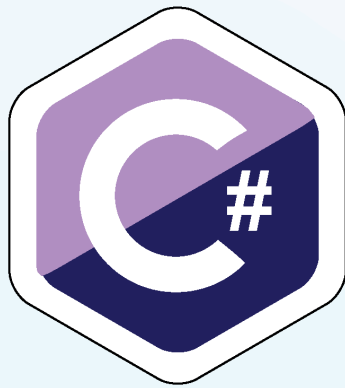


Selenium Recipes in C#

The Problem Solving Guide to Selenium WebDriver



Zhimin Zhan

Selenium Recipes in C#

The problem solving guide to Selenium WebDriver in C#

Zhimin Zhan

This book is for sale at <http://leanpub.com/selenium-recipes-in-csharp>

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1. Preface

After observing many failed test automation attempts by using expensive commercial test automation tools, I am delighted to see that the value of open-source testing frameworks has finally been recognized. I still remember the day (a rainy day at a Gold Coast hotel in 2011) when I found out that the Selenium was the most wanted testing skill in terms of the number of job ads on the Australia's top job-seeking site.

Now Selenium is big in the testing world. We all know software giants such as Facebook and LinkedIn use it, immensely-comprehensive automated UI testing enables them [pushing out releases several times a day](#)¹. However, from my observation, many software projects, while using Selenium, are not getting much value from test automation, and certainly nowhere near its potential. A clear sign of this is that the regression testing is not conducted on a daily basis (if test automation is done well, it will happen naturally).

Among the factors contributing to test automation failures, a key one is that automation testers lack sufficient knowledge in the test framework. It is quite common to see some testers or developers get excited when they first create a few simple test cases and see them run in a browser. However, it doesn't take long for them to encounter some obstacles: such as being unable to automate certain operations. If one step cannot be automated, the whole test case does not work, which is the nature of test automation. Searching solutions online is not always successful, and posting questions on forums and waiting can be frustrating (usually, very few people seek professional help from test automation coaches). Not surprisingly, many projects eventually gave up test automation or just used it for testing a handful of scenarios.

The motivation of this book is to help motivated testers work better with Selenium. The book contains over 100 recipes for web application tests with Selenium. If you have read one of my other books: '[Practical Web Test Automation](#)'², you probably know my style: **practical**. I will let the test scripts do most of the 'talking'. These recipe test scripts are 'live', as I have created the target test site and included offline test web pages. With both, you can:

1. **Identify** your issue
2. **Find** the recipe
3. **Run** the test case
4. **See** test execution in your browser

¹<http://www.wired.com/business/2013/04/linkedin-software-revolution/>

²<https://leanpub.com/practical-web-test-automation>

1.1 Who should read this book

This book is for testers or programmers who are writing (or want to learn) Selenium test scripts to test web applications. In order to get the most of this book, basic (very basic) C# coding skill is required.

1.2 How to read this book

Usually, a ‘recipe’ book is a reference book. Readers can go directly to the part that interests them. For example, if you are testing a multiple select list and don’t know how, you can look up in the Table of Contents, then go to the chapter. This book supports this style of reading. Since the recipes are arranged according to their levels of complexity, readers will also be able to work through the book from the front to back if they are looking to learn test automation with Selenium.

1.3 Recipe test scripts

To help readers to learn more effectively, this book has a [dedicated site](#)³ that contains the recipe test scripts and related resources.

As an old saying goes, “There’s more than one way to skin a cat.” You can achieve the same testing outcome with test scripts implemented in different ways. The recipe test scripts in this book are written for simplicity, there is always room for improvement. But for many, to understand the solution quickly and get the job done are probably more important.

If you have a better and simpler way, please let me know.

All recipe test scripts are Selenium 2 (also known as Selenium WebDriver) compliant, and can be run on Firefox, Chrome and Internet Explorer on multiple platforms. I plan to keep the test scripts updated with the latest stable Selenium version.

1.4 Send me feedback

I would appreciate your comments, suggestions, reports on errors in the book and the recipe test scripts. You may submit your feedback on the book site.

Zhimin Zhan

December 2014

³<http://zhimin.com/books/selenium-recipes-csharp>

2. Introduction

Selenium is a free and open source library for automated testing web applications. I assume that you have had some knowledge of Selenium, based on the fact that you picked up this book (or opened it in your eBook reader).

2.1 Selenium

Selenium was originally created in 2004 by Jason Huggins, who was later joined by his other ThoughtWorks colleagues. Selenium supports all major browsers and tests can be written in many programming languages and run on Windows, Linux and Macintosh platforms.

Selenium 2 is merged with another test framework WebDriver (that's why you see 'selenium-webdriver') led by Simon Stewart at Google (update: Simon now works at FaceBook), Selenium 2.0 was released in July 2011.

2.2 C# language binding

Selenium tests can be written in multiple programming languages such as Java, C#, Python, Perl, PHP and Ruby. All examples in this book are written in Selenium with C# binding.

```
using System;
using Microsoft.VisualStudio.TestTools.UnitTesting;
using OpenQA.Selenium;
using OpenQA.Selenium.Firefox;
```

```
public class GoogleSearch {
    public static void main(String[] args) {

        IWebDriver driver = new FirefoxDriver();

        // And now use this to visit Google
```

```
driver.Navigate().GoToUrl("http://www.google.com");

// Find the text input element by its name attribute
IWebElement element = driver.FindElement(By.Name("q"));

// Enter something to search for
element.SendKeys("Hello Selenium WebDriver!");

// Submit the form. WebDriver will find the form from the element
element.Submit();

// Check the title of the page
Console.WriteLine("Page title is: " + driver.Title);

driver.Quit();
}
```

Set up Development Environment

Most of C# programmers develop C# code in Visual Studio (Integrated Development Environment). I will use Visual Studio Express 2013 as the IDE of choice for this book, as it is free.

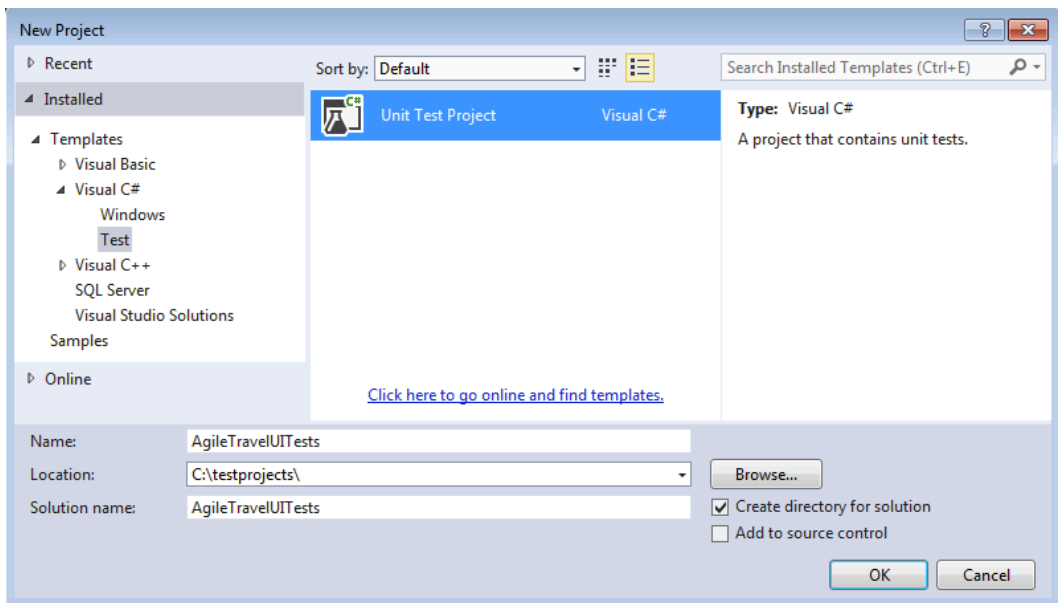
Prerequisite:

- Download and install Visual Studio 2013.
- Your target browser is installed, such as Chrome or Firefox.

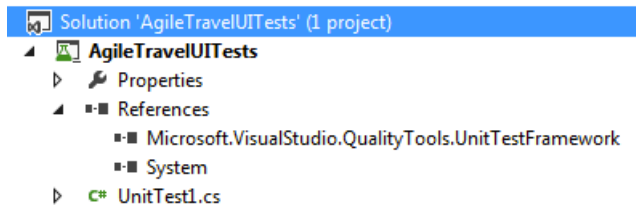
Set up Visual Studio Solution

1. Create a new project in Visual Studio

Select template 'Templates' -> 'Visual C#' -> 'Test' -> 'Unit Test Project'.



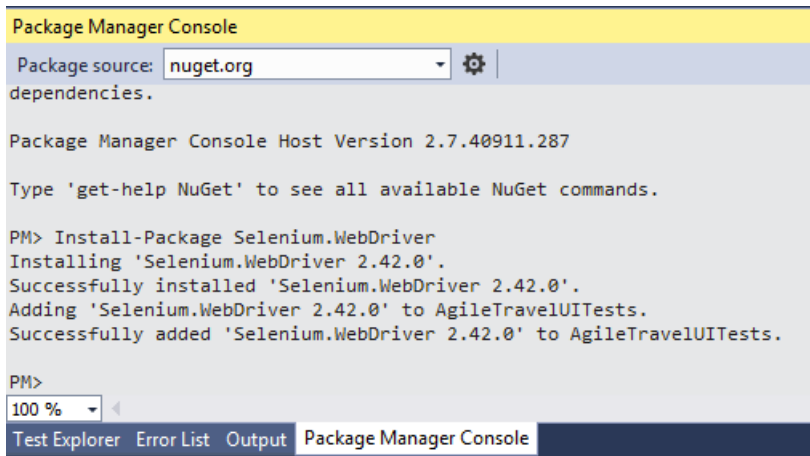
You shall see the project skeleton created.



2. Add Selenium WebDriver package to the project

Run the following command in 'Package Manager Console' (selecting menu 'Tools' -> 'Library Package Manager' -> 'Package Manager Console').

```
PM> Install-Package Selenium.WebDriver
```



```
Package Manager Console
Package source: nuget.org
dependencies.

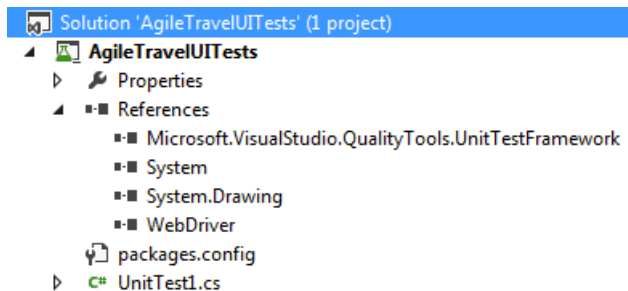
Package Manager Console Host Version 2.7.40911.287

Type 'get-help NuGet' to see all available NuGet commands.

PM> Install-Package Selenium.WebDriver
Installing 'Selenium.WebDriver 2.42.0'.
Successfully installed 'Selenium.WebDriver 2.42.0'.
Adding 'Selenium.WebDriver 2.42.0' to AgileTravelUITests.
Successfully added 'Selenium.WebDriver 2.42.0' to AgileTravelUITests.

PM>
```

Here is what looks like in Visual Studio's Solution Explorer after Selenium WebDriver was installed.



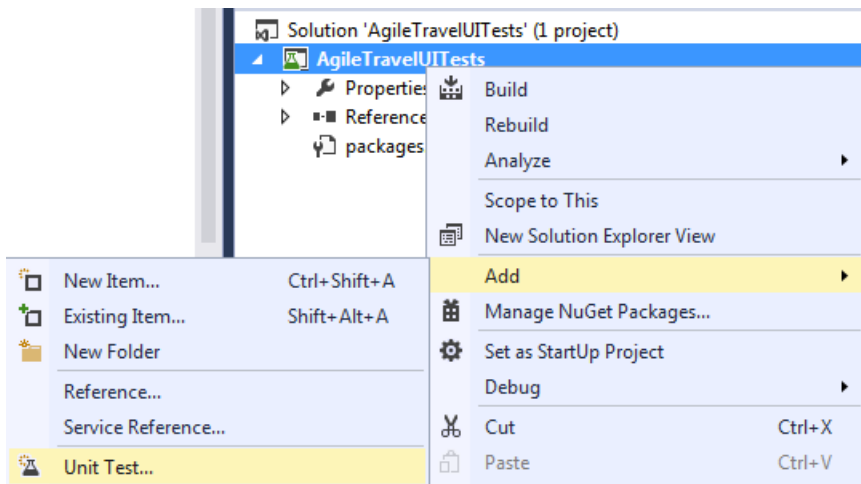
Also install “Selenium.Support”, which includes helper .NET classes for the Selenium WebDriver API.

```
PM> Install-Package Selenium.Support
```

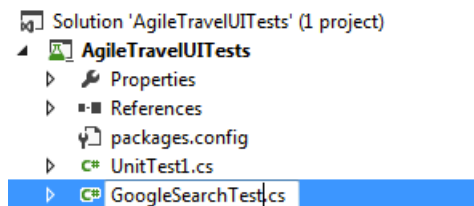
Create a test and run it

1. Add a new C# class (a test)

Essentially a Selenium test in C# is a C# Class. Right mouse click the project name (in Solution Explorer) select 'Add' -> 'Unit Test'.



A new unit test file is created (named UnitTest1.cs or UnitTest2.cs if UnitTest1.cs already exists). Rename it (press F2 key and enter a name in Camel Case, such as SayHelloWorld)



2. Create a test case

For simplicity, paste a google search test case script into the editor.

```
[TestClass]
public class GoogleSearchTest
{
    [TestMethod]
    public void TestSearch()
    {
        IWebDriver driver = new FirefoxDriver();

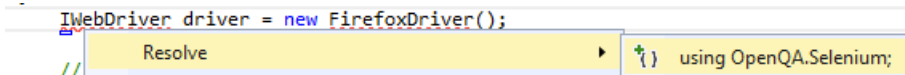
        // And now use this to visit Google
        driver.Navigate().GoToUrl("http://www.google.com");

        // Find the text input element by its name
        IWebElement element = driver.FindElement(By.Name("q"));

        // Enter something to search for
        element.SendKeys("Hello Selenium WebDriver!");

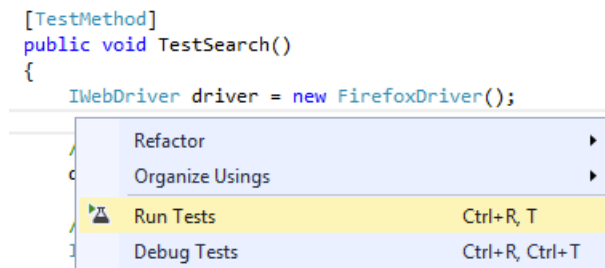
        // Now submit the form.
        element.Submit();
    }
}
```

The several red underlines indicate compiling errors. In this case, the Selenium classes were not loaded. To fix, right mouse click these red underlines and select 'Resolve'.



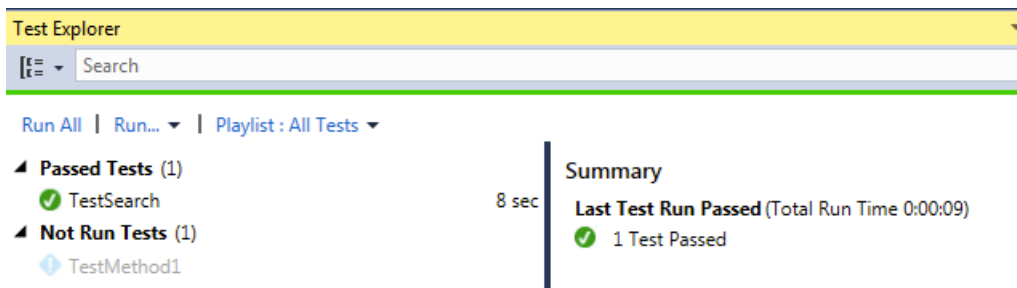
3. Run the test

Right click the editor and select 'Run Tests'.



You shall see a Firefox browser is opening and do a 'google search' in it, as we our instruction (in the GoogleSearchTest.cs).

Click 'Test Explorer' tab to see test execution result.



2.3 Cross browser testing

The biggest advantage of Selenium over other web test frameworks, in my opinion, is that it supports all major web browsers: Firefox, Chrome and Internet Explorer. The browser market nowadays is more diversified (based on the [StatsCounter](http://www.statscounter.com)¹, the usage share in November 2014 for Chrome, IE and Firefox Chrome are 51.8%, 21.7% and 18.5% respectively). It is logical that all external facing web sites require serious cross-browser testing. Selenium is a natural choice for this purpose, as it far exceeds other commercial tools and free test frameworks.

Firefox

Selenium supports Firefox out of the box, i.e., as long as you have Firefox (not too outdated version) installed, you are ready to go. The test script below will open a web site in a new Firefox window.

```
using OpenQA.Selenium.Firefox;  
// ...  
IWebDriver driver = new FirefoxDriver();
```

Chrome

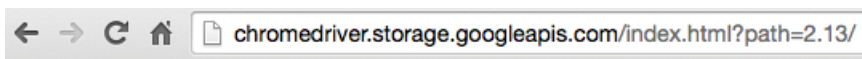
To run Selenium tests in Google Chrome, besides the Chrome browser itself, *ChromeDriver*² needs to be installed.

Installing ChromeDriver is easy: go to <http://chromedriver.storage.googleapis.com/index.html>³







¹http://en.wikipedia.org/wiki/Usage_share_of_web_browsers

²<http://chromedriver.storage.googleapis.com>

³<http://chromedriver.storage.googleapis.com/index.html>



Index of /2.13/

| | <u>Name</u> | Last modified | Size | |
|---|--|---------------------|--------|------------|
|  | Parent Directory | | - | |
|  | chromedriver_linux32.zip | 2014-12-10 13:17:59 | 2.23MB | 187dbe797: |
|  | chromedriver_linux64.zip | 2014-12-10 13:22:58 | 2.11MB | fcfd99333: |
|  | chromedriver_mac32.zip | 2014-12-10 14:02:54 | 3.27MB | e37a65a1b: |
|  | chromedriver_win32.zip | 2014-12-10 13:40:47 | 2.30MB | ae8540769: |
|  | notes.txt | 2014-12-10 13:18:01 | 0.01MB | a57d33a29: |

download the one for your target platform, unzip it and put chromedriver executable in your PATH. To verify the installation, open a command window, execute command *chromedriver*. You shall see:

```
C:\>chromedriver
Starting ChromeDriver 2.13.307647 (5a7d0541ebc58e69994a6fb2ed930f45261f3c29) on port 9515
Only local connections are allowed.
```

The test script below opens a site in a new Chrome browser window and closes it one second later.

```
using OpenQA.Selenium.Chrome;
//...
IWebDriver driver = new ChromeDriver();
```

Internet Explorer

Selenium requires IEDriverServer to drive IE browser. Its installation process is very similar to *chromedriver*. IEDriverServer is available at <http://www.seleniumhq.org/download/>⁴. Choose the right one based on your windows version (32 or 64 bit).

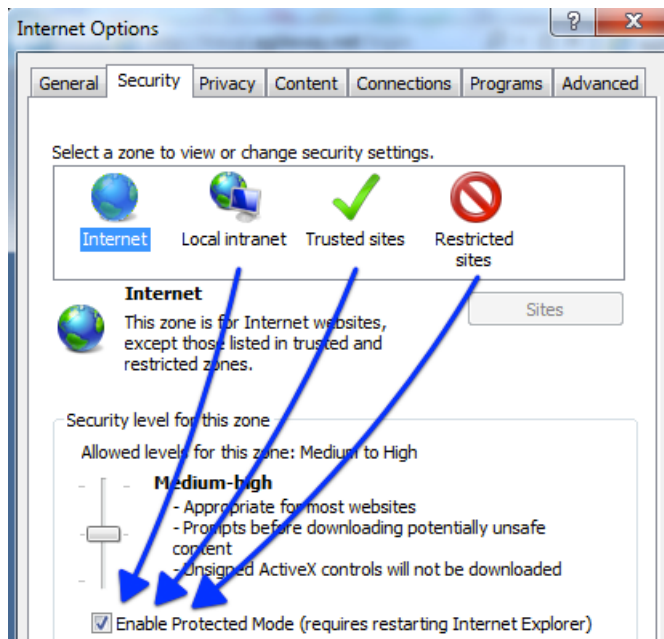
Download version 2.44.0 for (recommended) [32 bit Windows IE](#) or [64 bit Windows IE](#)
[CHANGELOG](#)

⁴<http://www.seleniumhq.org/download/>

When a tests starts to execute in IE, before navigating the target test site, you will see this first:



If you get this on IE9: “Unexpected error launching Internet Explorer. Protected Mode must be set to the same value (enabled or disabled) for all zones.” Go to ‘Internet Options’, select each zone (as illustrated below) and make sure they are all set to the same mode (protected or not).



```
using OpenQA.Selenium.IE;
```

```
//...
```

```
IWebDriver driver = new InternetExplorerDriver();
```

2.4 Visual Studio Unit Testing Framework

The examples above drive browsers. Strictly speaking, they are not tests. To make the effective use of Selenium scripts for testing, we need to put them in a test framework that defines test structures and provides assertions (performing checks in test scripts). The de facto test framework for Java is JUnit, and here is an example using JUnit 4.

```
using System;
using Microsoft.VisualStudio.TestTools.UnitTesting;
using OpenQA.Selenium;
using OpenQA.Selenium.Firefox;
using OpenQA.Selenium.IE;
using OpenQA.Selenium.Chrome;
using System.Collections.ObjectModel;

[TestClass]
public class GoogleSearchDifferentBrowsersTest {

    [TestMethod]
    public void testInIE() {
        IWebDriver driver = new InternetExplorerDriver();
        driver.Navigate().GoToUrl("http://testwisely.com/demo");
        System.Threading.Thread.Sleep(1000);
        driver.Quit();
    }

    [TestMethod]
    public void testInFirefox() {
        IWebDriver driver = new FirefoxDriver();
        driver.Navigate().GoToUrl("http://testwisely.com/demo");
        System.Threading.Thread.Sleep(1000);
        driver.Quit();
    }

    [TestMethod]
    public void testInChrome() {
        IWebDriver driver = new ChromeDriver();
        driver.Navigate().GoToUrl("http://testwisely.com/demo");
    }
}
```



```
        System.Threading.Thread.Sleep(1000);
        driver.Quit();
    }
}
```

@TestMethod annotates a test case below, in a format of testCamelCase() or TestCapitalCase. You will find more about VS Unit Test Framework from [its home page](#)⁵. However, I honestly don't think it is necessary. The part used for test scripts is not much and quite intuitive. After studying and trying out some examples, you will be quite comfortable with it.

Visual Studio Unit Testing Framework fixtures

If you worked with xUnit before, you must know setUp() and tearDown() fixtures, used run before or after every test. In VS Unit Test Framework, by using annotations ([ClassInitialize], [TestInitialize], [TestCleanup], [ClassCleanup]), you can choose the name for fixtures. Here are mine:

```
[ClassInitialize]
public static void beforeAll() {
    // run before all test cases
}
```

```
[TestInitialize]
public void before() {
    // run before each test case
}
```

```
[TestMethod]
public void testCase2() {
    // one test case
}
```

```
[TestMethod]
public void testCase2() {
```

⁵<http://msdn.microsoft.com/en-us/library/ms243147>

```
        // another test case
    }

    [TestCleanup]
    public void after() {
        // run after each test case
    }

    [ClassCleanup]
    public static void afterAll() {
        // run after all test cases, typically, close browser
    }
}
```

Please note that `ClassCleanup` does not guarantee all tests from one test class have been executed before a new test class is initialized. What does this mean to your execution? If you run one test case or all test cases in one test class, `[ClassCleanup]` is invoked as you expected. However, when you run several test classes in one go, the time of invocation of `[ClassCleanup]` is nondeterministic (which lead many browser windows open). In my opinion, it sucks. Read this MSDN blog post for explanation: “[ClassCleanup May Run Later Than You Think](http://blogs.msdn.com/b/ploeh/archive/2007/01/06/classcleanupmayrunlaterthanyouthink.aspx)”⁶.

2.5 Alternative framework NUnit

[NUnit](http://nunit.org/)⁷, inspired by JUnit, is an open source unit testing framework for Microsoft .NET. If you have used JUnit before, you will find similarities in NUnit. Personally, I like NUnit more (comparing to MS Unit Test Framework). In particular, it’s more flexible to execute tests from command line with JUnit style test reports (which can be easily integrated with CI Servers).

However, you will need to spend some effort getting NUnit to work with Visual Studio.

2.6 Run recipe scripts

Test scripts for all recipes can be downloaded from the book site. They are all in ready-to-run state. I include the target web pages/sites as well as Selenium test scripts. There are two kinds of target web pages: local HTML files and web pages on a live site. To run tests written for live sites requires Internet connection.

⁶<http://blogs.msdn.com/b/ploeh/archive/2007/01/06/classcleanupmayrunlaterthanyouthink.aspx>

⁷<http://nunit.org/>

Run tests in Visual Studio

The most convenient way to run one test case or a test suite is to do it in an IDE. (When you have a large number of test cases, the most effective way to run all tests is done by a Continuous Integration process)

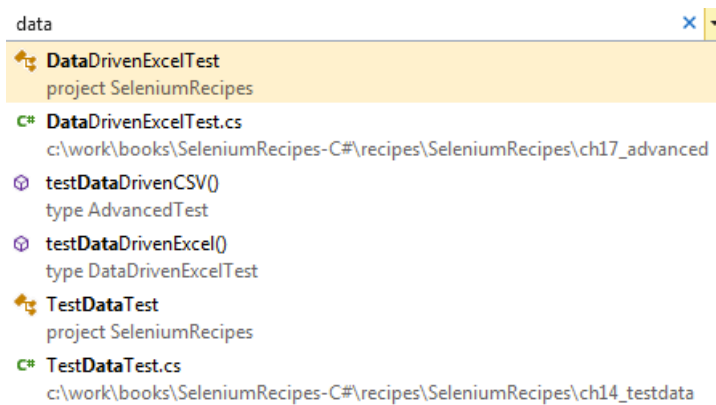
Find the test case

You can locate the recipe either by following the chapter or searching by name. There are over 100 test cases in one test project. Being able to quickly navigate to the test case is important when you have developed a large number of test cases.

Visual Studio has the “Navigate To” command, its default keyboard shortcut is **Ctrl + ’**.



A pop up window lists all artefacts (test cases, classes) in the project for your selection. The finding starts as soon as you type.

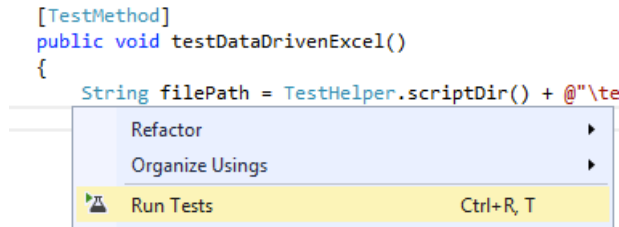


Run individual test case

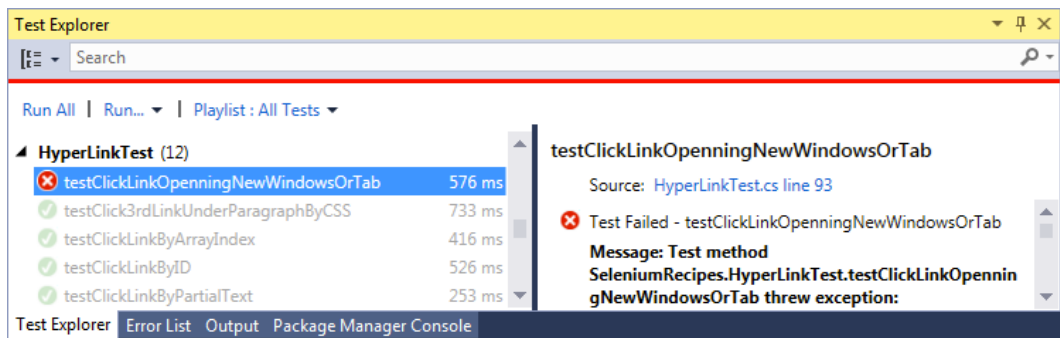
Move caret to a line within a test case, in

```
[TestMethod]
public void testCase2() {
    // one test case
}
```

Right mouse click and select “Run Tests” to run this case.

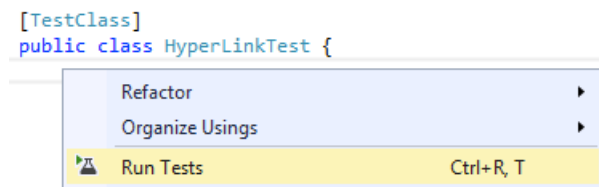


The below is a screenshot of execution panel when one test case failed,

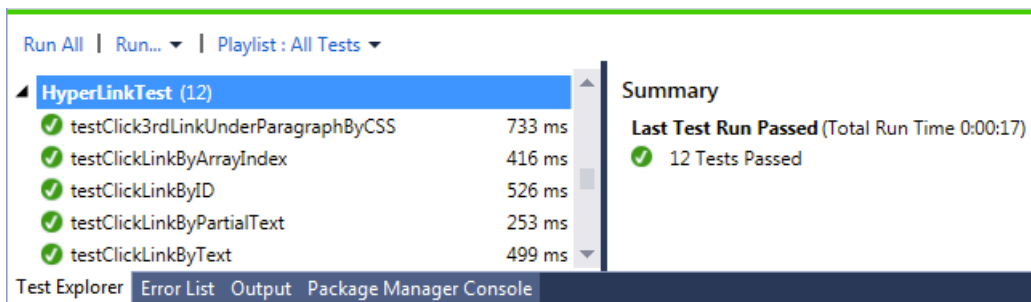


Run all test cases in a test script file

You can also run all test cases in the currently opened test script file by right mouse clicking anywhere in the editor and selecting ‘Test File’.

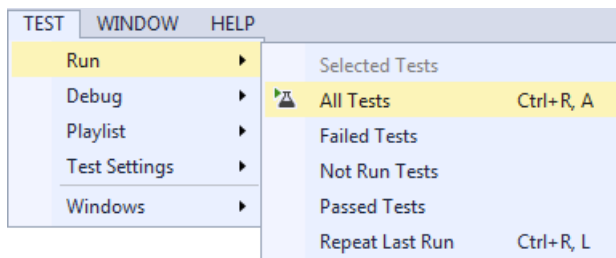


The below is a screenshot of the execution panel when all test cases in a test script file passed,

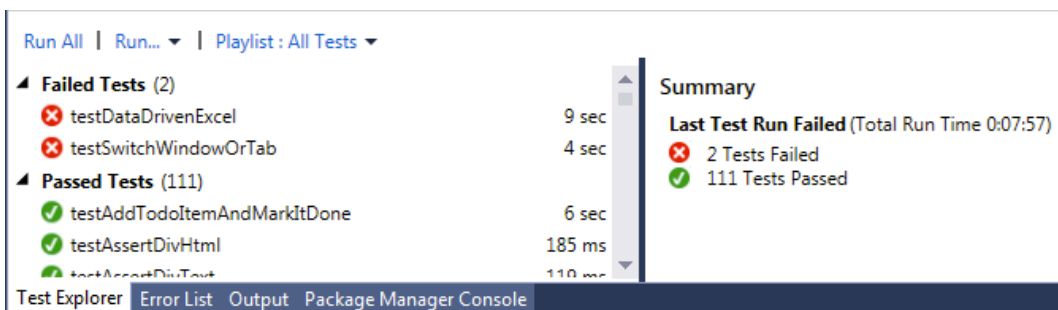


Run all tests

You can also run all test cases in a NetBeans project. Firstly, set the main project by selecting menu 'Tools' -> 'Run' -> 'All Tests'.



The below is a screenshot of the test results panel after running over 100 tests across dozens of test files.



Run tests from command line

One key advantage of open-source test frameworks, such as Selenium, is FREEDOM. You can edit the test scripts in any text editors and run them from a command line.

To run a C# class, you need to be compile it first (Within IDE, IDEs do it for you automatically).

1. Open a Visual Studio command prompt.

Click “Start” -> “All Programs” -> “Visual Studio 2013” -> “Visual Studio Tools”, and choose “Developer Command Prompt for VS2013”.

By default, the Visual Studio command prompt opens to the following folder:

```
<drive letter>:\Program Files (x86)\Microsoft Visual Studio 12.0>
```

2. Change directory to your solution folder

```
cd C:\work\books\SeleniumRecipes-C#\recipes\SeleniumRecipes\bin\Debug
```

3. Run VSTest.Console program

```
vstest.console SeleniumRecipes.dll
```

Example Output

```
Total tests: 113. Passed: 110. Failed: 3. Skipped: 0.  
Test Run Failed.  
Test execution time: 8.8321 Minutes
```

3. Hyperlink

Hyperlinks (or links) are fundamental elements of web pages. As a matter of fact, it is hyperlinks that makes the World Wide Web possible. A sample link is provided below, along with the HTML source.

[Recommend Selenium](#)

HTML Source

```
<a href="index.html" id="recommend_selenium_link" class="nav" data-id="123" \
style="font-size: 14px;">Recommend Selenium</a>
```

3.1 Start browser

Testing web sites starts with a browser.

```
static WebDriver driver = new FirefoxDriver();
driver.get("http://testwisely.com/demo")
```

Use ChromeDriver and IEDriver for testing in Chrome and IE respectively.

I recommend, for beginners, closing the browser window at the end of a test case.

```
driver.quit();
```

3.2 Click a link by label text

Using label text is probably the most direct way to click a link in Selenium, as it is what we see on the page.

```
driver.FindElement(By.LinkText("Recommend Selenium")).Click();
```

3.3 Click a link by ID

Using IDs is the easiest way (and the safest too, as it should be unique if the page is [W3C HTML conformed¹](http://www.w3.org/TR/WCAG20-TECHS/H93.html)) to identify web controls, if the programmers assign IDs to them. In contract to referring to the link label texts, test scripts that use IDs are usually less prone to application changes (eg. an application designer or developer may decide to change the label, but would not likely need to change the ID).

```
driver.FindElement(By.Id("recommend_selenium_link")).Click();
```

Furthermore, if you are testing a web site with multiple languages, using IDs is probably the only feasible option. You do not want to write test scripts like the below:

```
if (isItalian()) {  
    driver.FindElement(By.LinkText("Accedi")).Click();  
} else if (isChinese()) { // a helper function determines the locale  
    driver.FindElement(By.LinkText, "□□").Click();  
} else {  
    driver.FindElement(By.LinkText("Sign in")).Click();  
}
```

3.4 Click a link by partial label text

Selenium allows you to identify a hyperlink control with a partial text. This can be very useful when the label text is dynamically generated. For example, the label text on one web page might be different on your next visit. We might be able to use the common text shared by these dynamically generated link labels to identify these links.

```
driver.FindElement(By.PartialLinkText("Recommend Seleni")).Click();
```

¹<http://www.w3.org/TR/WCAG20-TECHS/H93.html>



As you might have already figured out, to drive a control, we need to find it first. There are a list of finders Selenium provides:

- Id
- LinkText
- PartialLinkText
- Name
- TagName
- XPath
- ClassName
- CssSelector

You may use either of them to narrow down the element you are looking for. Generally speaking, using `:id` is easiest, if present of course.

3.5 Click a link by XPath

XPath, the XML Path Language, is a query language for selecting nodes from an XML document. When browsers render a web page, it parses it into a DOM tree or similar, XPath can be used to refer a certain node in the tree. If this sounds a little too much technical for you, don't worry, just remember XPath is the most powerful way to find a specific web control. The example below is finding a link with text 'Recommend Selenium' under a `<p>` tag.

```
driver.FindElement(By.XPath("//p/a[text()='Recommend Selenium']")).Click();
```

Your might say the example before (find by `LinkText`) is simpler and more intuitive, that's correct. but let's examine another example:

First div [Click here](#)
Second div [Click here](#)

On this page, there are two 'Click here' links.

HTML Source

```

<div>
    First div
    <a href="link-url.html">Click here</a>
</div>
<div>
    Second div
    <a href="link-partial.html">Click here</a>
</div>

```

If test case requires you to click the second ‘Click here’ link, the simple `FindElement(By.LinkText("Click here"))` won’t work (as it clicks the first one). Here is a way to accomplish using XPath:

```

driver.FindElement(By.XPath("//div[contains(text(), \"Second\")]/a[text()='\"\\
Click here\\"]")).Click();


```

Some testers feel intimidated by the complexity of XPath. However, in practice, there is only limited scope of XPath to master for testers.

3.6 Click Nth link with exact same label

It is not uncommon that there are more than one links with exactly the same label text. By default, Selenium will choose the first one. What if you want to click the second or Nth one?

The web page below contains three “Show Answer” links,

1. Do you think automated testing is important and valuable? [Show Answer](#) 
2. Why didn't you do automated testing in your projects previously? [Show Answer](#)
3. Your project now has so comprehensive automated test suite, What changed? [Show Answer](#)

To click the second one,

```

Assert.IsTrue( driver.FindElements(By.LinkText("Show Answer")).Count == 2);
ReadOnlyCollection<IWebElement> links = driver.FindElements(By.LinkText("Sho\\
w Answer"));
links[1].Click(); // click the second one
Assert.IsTrue(driver.PageSource.Contains("second link page")); // second link

```

`FindElements` return a collection (also called array by some) of web controls matching the criteria in appearing order. Selenium (in fact C#) uses 0-based indexing, i.e., the first one is 0.

3.7 Click Nth link by CSS Selector

You may also use CSS selector to locate a web element.

```
// Click the 3rd link directly in <p> tag
driver.FindElement(By.CssSelector("p > a:nth-child(3)")).Click();
```

However, generally speaking, the stylesheet are more prone to changes.

3.8 Verify a link present or not?

```
Assert.IsTrue(driver.FindElement(By.LinkText("Recommend Selenium")).Displayed);
Assert.IsTrue(driver.FindElement(By.Id("recommend_selenium_link")).Displayed);
```

3.9 Getting link data attributes

Once a web control is identified, we can get its other attributes of the element. This is generally applicable to most of the controls.

```
Assert.AreEqual(TestHelper.siteUrl(), driver.FindElement(By.LinkText("Recommend Selenium")).GetAttribute("href"));
Assert.AreEqual("recommend_selenium_link", driver.FindElement(By.LinkText("Recommend Selenium")).GetAttribute("id"));
Assert.AreEqual("Recommend Selenium", driver.FindElement(By.Id("recommend_selenium_link")).Text);
Assert.AreEqual("a", driver.FindElement(By.Id("recommend_selenium_link")).TagName);
```

Also you can get the value of custom attributes of this element and its inline CSS style.

```
Assert.AreEqual("font-size: 14px;", driver.FindElement(By.Id("recommend_selenium_link")).GetAttribute("style"));
// Please note using attribute_value("style") won't work
Assert.AreEqual("123", driver.FindElement(By.Id("recommend_selenium_link")).GetAttribute("data-id"));
```

3.10 Test links open a new browser window

Clicking the link below will open the linked URL in a new browser window or tab.

```
<a href="http://testwisely.com/demo" target="_blank">Open new window</a>
```

While we could use `switchTo()` method (see chapter 10) to find the new browser window, it will be easier to perform all testing within one browser window. Here is how:

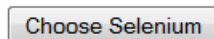
```
String currentUrl = driver.Url;
String newWindowUrl = driver.FindElement(By.LinkText("Open new window")).GetAttribute("href");
driver.Navigate().GoToUrl(newWindowUrl);
driver.FindElement(By.Name("name")).SendKeys("sometext");
driver.Navigate().GoToUrl(currentUrl); // back
```

In this test script, we use a local variable 'currentUrl' to store the current URL.

4. Button

There are mainly two types of buttons: standard buttons and submit/reset buttons in a form.

Standard button



Submit button in a form

Username:

HTML Source

```
<button id="choose_selenium_btn" class="nav" data-id="123" style="font-size:\
14px;">Choose Selenium</button>
<!-- ... -->
<form name="input" action="index.html" method="get">
  Username: <input type="text" name="user">
  <input type="submit" name="submit_action" value="Submit">
</form>
```

Please note that some controls look like buttons, but are actually hyperlinks by CSS styling.

4.1 Click a button by label

```
driver.FindElement(By.XPath("//button[contains(text(),'Choose Selenium')]"))\
.Click();
```

4.2 Click a form button by label

For an input button (in a HTML input tag) in a form, the label shown on the button is in fact the 'value' attribute, which might contain extra spaces or invisible characters.

```
<input type="submit" name="submit_action" value="Space After "/>
```

The test script below will fail as there is a space character in the end.

```
driver.FindElement(By.XPath("//input[@value='Space After']")).Click();
```

Changing to match the value exactly will fix it.

```
driver.FindElement(By.XPath("//input[@value='Space After '']")).Click();
```

4.3 Submit a form

In the official Selenium tutorial, the operation of clicking a form submit button is done by calling *submit* function on an input element within a form. For example, the test script below is to test user sign in.

```
username_element = driver.FindElement(By.Name("user"));
username_element.SendKeys("agileway");
password_element = driver.FindElement(By.Name("password"));
username_element.SendKeys("secret");
username_element.Submit();
```

However, this is not my preferred approach. Whenever possible, I write test scripts this way: one test step corresponds to one user operation, such as a text entry or a mouse click. This helps me to identify issues quicker during test debugging. Using *submit* means testers need a step to define a variable to store identified element (line 1 in above test script), to me, it breaks the flow. Here is my version:

```
driver.FindElement(By.Name("user")).SendKeys("agileway");
driver.FindElement(By.Name("password")).SendKeys("secret");
driver.FindElement(By.XPath("//input[@value='Sign in']")).Click();
```

Furthermore, if there is more than one submit buttons (unlikely but possible) in a form, calling *submit* is equivalent to clicking the first submit button only, which might cause confusion.

4.4 Click a button by ID

As always, a better way to identify a button is to use IDs. This applies to all controls, if there are IDs present.

```
driver.FindElement(By.Id("choose_selenium_btn")).Click();
```



For testers who work with the development team, rather than spending hours finding a way to identify a web control, just go to programmers and ask them to add IDs. It usually takes very little effort for programmers to do so.

4.5 Click a button by name

For an input button, we can use a new generic attribute to locate a control: 'name'.

```
driver.FindElement(By.Name("submit_action")).Click();
```

4.6 Click a image button

There is also another type of 'button': an image that works like a submit button in a form.



```
<input type="image" src="images/button_go.jpg"/>
```

Besides using ID, the button can also be identified by using *src* attribute.

```
driver.FindElement(By.XPath("//input[contains(@src, 'button_go.jpg')]")).Click();
```


4.7 Assert a button present

Just like hyperlinks, we can use `displayed?` to check whether a control is present on a web page. This check applies to most of the web controls in Selenium.

```
Assert.IsTrue(driver.FindElement(By.Id("choose_selenium_btn")).Displayed);
driver.FindElement(By.LinkText("Hide")).Click();
System.Threading.Thread.Sleep(500);
Assert.IsFalse(driver.FindElement(By.Id("choose_selenium_btn")).Displayed);
```

4.8 Assert a button enabled or disabled?

A web control can be in a disabled state. A disabled button is un-clickable, and it is displayed differently.

A screenshot of a web button with the text "Choose Selenium". The button has a light blue background and a thin grey border, indicating it is disabled.

Normally, enabling or disabling buttons (or other web controls) is triggered by JavaScripts.

```
Assert.IsTrue(driver.FindElement(By.Id("choose_selenium_btn")).Enabled);
driver.FindElement(By.LinkText("Disable")).Click();
System.Threading.Thread.Sleep(500);
Assert.IsFalse(driver.FindElement(By.Id("choose_selenium_btn")).Enabled);
driver.FindElement(By.LinkText("Enable")).Click();
System.Threading.Thread.Sleep(500);
Assert.IsTrue(driver.FindElement(By.Id("choose_selenium_btn")).Enabled);
```