Test Automation & Advanced Selenium

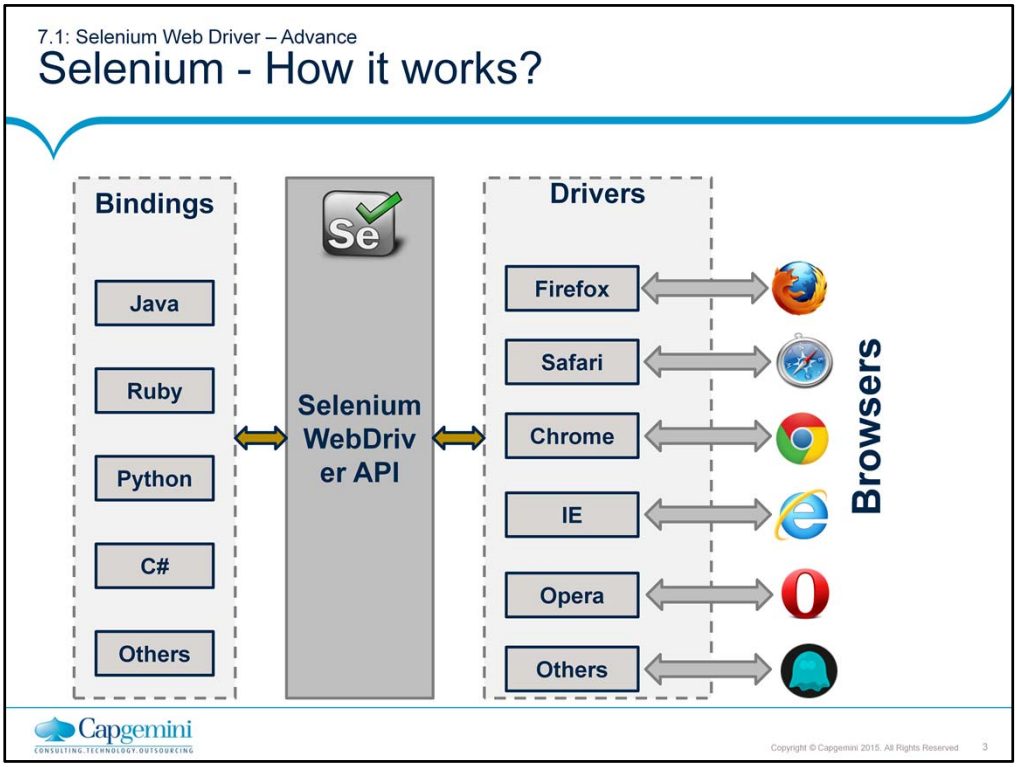
Lesson 7: Selenium Web Driver – Advance

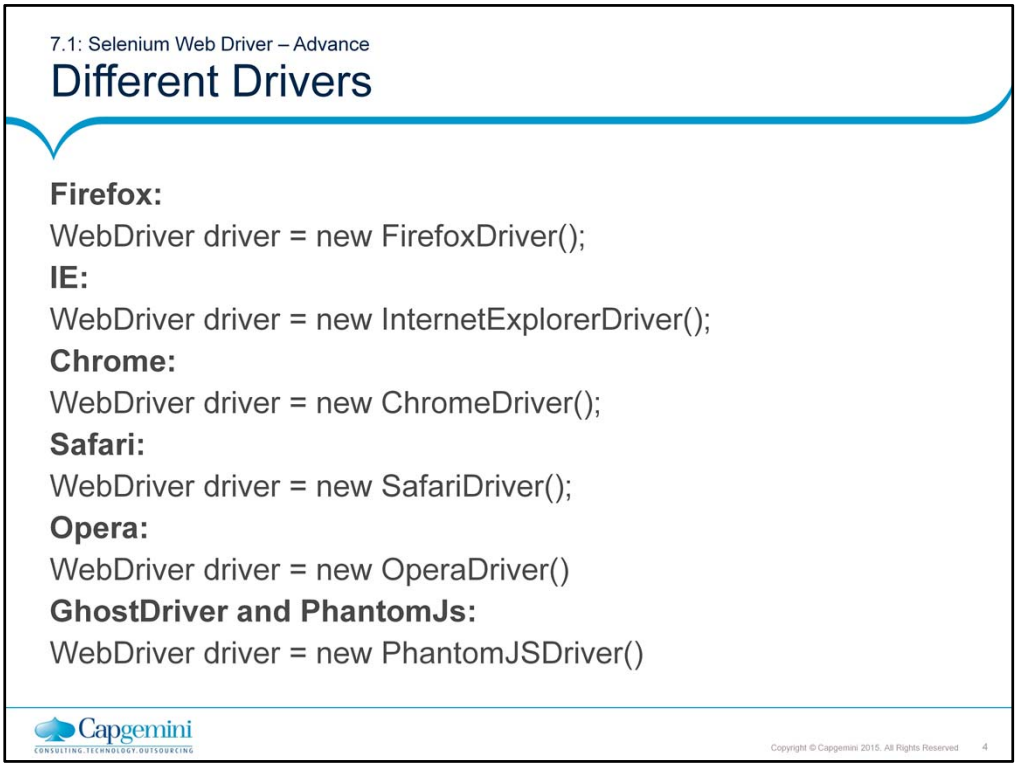
Lesson Objectives

- Selenium: How it works
- Different drivers
  - Chrome
  - Firefox
  - Internet Explorer
  - Headless Browser
    - Ghost Driver and Phantom JS
  - Mobile Browsers
    - Selendriod & Appium
  - Remote Web Driver
  - Capabilities
  - Profile setting
  - Selenium Grid

Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

 2


7.1: Selenium Web Driver – Advance
Selenium - How it works?
Bindings
Java
Ruby
Python
C#
Others
Selenium WebDriver API
Drivers
Firefox
Safari
Chrome
IE
Opera
Others
Browsers
Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING
Copyright © Capgemini 2015. All Rights Reserved
3



1. Architecture
WebDriver's architecture is simpler than Selenium RC's.

It controls the browser from the OS level
All you need are your programming language's IDE (which contains your Selenium commands) and a browser.
You first need to launch a separate application called Selenium Remote Control (RC) Server before you can start testing
The Selenium RC Server acts as a "middleman" between your Selenium commands and your browser
When you begin testing, Selenium RC Server "injects" a Javascript program called Selenium Core into the browser.
Once injected, Selenium Core will start receiving instructions relayed by the RC Server from your test program.
When the instructions are received, Selenium Core will execute them as Javascript commands.
The browser will obey the instructions of Selenium Core, and will relay its response to the RC Server.
The RC Server will receive the response of the browser and then display the results to you.
RC Server will fetch the next instruction from your test script to repeat the whole cycle.

2. Speed
WebDriver is faster than Selenium RC since it speaks directly to the browser uses the browser's own engine to control it.

- Selenium RC is slower since it uses a Javascript program called Selenium Core. This Selenium Core is the one that directly controls the browser, not you.

3. Real-life Interaction
WebDriver interacts with page elements in a more realistic way. For example, if you have a disabled text box on a page you were testing, WebDriver really cannot enter any value in it just as how a real person cannot.

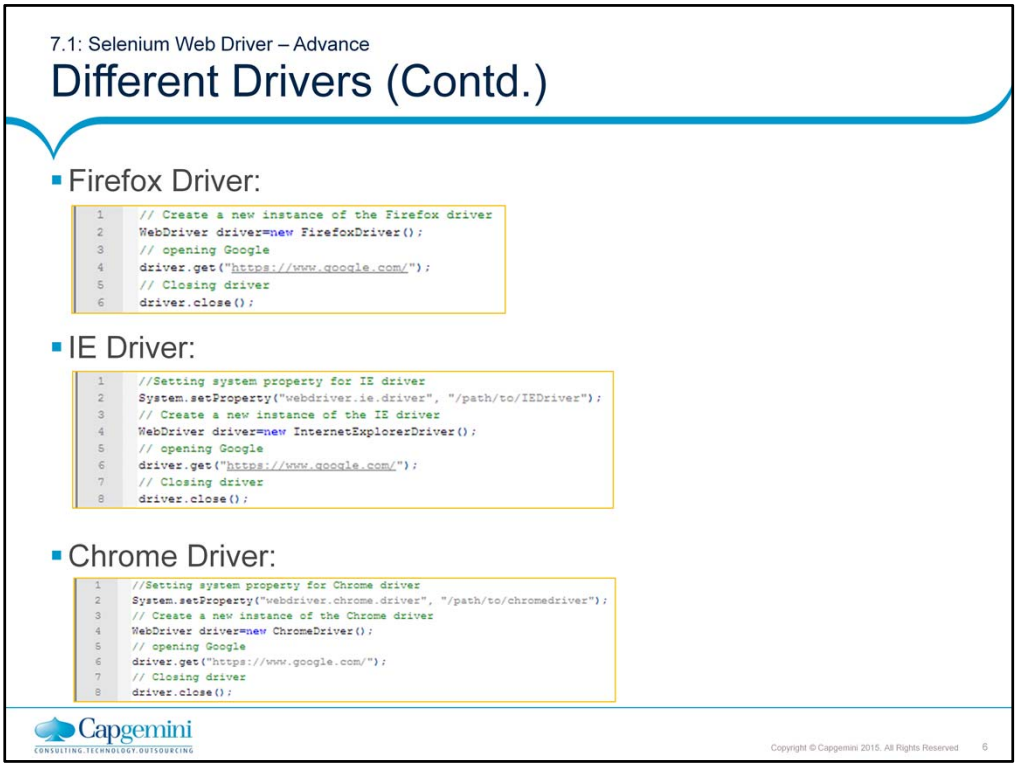
- Selenium Core, just like other Javascript codes, can access disabled elements. In the past, Selenium testers complain that Selenium Core was able to enter values to a disabled text box in their tests. Differences in API

4. API
Selenium RC's API is more matured but contains redundancies and often confusing commands.

- For example, most of the time, testers are confused whether to use type or typeKeys; or whether to use click, mouseDown, or mouseDownAt. Worse, different browsers interpret each of these commands in different ways tool
- WebDriver's API is simpler than Selenium RC's. It does not contain redundant and confusing commands.

5. Browser Support
WebDriver can support the headless HtmlUnit browser

- HtmlUnit is termed as "headless" because it is an invisible browser - it is GUI-less.
- It is a very fast browser because no time is spent in waiting for page elements to load. This accelerates your test execution cycles.
- Since it is invisible to the user, it can only be controlled through automated means.
- Selenium RC cannot support the headless HtmlUnit browser. It needs a real, visible browser to operate on.



1. Architecture
WebDriver's architecture is simpler than Selenium RC's.

It controls the browser from the OS level
All you need are your programming language's IDE (which contains your Selenium commands) and a browser.
You first need to launch a separate application called Selenium Remote Control (RC) Server before you can start testing
The Selenium RC Server acts as a "middleman" between your Selenium commands and your browser
When you begin testing, Selenium RC Server "injects" a Javascript program called Selenium Core into the browser.
Once injected, Selenium Core will start receiving instructions relayed by the RC Server from your test program.
When the instructions are received, Selenium Core will execute them as Javascript commands.
The browser will obey the instructions of Selenium Core, and will relay its response to the RC Server.
The RC Server will receive the response of the browser and then display the results to you.
RC Server will fetch the next instruction from your test script to repeat the whole cycle.

2. Speed
WebDriver is faster than Selenium RC since it speaks directly to the browser uses the browser's own engine to control it.

- Selenium RC is slower since it uses a Javascript program called Selenium Core. This Selenium Core is the one that directly controls the browser, not you.

3. Real-life Interaction
WebDriver interacts with page elements in a more realistic way. For example, if you have a disabled text box on a page you were testing, WebDriver really cannot enter any value in it just as how a real person cannot.

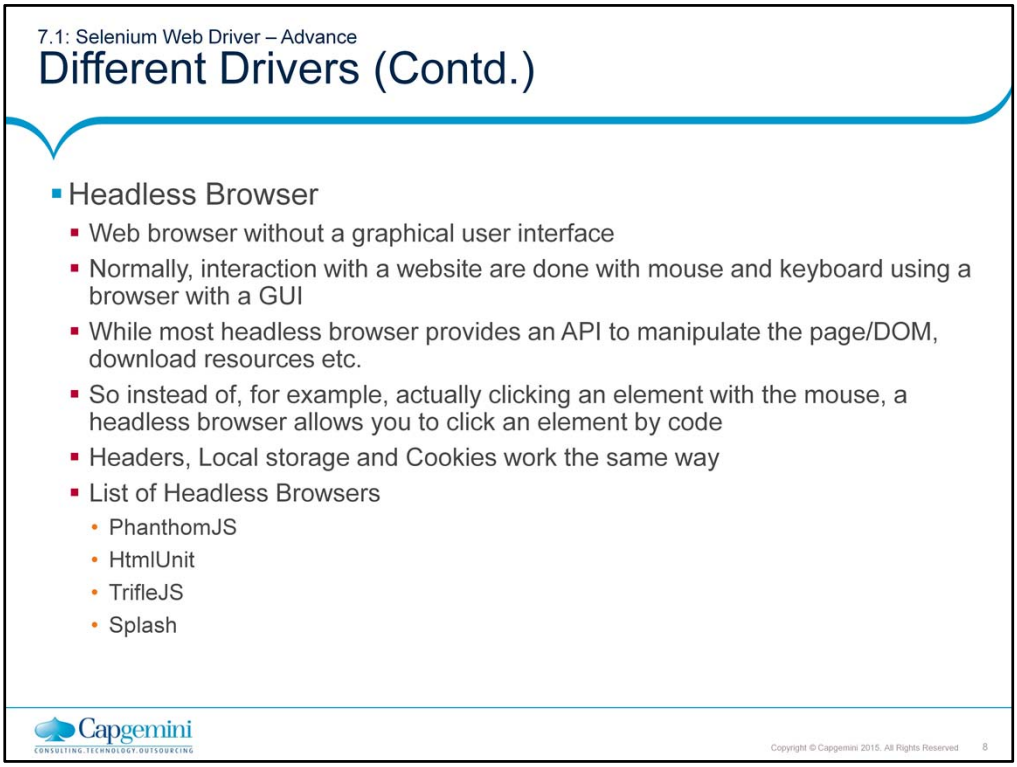
- Selenium Core, just like other Javascript codes, can access disabled elements. In the past, Selenium testers complain that Selenium Core was able to enter values to a disabled text box in their tests. Differences in API

4. API
Selenium RC's API is more matured but contains redundancies and often confusing commands.

- For example, most of the time, testers are confused whether to use type or typeKeys; or whether to use click, mouseDown, or mouseDownAt. Worse, different browsers interpret each of these commands in different ways tool
- WebDriver's API is simpler than Selenium RC's. It does not contain redundant and confusing commands.

5. Browser Support
WebDriver can support the headless HtmlUnit browser

- HtmlUnit is termed as "headless" because it is an invisible browser - it is GUI-less.
- It is a very fast browser because no time is spent in waiting for page elements to load. This accelerates your test execution cycles.
- Since it is invisible to the user, it can only be controlled through automated means.
- Selenium RC cannot support the headless HtmlUnit browser. It needs a real, visible browser to operate on.



Headless browsers are typically used in following situations:
1. You have a central build tool which does not have any browser installed on it. So to do the basic level of sanity tests after every build you may use the headless browser to run your tests.
2. You want to write a crawler program that goes through different pages and collects data, headless browser will be your choice. Because you really don't care about opening a browser. All you need is to access the webpages.
3. You would like to simulate multiple browser versions on the same machine. In that case you would want to use a headless browser, because most of them support simulation of different versions of browsers. We will come to this point soon.

Things to pay attention to before using headless browser
Headless browsers are simulation programs, they are not your real browsers. Most of these headless browsers have evolved enough to simulate, to a pretty close approximation, like a real browser. Still you would not want to run all your tests in a headless browser. JavaScript is one area where you would want to be really careful before using a Headless browser. JavaScript are implemented differently by different browsers. Although JavaScript is a standard but each browser has its own little differences in the way that they have implemented JavaScript. This is also true in case of headless browsers also. For example HtmlUnit headless browser uses the Rihno JavaScript engine which not being used by any other browser.

Selenium support for headless browser
Selenium supports headless testing using its class called HtmlUnitDriver. This class internally uses HtmlUnit headless browser. HtmlUnit is a pure Java implementation. HtmlUnitWebDriver can be created as mentioned below:

```
HtmlUnitDriver unitDriver = new HtmlUnitDriver();
```

7.1: Selenium Web Driver – Advance

Different Drivers (Contd.)

- PhanthomJS (Headless Browser)
  - HEADLESS WEBSITE TESTING
    - Headless Web Kit with JavaScript API
  - SCREEN CAPTURE
    - Programmatically capture web contents, including SVG and Canvas
  - PAGE AUTOMATION
    - Access and manipulate webpages with the standard DOM API, or with usual libraries like jQuery
  - Example of interacting with a page using PhantomJS:

```
page.evaluate(function() {
        //Fill in form on page
        document.getElementById('Name').value = 'John Doe';
        document.getElementById('Email').value = 'john.doe@john.doe';
        //Submit
        $('#SubmitButton').click();
    });
```

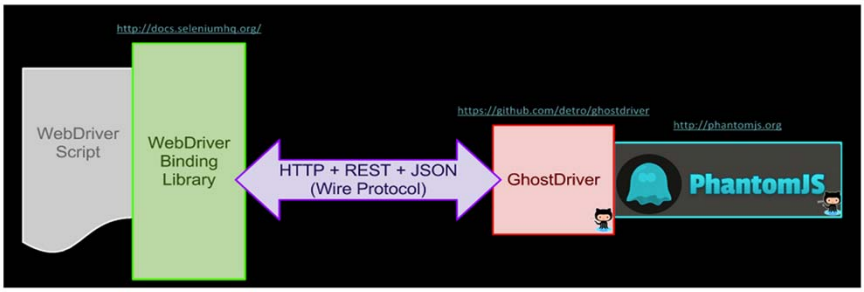
Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

 9

7.1: Selenium Web Driver – Advance

Different Drivers (Contd.)

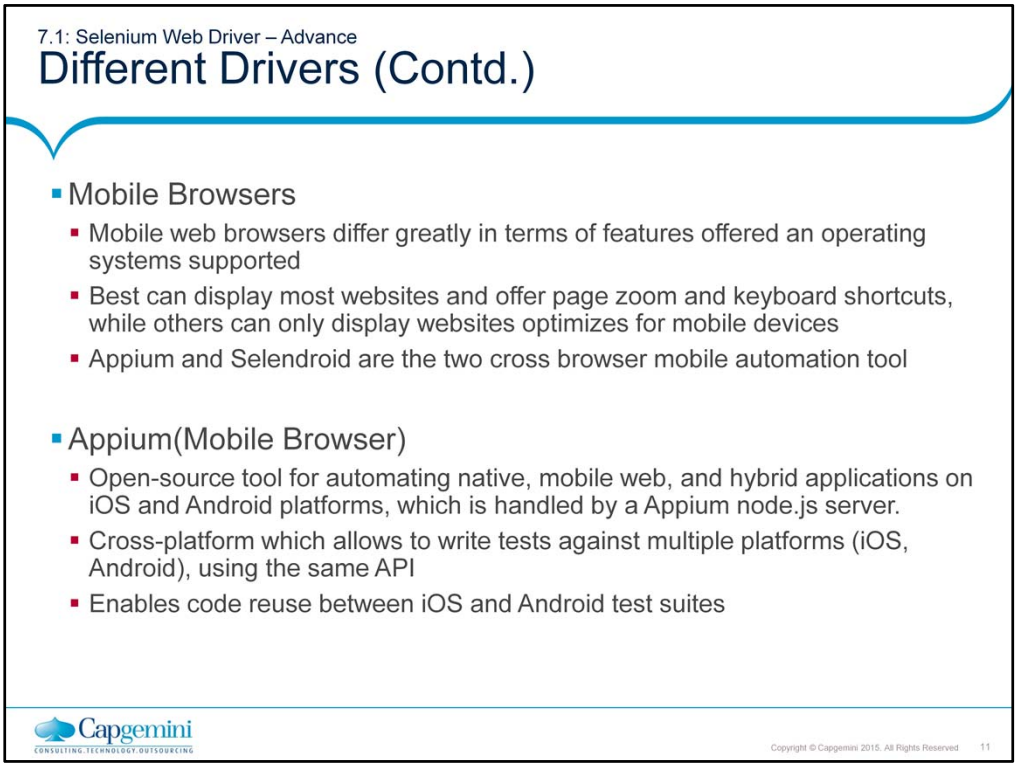
- GhostDriver(Headless Browser)
  - Pure JavaScript implementation of the WebDriver Wire Protocol for PhantomJS Remote
  - WebDriver that uses PhantomJS as back-end



Capgemini CONSULTING.TECHNOLOGY.OUTSOURCING

 10

GhostDriver is the project that provides the code that exposes the WebDriver API for use within PhantomJS.
PhantomJS bakes the GhostDriver code into itself, and ships it as part of its downloadable executable.
Thus, to use "GhostDriver" with PhantomJS, only PhantomJS is needed.



Native apps are those written using the iOS or Android SDKs.
Mobile web apps are web apps accessed using a mobile browser (Appium supports Safari on iOS and Chrome or the built-in 'Browser' app on Android). Hybrid apps have a wrapper around a "webview" -- a native control that enables interaction with web content. Projects like Phonegap, make it easy to build apps using web technologies that are then bundled into a native wrapper, creating a hybrid app.

Appium was designed to meet mobile automation needs according to a philosophy outlined by the following four tenets:

You shouldn't have to recompile your app or modify it in any way in order to automate it.
You shouldn't be locked into a specific language or framework to write and run your tests.
A mobile automation framework shouldn't reinvent the wheel when it comes to automation APIs.
A mobile automation framework should be open source, in spirit and practice as well as in name.

7.1: Selenium Web Driver – Advance

Different Drivers (Contd.)

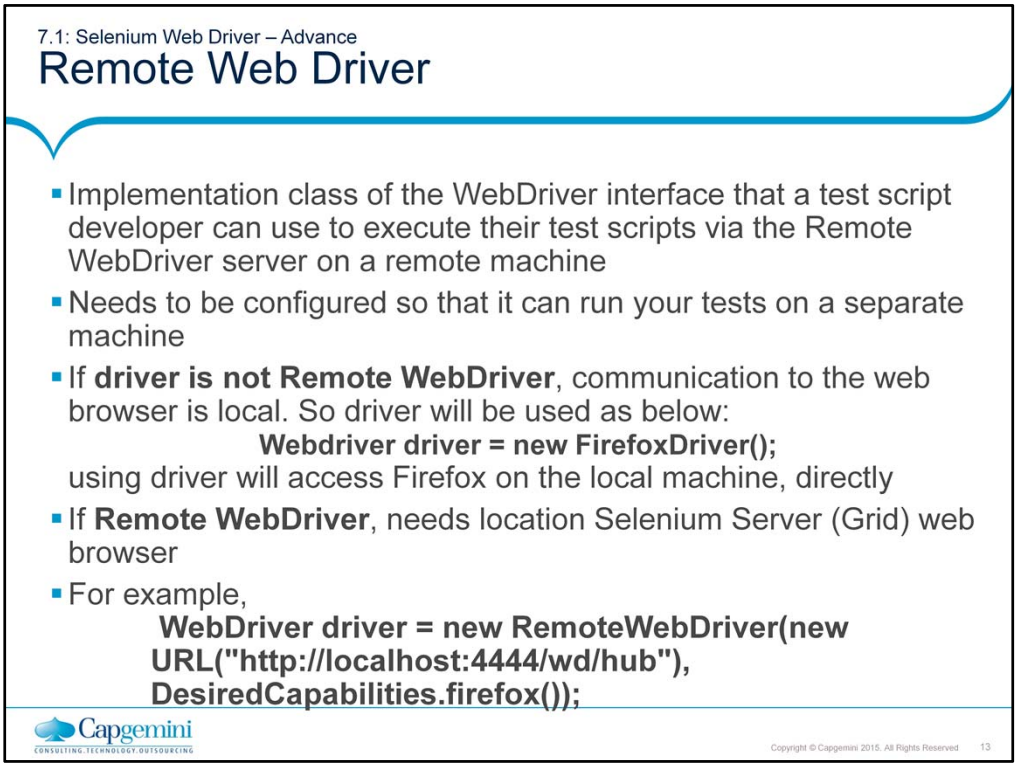
Selendroid

Test automation framework which is used Android native & hybrid applications (apps) and mobile web

- Full compatibility with the JSON Wire Protocol
- No modification of app under test required in order to automate it
- Testing the mobile web using built in Android driver webview app
- UI elements can be found by different locator types
- Selendroid can interact with multiple Android devices (emulators or hardware devices) at the same time
- Existing emulators are started automatically
- Supports hot plugging of hardware devices
- Full integration as a node into Selenium Grid for scaling and parallel testing

Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

 12



This example assumes that Selenium Server is running on localhost with the default port of 4444. The nice thing about this is you can run Selenium Server on any machine, change the URL to point to the new machine and run the tests. For example, I run the test code from my Mac OS X computer but I run Selenium Server on a Window XP machine. This way I can launch Internet Explorer tests from my Mac OS X computer.

7.1: Selenium Web Driver – Advance

Capabilities and Profile Setting

- Capabilities describes a series of key/value pairs that encapsulate aspects of a browser
- DesiredCapabilities set properties for the WebDriver
- Profile used to create custom Firefox profile and use it with desired capabilities

- Example to use Firefox profile with desired capabilities:

```
DesiredCapabilities dc=DesiredCapabilities.firefox();
FirefoxProfile profile = new FirefoxProfile();
dc.setCapability(FirefoxDriver.PROFILE, profile);
Webdriver driver =  new FirefoxDriver(dc);
```

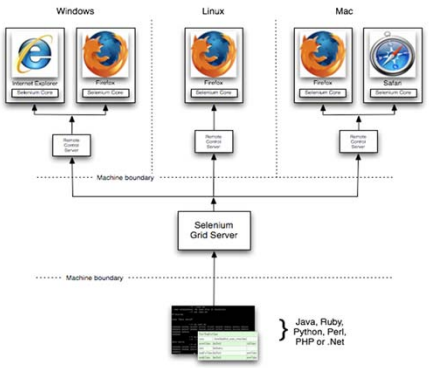
Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

 14

7.1: Selenium Web Driver – Advance

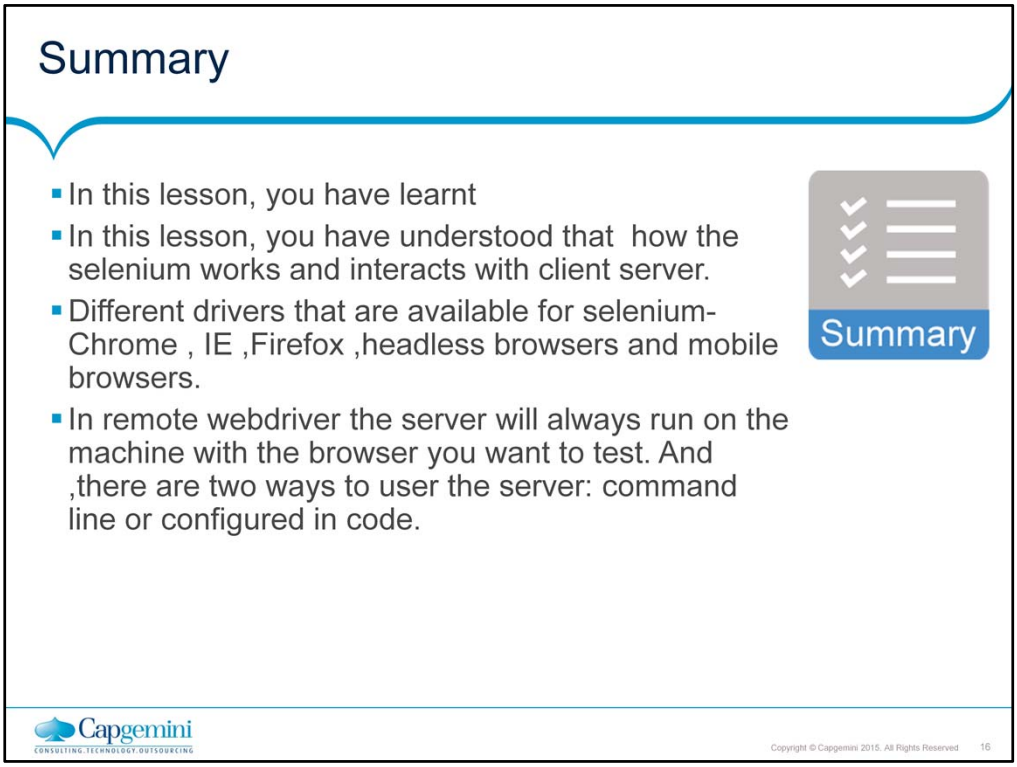
Selenium Grid

Allows you run your tests on different machines against different browsers in parallel. That is, running multiple tests at the same time against different machines running different browsers and operating systems. Essentially, Selenium-Grid support distributed test execution. It allows for running your tests in a distributed test execution environment.

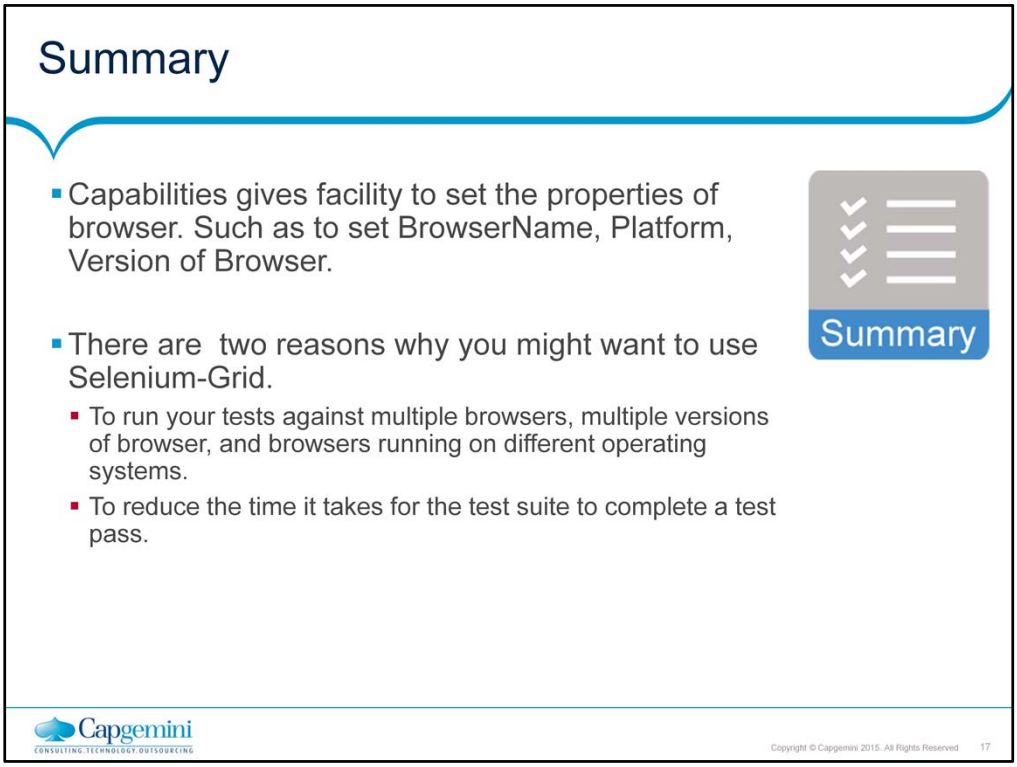


Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

 15



Add the notes here.



Add the notes here.

Review Question

- Question 1:
  - PhanthomJS is
  - Chrome Driver
  - Mobile Browser
  - Headless Browser
  - Firefox Driver
- Question 2: True/False
  - Firefox saves your information such as cookies and browser history in a file called your profile.
- Question 3: Fill in the Blanks
  - Client driver will send the program that is written in eclipse IDE as _____ and send it to Selenium server

Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

 18