* **Selenium WebDriver**
  + WebDriver is a web framework that helps you execute cross-browser tests; it uses browser automation APIs provided by browser vendors such as Firefox, Chrome, Safari, Microsoft Internet Explorer, Microsoft Edge, Opera, etc., to interact with the browser and simulate user actions. It supports different programming languages and allows you to write the test scripts in your choice of language. Additionally, it uses the JSON wire protocol over HTTP to interact with browser drivers.

#### WebDriver architecture

Interaction of the Selenium client library with the real browser is shown below.

Diagram

Description automatically generated

Selenium client library is available in multiple programming languages including JAVA, C#, Python, Ruby, JavaScript.

**TestNg**:

**TestNG** is an easy-to-use testing framework written in Java, designed for unit, functional, and end-to-end integration tests providing many functionalities. Many plugins are integrated with TestNG.

Writing tests with TestNG is very simple. Write the business logic inside a method. Then annotate the method with @Test. Add metadata about the test inside @Test like description, group, priority, enabled, etc.

**testng.xml** is a file that contains the test configuration, and it allows us to organize test classes and define test suites and tests.

Graphical user interface, text

Description automatically generated

## Page Object Model:

**Page Object Model (POM)** is a design pattern, popularly used in test automation that creates Object Repository for web UI elements. The advantage of the model is that it reduces code duplication and improves test maintenance.

Graphical user interface, text, application, chat or text message

Description automatically generated

| S.No. | POM | Page Factory |
| --- | --- | --- |
| 1. | It is an approach for Design patterns. | It is a class that is provided by Selenium Web driver. |
| 2. | It is not an optimal method to process tasks. | It is an optimal method to process tasks. |
| 3. | It helps in separating page objects and scripts. | It is a technique to implement POM. |
| 4. | ‘By’ annotation is used to define page objects. | It uses annotation ‘FindBy’ to describe page objects. |
| 5. | It does not handle exceptions efficiently. | It efficiently handles the exceptions. |
| 6. | It requires the initialization of every object. | It does not require the initialization of every object. |
| 7. | There is cache storage for performing tasks. | There is no need for cache storage. |

### **Data Driven Testing Framework in Selenium**

Data Driven framework is used to drive test cases and suites from an external data feed. The data feed can be data sheets like xls, xlsx, and csv files.

### **benefits of using the Data Driven Testing Framework:**

* Test cases can be modified without many changes to code.
* It allows testing the application with multiple sets of data values, especially during regression testing.
* It helps us to separate the logic of the test cases/scripts from the test data.

Data driven testing using Apache POI:

Graphical user interface, text, application

Description automatically generated

**ExcelUtils Class *-*** It is a utility class that will contain all the methods related to Excel Sheet read and write operations along with initializing the Workbook. You can then reuse the methods in different test cases, by creating an object of Excel Utils Class.