Automated Website Testing Using Selenium

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Our goals:

1. what Selenium is (for those who don't)
2. how to create and automate a browser
3. where Selenium fits in the continuous integration loop
4. how to scale Selenium

Introducing Selenium 

- What exactly is Selenium?
  - An API for accessing a browser from code
- How does it work?
  - code communicates to a browser via an API
  - write code that mimics user activity

A little background

- 2004: created at ThoughtWorks by Jim Huggins and open sourced
- 2005: evolves into Selenium Remote Control
- 2007: Jim goes to work at Google; Simon Stewart develops WebDriver
- 2008: Selenium Grid is created to replace Remote Control
- 2009: Both projects merge at next Google Test Automation Conference

*"you can cure mercury poisoning by taking **selenium** supplements"*

That being said…

- Project evolved to support many
  - browsers

    Chrome, Firefox, IE, Edge, Safari & headless browsers (mobile versions as well)
  - programming languages

    Ruby, Java, C#, Perl, PHP, Python, JavaScript & Groovy
  - platforms

    Linux, Windows, iOS & Andriod
- A truly universal open source community 

Selenium Offerings

- Selenium IDE
  - test recorder & playback tool
    (not very versatile)
- WebDriver
  - the heart of Selenium
- Grid
  - scales tests to many browsers and platforms

Goal 1: Accomplished!

what Selenium is
(you all now know)

WebDriver

1. create an instance
2. set the browser that you want
   - add browser capabilities (optional)
3. manipulate the DOM
4. quit the instance

DOM manipulation

- locate the desired element
  - (in order or performance)
    id, name, CSS or Xpath
- perform actions on the element
  - click, mouse, send keystrokes or set attributes
- check the result of the action


DEMO

Browsers...

- Chrome
  - fastest and most lightweight
- Firefox
  - new stand-alone driver (geckodriver) with Selenium 3 (currently in Beta)
- Internet Explorer
  - enterprise controlled security settings render it useless
- Edge
  - new stand-alone driver (WebDriver *how original!*) with Selenium 3 (currently in Beta) but only for C# and JavaScript

Browser gotchas…

- New browser versions can break your Selenium WebDriver
- Be cautious of automatic browser upgrades

WebDriver tips...

- Use only explicit waits

```
driver.wait(until.(some condition))
```

- Pre-populate cookies on the driver

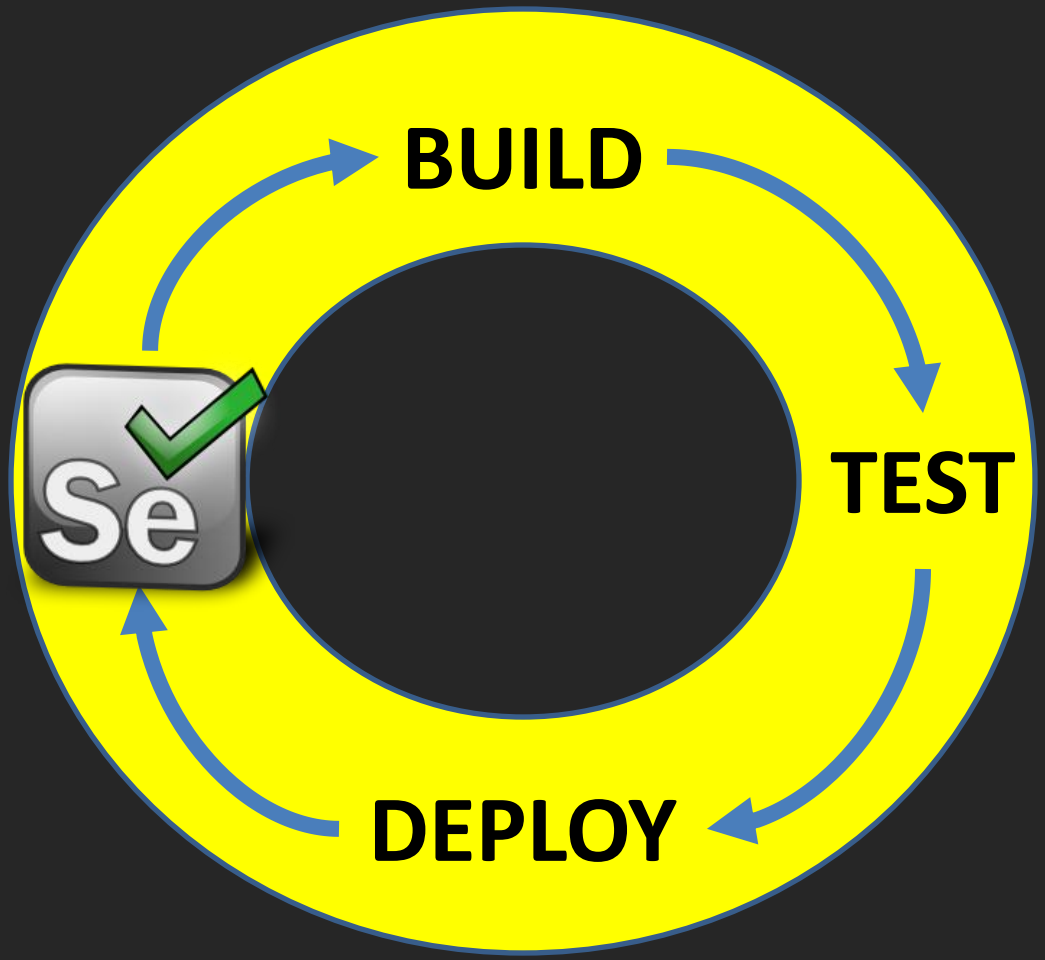
```
driver.manage().addCookie("test", "cookie-1");
```

- Disable images if not needed
- Maximize browser to prevent timeouts

Goal 2: Accomplished!

how to create and
automate a browser

Continuous Integration & Deployment



Testing frameworks

- Selenium integrates with almost any testing framework
  - mocha, TestNG, msTest, JUnit
- Your language of choice
- Create your own!


DEMO

Test execution

- Locally
- Continuous Integration (CI) Server

  Jenkins, TFS, TeamCity
- Headless browsers
- Dispatch to Selenium Grid

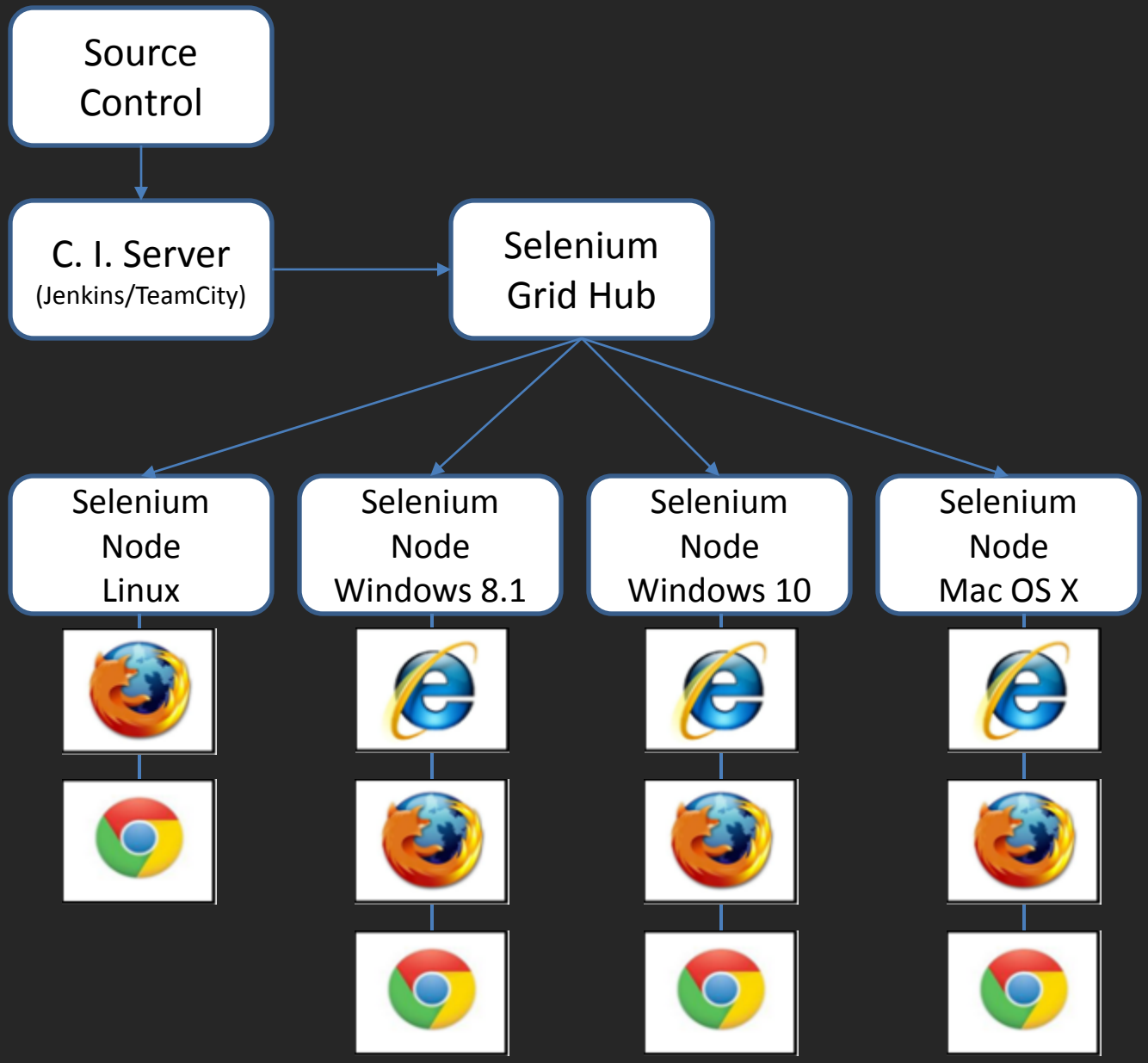
Goal 3: Accomplished!

where Selenium fits in the continuous integration loop

Selenium Grid

- Different platforms with different browsers
- Run multiple tests at the same time
- Reduces the time it takes for your test suite to complete

Speed up test execution!


Source Control
C. I. Server
(Jenkins/TeamCity)
Selenium Grid Hub
Selenium Node Linux
Selenium Node Windows 8.1
Selenium Node Windows 10
Selenium Node Mac OS X

How to set it up

- Stand-alone .jar file
- Create a Hub
  - Update the hub's JSON config
  - Run the .jar
- Create a Node
  - Update the node's JSON config
  - Run the .jar


DEMO
Time

Grid gotchas…

- No definitive documentation of hub to node ratios/setup
  - Hub can be a bottleneck
  - More hubs with fewer nodes and browsers
- Test exceptions don’t release resources
  - Browser instances left open
  - Nodes require restart

Good test writing tips…

- Write atomic and autonomous tests
- Small tests focused on one thing
- Group like tests together in small batches
- Run test groups in parallel
  - Test Runner or CI Server

Cloud Grid providers

- Sauce Labs
- BrowserStack
- CrossBrowserTesting
- bitbar (formerly TestDroid)
- many others…

Docker implementation

- Open source containers
  - Hub
  - Chrome Node with 1 browser instance
  - Firefox Node with 1 browser instance
- Linux CentOS 7.x or Ubuntu 14.x

https://hub.docker.com/r/selenium/

Selenium Grid Extras

- Created by Groupon
  https://github.com/groupon/Selenium-Grid-Extras
- Extra features:
  - Ability to restart a node after a set number of test executions
  - Automatically upgrade WebDriver
  - Ability to record tests
  - Take OS screenshots
  - more…

Goal 4: Accomplished!

how to scale Selenium

Other uses for Selenium

- Website monitoring
  - New Relic
- Boring web-based administration tasks
- Performance testing

Final thoughts…

- Works the same across all languages
- Easy to learn
- Great starting point for novice developers