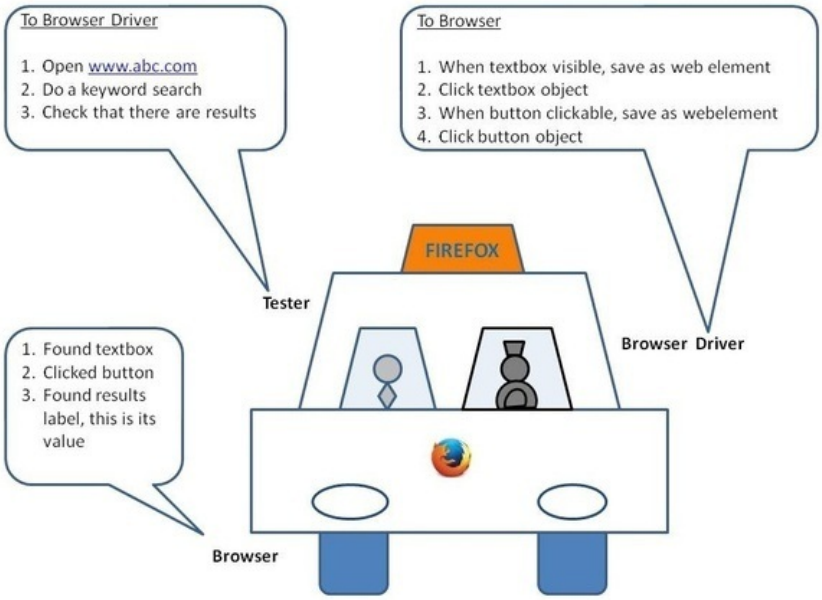
- **the client;** he tells the taxi driver where he wants to go and how to get there
- **the taxi driver;** he executes the client's requests; the taxi driver sends his own requests to the car
- **the car;** the car executes the taxi driver's requests

The client gets to the destination through dialogues that happen between the client - taxi driver and taxi driver - car.



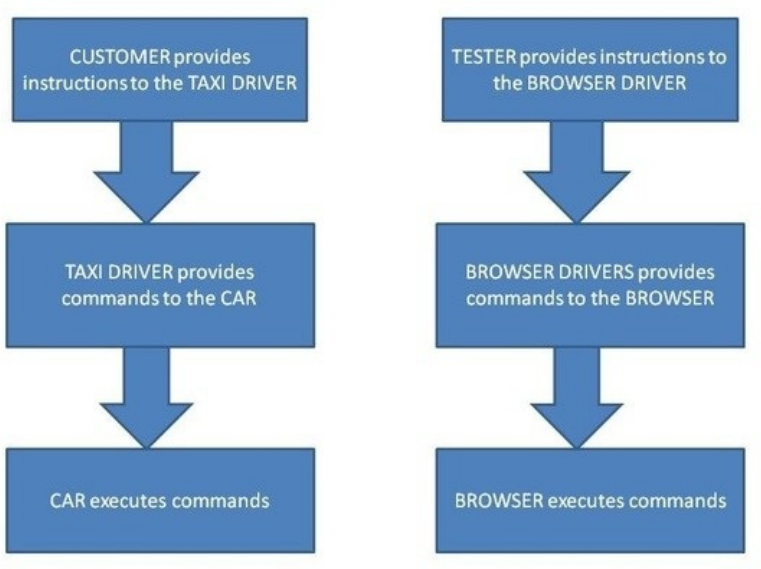
In test automation with Selenium WebDriver (and other tools), there are 3 actors as well:

- **test engineer that writes the automation code**; the automation code sends requests to the browser driver component
- **the browser driver component**; it executes the test engineer requests; it sends its own request to the browser
- **the browser**; it executes the browser driver requests



So this is the analogy:

1. the test engineer is like a taxi client
2. the browser driver is like a taxi driver
3. the browser is like a taxi



The technical explanation is not using analogies.

Like most technical explanations, there are no photos either :(

When the automation script is executed, the following steps happen:

- **for each Selenium command, a HTTP request is created and sent to the browser driver**
- the browser driver **uses a HTTP server for getting the HTTP requests**
- **the HTTP server** determines the **steps needed for implementing the Selenium command**
- the implementation steps are executed on the browser
- the execution status is sent back to the HTTP server
- the **HTTP server sends the status back to the automation script**

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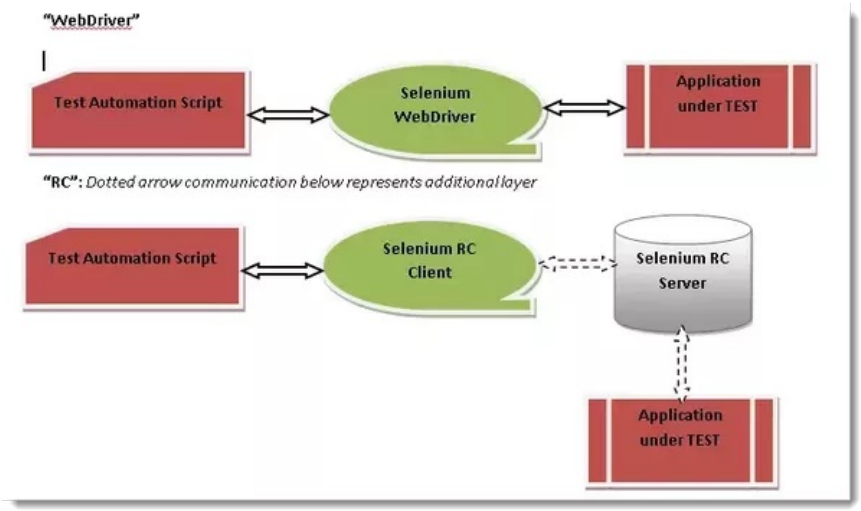
Fatema Keya, Reader & Writer at Quora
Answered Jan 12 Â· Author has **233** answers and **203.6k** answer views

Selenium WebDriver is a collection of open source APIs which are used to automate the testing of a web application. This tool is used to automate web application testing to verify that it works as expected. It supports many browsers such as Safari, Firefox, IE, and Chrome. However, using the Selenium WebDriver, we can automate testing for web applications only. It does not qualify for window-based applications.



It also supports different **programming languages** such as C#, Java, Perl, PHP and Ruby for writing test scripts. Selenium Webdriver is platform-independent since the same code can be used on different **Operating Systems** like Microsoft Windows, Apple OS and Linux. It is one of the elements of the selenium family, which also includes Selenium IDE, Selenium Remote Control, Selenium Client API, and Selenium Grid.

How Selenium WebDriver Works:

- All implementations of WebDriver that communicate with the browser or a RemoteWebDriver server use a common wire protocol. This wire protocol defines a RESTful web service using JSON over HTTP.
- So each WebDriver command is mapped to an HTTP method via the WebDriver service and then passed on to the HTTP Command Processor to communicate with the browser. The Command responses are returned as HTTP/1.1 response messages via the WebDriver service.
- Different drivers, such as the Firefox Driver and the IE Driver, have different implementations to accomplish the above.
- The **Selenium WebDriver** architecture document linked below goes into further details on how these are implemented and how WebDrvier commands flow through to the browser and back. Read section 16.6 for details on the Firefox Driver.

Pankaj Dubey, An automation test engineer with 6 years of experience.
Answered May 2 2016

Selenium is an automation test framework or an API that works with Java, C#, Perl, Ruby, Python and Groovy programming languages to automate the browser activities.

Selenium IDE: Selenium is not an automation tool like HP-UFT (QTP) as it doesnâ€™t give you any UI to perform some automation activity. While, selenium has its first version called **selenium IDE** which has a user Interface to record and play an activity without knowing any programming or scripting language. It used to work as a firefox browser plugin but that has very limited scope of achieving test automation objective.

Selenium RC: Later, Selenium came with **Selenium Remote Control**

(RC) or selenium 1.0 that allows tester to write automation script for web application UI tests in any programming language against any HTTP website using any mainstream JavaScript-enabled browser. In order to work with selenium RC selenium provided a server and it was required to run the server to start the execution of automation scripts.

Selenium WebDriver: Selenium provided the more advanced version and called it**selenium 2.0** or **Selenium WebDriver** or **WebDriver.** It has more clear and organized APIs and improved and added functionality which make it more popular choice as automation tool for web applications. So Webdriver is the only selenium (not IDE and RC) which is running in the market of automation

Benefit: The **benefit** of selecting selenium is that you can do almost everything that you can do using a programming language available in market as it gives the full strength of a programming language. So, what basically selenium gives is it has written the functions that a automation tester requires in almost all programming languages and later compiles all the function, classes, namespaces (packages) and supply it as a library that you can import into your project and start automating the test cases. So, does it mean you can create your own selenium tool and the answer is â€œ**YESâ€**.

Letâ€™s try to understand this with a scenario. Assume that a tester wants to visit a website:

If tester writes the code in java then he has to write multiple lines of code. First to launch a browser and then enter the website URL in address bar and then click on â€˜Goâ€™ and also take care of libraries available in java to do this. Basically you are working as a hard-core developer here and hence selenium comes in to the picture to eliminate your effort and simplify the automation process. So, when you use selenium youâ€™ll have to import a package in your test project which has readymade function where you can just put the browser name in one line and in second line put the web address and rest will be taken care by selenium to visit the page.

EX:

To launch a browser code if you use selenium with C#:

IWebDriver driver = new FirefoxDriver(); // It will launch the firefox browser

Driver.navigate().To(http://example.com) // to visit the web page

So simple!

Testbytes, Software Testing Company
Answered Jul 9 Â· Author has **80** answers and **21.6k** answer views

Selenium is defined as a portable software-testing framework that can be used for web applications.

It can be used for authoring tests without the need to learn scripting language Selenium IDE and test domain-Selenese to write tests in a number of popular programming languages, including C#, Groovy, Java, Perl, PHP, Python, Ruby and Scala.

These tests can used to execute against differentor latest web browsers.

A user can use selenium on Windows, Linux, and OS X platforms as well. It is an open-source software, released under the Apache 2.0 license and is available for free for downloading.

Selenium includes a number of components and each of these have a specific function to perform development of web application test automation.

Some of the common components are Selenium IDE (integrated development environment), Selenium client API, Selenium RC (Remote Control), Selenium WebDriver and Selenium Grid.

Also read : **FitNesse Testing vs Selenium Testing, Which is Better & Why?**

While it is true that Selenium WebDriver test automation framework is a successor of Selenium RC, there are still a number of similarities as well as differences between the two

This answer can help you develop a better understanding about the same and help you avoid any sort of confusion between the two.

1. **Browsers**

Both these tools can be used on different browsers such as, Firefox, IE, Chrome, Safari, Opera and others.

1. **Recording and playback**

Whether a user is using RC or WebDriver, it is possible for him/her to record as well as playback the execution of a test.

1. **Executing test script**

While RC requires one to start server again before executing the test script, the same is not a mandate in case of WebDriver.

1. **Type of program**

RC is a separate java program that allow a user execute HTML test suites. Whereas WebDriver is a programming interface which is available in multiple languages.

1. **Platform for interaction**

RC server executes the test as JavaScript commands whereas WebDriver performs on Selenium commands and a browser.

1. **API**

The API (Application Programming Interface) of RC is easy and small. But these contain a lot of redundancies and a lot of confusing commands. Various browsers interpret commands differently.

On the other hand, the API of WebDriver is large and a bit complex. These are also simple to comprehend and do not contain any sort of redundancy or confusing commands.

1. **Object-oriented**

Selenium RCâ€™s are not much object-oriented whereas Selenium

WebDriverâ€™s are completely object-oriented

1. **App testing**

One cannot test any sort of iPhone or Android application on Selenium RC whereas the same can be done using WebDriver.

1. **XPath attachment**

Selenium RC requires one to attach complete XPath whereas the same is not mandatory in case of WebDriver.

1. **Implementation of listeners**

It is not possible to implant listeners in Selenium RC whereas one can do the same with a WebDriver.

1. **Execution speed**

As compared to Selenium RC, WebDriver is faster in its execution as it is directly connected with the browser. The use of JavaScript program called Selenium Core slows down the Selenium RCâ€™s speed.

1. **Syntax**

While the syntax of RC is quite complex, the same is simple and easy to understand in case of WebDriver.

Also read : **Automation Test For Website and Web Apps Using Selenium**

Konduru Vijayalakshmi, Software Test Engineer at Wipro (2014-present)
Answered Jun 3 2017 Â· Author has **371** answers and **476.1k** answer views

If you are interested in how Selenium **WebDriver** works, this article explains it in detail.

Automation scripts use Selenium commands for emulating user actions on a web page.

When the automation script is executed, the following steps happen:

- **for each Selenium command, a HTTP request is created and sent to the browser driver**
- the browser driver **uses a HTTP server for getting the HTTP requests**
- **the HTTP server** determines the **steps needed for implementing the Selenium command**
- the implementation steps are executed on the browser
- the execution status is sent back to the HTTP server
- the **HTTP server sends the status back to the automation script**

It is a most important tool in Selenium Suite(Others are Selenium IDE, Selenium RC and Selenium Grid).

> It is an Interface (Programming Interface) allows us to execute tests against different browsers (ex: Firefox, IE, Chrome etc...)

> **WebDriver** enables us to use different programming languages to create tests.

Java
.NET
PHP
Perl
Python
Ruby

WebDriver **Environment Setup:**

> Download and Install Java (on OS(Ex: Microsoft Windows))

> set path Environment variable

> Download and unzip Eclipse software

> Download WebDriver Java language binding and Add **webDriver** jar files (in EClipse)

> Install Firebug plug-in for Firefox Browser (Install on FireFox) to inspect Web elements.

Navigation to Add WebDriver Jar files in eclipse:

Create Java Project
> Select src and right click
> Build Path
> Configure Build Path
> Select Libraries tab
> Click on "Add External JARs
> Browse path of the webDriver jars
> Add

Pre-requisites to create Automated Tests:

> Import WebDriver Libraries and Firefox driver library

> Create driver object

> Using web element (Object) locaters(properties) and Methods, write object call statements.

> Insert java programmatic statements to enhance tests.

WebDriver Sample Programs:

1) Launch Firefox Browser, Navigate to Google home, Capture the Title and Display.

```
package WebDriverSample;

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

public class GetBrowserTitle {
 public static void main(String [] args){
 WebDriver driver = new FirefoxDriver(); // Launches Firefox Browser with blank url
 driver.get("Google"); // Navigates to the specified URL
```

```
String Title = driver.getTitle();
System.out.println(Title);
driver.close(); // Closes the Browser
}
}
```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