

# EFFECTIVE TESTING OF RICH INTERNET APPLICATIONS





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## Authors

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## Abstract

From a testing point of view, Rich Internet Applications(RIA's) pose significant challenges due to complex multilayer architecture. One of the most difficult challenges from the point of view of automation testing arises with the AngularJS use of JavaScript. The very nature of JavaScript whereby it dynamically changes web page content, validates inputs and creates new web objects makes testing a challenging affair. Existing testing tools consequently find it very difficult to keep the test environment in sync with the application state. The Protractor framework is able to address many of these challenges to provide a powerful solution to effectively test Rich Internet Applications.



## Protractor Solution

*Protractor* is a popular end-to-end testing framework for AngularJS applications. It can not only be used to test AngularJS applications but also to perform automated regression tests for other types of web applications. Protractor runs tests against an application instance running in a browser, interacting with it in a manner exactly as a real user would. Protractor supports two behavior driven development (BDD) test frameworks out of the box: Jasmine and Mocha. These frameworks are based on JavaScript and Node.js and provide the scaffolding and reporting tools to write and manage your tests.

## Why Protractor?

Protractor comes with several exceptional features that differentiate it from competing solutions in the market:

- ▶ One of the unique features of Protractor is that it supports locator strategies that are specific to AngularJS. This permits you to test those page elements that are specific to AngularJS without requiring any additional setup efforts.
- ▶ Protractor supports automatic waiting which means that specific wait and sleep steps do not need to be added to test setups. Protractor automatically recognizes the point when a webpage has completed executing all pending tasks and then executes the next step. This means no manual efforts in waiting to execute a step until a webpage and the test environment are synced up.

## How does Protractor work?

Protractor works in conjunction with Selenium WebDriver to provide an automated test infrastructure that can simulate a user's interaction with an AngularJS application running in a browser or mobile device. Protractor is a wrapper around WebDriverJS, the JavaScript bindings for the Selenium WebDriver API. While WebDriver commands are asynchronous, the test scripts will send commands to the Selenium Server which in turn communicates with the browser driver.

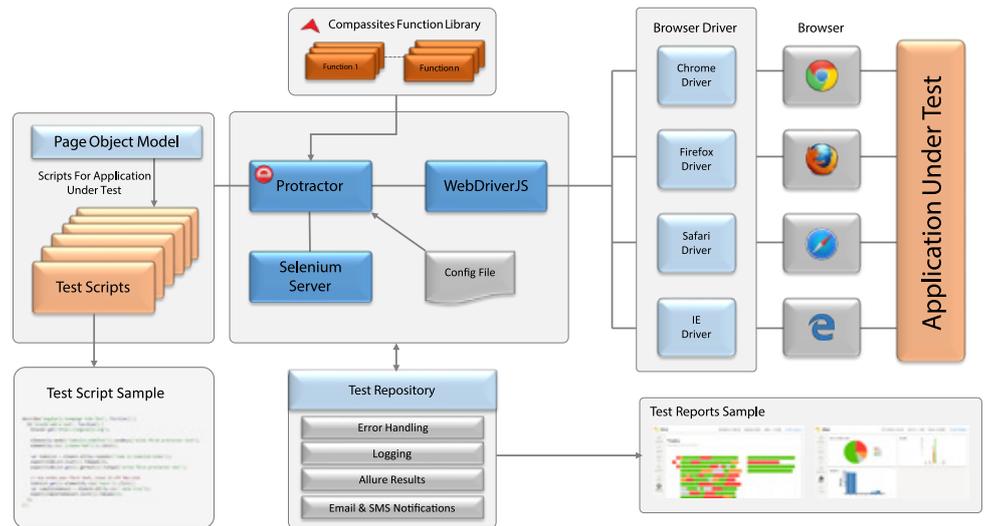


Fig.1 - Compassites Protractor Framework

A test using Selenium WebDriver involves three key elements - the test script, the server, and the browser. The communication between these elements is shown in Fig.1. The WebDriverJS upon which Protractor is built supports drivers for all leading browsers. Output test results and errors are written into a Test repository.

## Protractor Page Object Model

**The Protractor Page Object Model helps** write cleaner tests by encapsulating information about elements on the application page. The Page Object design pattern conceptualizes the Page Object as an object oriented class that operates as an interface to a page. The methods of this class are then utilized by tests across suites in a standardized manner.

The use of Protractor specific code and functions can cause hiding of business level detail, code duplication and excessive coupling between page behavior related code and low level page logic elements, all making for difficult maintainability. The Protractor Page Object Reference Model helps avoid the disadvantages arising out of these factors.

## Integration with Allure reports

Protractor provides complete integration with the Allure reporting framework. Allure provides a variety of advanced functionality including Timeline and Graphs. Allure also builds in a Behaviors page that uses BDD based grouping to conveniently report the specific stories and features that have reported issues during testing.

Allure is an open source testing framework that provides high quality representations of test execution outputs in web page format. Allure takes

the standard outputs produced by xUnit and adds additional data before producing the final outputs.



Fig.2 - Allure Report Sample

## Compassites Test Lab for Protractor

Compassites has been investing for the past several years in testing technologies that provide compelling capabilities with regards to the testing of Rich Internet Applications and products. Compassites has customised Protractor library functions to suit specific application needs, which is a part of the Compassites automation test framework.

Compassites has built a test lab around the Protractor framework that involves a Hub and three Nodes – Linux, Windows and iOS as shown below.

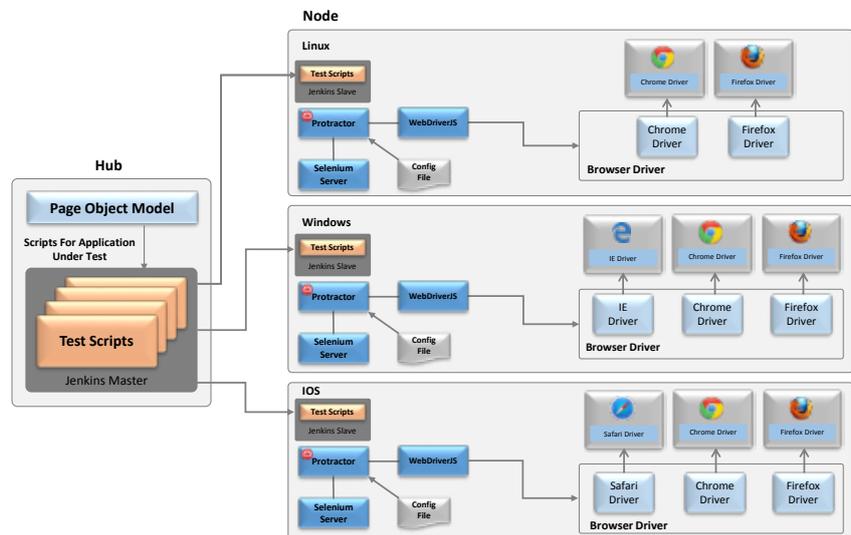


Fig.3 - Compassites Test Lab



## Summary

Protractor presents an excellent option for testing Rich Internet Applications due to several reasons; support for locator strategies, automatic waiting and the Page Object Reference model prime among them.

Recently, Compassites has executed a testing engagement with a complex product built on Java and AngularJS using the Protractor framework. There were several challenges around the Protractor framework, which was effectively overcome by the customised library functions. The use of the Protractor framework aided in greatly reducing the number of testing cycles and the total testing time in the engagement.

Compassites has an active Test Center of Excellence with clearly defined focus on Web testing and Mobility testing. The Center is actively working on Advanced automation frameworks, performance testing methodologies and Security testing techniques. We are leveraging our expertise and assets to deliver value-added services to our existing engagements.

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