Selenium Advanced Topics

XPath Methods and Axes, Shadow DOM, JavascriptExecutor, Page Object, BDD with Cucumber, etc

XPath Methods

XPath has a number of functions that you can use in your path expressions to manipulate strings, numbers, and other data types.

- **text(): string** — returns the text content of current node
- **contains(source, target): boolean** — returns whether the source string contains the target
- **starts-with(source, target): boolean —** returns whether the source string starts with target
- **position(): int —** returns the position of a node in a node set
- **normalise-space(): string —** removes leading and trailing white spaces from a string, and also replaces any sequence of white spaces within the string with a single space.
- **last():int —** return the index of the last node in a node set

XPath Axes

XPath axes allow you to select nodes based on their relationship to other nodes in the document.

Syntax: node/axis-name::tag[predicate]

- **ancestor**: select all the ancestor nodes relative to current node (parent, grandparent…)
- **descendant**: select all the descendant nodes relative to current node (children, grandchildren…)
- **parent**: select the parent node relative to current node
- **following-sibling**: select all the sibling (share the same parent) nodes after the current node
- **preceding-sibling:** select all the sibling nodes before the current node
- **following**: select all the node after the current node

Javascript Executor

What is JavascriptExecutor?

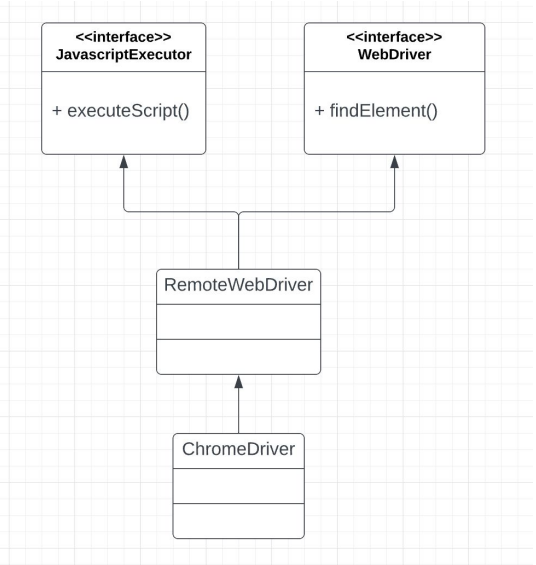
It is an interface with a set of APIs to execute javascript code

synchronously or asynchronously.

Why do we need JavascriptExecutor?

- Scroll around the web pages
- Change attribute of web elements (for example handling disabled elements)
- ...

UML Diagram:



Building a UI Testing framework from scratch

When building any frameworks, we need to consider the following things:

- Design Pattern → Factory Design Pattern for WebDriver
- Maintainability → Page Object Modeling
- Readability & Collaboration → BDD (Behavior Driven Development)
- Performance Optimization → Parallel Execution

Driver Factory

Background:

When performing the cross-browser testing, we need to create different types of Web Drivers, (for example Chrome, Firefox, Edge, etc), but all of them implements a common interface called WebDriver, which makes it perfect for the Factory Design Pattern.

Questions:

- How many webdrivers do we need during a test execution?
- How to make our DriverFactory thread safe when performing parallel testing?

Page Object Model

Page Object Model (POM) is a design pattern in which every web page is represented by a Java class that contains all the necessary web nodes and methods related to that page.

- Web nodes: all the nodes are represented by the properties in the Java class
- Interactions: all the interactions are represented by the methods in the Java class (click, hover, etc)

Advantages:

- Make your code more organized and maintainable by following OOP principles.
- Reduce the code duplication and improve the reusability of code.
- Improve the readability of code.

BDD – Behavior Driven Development

Background:

Before starting to write the code, the most important thing is to understand the requirements. But for most of the time, the requirements are not proposed by technical people and people from different backgrounds speak different “languages”. So how can we let these people work together?

BDD encourages the use of simple, user-friendly language (for example Gherkins) in defining requirements, test cases, etc to ensure that all the stakeholders understand the system’s behavior.

Gherkins Syntax

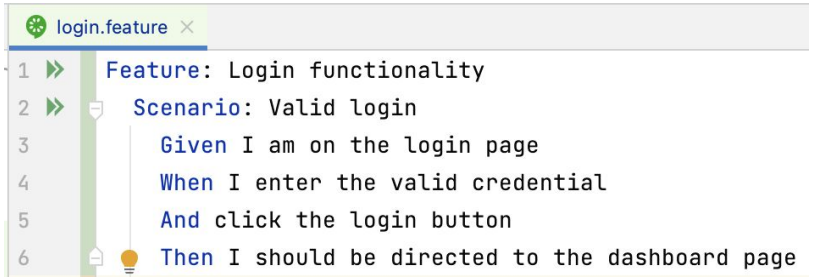
Feature: The description of the functionality/feature that we want to test.

Scenario: In Gherkins, we call every test case as a scenario.

Given: The precondition of the test case

When: Description of user actions

Then: Observe the output and perform assertions



BDD Testing using Cucumber, Selenium and TestNG

Three Steps to build a BDD Testing Framework:

- Wrote the feature file using Gherkins language
- Implement step definition using Cucumber Annotations and Selenium.
- Bind feature file and step definitions using @CucumberOptions and a runner class that extends AbstractTestNGCucumberTests class

Parallel Execution

Real interview Question:

How to optimize an existing testing framework?

First of all, we should identify scenarios that are independent from each other, so we can run them in parallel by overriding the @DataProvider method in the runner class. However, the maximum number of scenarios that can be run in parallel should depend on your actual computing resources.

Follow up:

So how do you make your WebDriver Thread Safe ?

Use ThreadLocal