RobusTest

Release 2

RobusTest

Sep 27, 2017

Contents

CHAPTER 1

RITE- RobusTest Integrated Testing Environment

Home

In this wiki, we mainly have these three parts.

- About-RITE This section introduces how to use each feature of RITE.
- Xpath-finder This section introduces how to use Xpath finder to get a custom Xpath
- Useful-tips This section is intended to help users avoid some known issues.
- Examples This section contains a few real site examples.
- Q&A This section answers quite a few common questions.

Please share your suggestions with us!

Google Moderator site

Contact us:

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Undercovers

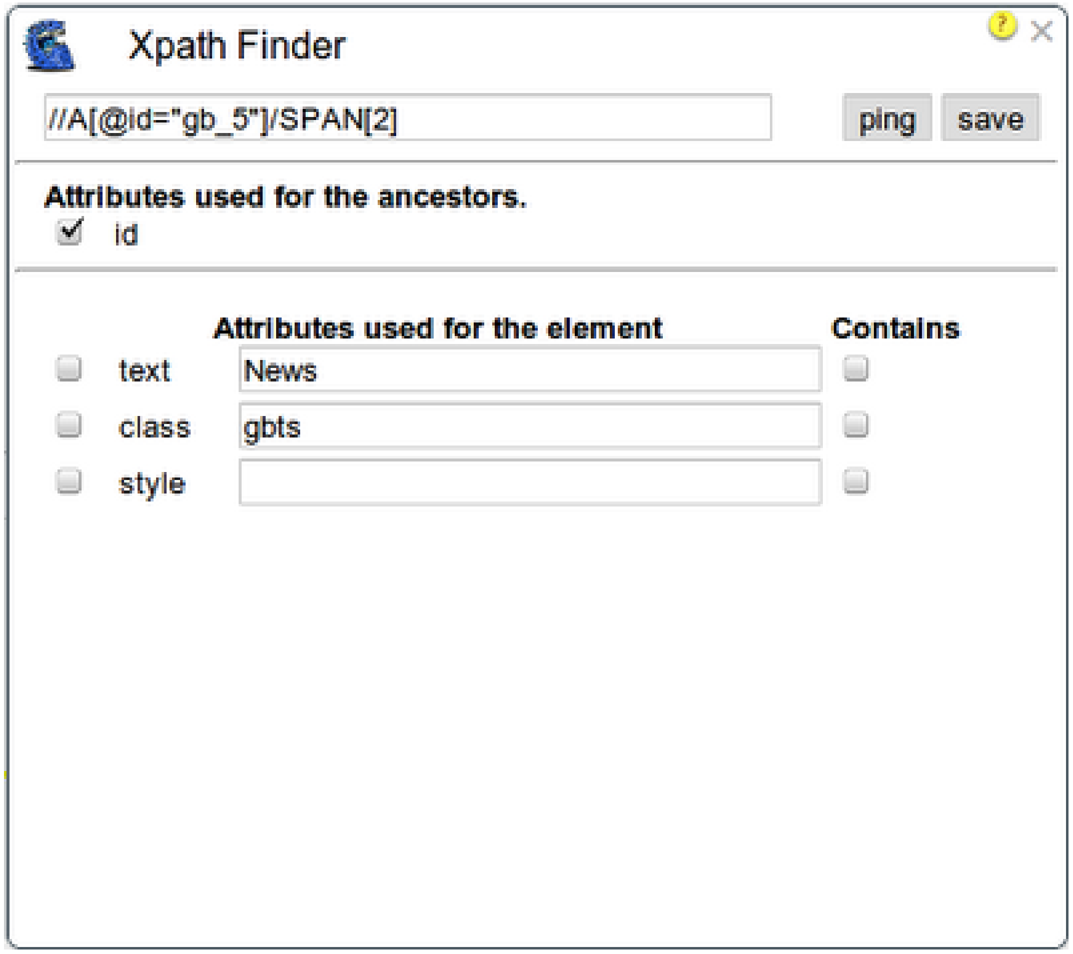
After introducing the basic functionalities, let's take a look at the undercover stuff:

- verification
- code generation
- content map
- descriptor

Comments

You do not have permission to add comments.

Xpath finder



//A[@id="gb_5"]/SPAN[2]

Attributes used for the ancestors.

[✓] id

	Attributes used for the element		Contains
☐	text	News	☐
☐	class	gbts	☐
☐	style		☐

How to turn on Xpath finder?

The Xpath finder could be either a standalone tool to help find a custom xpath or it could be used along with RITE.

- If you click the Xpath finder option in the extension popup dialog, it goes the standalone mode.
- To use it with RITE, you could open the settings dialog on RITE main console, and check the option "Use Xpath". Now when you enter the recording mode, you'll see the Xpath Finder shown in page.

A few quick tips to use it

- Press the "Shift" key to pause/resume the content changing while moving cursor. Once you've paused it, you could continue customizing your xpath by checking the options.
- Every time you click on an checkbox in Xpath finder, it will recalculate the xpath based on the change.
- If the Shift key doesn't pause/resume the xpath changing, it could be the tab is not focused.

How does it work?

When you move cursor around dom elements, you'll see the content changes correspondingly in Xpath Finder. In the top text box, it shows the xpath that is generated using the default algorithm. You can also customize the way that Xpath is generated in the following ways.

Based on attributes:

For example, the text in this case might not be changed anytime soon, so you could check that option, and it'll automatically show the updated xpath based on the text attribute.

Based on location:

Sometimes, none of the attributes are reliable, and you might just want to make the xpath based on the element's location in the dom tree. In this case, you could check all of the options off.

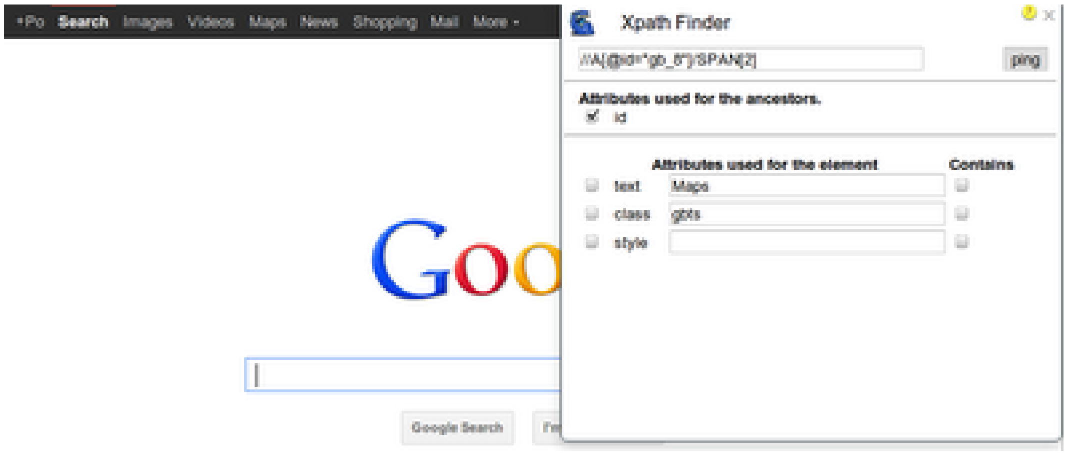
Partial match:

For example, you might just need the text attribute partially matched in some cases. Then you could check the contains checkbox next to the text input box.

After you've customized your new xpath, you might want to click the "ping" button to check if it's still matching the correct element. In the end, you could save it, so that RITE will use the new xpath instead of the default xpath when needed. When use the tool in the standalone mode, once your page navigates out, the Xpath finder will be gone, and you could reopen it if needed.

A real example

Let's say we'd like to get the xpath of the Maps link on Google home page.



//A[@id="gb_8"]/SPAN[2]

Attributes used for the ancestors.
[✓] id

	Attributes used for the element		Contains
☐	text	Maps	☐
☐	class	gbts	☐
☐	style		☐

When we move the cursor on top of the Maps link, we would see something like the above image, and by default, we get the xpath: //A[@id="gb_8"]/SPAN[2]

If we think the id in the xpath might be changed a lot more frequently than the text "Maps", then we could press the "Shift" key to pause the content changing, and then check the text checkbox before "Maps" in Xpath finder. Now, we get another xpath generated: //SPAN[text()="Maps"]

In some circumstances, there might not be any attributes that are reliable enough, we might just want to generate the xpath based on its location. In this case, we could simply check all of the checkboxes in Xpath finder off. Then we'll get another xpath: //DIV[1]/OL[1]/LI[5]/A[1]/SPAN[2]

Of course we would like to double check that after customizing the xpath, does it still match the correct element? That's what the ping button next to the Xpath input box does. Clicking the button will highlight the corresponding element in page with a blue boarder, and it will disappear within a sec.

Limitation

- It doesn't support iframe right now.
- When use it with RITE, for the custom xpath that is saved, it will be gone if you navigate out of the current page.

Comments

You do not have permission to add comments.

Useful tips

Main console

- Double click on a generated command like click(...), verify(...) will open the Details dialog.
- Ctrl + Alt +s to switch the generated script to readable mode and switch back.

Record

- To change the tab under record, click the RITE option in extension popup again. To check if the new tab is selected correctly, you could enter record mode and see if the new tab is popped up to the front and ready to record.
- To record an action like verify, verify not, and mouseover, try right clicking on the target element. In the popped up dialog in console, select the correct action and save the command.
- Always keep an eye on the generated code during recording. Most of the time, it should be obvious to understand the syntax. When there is a URL redirection happens, it should generate a redirectTo command following the original action command.
- Make sure the page is properly loaded and the dom element is yellow highlighted before performing actions, otherwise, it might miss recording the step.
- To turn the Xpath finder on, you'll need to check the option "Use Xpath" in the settings dialog which could be opened by clicking the settings button in the RITE menu bar.
- During recording, if a new tab is opened after clicking a link, you are still able to record in the original tab but the new tab.
- Due to an extension bug, RITE couldn't perform well in case of dynamically created iframes. For example, Gmail or the Google+ sharebox. As a workaround, it's possible to write up JS functions to simulate the behaviors.

Playback

- To run a whole project or any number of scripts within a project, you'll need to load the project first, and select the script names in the playback runtime dialog and play. In the end, it will show the links to view the results.
- You could cancel the whole run of multiple tests by clicking the X button in the playback runtime dialog. It only appears when you are running multiple tests.
- Try the stop button in playback runtime dialog to clear any playback status in case anything gets stuck.

Code

- **The commonly generated commands are the followings:**
  - click(Element) / dblclick(Element) / ...
  - type(Element, Variable) / select(Element, Variable) / verify(Element, Variable) /...
  - redirectTo(URL)
  - call(Custom Function)
  - changeUrl(URL), which could be manually typed in editor to perform a redirection.

Xpath finder

- "Shift" to pause/resume the content changing in Xpath finder.
- Turn on/off the checkboxes to customize the xpath.

Comments

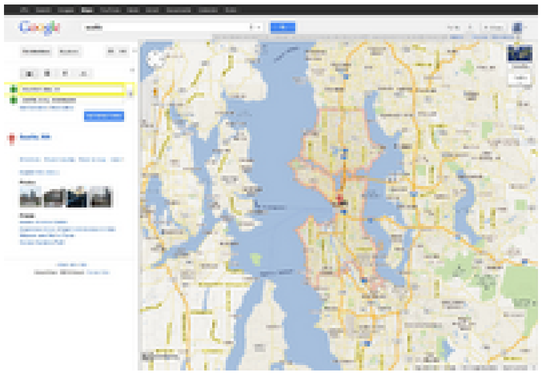
You do not have permission to add comments.

Examples

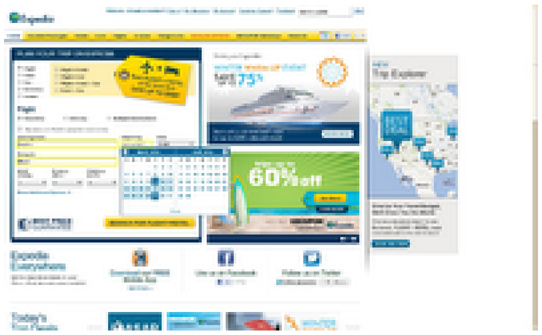
In this section, we'll have a look at a few scripts recorded on popular sites. Once you have the extension installed, you could click on any of the following screenshots and it will open the RITE main console and automatically load the script. Feel free to read the code, screenshots, or play it.

(Note that this page can not be recorded correctly because it contains special code for tutorial purpose.)

Google Maps



Expedia

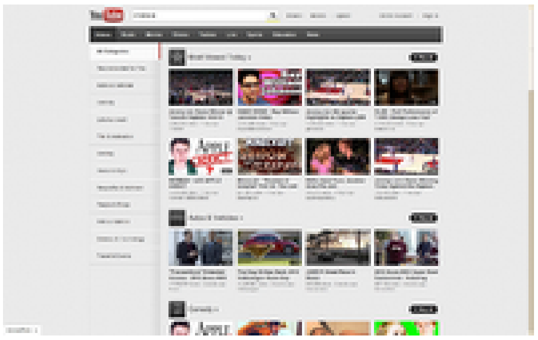


Amazon

Wikipedia

Yahoo

Youtube



Comments

You do not have permission to add comments.

CHAPTER 2

Selenium

Installation

Introduction

Selenium Python bindings provides a simple API to write functional/acceptance tests using Selenium WebDriver. Through Selenium Python API you can access all functionalities of Selenium WebDriver in an intuitive way.

Selenium Python bindings provide a convenient API to access Selenium WebDrivers like Firefox, Ie, Chrome, Remote etc. The current supported Python versions are 2.7, 3.2, 3.3 and 3.4.

This documentation explains Selenium 2 WebDriver API. Selenium 1 / Selenium RC API is not covered here.

Downloading Python bindings for Selenium

You can download Python bindings for Selenium from the PyPI page for selenium package. However, a better approach would be to use pip to install the selenium package. Python 3.4 has pip available in the standard library. Using *pip*, you can install selenium like this:

```
pip install selenium
```

You may consider using virtualenv to create isolated Python environments. Python 3.4 has pyvenv which is almost same as virtualenv.

Detailed instructions for Windows users

Note: You should have internet connection to perform this installation.

1. Install Python 3.4 using the MSI available in python.org download page.

2. Start a command prompt using the `cmd.exe` program and run the `pip` command as given below to install *selenium*.

   ```
   C:\Python34\Scripts\pip.exe install selenium
   ```

Now you can run your test scripts using Python. For example, if you have created a Selenium based script and saved it inside `C:\my_selenium_script.py`, you can run it like this:

```
C:\Python34\python.exe C:\my_selenium_script.py
```

Downloading Selenium server

Note: The Selenium server is only required, if you want to use the remote WebDriver. See the *Using Selenium with remote WebDriver* section for more details. If you are a beginner learning Selenium, you can skip this section and proceed with next chapter.

Selenium server is a Java program. Java Runtime Environment (JRE) 1.6 or newer version is recommended to run Selenium server.

You can download Selenium server 2.x from the download page of selenium website. The file name should be something like this: `selenium-server-standalone-2.x.x.jar`. You can always download the latest 2.x version of Selenium server.

If Java Runtime Environment (JRE) is not installed in your system, you can download the JRE from the Oracle website. If you are using a GNU/Linux system and have root access in your system, you can also use your operating system instructions to install JRE.

If *java* command is available in the PATH (environment variable), you can start the Selenium server using this command:

```
java -jar selenium-server-standalone-2.x.x.jar
```

Replace *2.x.x* with actual version of Selenium server you downloaded from the site.

If JRE is installed as a non-root user and/or if it is not available in the PATH (environment variable), you can type the relative or absolute path to the *java* command. Similarly, you can provide relative or absolute path to Selenium server jar file. Then, the command will look something like this:

```
/path/to/java -jar /path/to/selenium-server-standalone-2.x.x.jar
```

Getting Started

Simple Usage

If you have installed Selenium Python bindings, you can start using it from Python like this.

```
from selenium import webdriver
from selenium.webdriver.common.keys import Keys

driver = webdriver.Firefox()
driver.get("http://www.python.org")
assert "Python" in driver.title
```

```
elem = driver.find_element_by_name("q")
elem.send_keys("selenium")
elem.send_keys(Keys.RETURN)
driver.close()
```

The above script can be saved into a file (eg:- *python_org_search.py*), then it can be run like this:

```
python python_org_search.py
```

The *python* which you are running should have the *selenium* module installed.

Walk through of the example

The *selenium.webdriver* module provides all the WebDriver implementations. Currently supported WebDriver implementations are Firefox, Chrome, Ie and Remote. The *Keys* class provide keys in the keyboard like RETURN, F1, ALT etc.

```
from selenium import webdriver
from selenium.webdriver.common.keys import Keys
```

Next, the instance of Firefox WebDriver is created.

```
driver = webdriver.Firefox()
```

The *driver.get* method will navigate to a page given by the URL. WebDriver will wait until the page has fully loaded (that is, the "onload" event has fired) before returning control to your test or script. It's worth noting that if your page uses a lot of AJAX on load then WebDriver may not know when it has completely loaded.:

```
driver.get("http://www.python.org")
```

The next line is an assertion to confirm that title has "Python" word in it:

```
assert "Python" in driver.title
```

WebDriver offers a number of ways to find elements using one of the *find_element_by_** methods. For example, the input text element can be located by its *name* attribute using *find_element_by_name* method. Detailed explanation of finding elements is available in the *Locating Elements* chapter:

```
elem = driver.find_element_by_name("q")
```

Next we are sending keys, this is similar to entering keys using your keyboard. Special keys can be send using *Keys* class imported from *selenium.webdriver.common.keys*:

```
elem.send_keys("selenium")
elem.send_keys(Keys.RETURN)
```

After submission of the page, you should get the result if there is any:

Finally, the browser window is closed. You can also call *quit* method instead of *close*. The *quit* will exit entire browser where as *close* will close one tab, but if it just one tab, by default most browser will exit entirely.:

```
driver.close()
```

Using Selenium to write tests

Selenium is mostly used for writing test cases. The *selenium* package itself doesn't provide a testing tool/framework. You can write test cases using Python's unittest module. The other choices as a tool/framework are py.test and nose.

In this chapter, we use *unittest* as the framework of choice. Here is the modified example which uses unittest module. This is a test for *python.org* search functionality:

```
import unittest
from selenium import webdriver
from selenium.webdriver.common.keys import Keys

class PythonOrgSearch(unittest.TestCase):

    def setUp(self):
        self.driver = webdriver.Firefox()

    def test_search_in_python_org(self):
        driver = self.driver
        driver.get("http://www.python.org")
        self.assertIn("Python", driver.title)
        elem = driver.find_element_by_name("q")
        elem.send_keys("selenium")
        elem.send_keys(Keys.RETURN)

    def tearDown(self):
        self.driver.close()

if __name__ == "__main__":
    unittest.main()
```

You can run the above test case from a shell like this:

```
python test_python_org_search.py
.
----------------------------------------------------------------------
Ran 1 test in 15.566s

OK
```

The above results shows that, the test has been successfully completed.

Walk through of the example

Initially, all the basic modules required are imported. The unittest module is a built-in Python based on Java's JUnit. This module provides the framework for organizing the test cases. The *selenium.webdriver* module provides all the WebDriver implementations. Currently supported WebDriver implementations are Firefox, Chrome, Ie and Remote. The *Keys* class provide keys in the keyboard like RETURN, F1, ALT etc.

```
import unittest
from selenium import webdriver
from selenium.webdriver.common.keys import Keys
```

The test case class is inherited from *unittest.TestCase*. Inheriting from *TestCase* class is the way to tell *unittest* module that, this is a test case:

```
class PythonOrgSearch(unittest.TestCase):
```

The *setUp* is part of initialization, this method will get called before every test function which you are going to write in this test case class. Here you are creating the instance of Firefox WebDriver.

```
def setUp(self):
    self.driver = webdriver.Firefox()
```

This is the test case method. The first line inside this method create a local reference to the driver object created in *setUp* method.

```
def test_search_in_python_org(self):
    driver = self.driver
```

The *driver.get* method will navigate to a page given by the URL. WebDriver will wait until the page has fully loaded (that is, the "onload" event has fired) before returning control to your test or script. It's worth noting that if your page uses a lot of AJAX on load then WebDriver may not know when it has completely loaded.:

```
driver.get("http://www.python.org")
```

The next line is an assertion to confirm that title has "Python" word in it:

```
self.assertIn("Python", driver.title)
```

WebDriver offers a number of ways to find elements using one of the *find_element_by_** methods. For example, the input text element can be located by its *name* attribute using *find_element_by_name* method. Detailed explanation of findind elements is available in the *Locating Elements* chapter:

```
elem = driver.find_element_by_name("q")
```

Next we are sending keys, this is similar to entering keys using your keyboard. Special keys can be send using *Keys* class imported from *selenium.webdriver.common.keys*:

```
elem.send_keys("selenium")
elem.send_keys(Keys.RETURN)
```

After submission of the page, you should get result as per search if there is any.

The *tearDown* method will get called after every test method. This is a place to do all cleanup actions. In the current method, the browser window is closed. You can also call *quit* method instead of *close*. The *quit* will exit entire browser, where as *close* will close a tab, but if it is just one tab, by default most browser will exit entirely.:

```
def tearDown(self):
    self.driver.close()
```

Final lines are some boiler plate code to run the test suite:

```
if __name__ == "__main__":
    unittest.main()
```

Using Selenium with remote WebDriver

To use the remote WebDriver, you should have Selenium server running. To run the server, use this command:

```
java -jar selenium-server-standalone-2.x.x.jar
```

While running the Selenium server, you could see a message looks like this:

```
15:43:07.541 INFO - RemoteWebDriver instances should connect to: http://127.0.0.
↪1:4444/wd/hub
```

The above line says that, you can use this URL for connecting to remote WebDriver. Here are some examples:

```
from selenium.webdriver.common.desired_capabilities import DesiredCapabilities

driver = webdriver.Remote(
   command_executor='http://127.0.0.1:4444/wd/hub',
   desired_capabilities=DesiredCapabilities.CHROME)

driver = webdriver.Remote(
   command_executor='http://127.0.0.1:4444/wd/hub',
   desired_capabilities=DesiredCapabilities.OPERA)

driver = webdriver.Remote(
   command_executor='http://127.0.0.1:4444/wd/hub',
   desired_capabilities=DesiredCapabilities.HTMLUNITWITHJS)
```

The desired capabilities is a dictionary, so instead of using the default dictionaries, you can specifies the values explicitly:

```
driver = webdriver.Remote(
   command_executor='http://127.0.0.1:4444/wd/hub',
   desired_capabilities={'browserName': 'htmlunit',
                         'version': '2',
                        'javascriptEnabled': True})
```

Navigating

The first thing you'll want to do with WebDriver is navigate to a link. The normal way to do this is by calling `get` method:

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

WebDriver will wait until the page has fully loaded (that is, the `onload` event has fired) before returning control to your test or script. It's worth noting that if your page uses a lot of AJAX on load then WebDriver may not know when it has completely loaded. If you need to ensure such pages are fully loaded then you can use *waits*.

Interacting with the page

Just being able to go to places isn't terribly useful. What we'd really like to do is to interact with the pages, or, more specifically, the HTML elements within a page. First of all, we need to find one. WebDriver offers a number of ways to find elements. For example, given an element defined as:

```
<input type="text" name="passwd" id="passwd-id" />
```

you could find it using any of:

```
element = driver.find_element_by_id("passwd-id")
element = driver.find_element_by_name("passwd")
element = driver.find_element_by_xpath("//input[@id='passwd-id']")
```

You can also look for a link by its text, but be careful! The text must be an exact match! You should also be careful when using *XPATH in WebDriver*. If there's more than one element that matches the query, then only the first will be returned. If nothing can be found, a `NoSuchElementException` will be raised.

WebDriver has an "Object-based" API; we represent all types of elements using the same interface. This means that although you may see a lot of possible methods you could invoke when you hit your IDE's auto-complete key combination, not all of them will make sense or be valid. Don't worry! WebDriver will attempt to do the Right Thing, and if you call a method that makes no sense ("setSelected()" on a "meta" tag, for example) an exception will be raised.

So, you've got an element. What can you do with it? First of all, you may want to enter some text into a text field:

```
element.send_keys("some text")
```

You can simulate pressing the arrow keys by using the "Keys" class:

```
element.send_keys(" and some", Keys.ARROW_DOWN)
```

It is possible to call *send_keys* on any element, which makes it possible to test keyboard shortcuts such as those used on GMail. A side-effect of this is that typing something into a text field won't automatically clear it. Instead, what you type will be appended to what's already there. You can easily clear the contents of a text field or textarea with *clear* method:

```
element.clear()
```

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 drop down, and you can use "setSelected" to set something like an *OPTION* tag selected. Dealing with *SELECT* tags isn't too bad:

```
element = driver.find_element_by_xpath("//select[@name='name']")
all_options = element.find_elements_by_tag_name("option")
for option in all_options:
    print("Value is: %s" % option.get_attribute("value"))
    option.click()
```

This will find the first "SELECT" element on the page, and cycle through each of it's OPTIONs in turn, printing out their values, and selecting each in turn.

As you can see, 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:

```
from selenium.webdriver.support.ui import Select
select = Select(driver.find_element_by_name('name'))
select.select_by_index(index)
select.select_by_visible_text("text")
select.select_by_value(value)
```

WebDriver also provides features for deselecting all the selected options:

```
select = Select(driver.find_element_by_id('id'))
select.deselect_all()
```

This will deselect all OPTIONs from the first SELECT on the page.

Suppose in a test, we need the list of all default selected options, Select class provides a property method that returns a list:

```
select = Select(driver.find_element_by_xpath("xpath"))
all_selected_options = select.all_selected_options
```

To get all available options:

```
options = select.options
```

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:

```
# Assume the button has the ID "submit" :)
driver.find_element_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 the `NoSuchElementException` will be raised:

```
element.submit()
```

Drag and drop

You can use drag and drop, either moving an element by a certain amount, or on to another element:

```
element = driver.find_element_by_name("source")
target = driver.find_element_by_name("target")

from selenium.webdriver import ActionChains
action_chains = ActionChains(driver)
action_chains.drag_and_drop(element, target)
```

Moving between windows and frames

It's rare for a modern web application not to have any frames or to be constrained to a single window. WebDriver supports moving between named windows using the "switch_to_window" method:

```
driver.switch_to_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 "switch_to_window()" method. Knowing this, it's possible to iterate over every open window like so:

```
for handle in driver.window_handles:
    driver.switch_to_window(handle)
```

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

```
driver.switch_to_frame("frameName")
```

It's possible to access subframes by separating the path with a dot, and you can specify the frame by its index too. That is:

```
driver.switch_to_frame("frameName.0.child")
```

would go to the frame named "child" of the first subframe of the frame called "frameName". **All frames are evaluated as if from *top*.**

Once we are done with working on frames, we will have to come back to the parent frame which can be done using:

```
driver.switch_to_default_content()
```

Popup dialogs

Selenium WebDriver has built-in support for handling popup dialog boxes. After you've triggerd and action that would open a popup, you can access the alert with the following:

```
alert = driver.switch_to_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, prompts. Refer to the API documentation for more information.

Navigation: history and location

Earlier, we covered navigating to a page using the "get" command (`driver.get("http://www.example.com")`) As you've seen, WebDriver has a number of smaller, task-focused interfaces, and navigation is a useful task. To navigate to a page, you can use *get* method:

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

To move backwards and forwards in your browser's history:

```
driver.forward()
driver.back()
```

Please be aware that this functionality depends entirely on the underlying driver. 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:

```
# Go to the correct domain
driver.get("http://www.example.com")

# Now set the cookie. This one's valid for the entire domain
cookie = {"key": "value"})
driver.add_cookie(cookie)

# And now output all the available cookies for the current URL
all_cookies = driver.get_cookies()
for cookie_name, cookie_value in all_cookies.items():
    print("%s -> %s", cookie_name, cookie_value)
```

Locating Elements

There are vaious strategies to locate elements in a page. You can use the most appropriate one for your case. Selenium provides the following methods to locate elements in a page:

- *find_element_by_id*
- *find_element_by_name*
- *find_element_by_xpath*
- *find_element_by_link_text*
- *find_element_by_partial_link_text*
- *find_element_by_tag_name*
- *find_element_by_class_name*
- *find_element_by_css_selector*

To find multiple elements (these methods will return a list):

- *find_elements_by_name*
- *find_elements_by_xpath*
- *find_elements_by_link_text*
- *find_elements_by_partial_link_text*
- *find_elements_by_tag_name*
- *find_elements_by_class_name*
- *find_elements_by_css_selector*

Locating by Id

Use this when you know *id* attribute of an element. With this strategy, the first element with the *id* attribute value matching the location will be returned. If no element has a matching *id* attribute, a `NoSuchElementException` will be raised.

For instance, conside this page source:

```
<html>
 <body>
  <form id="loginForm">
   <input name="username" type="text" />
   <input name="password" type="password" />
   <input name="continue" type="submit" value="Login" />
  </form>
 </body>
<html>
```

The form element can be located like this:

```
login_form = driver.find_element_by_id('loginForm')
```

Locating by Name

Use this when you know *name* attribute of an element. With this strategy, the first element with the *name* attribute value matching the location will be returned. If no element has a matching *name* attribute, a `NoSuchElementException` will be raised.

For instance, conside this page source:

```
<html>
 <body>
  <form id="loginForm">
   <input name="username" type="text" />
   <input name="password" type="password" />
   <input name="continue" type="submit" value="Login" />
   <input name="continue" type="button" value="Clear" />
  </form>
</body>
<html>
```

The username & password elements can be located like this:

```
username = driver.find_element_by_name('username')
password = driver.find_element_by_name('password')
```

This will give the "Login" button as it occur before the "Clear" button:

```
continue = driver.find_element_by_name('continue')
```

Locating by XPath

XPath is the language used for locating nodes in an XML document. As HTML can be an implementation of XML (XHTML), Selenium users can leverage this powerful language to target elements in their web applications. XPath extends beyond (as well as supporting) the simple methods of locating by id or name attributes, and opens up all sorts of new possibilities such as locating the third checkbox on the page.

One of the main reasons for using XPath is when you don't have a suitable id or name attribute for the element you wish to locate. You can use XPath to either locate the element in absolute terms (not advised), or relative to an element that does have an id or name attribute. XPath locators can also be used to specify elements via attributes other than id and name.

Absolute XPaths contain the location of all elements from the root (html) and as a result are likely to fail with only the slightest adjustment to the application. By finding a nearby element with an id or name attribute (ideally a parent element) you can locate your target element based on the relationship. This is much less likely to change and can make your tests more robust.

For instance, conside this page source:

```
<html>
 <body>
  <form id="loginForm">
   <input name="username" type="text" />
   <input name="password" type="password" />
   <input name="continue" type="submit" value="Login" />
   <input name="continue" type="button" value="Clear" />
  </form>
</body>
<html>
```

The form elements can be located like this:

```
login_form = driver.find_element_by_xpath("/html/body/form[1]")
login_form = driver.find_element_by_xpath("//form[1]")
login_form = driver.find_element_by_xpath("//form[@id='loginForm']")
```

1. Absolute path (would break if the HTML was changed only slightly)
2. First form element in the HTML
3. The form element with attribute named *id* and the value *loginForm*

The username element can be located like this:

```
username = driver.find_element_by_xpath("//form[input/@name='username']")
username = driver.find_element_by_xpath("//form[@id='loginForm']/input[1]")
username = driver.find_element_by_xpath("//input[@name='username']")
```

1. First form element with an input child element with attribute named *name* and the value *username*
2. First input child element of the form element with attribute named *id* and the value *loginForm*
3. First input element with attribute named 'name' and the value *username*

The "Clear" button element can be located like this:

```
clear_button = driver.find_element_by_xpath("//input[@name='continue'][@type='button']
↪")
clear_button = driver.find_element_by_xpath("//form[@id='loginForm']/input[4]")
```

1. Input with attribute named *name* and the value *continue* and attribute named *type* and the value *button*
2. Fourth input child element of the form element with attribute named *id* and value *loginForm*

These examples cover some basics, but in order to learn more, the following references are recommended:

- W3Schools XPath Tutorial
- W3C XPath Recommendation
- XPath Tutorial - with interactive examples.

There are also a couple of very useful Add-ons that can assist in discovering the XPath of an element:

- XPath Checker - suggests XPath and can be used to test XPath results.

- Firebug - XPath suggestions are just one of the many powerful features of this very useful add-on.
- XPath Helper - for Google Chrome

Locating Hyperlinks by Link Text

Use this when you know link text used within an anchor tag. With this strategy, the first element with the link text value matching the location will be returned. If no element has a matching link text attribute, a `NoSuchElementException` will be raised.

For instance, consider this page source:

```
<html>
 <body>
  <p>Are you sure you want to do this?</p>
  <a href="continue.html">Continue</a>
  <a href="cancel.html">Cancel</a>
</body>
<html>
```

The continue.html link can be located like this:

```
continue_link = driver.find_element_by_link_text('Continue')
continue_link = driver.find_element_by_partial_link_text('Conti')
```

Locating Elements by Tag Name

Use this when you want to locate an element by tag name. With this strategy, the first element with the give tag name will be returned. If no element has a matching tag name, a `NoSuchElementException` will be raised.

For instance, conside this page source:

```
<html>
 <body>
  <h1>Welcome</h1>
  <p>Site content goes here.</p>
</body>
<html>
```

The heading (h1) element can be located like this:

```
heading1 = driver.find_element_by_tag_name('h1')
```

Locating Elements by Class Name

Use this when you want to locate an element by class attribute name. With this strategy, the first element with the matching class attribute name will be returned. If no element has a matching class attribute name, a `NoSuchElementException` will be raised.

For instance, consider this page source:

```
<html>
 <body>
  <p class="content">Site content goes here.</p>
```

```
</body>
<html>
```

The “p” element can be located like this:

```
content = driver.find_element_by_class_name('content')
```

Locating Elements by CSS Selectors

Use this when you want to locate an element by CSS selector syntaxt. With this strategy, the first element with the matching CSS selector will be returned. If no element has a matching CSS selector, a `NoSuchElementException` will be raised.

For instance, consider this page source:

```
<html>
 <body>
  <p class="content">Site content goes here.</p>
</body>
<html>
```

The “p” element can be located like this:

```
content = driver.find_element_by_css_selector('p.content')
```

Sauce Labs has good documentation on CSS selectors.

Waits

These days most of the web apps are using AJAX techniques. When a page is loaded to browser, the elements within that page may load at different time intervals. This makes locating elements difficult, if the element is not present in the DOM, it will raise *ElementNotVisibleException* exception. Using waits, we can solve this issue. Waiting provides some time interval between actions performed - mostly locating element or any other operation with the element.

Selenium Webdriver provides two types of waits - implicit & explicit. An explicit wait makes WebDriver to wait for a certain condition to occur before proceeding further with executions. An implicit wait makes WebDriver to poll the DOM for a certain amount of time when trying to locate an element.

Explicit Waits

An explicit waits is code you define to wait for a certain condition to occur before proceeding further in the code. The worst case of this is time.sleep(), which sets the condition to an exact time period to wait. There are some convenience methods provided that help you write code that will wait only as long as required. WebDriverWait in combination with ExpectedCondition is one way this can be accomplished.

```
from selenium import webdriver
from selenium.webdriver.common.by import By
from selenium.webdriver.support.ui import WebDriverWait
from selenium.webdriver.support import expected_conditions as EC

driver = webdriver.Firefox()
driver.get("http://somedomain/url_that_delays_loading")
```

```
try:
    element = WebDriverWait(driver, 10).until(
        EC.presence_of_element_located((By.ID, "myDynamicElement"))
    )
finally:
    driver.quit()
```

This waits up to 10 seconds before throwing a TimeoutException or if it finds the element will return it in 0 - 10 seconds. WebDriverWait by default calls the ExpectedCondition every 500 milliseconds until it returns successfully. A successful return is for ExpectedCondition type is Boolean return true or not null return value for all other ExpectedCondition types.

Expected Conditions

There are some common conditions that are frequently come across when automating web browsers. Listed below are Implementations of each. Selenium Python binding provides some convienence methods so you don't have to code an expected_condition class yourself or create your own utility package for them.

- title_is
- title_contains
- presence_of_element_located
- visibility_of_element_located
- visibility_of
- presence_of_all_elements_located
- text_to_be_present_in_element
- text_to_be_present_in_element_value
- frame_to_be_available_and_switch_to_it
- invisibility_of_element_located
- element_to_be_clickable - it is Displayed and Enabled.
- staleness_of
- element_to_be_selected
- element_located_to_be_selected
- element_selection_state_to_be
- element_located_selection_state_to_be
- alert_is_present

```
from selenium.webdriver.support import expected_conditions as EC

wait = WebDriverWait(driver, 10)
element = wait.until(EC.element_to_be_clickable((By.ID,'someid')))
```

The expected_conditions module contains a set of predefined conditions to use with WebDriverWait.

Implicit Waits

An implicit wait is to tell WebDriver to poll the DOM for a certain amount of time when trying to find an element or elements if they are not immediately available. The default setting is 0. Once set, the implicit wait is set for the life of the WebDriver object instance.

```
from selenium import webdriver

driver = webdriver.Firefox()
driver.implicitly_wait(10) # seconds
driver.get("http://somedomain/url_that_delays_loading")
myDynamicElement = driver.find_element_by_id("myDynamicElement")
```

WebDriver API

Note: This is not an official documentation. Official API documentation is available here.

This chapter cover all the interfaces of Selenium WebDriver.

Recommended Import Style

The API definitions in this chapter shows the absolute location of classes. However the recommended import style is as given below:

```
from selenium import webdriver
```

Then, you can access the classes like this:

```
webdriver.Firefox
webdriver.FirefoxProfile
webdriver.Chrome
webdriver.ChromeOptions
webdriver.Ie
webdriver.Opera
webdriver.PhantomJS
webdriver.Remote
webdriver.DesiredCapabilities
webdriver.ActionChains
webdriver.TouchActions
webdriver.Proxy
```

The special keys class (`Keys`) can be imported like this:

```
from selenium.webdriver.common.keys import Keys
```

The exception classes can be imported like this (Replace the `TheNameOfTheExceptionClass` with actual class name given below):

```
from selenium.common.exceptions import [TheNameOfTheExceptionClass]
```

Conventions used in the API

Some attributes are callable (or methods) and others are non-callable (properties). All the callable attributes are ending with round brackets.

Here is an example for property:

- current_url

  URL of the current loaded page.

Usage:

```
driver.current_url
```

Here is an example for a method:

- close()

  Closes the current window.

  Usage:

```
driver.close()
```

Exceptions

Action Chains

Alerts

Special Keys

Firefox WebDriver

Chrome WebDriver

Remote WebDriver

WebElement

UI Support

Color Support

Expected conditions Support

Appendix: Frequently Asked Questions

Another FAQ: https://code.google.com/p/selenium/wiki/FrequentlyAskedQuestions

How to use ChromeDriver ?

Download the latest chromedriver from download page. Unzip the file:

```
unzip chromedriver_linux32_x.x.x.x.zip
```

You should see a `chromedriver` executable. Now you can create an instance of Chrome WebDriver like this:

```
driver = webdriver.Chrome(executable_path="/path/to/chromedriver")
```

The rest of the example should work as given in other documentation.

Does Selenium 2 support XPath 2.0 ?

Ref: http://seleniumhq.org/docs/03_webdriver.html#how-xpath-works-in-webdriver

Selenium delegates XPath queries down to the browser's own XPath engine, so Selenium support XPath supports whatever the browser supports. In browsers which don't have native XPath engines (IE 6,7,8), Selenium supports XPath 1.0 only.

How to scroll down to the bottom of a page ?

Ref: http://blog.varunin.com/2011/08/scrolling-on-pages-using-selenium.html

You can use the *execute_script* method to execute javascript on the loaded page. So, you can call the JavaScript API to scroll to the bottom or any other position of a page.

Here is an example to scroll to the bottom of a page:

```
driver.execute_script("window.scrollTo(0, document.body.scrollHeight);")
```

The window object in DOM has a scrollTo method to scroll to any position of an opened window. The scrollHeight is a common property for all elements. The *document.body.scrollHeight* will give the height of the entire body of the page.

How to auto save files using custom Firefox profile ?

Ref: http://stackoverflow.com/questions/1176348/access-to-file-download-dialog-in-firefox

Ref: http://blog.codecentric.de/en/2010/07/file-downloads-with-selenium-mission-impossible/

The first step is to identify the type of file you want to auto save.

To identify the content type you want to download automatically, you can use curl:

```
curl -I URL | grep "Content-Type"
```

Another way to find content type is using the requests module, you can use it like this:

```
import requests
content_type = requests.head('http://www.python.org').headers['content-type']
print(content_type)
```

Once the content type is identified, you can use it to set the firefox profile preference: `browser.helperApps.neverAsk.saveToDisk`

Here is an example:

```
import os

from selenium import webdriver

fp = webdriver.FirefoxProfile()

fp.set_preference("browser.download.folderList",2)
fp.set_preference("browser.download.manager.showWhenStarting",False)
fp.set_preference("browser.download.dir", os.getcwd())
fp.set_preference("browser.helperApps.neverAsk.saveToDisk", "application/octet-stream
↪")
```

```
browser = webdriver.Firefox(firefox_profile=fp)
browser.get("http://pypi.python.org/pypi/selenium")
browser.find_element_by_partial_link_text("selenium-2").click()
```

In the above example, `application/octet-stream` is used as the content type.

The `browser.download.dir` option specify the directory where you want to download the files.

How to use firebug with Firefox ?

First download the Firebug XPI file, later you call the `add_extension` method available for the firefox profile:

```
from selenium import webdriver

fp = webdriver.FirefoxProfile()

fp.add_extension(extension='firebug-1.8.4.xpi')
fp.set_preference("extensions.firebug.currentVersion", "1.8.4") #Avoid startup screen
browser = webdriver.Firefox(firefox_profile=fp)
```

How to take screenshot of the current window ?

Use the *save_screenshot* method provided by the webdriver:

```
from selenium import webdriver

driver = webdriver.Firefox()
driver.get('http://www.python.org/')
driver.save_screenshot('screenshot.png')
driver.quit()
```

Note: This is not an official documentation. Official API documentation is available here.

CHAPTER 3

Indices and tables

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Robustest - Contextual Bug Reporting