Automated Web Testing with Selenium

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ThoughtWorks

Agenda

- **What is Selenium?**
- Writing Maintainable Tests

What is Selenium?

- Test tool for web applications
- Runs in any mainstream browser
- Supports tests in many languages
  - Selenese (pure HTML, no backend required)
  - Java, C#, Perl, Python, Ruby
- Record/playback (Selenium IDE)
- Open Source with corporate backing
- Lives at selenium.openqa.org

Demo

- Record a test in Selenium IDE
- Show same test written in Java

Java Test example

```
public void testGoogleTestSearch() throws Exception
{
  selenium.open("http://www.google.com/webhp");
  assertEquals("Google", selenium.getTitle());
  selenium.type("q", "Selenium OpenQA");
  selenium.click("btnG");
  selenium.waitForPageToLoad("5000");
  assertEquals("Selenium OpenQA - Google Search",
                                  selenium.getTitle());
}
```

Java SetUp/TearDown example

```
public void setUp() throws Exception
{
   selenium = new DefaultSelenium(
       "localhost", 4444, "*chrome",
       "http://www.google.com");
   selenium.start();
}

public void tearDown() throws Exception
{
   selenium.stop();
}
```

A few Selenese commands

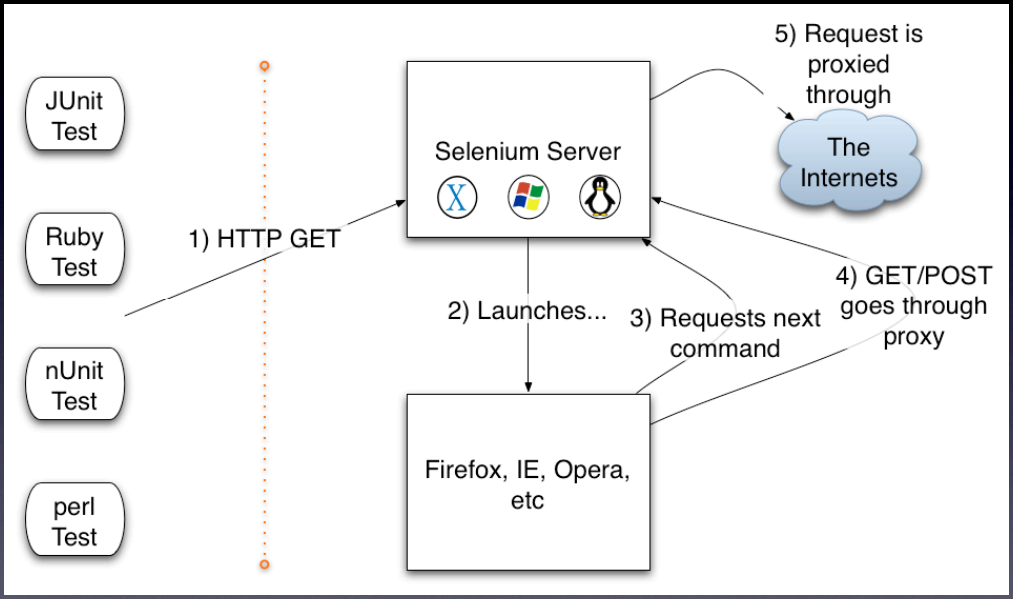
click	getHtmlSource	isVisible
close	getTitle	keyPress
createCookie	getValue	mouseOver
dragdrop	goBack	**open**
fireEvent	isElementPresent	refresh
getEval	**isTextPresent**	**type**

Element locators

- **ID:** id=foo
- **Name:** name=foo
- **First ID, then name:** identifier=foo
- **DOM:** document.forms['myform'].myDropdown
- **XPath:** xpath=//table[@id='table1']//tr[4]/td[2]
- **Link Text:** link=sometext
- **CSS Selector:** css=a[href="#id3"]
- Sensible defaults, e.g. xpath if starts with //

```
selenium.click("btnG");
```

How Selenium works



Agenda

- What is Selenium?
- **Writing Maintainable Tests**

Standard end-user black-box test

1. Login as administrator
2. Create a user
3. Log out
4. Login as that user
5. Create a folder
6. Create a thingy in that folder
7. Search for that thingy in the search box
8. Make sure your thingy shows up on the search results page

Fragile Automated Tests

- Exercising irrelevant features
  - Logging in/Logging out
  - Creating a folder
  - Creating a thingy
- If the UI for any one of those features changes, your search test fails

Know when to record tests

- Recorded tests reuse no code
- “Record & Tweak” vs. “Fire and Forget”
- Slight change in folder creator page means *all* of those tests have to be re-recorded *from scratch*
- Use the recorder to create reusable code

Unit testing vs. Integration testing

- Selenium tests are integration tests
  - Functional/Acceptance/User/Compatibility
- Unit tests verify a unit in isolation
  - If FooTest.java fails, the bug must be in Foo.java
  - Cannot fail due to browser incompatibilities
  - Must be completely isolated from each other
- Integration tests verify that units work together
  - Requires testing multiple configurations (browsers)
  - Tend to build on the side-effects of earlier tests

Presentation Model

- Create a layer of classes that mimic the UI
  - a field for every text box, etc.
  - a method for every button
- Test the application flow using this model
  - Can use normal unit test framework
  - Insulated from design changes
- Use Selenium to check wiring and browser compatibility

Create abstractions

- Tests can use all language features
  - extract method, inheritance, …

```
public void testSearchForThingy()
{
    createTestUserAndLogin();
    createThingyInFolder("Foo", "Test Folder");
    searchForThingy("Foo");
    assertTrue(isPresentInResultList("Foo"));
}
```

- Re-use makes tests less fragile

Use your code directly

- Prepare your search tests using model API

```
FolderBean fb = new FolderBean();
fb.setParent(FolderBean.ROOT);
fb.setName("foo");
fb.createNewFolder(); // adds a folder to the DB

selenium.open("/search");
selenium.type("query", "foo");
selenium.click("search");
assertTrue(selenium.isTextPresent("foo found");
```

- Your tests and web app are written in same language...

A class per test vs. A class per page

- Do create a class for each test
  - this inherits from TestCase
  - contains the ‘flow’ of the test
- If the same pages are used by multiple tests
  - create a separate hierarchy of classes, one per page
  - inject the test into the page to access Selenium

```
public void testWorkflow() {
  WelcomePage welcomePage = new WelcomePage(this);
  welcomePage.selectDailyView();
  DailyView dailyView = new DailyView(this);
  dailyView.selectLocation("LDN");
  dailyView.clickOk();
```

JUnit vs. TestNG

- JUnit is "opinionated sof
  - Dependencies between tes
  - Separate tests are testing
  - Everything gets torn down
  - Constantly starting/stoppi
- TestNG has *dependsOn*

```
public void setUp() {
  log("setup");
}
public void testFoo() {
  log("foo");
}
public void testBar() {
  log("bar");
}
public void tearDown() {
  log("teardown");
}
```

```
» setup foo teardown
setup bar teardown
```

Summary

- Use Selenium when it makes sense
  - when you want to reproduce a user's interaction with your application in a real web browser
  - when you depend on the browser (AJAX)
- Do consider presentation model and HTTPUnit
- Use Selenium for Integration Testing
- Use Selenium *in* your development environment
- Use the features offered by your language