Selenium WebDriver

*NOTE: We’re currently working on documenting these sections. We believe the information here is accurate, however be aware we are also still working on this chapter. Additional information will be provided as we go which should make this chapter more solid.*

Introducing WebDriver

The primary new feature in Selenium 2.0 is the integration of the WebDriver API. WebDriver is designed to provide a simpler, more concise programming interface in addition to addressing some limitations in the Selenium-RC API. Selenium-WebDriver was developed to better support dynamic web pages where elements of a page may change without the page itself being reloaded. WebDriver’s goal is to supply a well-designed object-oriented API that provides improved support for modern advanced web-app testing problems.

How Does WebDriver ‘Drive’ the Browser Compared to Selenium-RC?

Selenium-WebDriver makes direct calls to the browser using each browser’s native support for automation. How these direct calls are made, and the features they support depends on the browser you are using. Information on each ‘browser driver’ is provided later in this chapter.

For those familiar with Selenium-RC, this is quite different from what you are used to. Selenium-RC worked the same way for each supported browser. It ‘injected’ javascript functions into the browser when the browser was loaded and then used its javascript to drive the AUT within the browser. WebDriver does not use this technique. Again, it drives the browser directly using the browser’s built in support for automation.

WebDriver and the Selenium-Server

You may, or may not, need the Selenium Server, depending on how you intend to use Selenium-WebDriver. If your browser and tests will all run on the same machine, and your tests only use the WebDriver API, then you do not need to run the Selenium-Server; WebDriver will run the browser directly.

There are some reasons though to use the Selenium-Server with Selenium-WebDriver.

* You are using Selenium-Grid to distribute your tests over multiple machines or virtual machines (VMs).
* You want to connect to a remote machine that has a particular browser version that is not on your current machine.
* You are not using the Java bindings (i.e. Python, C#, or Ruby) and would like to use [HtmlUnit Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp" \l "htmlunit-driver)

Setting Up a Selenium-WebDriver Project

To install Selenium means to set up a project in a development so you can write a program using Selenium. How you do this depends on your programming language and your development environment.

**Java**

The easiest way to set up a Selenium 2.0 Java project is to use Maven. Maven will download the java bindings (the Selenium 2.0 java client library) and all its dependencies, and will create the project for you, using a maven pom.xml (project configuration) file. Once you’ve done this, you can import the maven project into your preferred IDE, IntelliJ IDEA or Eclipse.

First, create a folder to contain your Selenium project files. Then, to use Maven, you need a pom.xml file. This can be created with a text editor. We won’t teach the details of pom.xml files or for using Maven since there are already excellent references on this. Your pom.xml file will look something like this. Create this file in the folder you created for your project.

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

<project xmlns="http://maven.apache.org/POM/4.0.0"

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

xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">

<modelVersion>4.0.0</modelVersion>

<groupId>MySel20Proj</groupId>

<artifactId>MySel20Proj</artifactId>

<version>1.0</version>

<dependencies>

<dependency>

<groupId>org.seleniumhq.selenium</groupId>

<artifactId>selenium-java</artifactId>

<version>2.53.0</version>

</dependency>

<dependency>

<groupId>org.seleniumhq.selenium</groupId>

<artifactId>htmlunit-driver</artifactId>

<version>2.21</version>

</dependency>

</dependencies>

</project>

Be sure you specify the most current version. At the time of writing, the version listed above was the most current, however there were frequent releases immediately after the release of Selenium 2.0. Check the [Maven download page](http://seleniumhq.org/download/maven.html) for the current release and edit the above dependency accordingly.

Now, from a command-line, CD into the project directory and run maven as follows.

mvn clean install

This will download Selenium and all its dependencies and will add them to the project.

Finally, import the project into your preferred development environment. For those not familiar with this, we’ve provided an appendix which shows this.

[Importing a maven project into IntelliJ IDEA](http://docs.seleniumhq.org/docs/appendix_installing_java_driver_Sel20_via_maven.jsp#importing-maven-into-intellij-reference). [Importing a maven project into Eclipse](http://docs.seleniumhq.org/docs/appendix_installing_java_driver_Sel20_via_maven.jsp#importing-maven-into-eclipse-reference).

**C#**

As of Selenium 2.2.0, the C# bindings are distributed as a set of signed dlls along with other dependency dlls. Prior to 2.2.0, all Selenium dll’s were unsigned. To include Selenium in your project, simply download the latest selenium-dotnet zip file from <http://selenium-release.storage.googleapis.com/index.html>. If you are using Windows Vista or above, you should unblock the zip file before unzipping it: Right click on the zip file, click “Properties”, click “Unblock” and click “OK”.

Unzip the contents of the zip file, and add a reference to each of the unzipped dlls to your project in Visual Studio (or your IDE of choice).

Official NuGet Packages: [RC](http://www.nuget.org/List/Packages/Selenium.RC) [WebDriver](http://www.nuget.org/List/Packages/Selenium.WebDriver) [WebDriverBackedSelenium](http://www.nuget.org/List/Packages/Selenium.WebDriverBackedSelenium) [Support](http://www.nuget.org/List/Packages/Selenium.Support)

**Python**

If you are using Python for test automation then you probably are already familiar with developing in Python. To add Selenium to your Python environment run the following command from a command-line.

pip install selenium

Pip requires [pip](http://pypi.python.org/pypi/pip) to be installed, pip also has a dependency on [setuptools](http://pypi.python.org/pypi/setuptools).

Teaching Python development itself is beyond the scope of this document, however there are many resources on Python and likely developers in your organization can help you get up to speed.

**Ruby**

If you are using Ruby for test automation then you probably are already familiar with developing in Ruby. To add Selenium to your Ruby environment run the following command from a command-line.

gem install selenium-webdriver

Teaching Ruby development itself is beyond the scope of this document, however there are many resources on Ruby and likely developers in your organization can help you get up to speed.

**Perl**

Perl bindings are provided by a third party, please refer to any of their documentation on how to install / get started. There is one known [Perl binding](https://metacpan.org/module/Selenium::Remote::Driver) as of this writing.

**PHP**

PHP bindings are provided by a third party, please refer to any of their documentation on how to install / get started. There are three known bindings at this time: [By Chibimagic](https://github.com/chibimagic/WebDriver-PHP/) [By Lukasz Kolczynski](http://code.google.com/p/php-webdriver-bindings/) and [By the Facebook](https://github.com/facebook/php-webdriver)

**JavaScript**

If you are using node.js to develop your application, the selenium project provides[Javascript bindings on npm](https://www.npmjs.com/package/selenium-webdriver).

Install the Javascript bindings with npm:

npm install selenium-webdriver

You can find the [API docs](http://seleniumhq.github.io/selenium/docs/api/javascript/index.html) here.

Migrating from Selenium 1.0

For those who already have test suites written using Selenium 1.0, we have provided tips on how to migrate your existing code to Selenium 2.0. Simon Stewart, the lead developer for Selenium 2.0, has written an article on migrating from Selenium 1.0. We’ve included this as an appendix.

[Migrating From Selenium RC to Selenium WebDriver](http://docs.seleniumhq.org/docs/appendix_migrating_from_rc_to_webdriver.jsp#migrating-to-webdriver-reference)

Introducing the Selenium-WebDriver API by Example

WebDriver is a tool for automating web application testing, and in particular to verify that they work as expected. It aims to provide a friendly API that’s easy to explore and understand, easier to use than the Selenium-RC (1.0) API, which will help to make your tests easier to read and maintain. It’s not tied to any particular test framework, so it can be used equally well in a unit testing project or from a plain old “main” method. This section introduces WebDriver’s API and helps get you started becoming familiar with it. Start by setting up a WebDriver project if you haven’t already. This was described in the previous section, [Setting Up a Selenium-WebDriver Project](http://docs.seleniumhq.org/docs/03_webdriver.jsp#setting-up-webdriver-project).

Once your project is set up, you can see that WebDriver acts just as any normal library: it is entirely self-contained, and you usually don’t need to remember to start any additional processes or run any installers before using it, as opposed to the proxy server with Selenium-RC.

Note: additional steps are required to use [ChromeDriver](http://docs.seleniumhq.org/docs/03_webdriver.jsp" \l "chromedriver), [Opera Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp#opera-driver), [Android Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp#android-driver) and [iOS Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp" \l "ios-driver)

You’re now ready to write some code. An easy way to get started is this example, which searches for the term “Cheese” on Google and then outputs the result page’s title to the console.



**package** **org.openqa.selenium.example**;

**import** **org.openqa.selenium.By**;

**import** **org.openqa.selenium.WebDriver**;

**import** **org.openqa.selenium.WebElement**;

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

**import** **org.openqa.selenium.support.ui.ExpectedCondition**;

**import** **org.openqa.selenium.support.ui.WebDriverWait**;

**public** **class** **Selenium2Example** {

**public** **static** **void** **main**(String[] args) {

// Create a new instance of the Firefox driver

// Notice that the remainder of the code relies on the interface,

// not the implementation.

WebDriver driver = **new** FirefoxDriver();

// And now use this to visit Google

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

// Alternatively the same thing can be done like this

// driver.navigate().to("http://www.google.com");

// Find the text input element by its name

WebElement element = driver.findElement(By.name("q"));

// Enter something to search for

element.sendKeys("Cheese!");

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

element.submit();

// Check the title of the page

System.out.println("Page title is: " + driver.getTitle());

// Google's search is rendered dynamically with JavaScript.

// Wait for the page to load, timeout after 10 seconds

(**new** WebDriverWait(driver, **10**)).until(**new** ExpectedCondition<Boolean>() {

**public** Boolean **apply**(WebDriver d) {

**return** d.getTitle().toLowerCase().startsWith("cheese!");

}

});

// Should see: "cheese! - Google Search"

System.out.println("Page title is: " + driver.getTitle());

//Close the browser

driver.quit();

}

}

    

In upcoming sections, you will learn more about how to use WebDriver for things such as navigating forward and backward in your browser’s history, and how to test web sites that use frames and windows. We also provide a more thorough discussions and examples.

Selenium-WebDriver API Commands and Operations

**Fetching a Page**

The first thing you’re likely to want to do with WebDriver is navigate to a page. The normal way to do this is by calling “get”:



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

    

Dependent on several factors, including the OS/Browser combination, WebDriver may or may not wait for the page to load. In some circumstances, WebDriver may return control before the page has finished, or even started, loading. To ensure robustness, you need to wait for the element(s) to exist in the page using [Explicit and Implicit Waits](http://docs.seleniumhq.org/docs/04_webdriver_advanced.jsp#explicit-and-implicit-waits-reference).

**Locating UI Elements (WebElements)**

Locating elements in WebDriver can be done on the WebDriver instance itself or on a WebElement. Each of the language bindings exposes a “Find Element” and “Find Elements” method. The former returns a WebElement object matching the query, and throws an exception if such an element cannot be found. The latter returns a list of WebElements, possibly empty if no DOM elements match the query.

The “Find” methods take a locator or query object called “By”. “By” strategies are listed below.

**By ID**

This is the most efficient and preferred way to locate an element. Common pitfalls that UI developers make is having non-unique id’s on a page or auto-generating the id, both should be avoided. A class on an html element is more appropriate than an auto-generated id.

Example of how to find an element that looks like this:

<div id="coolestWidgetEvah">...</div>



WebElement element = driver.findElement(By.id("coolestWidgetEvah"));

    

**By Class Name**

“Class” in this case refers to the attribute on the DOM element. Often in practical use there are many DOM elements with the same class name, thus finding multiple elements becomes the more practical option over finding the first element.

Example of how to find an element that looks like this:

<div class="cheese"><span>Cheddar</span></div><div class="cheese"><span>Gouda</span></div>



List<WebElement> cheeses = driver.findElements(By.className("cheese"));

    

**By Tag Name**

The DOM Tag Name of the element.

Example of how to find an element that looks like this:

<iframe src="..."></iframe>



WebElement frame = driver.findElement(By.tagName("iframe"));

    

**By Name**

Find the input element with matching name attribute.

Example of how to find an element that looks like this:

<input name="cheese" type="text"/>



WebElement cheese = driver.findElement(By.name("cheese"));

    

**By Link Text**

Find the link element with matching visible text.

Example of how to find an element that looks like this:

<a href="http://www.google.com/search?q=cheese">cheese</a>>



WebElement cheese = driver.findElement(By.linkText("cheese"));

    

**By Partial Link Text**

Find the link element with partial matching visible text.

Example of how to find an element that looks like this:

<a href="http://www.google.com/search?q=cheese">search for cheese</a>>



WebElement cheese = driver.findElement(By.partialLinkText("cheese"));

    

**By CSS**

Like the name implies it is a locator strategy by css. Native browser support is used by default, so please refer to [w3c css selectors](http://www.w3.org/TR/CSS/#selectors) for a list of generally available css selectors. If a browser does not have native support for css queries, then [Sizzle](http://sizzlejs.com/) is used. IE 6,7 and FF3.0 currently use Sizzle as the css query engine.

Beware that not all browsers were created equal, some css that might work in one version may not work in another.

Example of to find the cheese below:

<div id="food"><span class="dairy">milk</span><span class="dairy aged">cheese</span></div>



WebElement cheese = driver.findElement(By.cssSelector("#food span.dairy.aged"));

    

**By XPath**

At a high level, WebDriver uses a browser’s native XPath capabilities wherever possible. On those browsers that don’t have native XPath support, we have provided our own implementation. This can lead to some unexpected behaviour unless you are aware of the differences in the various XPath engines.

| **Driver** | **Tag and Attribute Name** | **Attribute Values** | **Native XPath Support** |
| --- | --- | --- | --- |
| [HtmlUnit Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp#htmlunit-driver) | Lower-cased | As they appear in the HTML | Yes |
| [Internet Explorer Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp#internet-explorer-driver) | Lower-cased | As they appear in the HTML | No |
| [Firefox Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp#firefox-driver) | Case insensitive | As they appear in the HTML | Yes |

This is a little abstract, so for the following piece of HTML:

<input type="text" name="example" />

<INPUT type="text" name="other" />



List<WebElement> inputs = driver.findElements(By.xpath("//input"));

    

The following number of matches will be found

| **XPath expression** | [**HtmlUnit Driver**](http://docs.seleniumhq.org/docs/03_webdriver.jsp#htmlunit-driver) | [**Firefox Driver**](http://docs.seleniumhq.org/docs/03_webdriver.jsp#firefox-driver) | [**Internet Explorer Driver**](http://docs.seleniumhq.org/docs/03_webdriver.jsp#internet-explorer-driver) |
| --- | --- | --- | --- |
| //input | 1 (“example”) | 2 | 2 |
| //INPUT | 0 | 2 | 0 |

Sometimes HTML elements do not need attributes to be explicitly declared because they will default to known values. For example, the “input” tag does not require the “type” attribute because it defaults to “text”. The rule of thumb when using xpath in WebDriver is that you **should not** expect to be able to match against these implicit attributes.

**Using JavaScript**

You can execute arbitrary javascript to find an element and as long as you return a DOM Element, it will be automatically converted to a WebElement object.

Simple example on a page that has jQuery loaded:



WebElement element = (WebElement) ((JavascriptExecutor)driver).executeScript("return $('.cheese')[0]");

   

Finding all the input elements for every label on a page:



List<WebElement> labels = driver.findElements(By.tagName("label"));

List<WebElement> inputs = (List<WebElement>) ((JavascriptExecutor)driver).executeScript(

"var labels = arguments[0], inputs = []; for (var i=0; i < labels.length; i++){" +

"inputs.push(document.getElementById(labels[i].getAttribute('for'))); } return inputs;", labels);

   

**Getting text values**

People often wish to retrieve the innerText value contained within an element. This returns a single string value. Note that this will only return the visible text displayed on the page.



WebElement element = driver.findElement(By.id("elementID"));

element.getText();

   

**User Input - Filling In Forms**

We’ve already seen how to enter text into a textarea or text field, but what about the other elements? You can “toggle” the state of checkboxes, and you can use “click” to set something like an OPTION tag selected. Dealing with SELECT tags isn’t too bad:



WebElement select = driver.findElement(By.tagName("select"));

List<WebElement> allOptions = select.findElements(By.tagName("option"));

**for** (WebElement option : allOptions) {

System.out.println(String.format("Value is: %s", option.getAttribute("value")));

option.click();

}

   

This will find the first “SELECT” element on the page, and cycle through each of its OPTIONs in turn, printing out their values, and selecting each in turn. As you will notice, this isn’t the most efficient way of dealing with SELECT elements. WebDriver’s support classes include one called “Select”, which provides useful methods for interacting with these.



Select select = **new** Select(driver.findElement(By.tagName("select")));

select.deselectAll();

select.selectByVisibleText("Edam");

  

This will deselect all OPTIONs from the first SELECT on the page, and then select the OPTION with the displayed text of “Edam”.

Once you’ve finished filling out the form, you probably want to submit it. One way to do this would be to find the “submit” button and click it:



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

    

Alternatively, WebDriver has the convenience method “submit” on every element. If you call this on an element within a form, WebDriver will walk up the DOM until it finds the enclosing form and then calls submit on that. If the element isn’t in a form, then theNoSuchElementException will be thrown:



element.submit();

    

**Moving Between Windows and Frames**

Some web applications have many frames or multiple windows. WebDriver supports moving between named windows using the “switchTo” method:



driver.switchTo().window("windowName");

    

All calls to driver will now be interpreted as being directed to the particular window. But how do you know the window’s name? Take a look at the javascript or link that opened it:

<a href="somewhere.html" target="windowName">Click here to open a new window</a>

Alternatively, you can pass a “window handle” to the “switchTo().window()” method. Knowing this, it’s possible to iterate over every open window like so:



**for** (String handle : driver.getWindowHandles()) {

driver.switchTo().window(handle);

}

   

You can also switch from frame to frame (or into iframes):



driver.switchTo().frame("frameName");

    

**Popup Dialogs**

Starting with Selenium 2.0 beta 1, there is built in support for handling popup dialog boxes. After you’ve triggered an action that opens a popup, you can access the alert with the following:



Alert alert = driver.switchTo().alert();

    

This will return the currently open alert object. With this object you can now accept, dismiss, read its contents or even type into a prompt. This interface works equally well on alerts, confirms, and prompts. Refer to the [JavaDocs](https://seleniumhq.github.io/selenium/docs/api/java/index.html) or [RubyDocs](https://seleniumhq.github.io/selenium/docs/api/rb/Selenium/WebDriver/Alert.html) for more information.

**Navigation: History and Location**

Earlier, we covered navigating to a page using the “get” command (driver.get("http://www.example.com") or driver.Url="http://www.example.com" in C#). As you’ve seen, WebDriver has a number of smaller, task-focused interfaces, and navigation is a useful task. Because loading a page is such a fundamental requirement, the method to do this lives on the main WebDriver interface, but it’s simply a synonym to:



driver.navigate().to("http://www.example.com");

    

To reiterate: “navigate().to()” and “get()” do exactly the same thing. One’s just a lot easier to type than the other!

The “navigate” interface also exposes the ability to move backwards and forwards in your browser’s history:



driver.navigate().forward();

driver.navigate().back();

   

Please be aware that this functionality depends entirely on the underlying browser. It’s just possible that something unexpected may happen when you call these methods if you’re used to the behaviour of one browser over another.

**Cookies**

Before we leave these next steps, you may be interested in understanding how to use cookies. First of all, you need to be on the domain that the cookie will be valid for. If you are trying to preset cookies before you start interacting with a site and your homepage is large / takes a while to load an alternative is to find a smaller page on the site (typically the 404 page is small, e.g. <http://example.com/some404page>).



// Go to the correct domain

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

// Now set the cookie. This one's valid for the entire domain

Cookie cookie = **new** Cookie("key", "value");

driver.manage().addCookie(cookie);

// And now output all the available cookies for the current URL

Set<Cookie> allCookies = driver.manage().getCookies();

**for** (Cookie loadedCookie : allCookies) {

System.out.println(String.format("%s -> %s", loadedCookie.getName(), loadedCookie.getValue()));

}

// You can delete cookies in 3 ways

// By name

driver.manage().deleteCookieNamed("CookieName");

// By Cookie

driver.manage().deleteCookie(loadedCookie);

// Or all of them

driver.manage().deleteAllCookies();

  

**Changing the User Agent**

This is easy with the [Firefox Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp#firefox-driver):



FirefoxProfile profile = **new** FirefoxProfile();

profile.addAdditionalPreference("general.useragent.override", "some UA string");

WebDriver driver = **new** FirefoxDriver(profile);

   

**Drag And Drop**

Here’s an example of using the Actions class to perform a drag and drop. Native events are required to be enabled.



WebElement element = driver.findElement(By.name("source"));

WebElement target = driver.findElement(By.name("target"));

(**new** Actions(driver)).dragAndDrop(element, target).perform();

   

Driver Specifics and Tradeoffs

Selenium-WebDriver’s Drivers

WebDriver is the name of the key interface against which tests should be written, but there are several implementations. These include:

**HtmlUnit Driver**

This is currently the fastest and most lightweight implementation of WebDriver. As the name suggests, this is based on HtmlUnit. HtmlUnit is a java based implementation of a WebBrowser without a GUI. For any language binding (other than java) the Selenium Server is required to use this driver.

**Usage**



WebDriver driver = **new** HtmlUnitDriver();

   

**Pros**

* Fastest implementation of WebDriver
* A pure Java solution and so it is platform independent.
* Supports JavaScript

**Cons**

* Emulates other browsers’ JavaScript behaviour (see below)

**JavaScript in the HtmlUnit Driver**

None of the popular browsers uses the JavaScript engine used by HtmlUnit (Rhino). If you test JavaScript using HtmlUnit the results may differ significantly from those browsers.

When we say “JavaScript” we actually mean “JavaScript and the DOM”. Although the DOM is defined by the W3C each browser has its own quirks and differences in their implementation of the DOM and in how JavaScript interacts with it. HtmlUnit has an impressively complete implementation of the DOM and has good support for using JavaScript, but it is no different from any other browser: it has its own quirks and differences from both the W3C standard and the DOM implementations of the major browsers, despite its ability to mimic other browsers.

With WebDriver, we had to make a choice; do we enable HtmlUnit’s JavaScript capabilities and run the risk of teams running into problems that only manifest themselves there, or do we leave JavaScript disabled, knowing that there are more and more sites that rely on JavaScript? We took the conservative approach, and by default have disabled support when we use HtmlUnit. With each release of both WebDriver and HtmlUnit, we reassess this decision: we hope to enable JavaScript by default on the HtmlUnit at some point.

**Enabling JavaScript**

If you can’t wait, enabling JavaScript support is very easy:



HtmlUnitDriver driver = **new** HtmlUnitDriver(**true**);

   

This will cause the HtmlUnit Driver to emulate Firefox 3.6’s JavaScript handling by default.

**Firefox Driver**

Controls the [Firefox](http://getfirefox.com/) browser using a Firefox plugin. The Firefox Profile that is used is stripped down from what is installed on the machine to only include the Selenium WebDriver.xpi (plugin). A few settings are also changed by default ([see the source to see which ones](https://github.com/SeleniumHQ/selenium/blob/master/javascript/firefox-driver/webdriver.json)) Firefox Driver is capable of being run and is tested on Windows, Mac, Linux. Currently on versions 3.6, 10, latest - 1, latest

**Usage**



WebDriver driver = **new** FirefoxDriver();

   

**Pros**

* Runs in a real browser and supports JavaScript
* Faster than the [Internet Explorer Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp#internet-explorer-driver)

**Cons**

* Slower than the [HtmlUnit Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp" \l "htmlunit-driver)

**Modifying the Firefox Profile**

Suppose that you wanted to modify the user agent string (as above), but you’ve got a tricked out Firefox profile that contains dozens of useful extensions. There are two ways to obtain this profile. Assuming that the profile has been created using Firefox’s profile manager (firefox -ProfileManager):



ProfilesIni allProfiles = **new** ProfilesIni();

FirefoxProfile profile = allProfiles.getProfile("WebDriver");

profile.setPreferences("foo.bar", **23**);

WebDriver driver = **new** FirefoxDriver(profile);



Alternatively, if the profile isn’t already registered with Firefox:



File profileDir = **new** File("path/to/top/level/of/profile");

FirefoxProfile profile = **new** FirefoxProfile(profileDir);

profile.addAdditionalPreferences(extraPrefs);

WebDriver driver = **new** FirefoxDriver(profile);



As we develop features in the [Firefox Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp#firefox-driver), we expose the ability to use them. For example, until we feel native events are stable on Firefox for Linux, they are disabled by default. To enable them:



FirefoxProfile profile = **new** FirefoxProfile();

profile.setEnableNativeEvents(**true**);

WebDriver driver = **new** FirefoxDriver(profile);

  

**Info**

See the [Firefox section in the wiki page](https://github.com/SeleniumHQ/selenium/wiki/FirefoxDriver) for the most up to date info.

**Internet Explorer Driver**

The InternetExplorerDriver is a standalone server which implements WebDriver’s wire protocol. This driver has been tested with IE 7, 8, 9, 10, and 11 on appropriate combinations of Vista, Windows 7, Windows 8, and Windows 8.1. As of 15 April 2014, IE 6 is no longer supported.

The driver supports running 32-bit and 64-bit versions of the browser. The choice of how to determine which “bit-ness” to use in launching the browser depends on which version of the IEDriverServer.exe is launched. If the 32-bit version of IEDriverServer.exe is launched, the 32-bit version of IE will be launched. Similarly, if the 64-bit version of IEDriverServer.exe is launched, the 64-bit version of IE will be launched.

**Usage**



WebDriver driver = **new** InternetExplorerDriver();

   

**Pros**

* Runs in a real browser and supports Javascript

**Cons**

* Obviously the InternetExplorerDriver will only work on Windows!
* Comparatively slow (though still pretty snappy!)

**Info**

See the [Internet Explorer section of the wiki page](https://github.com/SeleniumHQ/selenium/wiki/InternetExplorerDriver) for the most up to date info. Please take special note of the Required Configuration section.

**ChromeDriver**

ChromeDriver is maintained / supported by the [Chromium](http://code.google.com/p/chromium/) project iteslf. WebDriver works with Chrome through the chromedriver binary (found on the chromium project’s download page). You need to have both chromedriver and a version of chrome browser installed. chromedriver needs to be placed somewhere on your system’s path in order for WebDriver to automatically discover it. The Chrome browser itself is discovered by chromedriver in the default installation path. These both can be overridden by environment variables. Please refer to [the wiki](https://github.com/SeleniumHQ/selenium/wiki/ChromeDriver) for more information.

**Usage**



WebDriver driver = **new** ChromeDriver();

   

**Pros**

* Runs in a real browser and supports JavaScript
* Because Chrome is a Webkit-based browser, the [ChromeDriver](http://docs.seleniumhq.org/docs/03_webdriver.jsp" \l "chromedriver) may allow you to verify that your site works in Safari. Note that since Chrome uses its own V8 JavaScript engine rather than Safari’s Nitro engine, JavaScript execution may differ.

**Cons**

* Slower than the [HtmlUnit Driver](http://docs.seleniumhq.org/docs/03_webdriver.jsp" \l "htmlunit-driver)

**Info**

[See our wiki](https://github.com/SeleniumHQ/selenium/wiki/ChromeDriver) for the most up to date info. More info can also be found on the [downloads page](http://docs.seleniumhq.org/download/)

**Getting running with ChromeDriver**

Download the [ChromeDriver executable](https://sites.google.com/a/chromium.org/chromedriver/) and follow the other instructions on the [wiki page](https://github.com/SeleniumHQ/selenium/wiki/ChromeDriver)

**Opera Driver**

See the [Opera Driver wiki article](https://github.com/SeleniumHQ/selenium/wiki/OperaDriver) in the Selenium Wiki for information on using the Opera Driver.

**iOS Driver**

See either the [ios-driver](http://ios-driver.github.io/ios-driver/) or [appium](http://appium.io/) projects.

**Android Driver**

See the [Selendroid project](http://selendroid.io/)

Alternative Back-Ends: Mixing WebDriver and RC Technologies

**WebDriver-Backed Selenium-RC**

The Java version of WebDriver provides an implementation of the Selenium-RC API. These means that you can use the underlying WebDriver technology using the Selenium-RC API. This is primarily provided for backwards compatibility. It allows those who have existing test suites using the Selenium-RC API to use WebDriver under the covers. It’s provided to help ease the migration path to Selenium-WebDriver. Also, this allows one to use both APIs, side-by-side, in the same test code.

Selenium-WebDriver is used like this:



// You may use any WebDriver implementation. Firefox is used here as an example

WebDriver driver = **new** FirefoxDriver();

// A "base url", used by selenium to resolve relative URLs

String baseUrl = "http://www.google.com";

// Create the Selenium implementation

Selenium selenium = **new** WebDriverBackedSelenium(driver, baseUrl);

// Perform actions with selenium

selenium.open("http://www.google.com");

selenium.type("name=q", "cheese");

selenium.click("name=btnG");

// Get the underlying WebDriver implementation back. This will refer to the

// same WebDriver instance as the "driver" variable above.

WebDriver driverInstance = ((WebDriverBackedSelenium) selenium).getWrappedDriver();

//Finally, close the browser. Call stop on the WebDriverBackedSelenium instance

//instead of calling driver.quit(). Otherwise, the JVM will continue running after

//the browser has been closed.

selenium.stop();

**Pros**

* Allows for the WebDriver and Selenium APIs to live side-by-side
* Provides a simple mechanism for a managed migration from the Selenium RC API to WebDriver’s
* Does not require the standalone Selenium RC server to be run

**Cons**

* Does not implement every method
* More advanced Selenium usage (using “browserbot” or other built-in JavaScript methods from Selenium Core) may not work
* Some methods may be slower due to underlying implementation differences

**Backing WebDriver with Selenium**

WebDriver doesn’t support as many browsers as Selenium RC does, so in order to provide that support while still using the WebDriver API, you can make use of theSeleneseCommandExecutor

Safari is supported in this way with the following code (be sure to disable pop-up blocking):



DesiredCapabilities capabilities = **new** DesiredCapabilities();

capabilities.setBrowserName("safari");

CommandExecutor executor = **new** SeleneseCommandExecutor(**new** URL("http://localhost:4444/"), **new** URL("http://www.google.com/"), capabilities);

WebDriver driver = **new** RemoteWebDriver(executor, capabilities);

There are currently some major limitations with this approach, notably that findElements doesn’t work as expected. Also, because we’re using Selenium Core for the heavy lifting of driving the browser, you are limited by the JavaScript sandbox.

Running Standalone Selenium Server for use with RemoteDrivers

From [Selenium’s Download page](http://selenium-release.storage.googleapis.com/index.html) download selenium-server-standalone-<version>.jar and optionally IEDriverServer. If you plan to work with Chrome, download it from [Google Code](http://chromedriver.googlecode.com/).

Unpack IEDriverServer and/or chromedriver and put them in a directory which is on the $PATH / %PATH% - the Selenium Server should then be able to handle requests for IE / Chrome without additional modifications.

Start the server on the command line with

java -jar <path\_to>/selenium-server-standalone-<version>.jar

If you want to use native events functionality, indicate this on the command line with the option

-Dwebdriver.enable.native.events=1

For other command line options, execute

java -jar <path\_to>/selenium-server-standalone-<version>.jar -help

In order to function properly, the following ports should be allowed incoming TCP connections: 4444, 7054-5 (or twice as many ports as the number of concurrent instances you plan to run). Under Windows, you may need to unblock the applications as well.