

Selenium

Introduction

Selenium is one of the most popular automated testing suites. Selenium is designed in a way to support and encourage automation testing of functional aspects of web based applications and a wide range of browsers and platforms.

- Due to its existence in the open source community, it has become one of the most accepted tools amongst the testing professionals.

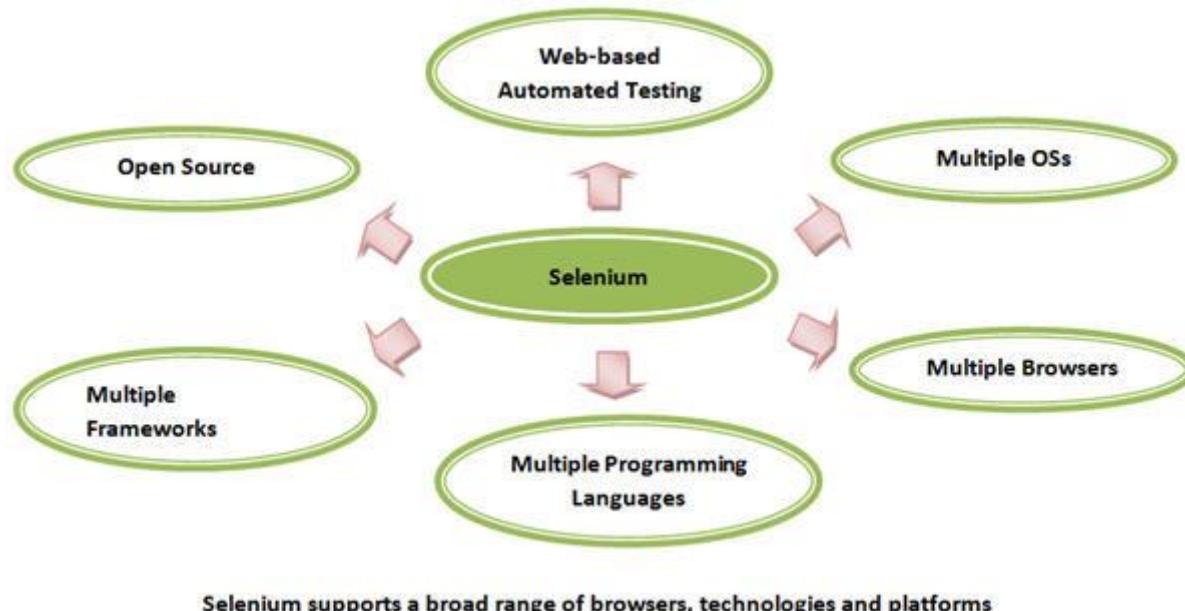
Why Selenium?

As the current industry trends have shown that there is mass movement towards automation testing. The cluster of repetitive manual testing scenarios has raised a demand to bring in the practice of automating these manual scenarios.

The benefits of implementing automation test are many; let us take a look at them:

- Supports execution of repeated test cases
- Aids in testing a large test matrix
- Enables parallel execution
- Encourages unattended execution
- Improves accuracy thereby reducing human generated errors
- Saves time and money

Selenium supports a broad range of browsers, technologies and platforms.



Selenium Components

Selenium is not just a single tool or a utility, rather a package of several testing tools and for the same reason it is referred to as a Suite.

Each of these tools is designed to cater different testing and test environment requirements.

The suite package constitutes of the following sets of tools:

- Selenium Integrated Development Environment (IDE)
- Selenium Remote Control (RC)
- Selenium WebDriver
- Selenium Grid

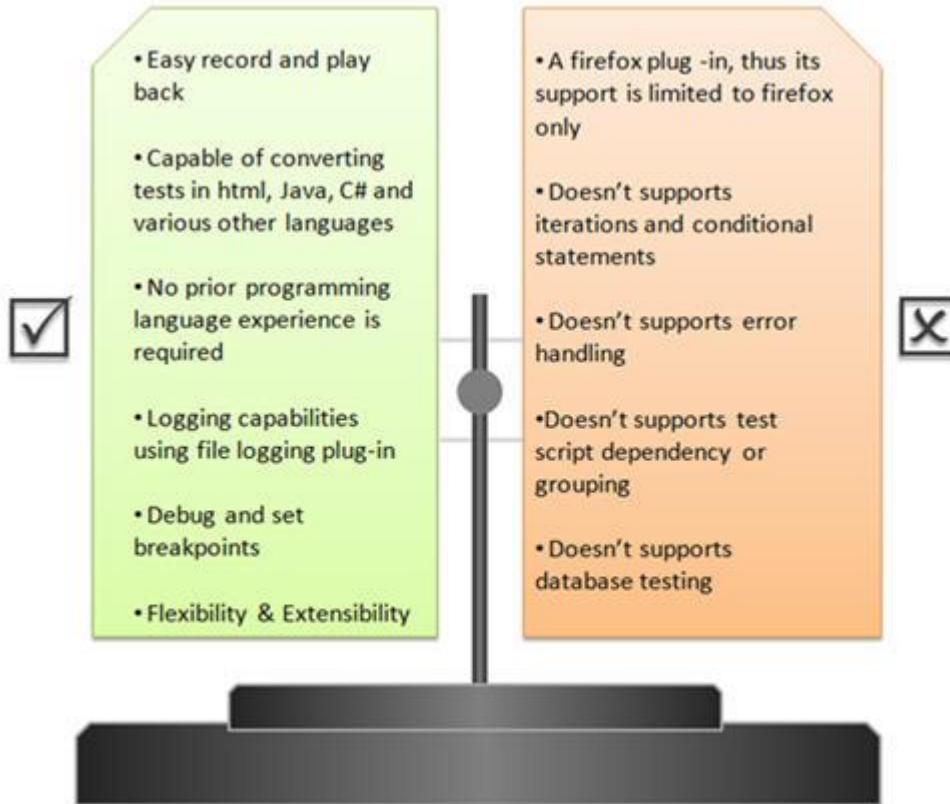
Selenium RC and WebDriver, in a combination are popularly known as Selenium 2. Selenium RC alone is also referred as Selenium 1.



Fig 1:-

1. Selenium IDE (Integrated Development Environment)

- **Overview :** Selenium IDE is a browser extension for Firefox and Chrome that allows developers and testers to record, edit, and debug tests.
- **Features :** It provides a user-friendly interface for creating automated tests without requiring extensive programming knowledge. Tests are created using a record-and-playback technique, although users can also write tests using a scripting language called Selenese.
- **Usage :** Ideal for beginners in test automation or for creating simple test scripts quickly. However, it lacks the robustness needed for more complex test scenarios



Advantages and disadvantages of Selenium IDE - © www.SoftwareTestingHelp.com

Fig 2:-

2. Selenium Remote Control (RC)

- **Overview :** Selenium RC was one of the first tools in the Selenium project that allowed testers to write automated web application UI tests in any programming language against any HTTP website using any mainstream JavaScript-enabled browser.
- **Features :** Selenium RC worked by using a server that automatically launches and kills browsers, and acts as a proxy for web requests from them.
- **Usage :** It has largely been deprecated and replaced by WebDriver due to its more modern and stable architecture.

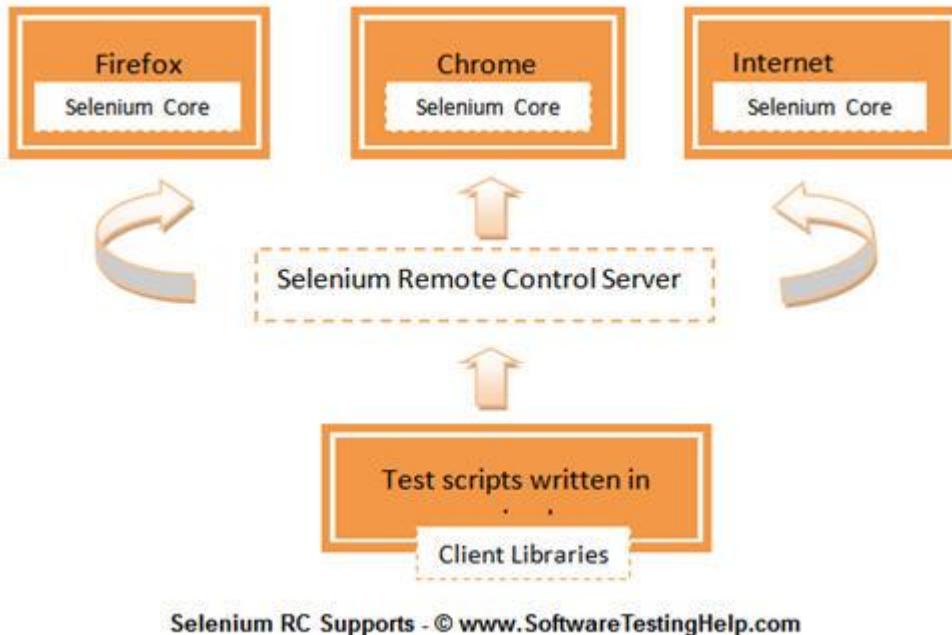


Fig 3:-

There are a few pre-requisites to be in place before creating Selenium RC scripts:

- A Programming Language – Java, C#, Python etc.
- An Integrated Development Environment – Eclipse, Netbeans etc.
- A Testing Framework (optional) – JUnit, TestNG etc.
- And Selenium RC setup off course

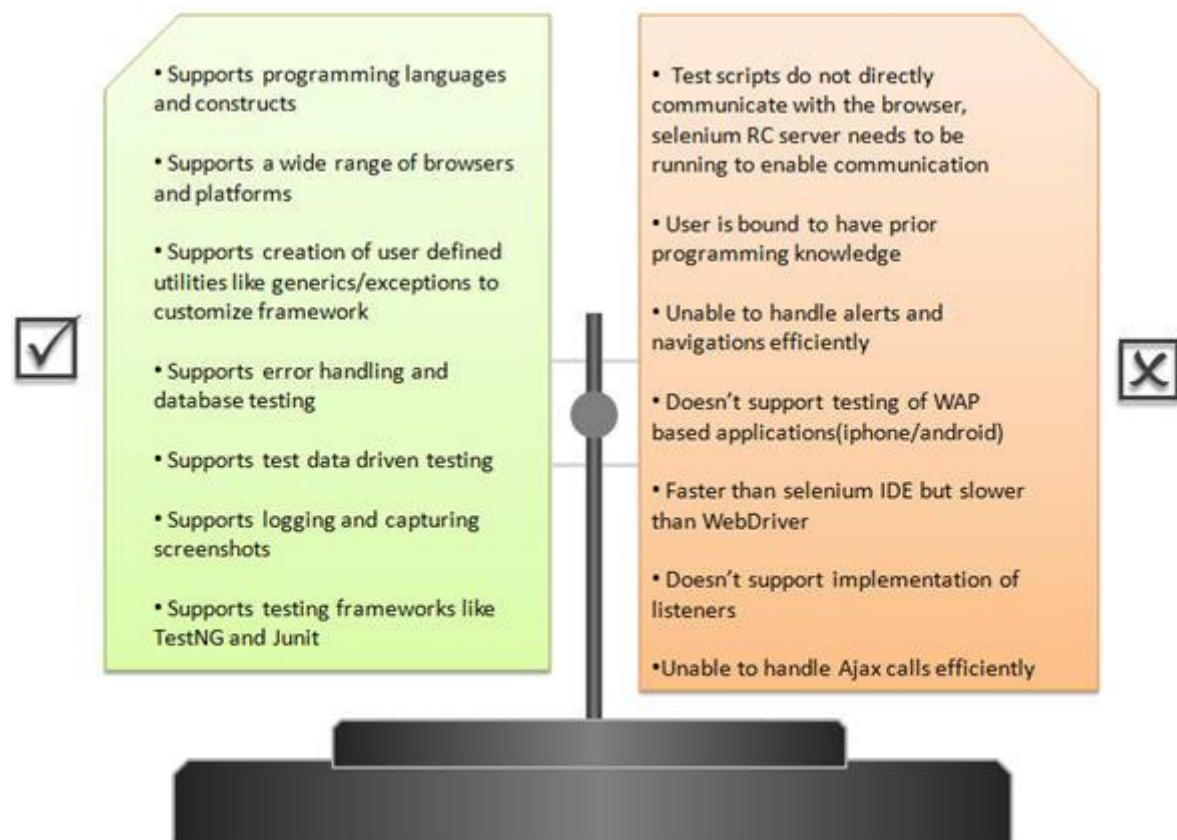
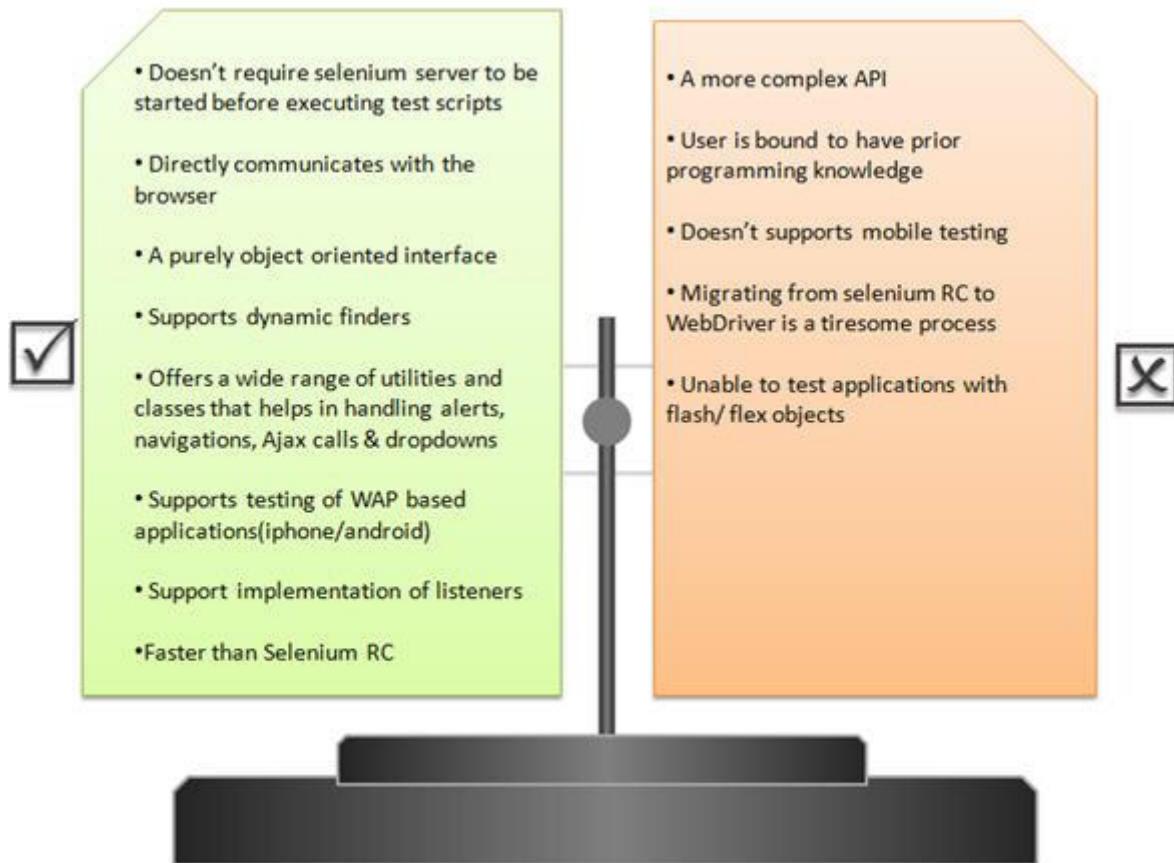


Fig 4:-

3. Selenium WebDriver

- Overview :** Selenium WebDriver is the successor to Selenium RC and provides all the capabilities of RC but with better support for modern web testing needs. It does this by making direct calls to the browser using each browser's native support for automation.
- Features :** More realistic interaction with web pages than Selenium RC, as it does not rely on JavaScript for automation. It supports programming in various languages like Java, C#, Python, Ruby, and JavaScript.
- Usage :** WebDriver can handle more complex and advanced web automation tasks. It is widely used in industry for creating robust, browser-based regression automation suites and tests.



Advantages and disadvantages of Selenium WebDriver - © www.SoftwareTestingHelp.com

Fig 5:-

4. Selenium Grid

- Overview :** Selenium Grid allows the Selenium WebDriver scripts to run on different machines and different browsers simultaneously / concurrently.
- Features :** It supports distributed test execution. A central hub distributes the tests to multiple nodes (machines), allowing tests to run in parallel, reducing the time for test execution and providing cross-browser, cross-platform testing capabilities.
- Usage :** Ideal for large test suites that need to be executed in multiple environments. It helps in speeding up the execution of a test suite by using multiple machines.

Selenium 3

Selenium 3 is an advance version of Selenium 2. It is a tool focused for automation of mobile and web applications. Stating that it supports mobile testing, we mean to say that the WebDriver API has been

extended to address the needs of mobile application testing.

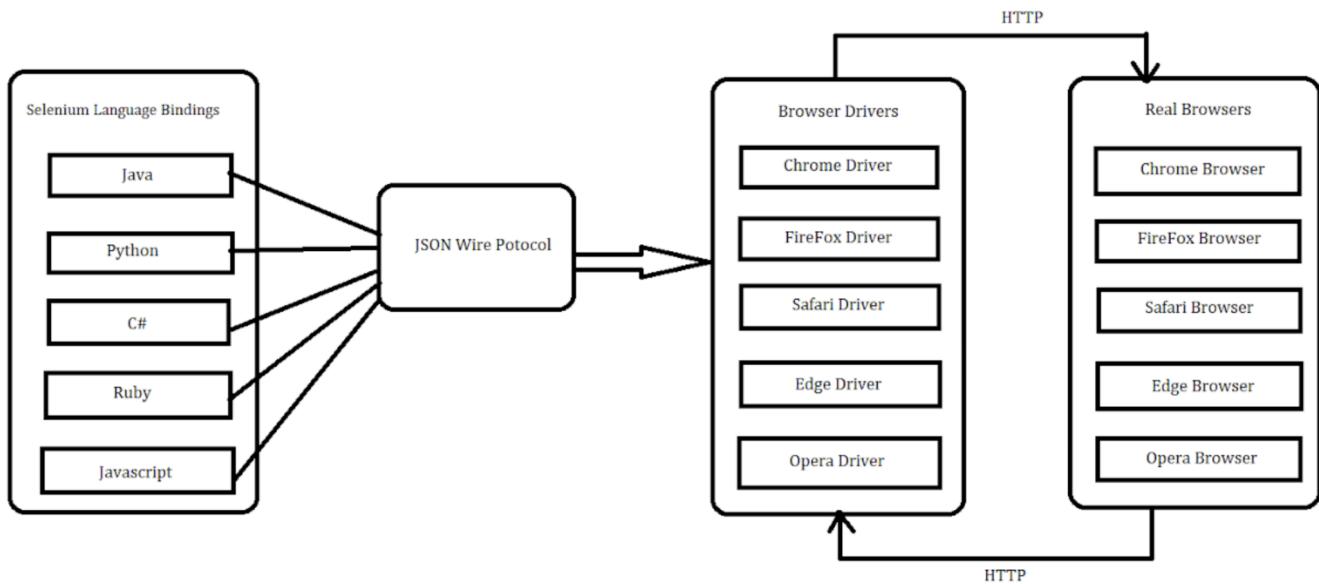


Fig 6:- Selenium 3 Architecture

Selenium 4

Selenium 4 was introduced by Simon Stewart in 2018. However the stable version of Selenium 4 was released in October 2021. One of the major changes made in Selenium 4 was the introduction of W3C Webdriver protocol which replaced the previously used JSON wire protocol in Selenium 3. This article highlights the major differences between Selenium 3 and Selenium 4.

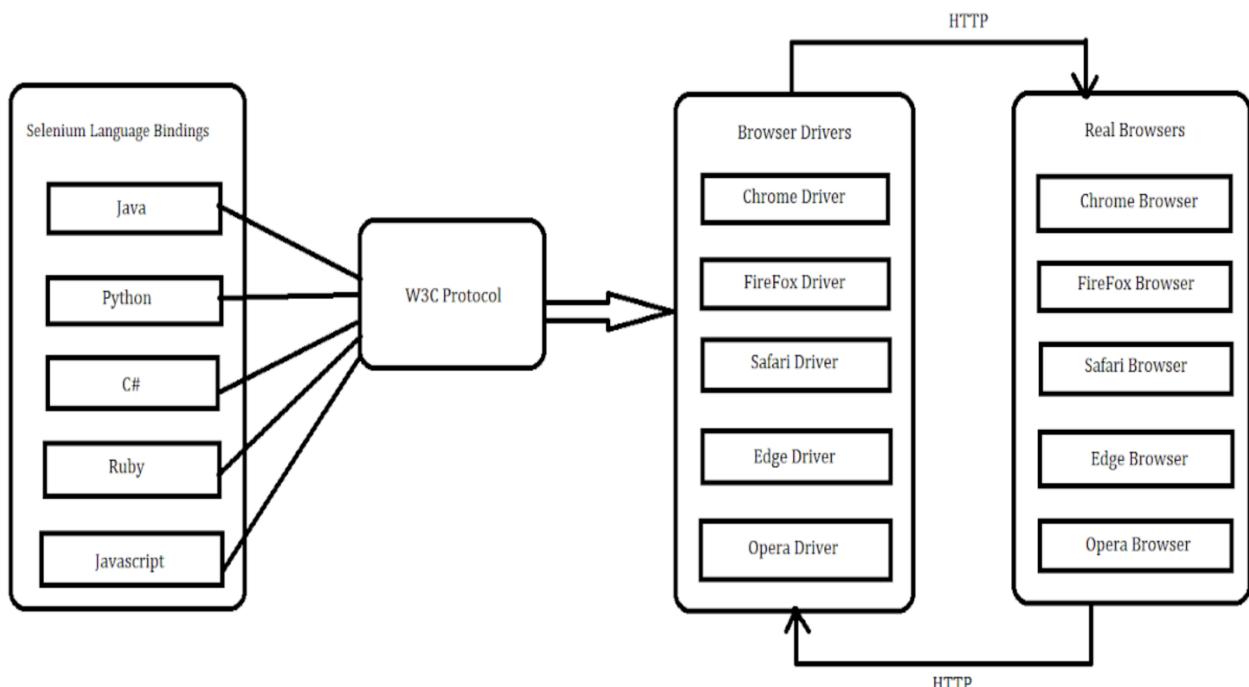


Fig 7:- Selenium 4 Architecture

Category	Supported Technologies
Operating Systems	Windows, macOS, Linux, Unix-like systems
Browsers (Selenium 4)	Google Chrome, Mozilla Firefox, Internet Explorer, Safari, Microsoft Edge
Browser Drivers	ChromeDriver, GeckoDriver (Firefox), IEDriverServer (IE), SafariDriver, EdgeDriver
Programming Languages	Java, C#, Python, Ruby, JavaScript (Node.js), Kotlin, PHP
Testing Frameworks	JUnit, TestNG, PyTest, RSpec, NUnit, Mocha, Jasmine
CI/CD Tools	Jenkins, Travis CI, CircleCI, GitLab CI, Bamboo
Cloud Platforms	Sauce Labs, BrowserStack, CrossBrowserTesting
IDEs	Eclipse, IntelliJ IDEA, Visual Studio, PyCharm, WebStorm, RubyMine

Selenium 4 further enhances support for the latest browser-specific drivers, ensuring compatibility and optimized performance across the most commonly used web browsers. This includes:

- Google Chrome: Via ChromeDriver.
- Mozilla Firefox: Via GeckoDriver.
- Microsoft Edge: Via EdgeDriver.
- Safari: Integrated directly into the browser with SafariDriver.
- Internet Explorer: Though less commonly used now, still supported via IEDriverServer.

Getting Started with Selenium IDE (Installation and its Features)

Selenium IDE Download and Installation

Configuring WebDriver

As we would be using Java as the programming language for this series and in order to create test scripts in java, we would have to introduce language- specific client drivers. Thus, let us begin with the downloading of Selenium Java Client Libraries.

Download the Selenium Java Client Libraries Step 1: Go to Selenium's official website and navigate to its download page – "<http://docs.seleniumhq.org/download/>". Refer the section in the below illustration where you can find Client Libraries listed for distinct programming languages. Click on the download link for Java Client Library.

The screenshot shows the Selenium Downloads page. At the top, it says "Selenium Conf 2024 Call for Proposals is now open! Submissions close 30 April. Learn more & submit". Below that is a section titled "Downloads" with the sub-section "Selenium Clients and WebDriver Language Bindings". It lists four language bindings: C# (Stable: 4.19.0 (March 27, 2024)), Ruby (Stable: 4.19.0 (March 27, 2024)), Python (Stable: 4.19.0 (March 27, 2024)), and JavaScript (Stable: 4.19.1 (March 29, 2024)). Each entry includes links for "Changelog" and "API Docs". A red box highlights the Java entry.

Fig 8:-

Step 2: Once downloaded, copy the folder and place it in the desired location on your file system.

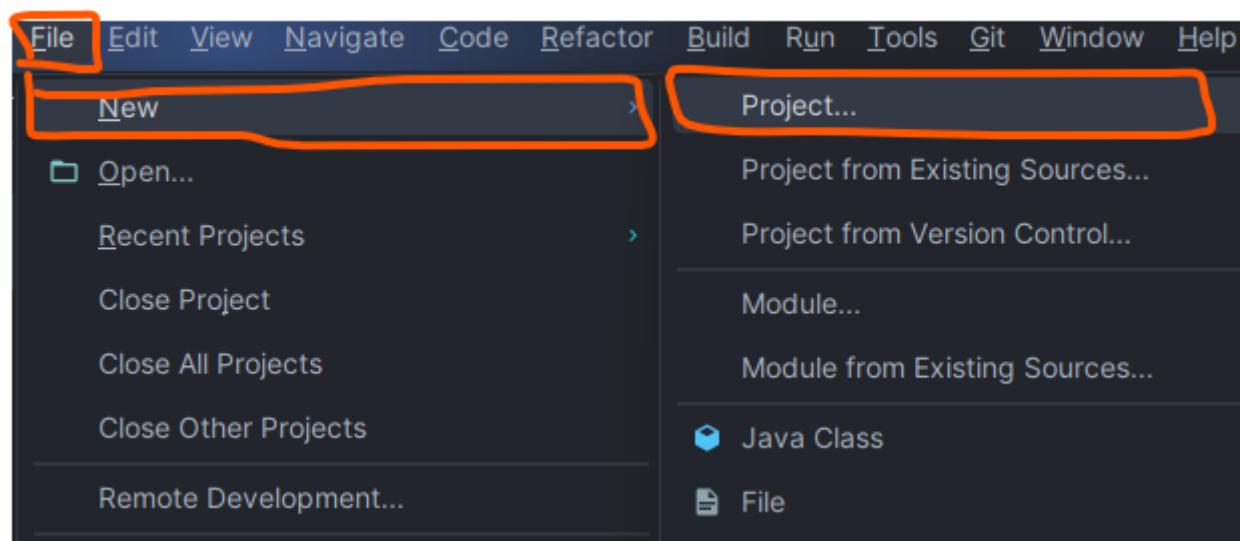
Step 3: Extract the zipped folder, a folder named as "Selenium-java-4.19.1.zip" can be seen. The folder embodies all the required jar files which enable users to create test scripts in Java.

Thus these libraries can be configured in IntelliJ IDE

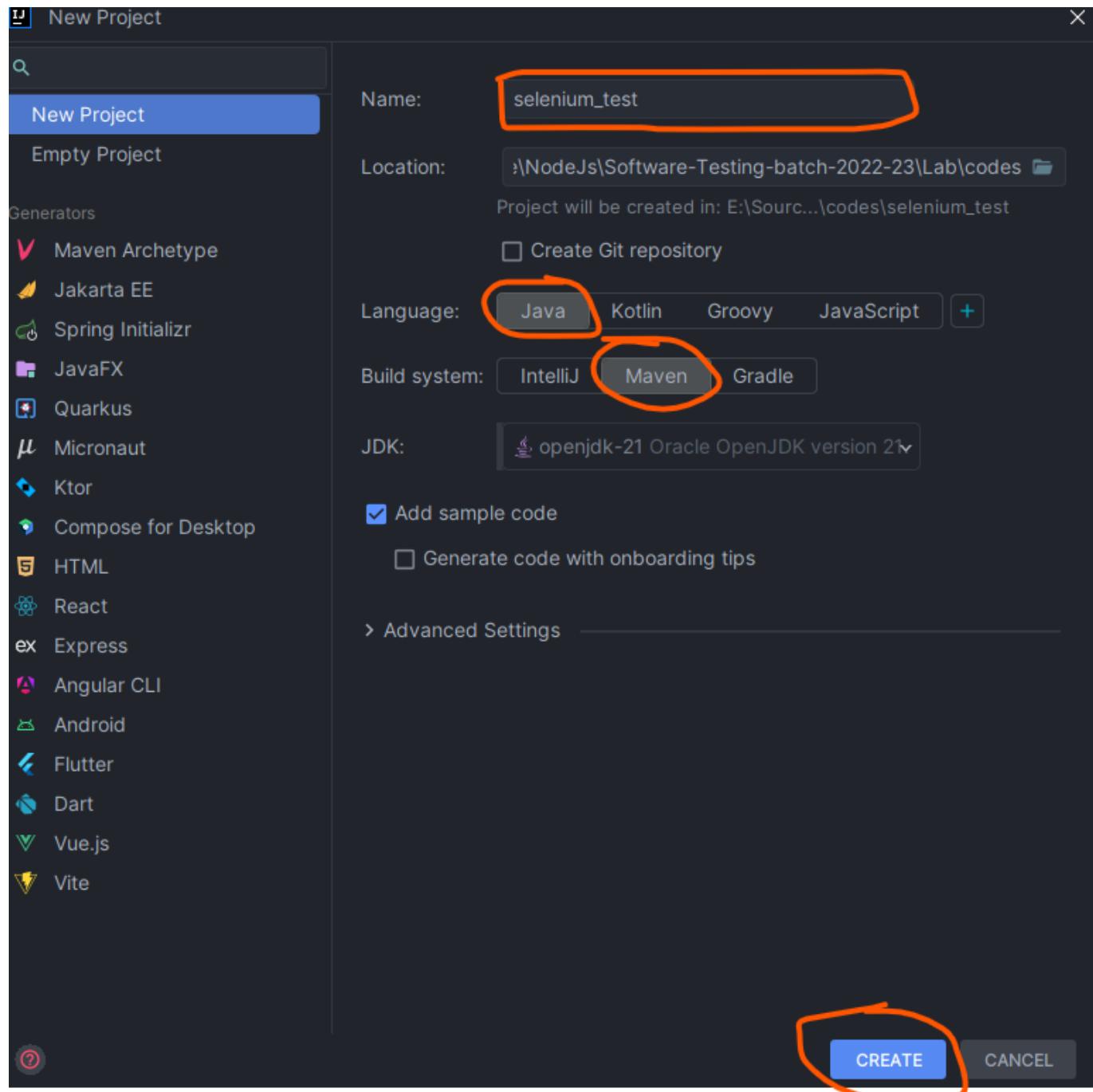
selenium-java-4.19.1	4/19/2024 12:44 PM	File folder
selenium-java-4.19.1.zip	4/19/2024 12:34 PM	Compressed (zipp...) 27,758 KB

Fig 9:-

Configuring Libraries with IntelliJ IDE Step 1: Navigate towards IntelliJ IDE. Create a new java based project following File -> New -> Java Project.



Refer the following figure for the same



<https://mvnrepository.com/artifact/org.seleniumhq.selenium/selenium-java>

<https://mvnrepository.com/artifact/org.seleniumhq.selenium/selenium-java/4.19.1>

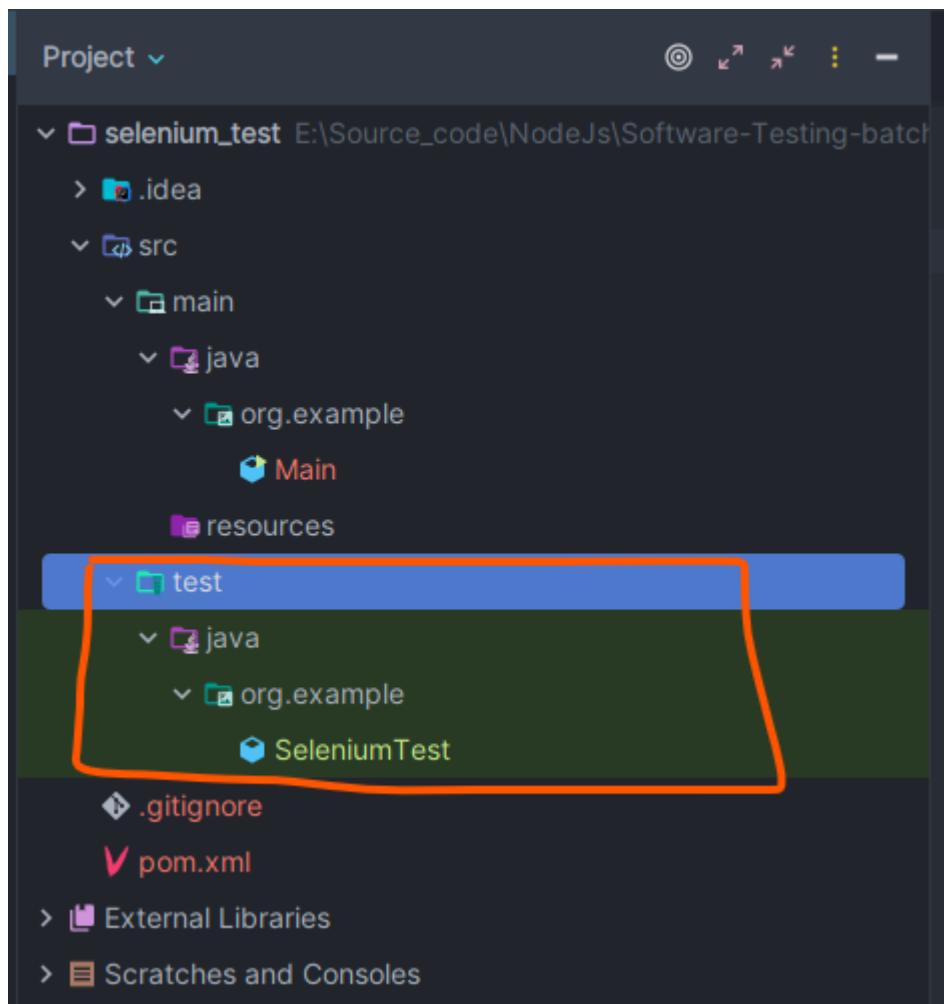
```
<dependency>
    <groupId>org.seleniumhq.selenium</groupId>
    <artifactId>selenium-java</artifactId>
    <version>4.19.1</version>
</dependency>

<dependency>
    <groupId>org.junit.jupiter</groupId>
    <artifactId>junit-jupiter-api</artifactId>
    <version>5.10.2</version>
    <scope>test</scope>
```

```
</dependency>

<--- OR --->

<dependency>
    <groupId>org.testng</groupId>
    <artifactId>testng</artifactId>
    <version>7.10.1</version>
    <scope>test</scope>
</dependency>
```



```

<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <groupId>org.example</groupId>
  <artifactId>selenium_test</artifactId>
  <version>1.0-SNAPSHOT</version>
  <properties>
    <maven.compiler.source>21</maven.compiler.source>
    <maven.compiler.target>21</maven.compiler.target>
    <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
  </properties>
  <dependencies>
    <dependency>
      <groupId>org.seleniumhq.selenium</groupId>
      <artifactId>selenium-java</artifactId>
      <version>4.19.1</version>
    </dependency>
  </dependencies>
</project>

```

Rename Main.java to SeleniumTest.Java

Now, time to doownload the driver

first check your browser version edge://settings/?search=update

About - 3 results

Microsoft Edge
Version 123.0.2420.97 (Official build) (64-bit)

Updates are underway. Wait a few minutes, then refresh the page.

Download **Updates** over metered connections

Automatically download **updates** over metered networks (for example, cellular network) and apply them on browser restart. Charges may apply.

Google

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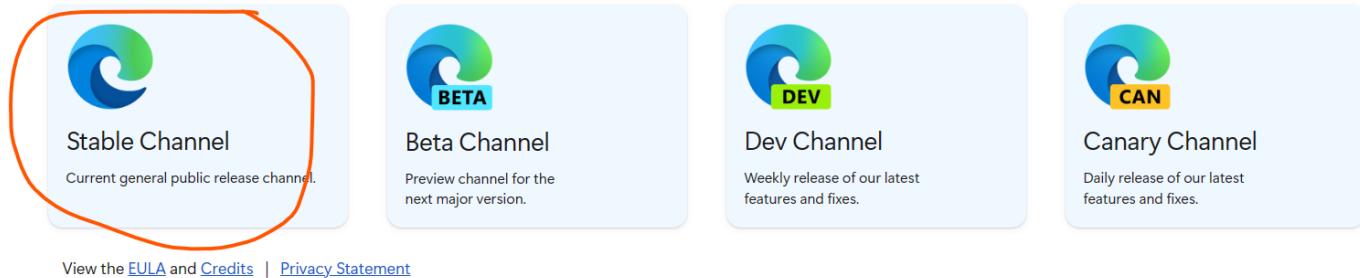
Including results for **edge webdriver** download
Search only for edge driver download

 Microsoft Developer
<https://developer.microsoft.com/microsoft-edge/tools/>

Microsoft Edge WebDriver

Download the correct Microsoft **Edge WebDriver** version for your build of Microsoft **Edge**.
Download a **WebDriver** testing framework of your choice. View ...

<https://developer.microsoft.com/en-us/microsoft-edge/tools/webdriver/?form=MA13LH>



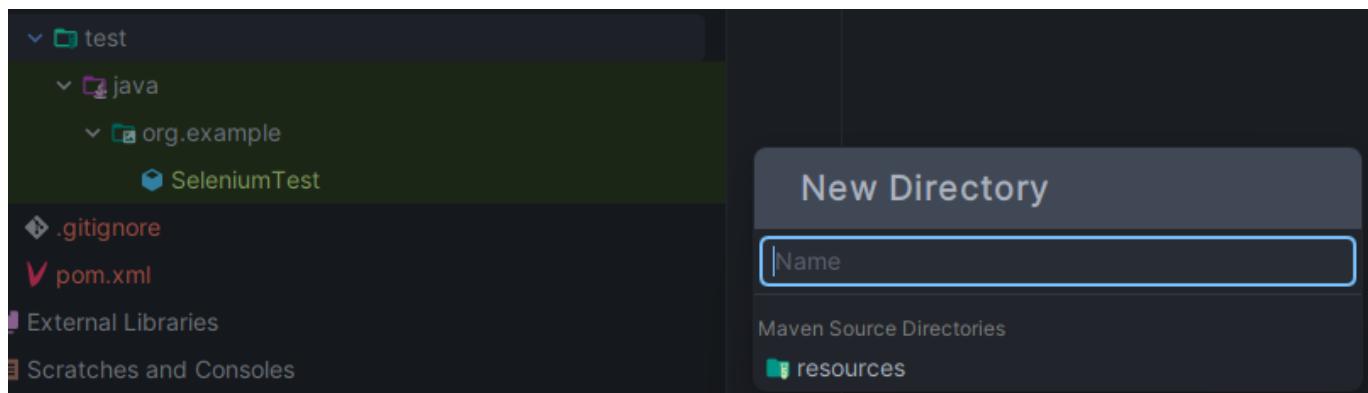
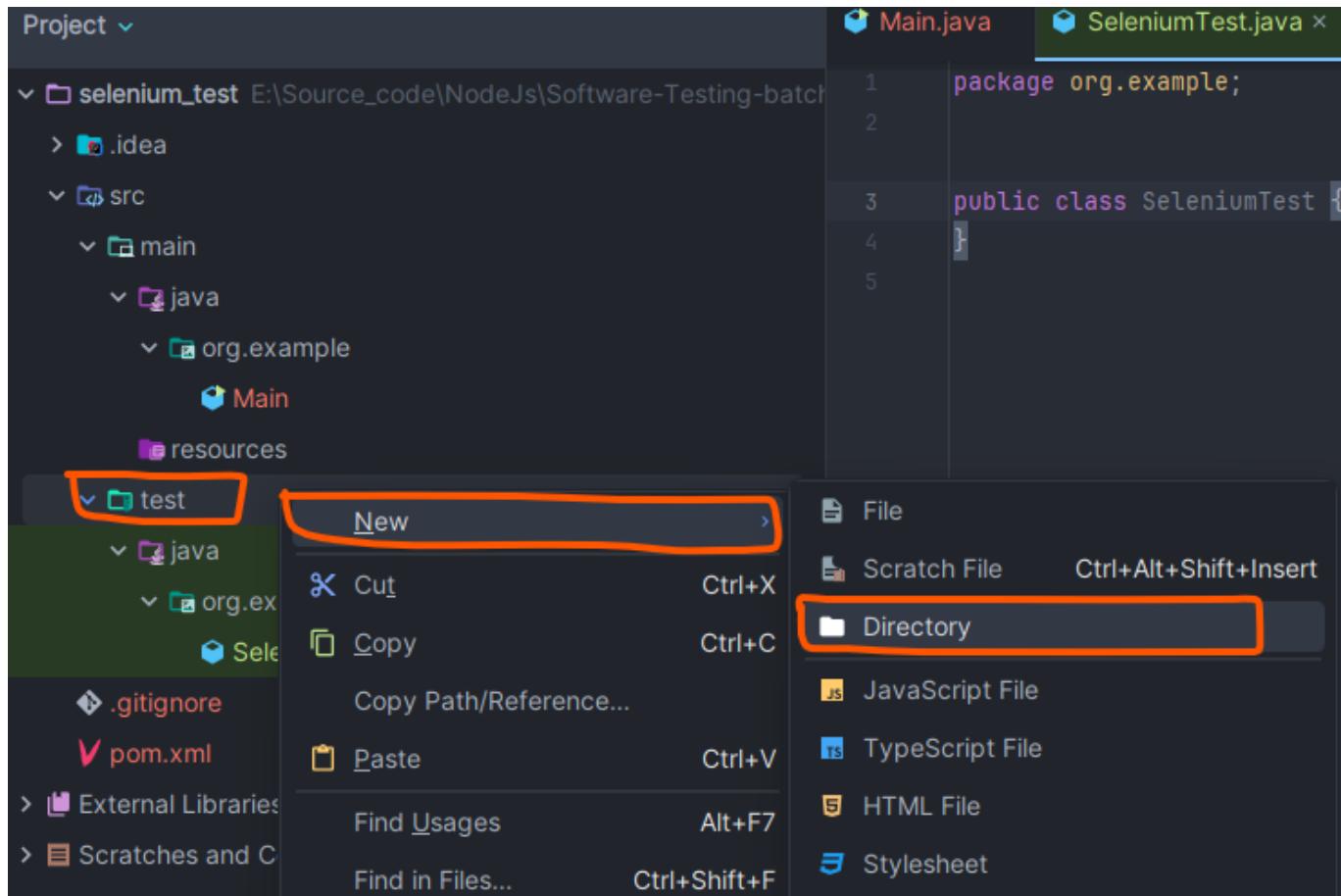
Recent versions

Release 124	Release 123	Release 122	Release 121
Version 124.0.2477.0 x86 ARM64	Version 123.0.2420.97 x86 x64 Mac M1 Mac Linux ARM64	Version 122.0.2365.120 x86 x64 ARM64	Version 121.0.2277.128 x86 x64 Mac M1 Mac Linux ARM64
Version 124.0.2476.0 x86 x64 Mac M1 Mac ARM64	Version 123.0.2420.81 x86 x64 Mac M1 Mac Linux ARM64	Version 122.0.2365.113 x86 x64 ARM64	Version 121.0.2277.113 Linux
Version 124.0.2474.0 x86 x64 Mac M1 Mac ARM64	Version 123.0.2420.65 x86 x64 Mac M1 Mac Linux ARM64	Version 122.0.2365.106 x86 x64 ARM64	Version 121.0.2277.112 x86 x64 Mac M1 Mac ARM64
Version 124.0.2472.0 x86 x64 Mac M1 Mac ARM64	Version 123.0.2420.53 x86 x64 Mac M1 Mac Linux ARM64	Version 122.0.2365.92 x86 x64 Mac M1 Mac Linux ARM64	Version 121.0.2277.110 x86 x64 ARM64
Version 124.0.2471.0 x86 x64 ARM64	Version 123.0.2420.51 x86 x64 ARM64	Version 122.0.2365.80 x86 x64 Mac M1 Mac Linux ARM64	Version 121.0.2277.106 x86 x64 Mac M1 Mac Linux ARM64

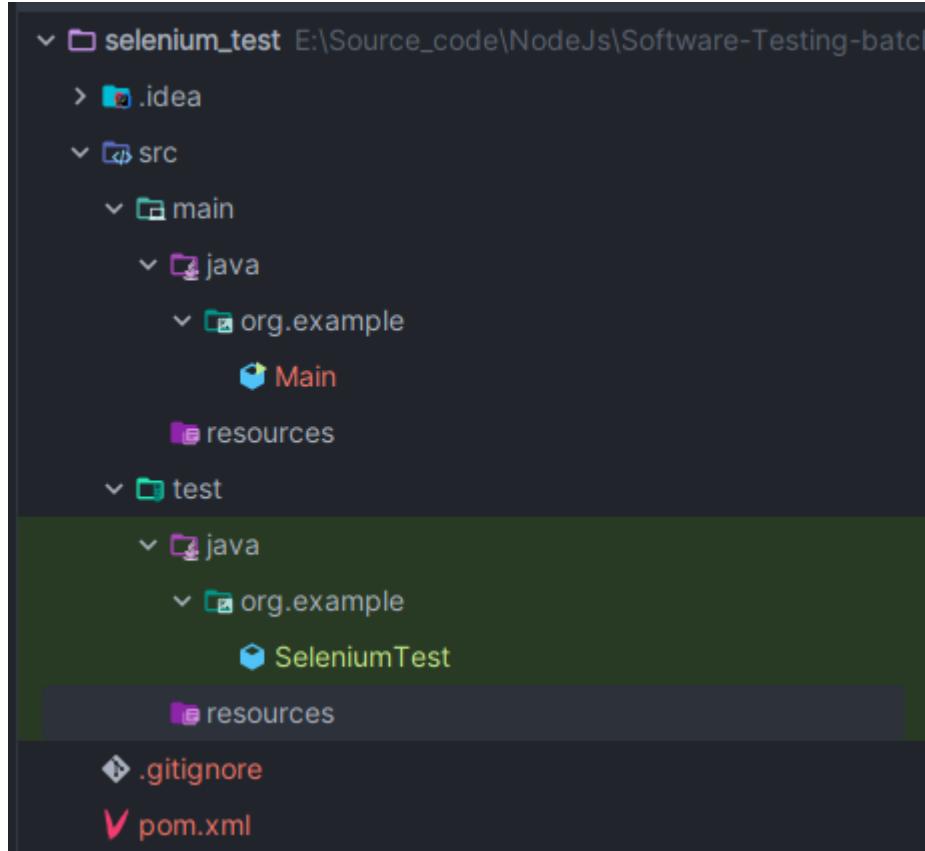
then extract

 **edgedriver_win64** 4/19/2024 2:11 PM File folder

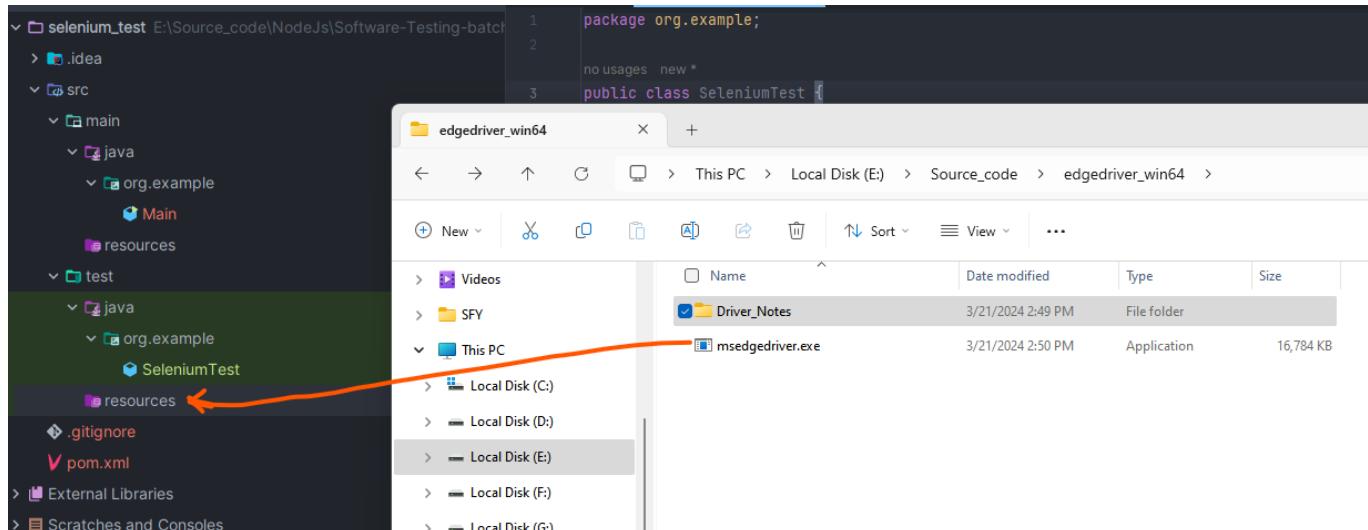
Right click on test

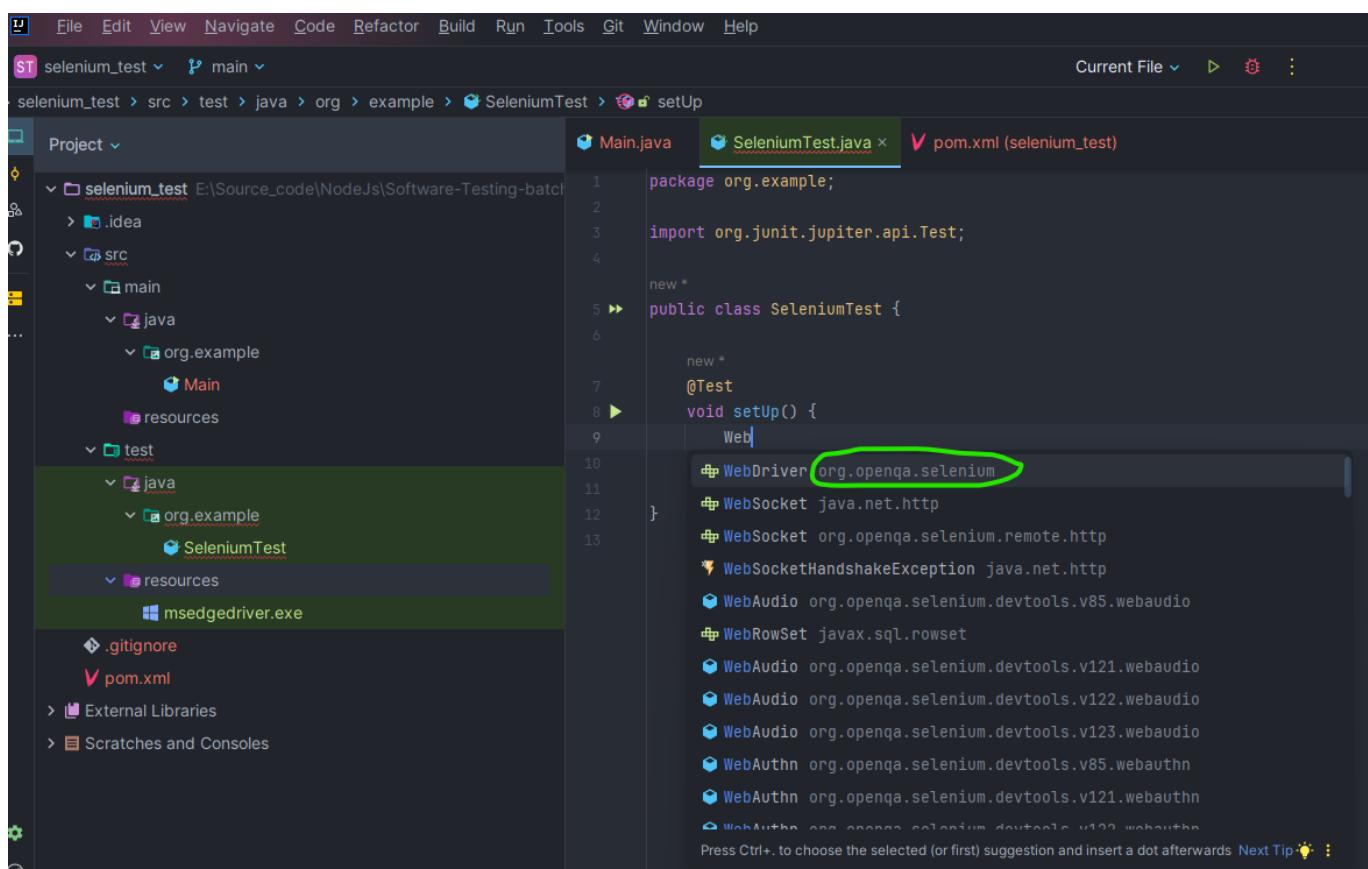
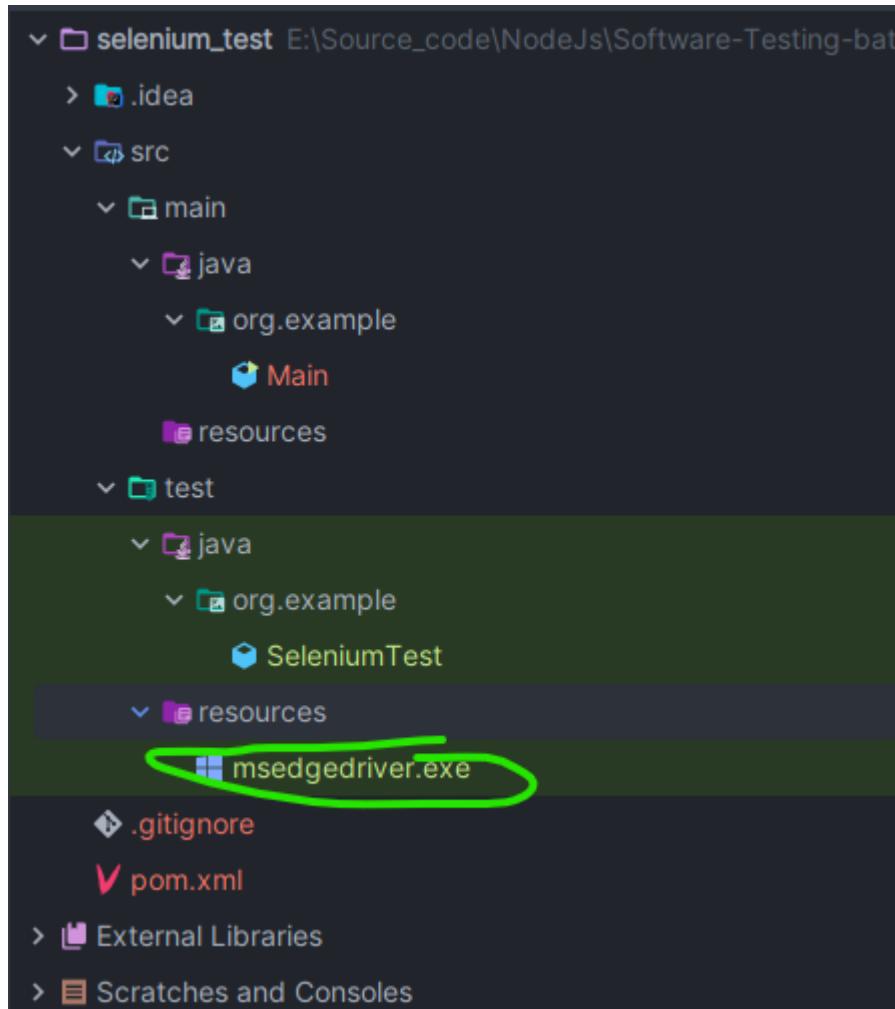


Select Enter and click **Enter** key



copy the drive into the resource folder





```
public class SeleniumTest {  
  
    @Test  
    void setUp() {  
        // Set the system property for the Microsoft Edge driver  
        System.setProperty("webdriver.edge.driver",  
        System.getProperty("user.dir") + "/src/test/resources/msedgedriver.exe");  
  
        // Initialize the WebDriver instance using EdgeDriver  
        WebDriver driver = new EdgeDriver();  
    }  
  
}
```

Explanation:

1. `System.setProperty(String key, String value)`:

This method is used to set a system property, and in this case, it is setting the path to the Microsoft Edge driver executable.

2. `System.getProperty("user.dir")`:

This method returns the current working directory of the user's project. It's a useful way to build paths that are relative to the project directory, making your code more portable.

3. `EdgeDriver`:

This initializes a new instance of EdgeDriver, which will control the Edge browser. Make sure that the `msedgedriver.exe` matches the version of your Microsoft Edge browser and that it's located in the specified directory within your project.

```
@Test  
void setUp() {  
    // Set the system property for the Microsoft Edge driver  
    System.setProperty("webdriver.edge.driver",  
    System.getProperty("user.dir") + "/src/test/resources/msedgedriver.exe");  
  
    // Initialize the WebDriver instance using EdgeDriver  
    WebDriver driver = new EdgeDriver();  
  
    driver.get("https://www.baidu.com");  
}
```

and now run

```
@Test  
void setUp() {  
    // EdgeOptions options = new EdgeOptions();
```

```
// options.addArguments("--remote-allow-origins=*");

// Set the system property for the Microsoft Edge driver
System.setProperty("webdriver.edge.driver",
System.getProperty("user.dir") + "/src/test/resources/msedgedriver.exe");

// Initialize the WebDriver instance using EdgeDriver
WebDriver driver = new EdgeDriver(); // if allow origins, then
EdgeDriver(allow)

driver.get("https://www.baidu.com");
}
```

Now time to open and quit the browser

```
package org.example;

import org.junit.jupiter.api.AfterAll;
import org.junit.jupiter.api.BeforeAll;
import org.junit.jupiter.api.Test;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.edge.EdgeDriver;
import org.openqa.selenium.edge.EdgeOptions;

public class SeleniumTest {

    private static EdgeOptions options;
    private static WebDriver driver;

    @BeforeAll
    static void setup() {
        options = new EdgeOptions(); // Initialize the EdgeOptions object
        options.addArguments("--remote-allow-origins=*");
        System.setProperty("webdriver.edge.driver",
System.getProperty("user.dir") + "/src/test/resources/msedgedriver.exe");
        driver = new EdgeDriver(options); // Ensure EdgeDriver is
imported

        driver.get("https://www.bing.com");
    }

    @Test
    void testSteps() {
        // Implement test steps here
    }

    @AfterAll
    static void tearDown() {
        driver.quit(); // quit to completely exit the browser session
    }
}
```

```
}
```

Time to test searching functionality of the Bing

What is Document Object Model (Dom)?

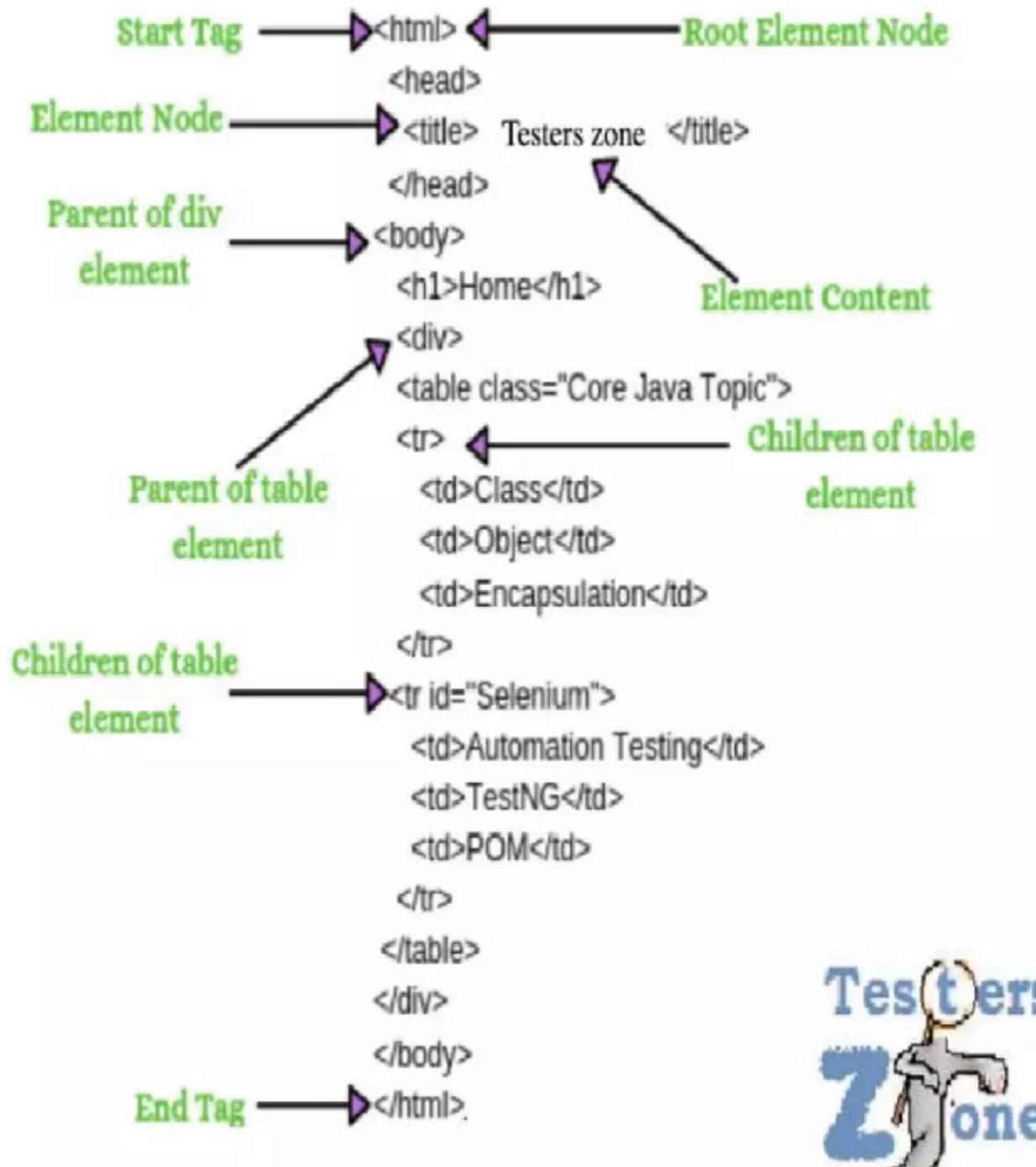
The diagram illustrates the Document Object Model (DOM) structure for a table. It shows a hierarchical tree starting from the root element <TABLE>. This root has a single child element <ROWS>. The <ROWS> element has two children, both of which are <TR> elements. Each <TR> element has two children, both of which are <TD> elements. The <TD> elements have their respective text values as children: "Shady Grove", "Aeolian", "Over the River, Charlie", and "Dorian". To the left of the diagram, there is a red arrow pointing right with the text "What is DOM?". Above the arrow, there is a logo for "Testers Zone" featuring a magnifying glass over a person's head.

```
graph TD; TABLE["<TABLE>"] --> ROWS["<ROWS>"]; ROWS --> TR1["<TR>"]; ROWS --> TR2["<TR>"]; TR1 --> TD1["<TD>"]; TR1 --> TD2["<TD>"]; TD1 --> ShadyGrove("Shady Grove"); TD2 --> Aeolian("Aeolian"); TR2 --> TD3["<TD>"]; TR2 --> TD4["<TD>"]; TD3 --> OverRiver("Over the River, Charlie"); TD4 --> Dorian("Dorian")
```

Locators

Identification of the correct **GUI** element on a web page is pre-requisite for creating any successful automation script. It is where locators come into the picture.

- Locators are one of the essential components of Selenium infrastructure, which help Selenium scripts in uniquely identifying the WebElements(such as **TextBox**, **Button**, etc.)



Attributes-based locators: Attributes-based locators utilize the attributes of HTML elements to identify them on a web page. Common attributes include:

- Identifier: Combines the id and name attributes for a broad match.
- Id: Targets the unique identifier of an element.
- Name: Selects the **first** element with a specified **name** attribute.
- Link: Identifies links by the text they display.
- CSS: Uses CSS selectors to define elements' styles and identify them.

Structure-based locators: These locators depend on the web page's structural elements to locate HTML elements: It rely on the structure of the page to find elements.

- DOM: Accesses elements based on their hierarchical relationship in the page structure.
- XPATH: Navigates through elements and attributes in an XML-like structure.

- CSS: Identifies elements using style selectors which are both fast and versatile.

Location Techniques

```
<html>
  <body>
    <form id="loginForm">
      <input name="email" type="text"/>
      <input name="password" type="password"/>
      <input name="continue" type="submit" value="Login"/>
      <input name="clear" type="password" value="Login"/>
      <a href="continue.html">Continue</a>
      <a href="cancel.html">Cancel</a>
    </form>
  </body>
</html>
```

Identifier:

- Example: `identifier=loginForm, identifier=password`

Id:

- Example: `id=loginForm`

Name:

- Example: `name=username, name=continue.`

Link:

- Example: `link=Continue, link=Cancel`

DOM:

- Example: `dom = document.getElementById('loginForm'),
 dom = document.forms['loginForm']`

CSS:

- Example: `css=form#loginForm > input[name='email']..`

There are three important special characters in css selectors:

1. '^': Matches elements whose attribute starts with the specified value.
2. '\$': Matches elements whose attribute ends with the specified value.
3. '*': Matches elements containing the specified value in the attribute. Example:

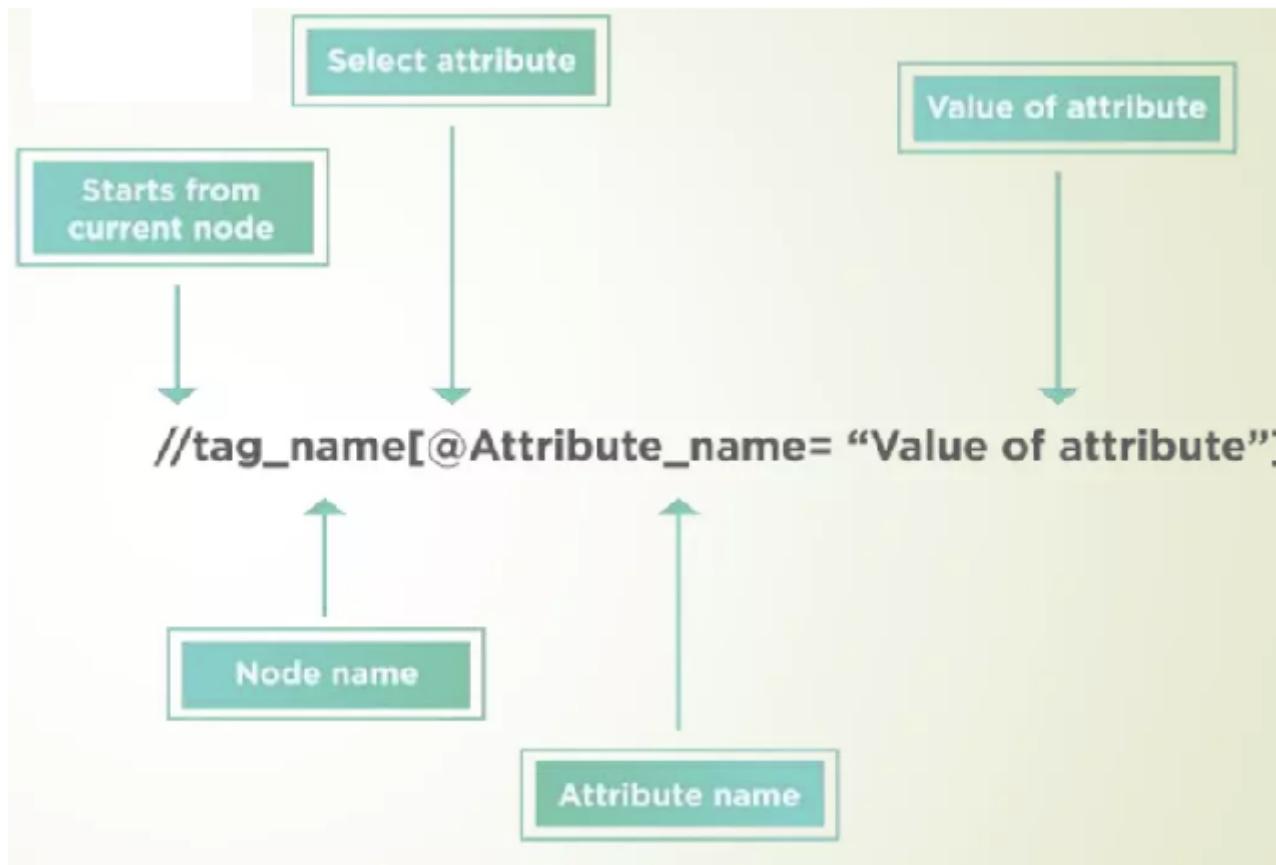
`css=input[id$='mail'], css=input[id*='mail']`

XPath Locator in Selenium: XPath allows navigation through the HTML structure of a page using path expressions:

- XPath is defined as XML path. It is a syntax or language for finding any element on the web page using the XML path expression.

Syntax XPath

```
XPath = //tag_name[@Attribute_name ="Value of attribute"]
```



```
//      ----> Select current node. tag_name --> Tagname of the particular node.
@ --> Select attribute.
Attribute_name --> Attribute name of the node.
Value of attribute --> Value of the attribute.
```

Types of XPath:

Absolute Xpath Absolute XPath is the direct way of finding the element. Moreover, it starts from the first/root node of the XM4HTML document and goes all the way to the required node following one node at a time

Example: `/html/body/div/header/a/img`

Relative Xpath Relative XPath starts from any node inside the HTML DOM; it need not start from the root node. It begins with a double forward slash.

Example: `//img [@src= "/images/Testerszone.jpg"]`

Pre-defined XPath Syntax for Locators:

```
Using text() ://*[text()='testers zone'] Using name() ://input[@name='username']
Using id() ://input[@id= user-message] Using class() ://input[@class='user-
message'] LinkText() ://a[@href='http://testerszone.com/']
```

Note: We can use * in place of input, it will also work fine. Input is specific tag name but * is generic (point out all the available tags in the DOM) we can use for any tag name.

Key Points:

We can directly use the pre defined locators in `findElement` method instead of xpath.

```
driver.findElement(By.id("Testers Zone"));
```

Note:

We can use other locators like name, className etc in same way.

You will get to know all available locators using `driver.findElement(By.);`

<code>m id(String id)</code>	By
<code>m className(String className)</code>	By
<code>m xpath(String xpathExpression)</code>	By
<code>m class</code>	
<code>m cssSelector(String cssSelector)</code>	By
<code>m linkText(String linkText)</code>	By
<code>m name(String name)</code>	By
<code>m partialLinkText(String partialLinkText)</code>	By
<code>m tagName(String tagName)</code>	By

Use of `contains()` in Xpath

The `contains()` function is utilized in XPath to match elements that include partial text or attribute values. This approach is particularly useful when dealing with elements that have long or dynamic text.

Examples:

Using `text()`:

- Syntax: `//*[contains(text(), 'testers')]`

Using `name` attribute:

- Syntax: `//input[contains(@name, 'Mith')]`

Using `id` attribute:

- Syntax: `//input[contains(@id, 'user-message')]`

Using `class` attribute:

- Syntax: `//input[contains(@class, 'user-message')]`

Using href attribute (similar to Partial-LinkText()):

- Syntax: `//a[contains(@href, 'testerszone.com')]`

Use of `starts-with()` The `starts-with()` function is employed when the initial part of an attribute value or text associated with a web element is known. This method helps in targeting elements whose attributes begin with a specified text.

Syntax: Example: `//a[starts-with(@id, 'link-testers_')]`

Note: inside the " you have to mention the partial text value, make sure you are getting unique matching element with your xpath. Simillar way we have ends with also. We use end partial part of text.

Logical Operators in XPath

XPath supports logical operators such as **OR** and **AND** to combine multiple conditions:

OR: This operator is used when at least one of the conditions must be true. It helps in selecting elements that meet any of the specified criteria.

Syntax:

Example: `//*[@type='submit' or @name='btnReset']`

AND: This operator is used when all specified conditions must be true. It is useful for more specific element targeting.

Syntax:

Example: `//input[@type='submit' and @name='btnLogin']`

Note: sometime a single parameter in xpath does not yield a unique element then we follow these approaches.

XPath axes method

Sometimes we don't get element very easily so we need to use axes method in xpath, we use this to find complex and dynamic element also.

1. Following:

This will give you the count of total elements in a document of the current node and we can access them using index.

Syntax

Xpath=//*[@type='text']/following::input



Email address or phone number

Password

Log In

[Forgotten password?](#)

Create New Account

Create a Page for a celebrity, band or business

1

2. Ancestor

The ancestor axis selects all ancestors element (parent, grandparent, great-grandparents, etc.) of the current node.

Syntax:

Xpath=//*[@type='text']//ancestor::div



facebook

Facebook helps you connect and share with the people in your life.

Email address or phone number

Password

[Log In](#)

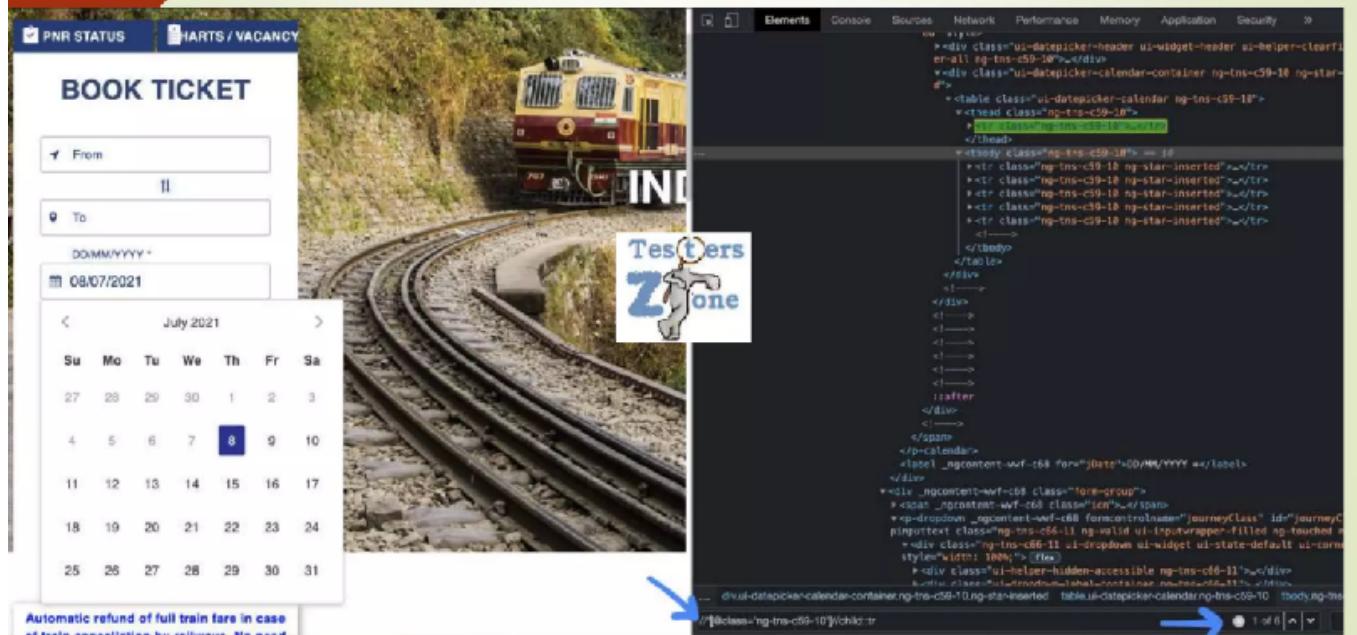
[Forgotten password?](#)

Create a Page for a celebrity, band or business

3. Child

Select all the child elements of the current node.

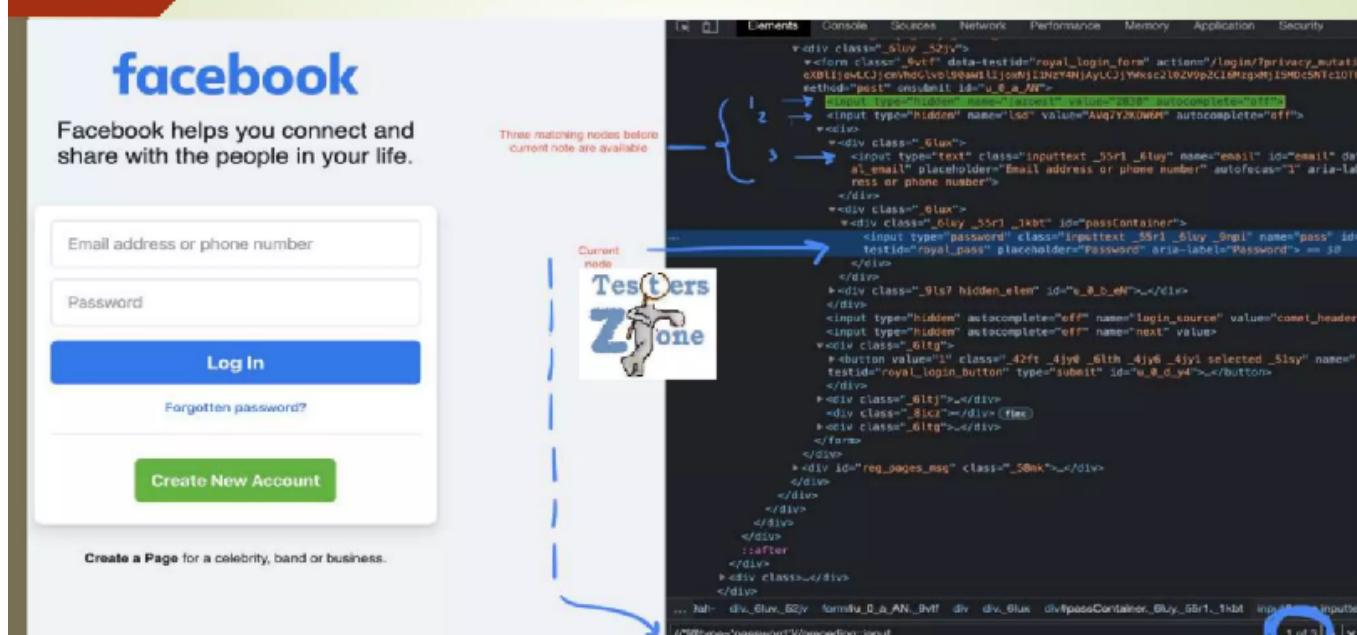
Xpath= //*[@class='ng-tns-c59-10']//child::tr



4. Preceding

Select all nodes that come before the current node

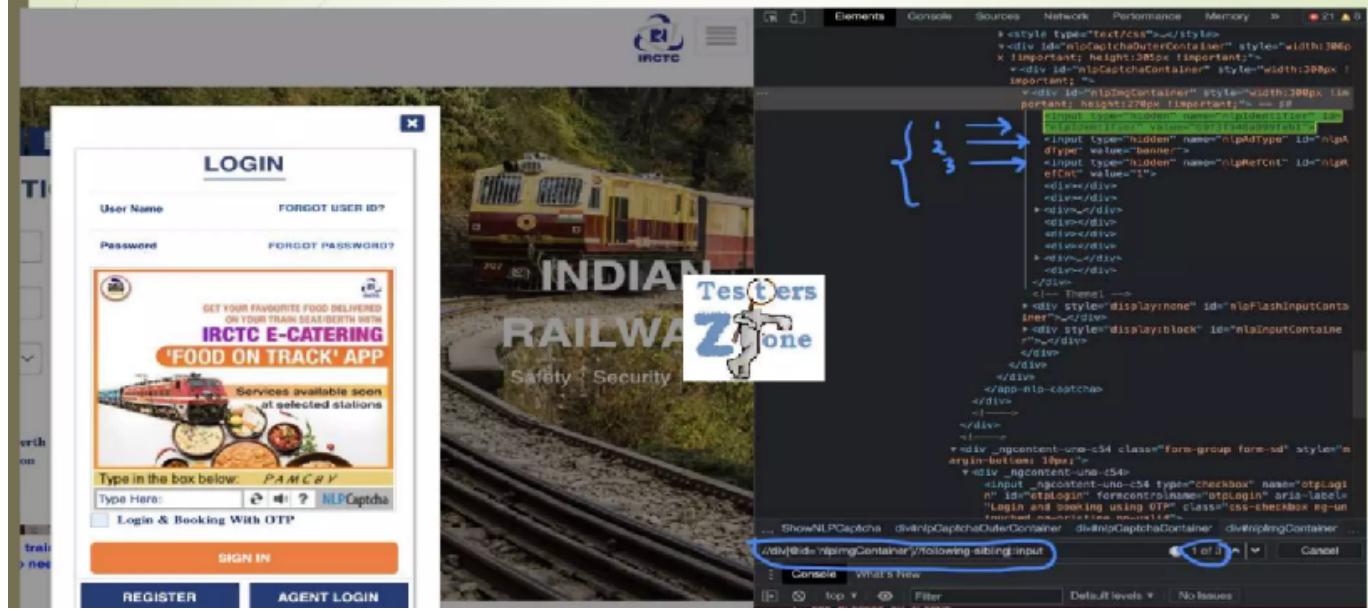
Xpath= //*[@type='password']//preceding::input



5. Following-sibling:

The **`following-sibling`** selects all sibling nodes after the current node at the same level. i.e. It will find the element after the current node.

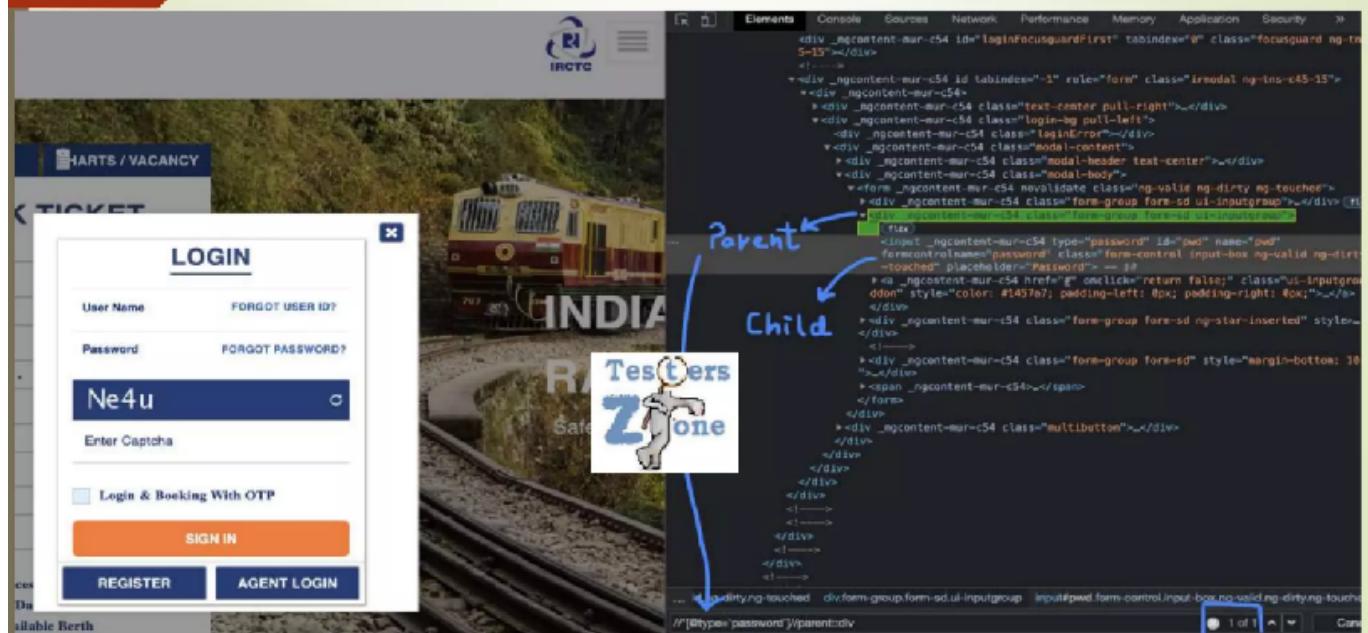
Xpath=//div[@id='nlplImgContainer']//following-sibling::input



6. Parent

It selects the parent of the current node.

Xpath= //*[@type='password']/parent::div



7. Descendant

It select below child and grand child node of the current node.

Note: There is small **difference between descendant and following**, following gives all the matching node in the document and descendant gives elements of current node only.



Facebook helps you connect and share with the people in your life.

Email address or phone number

Password

Log In

[Forgotten password?](#)

[Create New Account](#)

Create a Page for a celebrity, band or business

Key Points:

Xpath :

- ▶ XPath stands for XML Path
 - ▶ XPath is used to find the element in the HTML DOM
 - ▶ The success rate of finding an element using Xpath is too high
 - ▶ XPath is used where element has no other way of locating
 - ▶ Locate elements in forward and backward direction.
 - ▶ Can locate element by text
 - ▶ Starts with / or //
 - ▶ More flexible



CSS Selector :

- ▶ CSS stands for cascading style sheet
 - ▶ CSS Selector is used to find the element in the HTML DOM using style sheet language.
 - ▶ The success rate of finding an element using CSS Selector is less compare to Xpath.
 - ▶ do not support all CSS features.
 - ▶ Faster in all browsers
 - ▶ Can not locate by element by text
 - ▶ Locate elements only in forward direction
 - ▶ Some CSS selectors will not work all browsers

The screenshot shows a Facebook login page with a yellow error message box stating "You must log in to continue.". Below it are fields for "Email or phone number" and "Password", followed by a blue "Log In" button. At the bottom is a link to "Forgot account? · Sign up for Facebook". To the right, a context menu is open with various options like Back, Forward, Reload, Save as..., Print..., Cast..., Create QR Code for this page, Block element..., Download with IDM, Get image descriptions from Google, View page source, and Inspect. The "Inspect" option is circled in red.

```
<textarea id="sb_form_q" class="sb_form_q sb_form_ta" name="q" type="search" ... ></textarea>
```

get the xPath

```
//*[@id="sb_form_q"]
```

```
public class SeleniumTest {

    private static EdgeOptions options;
    private static WebDriver driver;

    @BeforeAll
    static void setup() {
        options = new EdgeOptions(); // Initialize the EdgeOptions object
        options.addArguments("--remote-allow-origins=*");
        System.setProperty("webdriver.edge.driver",
        System.getProperty("user.dir") + "/src/test/resources/msedgedriver.exe");
        driver = new EdgeDriver(options); // Ensure EdgeDriver is
        imported

        driver.get("https://www.bing.com");
    }

    @Test
    void testSteps() throws InterruptedException {
```

```
// Implement test steps here
WebElement textArea = driver.findElement(By.xpath("//*
[@id=\"sb_form_q\"]"));
Thread.sleep(2000);

// Set the desired value in the textarea
textArea.sendKeys("Neusoft institute guangdong");
Thread.sleep(2000);

// Simulate pressing the Enter key
textArea.sendKeys(Keys.ENTER);

}

@AfterAll
static void tearDown() { // Renamed from tearUp to tearDown for
clarity
    // driver.quit(); // Changed from close to quit to completely
exit the browser session
}

}
```

@Timeout(/second)

```
@Timeout(2) // 2 seconds
@Test
void testSteps() throws InterruptedException {
    // Implement test steps here
    WebElement textArea = driver.findElement(By.xpath("//*
[@id=\"sb_form_q\"]"));
    Thread.sleep(2000);

    // Set the desired value in the textarea
    textArea.sendKeys("Neusoft institute guangdong");
    Thread.sleep(2000);

    // Simulate pressing the Enter key
    textArea.sendKeys(Keys.ENTER);
}
```

Is the test passed / failed?

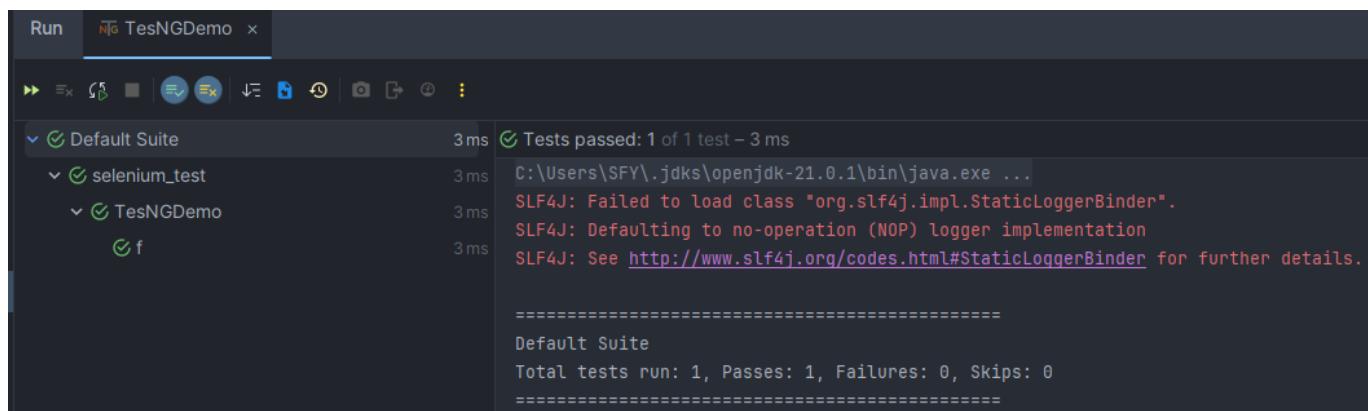
Creating a TestNG classs

```
package org.example;

import org.testng.annotations.Test;

public class TesNGDemo {
    @Test
    public void f() {

    }
}
```



Similarities and difference annotation of JUnit and TestNG.

JUnit 4	JUnit 5	TestNG	Description
@Before	@BeforeEach	@BeforeMethod	Executed before each test method.
@After	@AfterEach	@AfterMethod	Executed after each test method.
@BeforeClass	@BeforeAll	@BeforeClass	Executed once before all test methods in a class.
@AfterClass	@AfterAll	@AfterClass	Executed once after all test methods in a class.
@Ignore	@Disabled	@Ignore	Marks a test method as ignored/skipped.
@Test	@Test	@Test	Marks a method as a test method.
@Test(expected)	@Test with assertThrows	@Test(expectedExceptions)	Specifies that a test method should throw an exception.

JUnit 4	JUnit 5	TestNG	Description
@RunWith	@ExtendWith	Not directly equivalent	Used to customize the test execution (like using different runners or extensions). TestNG uses listeners and factories instead.
N/A	@DisplayName	Not directly equivalent	Provides a custom name for the test display.
N/A	@Nested	Not directly equivalent	Allows declaring nested test classes.
N/A	@Tag	@Groups	Allows filtering tests for selective execution.
N/A	N/A	@DataProvider	Provides data for parameterized tests.
N/A	N/A	@Parameters	Allows passing parameters from XML files.
@Parameterized	@ParameterizedTest	@Test with @DataProvider	For executing parameterized tests.
@Rule	@ExtendWith with custom extensions	Not directly equivalent	Allows adding or overriding test behavior.
N/A	@RepeatedTest	Not directly equivalent	Specifies that a test should be run multiple times.

```

import org.openqa.selenium.WebDriver;
import org.openqa.selenium.edge.EdgeDriver;
import org.openqa.selenium.edge.EdgeOptions;
import org.testng.annotations.*;

public class DemoTestNG {

    private static WebDriver driver;
    private static EdgeOptions options;

    @BeforeClass
    static void setUp() throws InterruptedException {
        options = new EdgeOptions();
        options.addArguments("--remote-allow-origins=*");
        // System.setProperty("webdriver.edge.driver",
        System.setProperty("user.dir") + "/src/test/resources/msedgedriver.exe";
        driver = new EdgeDriver(options);
        String appUrl = "https://www.bing.com";
        driver.get(appUrl);
    }
}

```

```
        Thread.sleep(3000);
    }

    @Test
    void fo() {

    }

    @AfterClass
    static void tearDown(){
        driver.quit();
    }

}
```

Home

For this homework, you are expected to delve into the practical usage of the **TestNG** framework within software testing. Begin by reading about **TestNG** to understand its key features and functionalities. Your primary task will be to **not** only study the theoretical aspects but to actively engage with the framework by setting up a real testing environment.

Requirements: **Setup:** Adding testNG dependecies. **Experimentation:** Create at least one sample project that includes multiple test cases using TestNG annotations such as @Test, @BeforeClass, @AfterClass, @DataProvider, and others you find pertinent. **Documentation:**

1. Write a comprehensive report that includes:
2. Description of the test cases you developed, including the purpose of each test and how TestNG features were utilized.
3. Screenshots of your IDE showing the test execution results.
4. Reflection on the learning experience and how TestNG can be utilized in future projects.
5. Submission: Prepare your report and code samples for submission by [insert due date here]. Ensure your report is clear, informative, and well-organized.

Examples In JUnit 5, you can control the execution order of test methods using the **@TestMethodOrder** annotation along with specific ordering methods.

For the Junit code

```
import org.junit.jupiter.api.MethodOrderer.OrderAnnotation;
import org.junit.jupiter.api.Order;
import org.junit.jupiter.api.Test;
import org.junit.jupiter.api.TestMethodOrder;

@TestMethodOrder(OrderAnnotation.class) // Enable method ordering based on
@Order
public class OrderedTests {
```

```
@Test  
@Order(3)  
void testA() {  
    System.out.println("Running testA");  
}  
  
@Test  
@Order(1)  
void testB() {  
    System.out.println("Running testB");  
}  
  
@Test  
@Order(2)  
void testC() {  
    System.out.println("Running testC");  
}  
}
```

The TestNG code will be:

```
import org.testng.annotations.Test;  
  
public class PrioritizedTests {  
  
    @Test(priority = 3)  
    public void testA() {  
        System.out.println("Running testA");  
    }  
  
    @Test(priority = 1)  
    public void testB() {  
        System.out.println("Running testB");  
    }  
  
    @Test(priority = 2)  
    public void testC() {  
        System.out.println("Running testC");  
    }  
}
```

... more

```
import org.testng.Assert;  
import org.testng.annotations.DataProvider;  
import org.testng.annotations.Test;
```

```
public class FactorialTest {

    @DataProvider(name = "factorialData")
    public Object[][] createFactorialTestData() {
        return new Object[][] {
            {0, 1L}, // factorial(0) should be 1
            {1, 1L}, // factorial(1) should be 1
            {2, 2L}, // factorial(2) should be 2
            {3, 6L}, // factorial(3) should be 6
            {4, 24L}, // factorial(4) should be 24
            {5, 120L}, // factorial(5) should be 120
            {6, 720L} // factorial(6) should be 720
        };
    }

    @Test(dataProvider = "factorialData")
    public void testFactorial(int input, long expected) {
        long actual = MathUtils.factorial(input);
        Assert.assertEquals(actual, expected, "Factorial of " + input + " should be " + expected);
    }
}
```

```
import org.junit.jupiter.api.Test;
import org.junit.jupiter.api.Assertions;
import java.time.Duration;

public class TimeoutExampleJUnit {

    @Test
    public void testMethodWithTimeout() {
        Assertions.assertTimeout(Duration.ofSeconds(2), () -> {
            // Code block that must complete within the specified time
            try {
                Thread.sleep(3000); // This will cause the test to fail
            } catch (InterruptedException e) {
                Thread.currentThread().interrupt();
                System.out.println("Thread was interrupted, Failed to complete operation");
            }
        });
    }
}
```

```
import org.testng.annotations.Test;

public class TimeoutExampleTestNG {
```

```
@Test(timeout = 2000) // timeout in milliseconds
public void testMethodWithTimeout() {
    try {
        // Simulating a long running process
        Thread.sleep(3000);
    } catch (InterruptedException e) {
        Thread.currentThread().interrupt();
        System.out.println("Thread was interrupted, Failed to complete
operation");
    }
}
```

Usage of Selenium Select Class for Handling Dropdown Elements on a Web and other Webdrive elements

```
<!DOCTYPE html>
<html>
    <head>
        <title>Web Elements Testing</title>
    </head>
    <body>
        <!-- Navigation Links -->
        <nav id="mainNav">
            <ul>
                <li><a href="https://www.bing.com">Bing</a></li>
            </ul>
        </nav>

        <!-- Dropdowns for Testing -->
        <select id="colorSelector">
            <option value="red">Red</option>
            <option value="blue">Blue</option>
            <option value="green">Green</option>
        </select>

        <select id="fruitSelector">
            <option value="apple">Apple</option>
            <option value="orange">Orange</option>
            <option value="banana">Banana</option>
        </select>

        <!-- Input Field -->
        <input type="text" id="nameInput" placeholder="Enter your name"/>

        <!-- Radio Buttons for Gender Selection -->
        <fieldset>
            <legend>Gender:</legend>
            <label><input type="radio" name="gender" value="male">
```

```
Male</label>
    <label><input type="radio" name="gender" value="female">
Female</label>
    </fieldset>

    <!-- Checkboxes for Selection of Hobbies -->
    <fieldset>
        <legend>Hobbies:</legend>
        <label><input type="checkbox" name="hobby" value="sports">
Sports</label>
        <label><input type="checkbox" name="hobby" value="reading">
Reading</label>
    </fieldset>

    <!-- Simple Dropdown Menu for Country Selection -->
    <label for="countrySelect">Choose a country:</label>
    <select id="countrySelect">
        <option value="india">China</option>
        <option value="india">Ethiopia</option>
        <option value="usa">United States</option>
        <option value="uk">United Kingdom</option>
    </select>

    <br><br>
    <!-- Button -->
    <button id="submitBtn">Submit</button>
</body>
</html>
```

```
public class HandlingWebElementsTest {

    private static WebDriver driver;

    @BeforeAll
    static void setUp() {
        EdgeOptions options = new EdgeOptions();
        options.addArguments("--remote-allow-origins=*");
        System.setProperty("webdriver.edge.driver",
        System.getProperty("user.dir") + "/src/main/resources/msedgedriver.exe");
        driver = new EdgeDriver(options);

        if (driver == null) {
            throw new IllegalStateException("Driver did not initialize.
Please check your WebDriver executable path and configurations.");
        }

        String appUrl =
"http://127.0.0.1:3000/Lab/codes/frontend/web_elements.html";
        driver.get(appUrl);

        // maximize the window
```

```
        driver.manage().window().maximize();
    }

    @Test
    public void testDropDowns() throws InterruptedException{

        // Go to Bing, find by link
        driver.findElement(By.linkText("Bing")).click();
        Thread.sleep(2000);
        // navigate back to previous page
        driver.navigate().back();
        Thread.sleep(2000);

        // Select by visible text
        Select colorDropdown = new
Select(driver.findElement(By.id("colorSelector")));
        colorDropdown.selectByVisibleText("Green");
        Thread.sleep(1000);

        // Select by value
        Select fruitDropDown = new
Select(driver.findElement(By.id("fruitSelector")));
        fruitDropDown.selectByValue("banana");
        Thread.sleep(1000);

        // Fill then name Field
        WebElement nameInput = driver.findElement(By.id("nameInput"));
        nameInput.sendKeys("Neusoft Institute Guangdong");

        // Handling radio buttons
        WebElement maleRadio =
driver.findElement(By.xpath("//input[@name='gender'] [@value='male']"));
        maleRadio.click();
        Thread.sleep(1000);

        // Handling checkboxes
        WebElement sportsCheckbox =
driver.findElement(By.xpath("//input[@name='hobby'] [@value='sports']"));
        if (!sportsCheckbox.isSelected()) {
            sportsCheckbox.click();
        }
        Thread.sleep(1000);

        // select by index
        Select countryDropdown = new
Select(driver.findElement(By.id("countrySelect")));
        countryDropdown.selectByIndex(1);
        Thread.sleep(1000);

        // Submitting the form
        driver.findElement(By.id("submitBtn")).click();
        Thread.sleep(1000);
```

```
}

@AfterAll
static void tearDown(){
    if (driver != null) {
        driver.quit();
    }
}

}
```

Class Activity

Lab/code/frontend/index.tst.html

```
<!DOCTYPE html>
<html>
    <head>
        <title>Testing Select Class</title>
    </head>

    <body>
        <div id="header">
            <ul id="linkTabs">
                <li>
                    <a href="https://www.bing.com">Bing</a>
                </li>
            </ul>
        </div>

        <div class="header_spacer"></div>

        <div id="container">
            <div id="content" style="padding-left: 185px;">
                <table id="selectTable">
                    <tbody>
                        <tr>
                            <td>
                                <div>
                                    <select id="SelectId_One">
                                        <option
value="redValue">Red</option>
                                        <option
value="greenValue">Green</option>
                                        <option
value="yellowValue">Yellow</option>
                                        <option
value="greyValue">Grey</option>
                                    </select>
                                </div>
                            </td>
                        </tr>
                    </tbody>
                </table>
            </div>
        </div>
    </body>
</html>
```

```

        <td>
            <div>
                <select id="SelectID_Two">
                    <option
value="applevalue">Apple</option>
                    <option
value="orangevalue">Orange</option>
                    <option
value="mangovalue">Mango</option>
                    <option
value="limevalue">Lime</option>
                </select>
            </div>
        </td>

        <td>
            <div>
                <select id="SelectID_Three">
                    <option
value="selectvalue">Select</option>
                    <option
value="elephantvalue">Elephant</option>
                    <option
value="mousevalue">Mouse</option>
                    <option
value="dogvalue">Dog</option>
                </select>
            </div>
        </td>
    </tr>
</tbody>
</table>
</div>
</div>
</body>
</html>

```

Write the WebDriver Code using Selenium Select Class

Step 1: Create a new java class named as "HandlingDropDown" under the "Learning_Selenium" project.

Step 2: Copy and paste the below code in the "HandlingDropDown.java" class.

```

package org.example;

import org.junit.jupiter.api.AfterAll;
import org.junit.jupiter.api.BeforeAll;
import org.junit.jupiter.api.Test;
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.edge.EdgeDriver;

```

```
import org.openqa.selenium.support.ui.Select;

public class HandlingDropDown {
    static WebDriver driver;
    @BeforeAll
    static void setUp() {
        driver = new EdgeDriver(); // Ensure EdgeDriver is imported

        driver.get("http://127.0.0.1:3000/Lab/codes/frontend/index_test.html");

        // maximize the window
        driver.manage().window().maximize();
    }

    @Test
    void testComboBox() throws InterruptedException {
        // Go to Bing
        driver.findElement(By.linkText("Bing")).click();

        // navigate back to previous page
        driver.navigate().back();
        Thread.sleep(3000);

        // Select the first operator using "select by value"
        Select selectByValue = new
Select(driver.findElement(By.id("SelectId_One")));
        selectByValue.selectByValue("greenValue");
        Thread.sleep(3000);

        // Select the second operator using "select by visible text"
        Select visibleText = new
Select(driver.findElement(By.id("SelectID_Two")));
        visibleText.selectByVisibleText("Lime");
        Thread.sleep(3000);

        // Select third dropDown using "select by index"
        Select selectedIndex = new
Select(driver.findElement(By.id("SelectID_Three")));
        selectedIndex.selectByIndex(2);
        Thread.sleep(3000);
    }

    @AfterAll
    static void tearDown() {
        driver.quit();
    }
}
```

Example HTML Code for a Table

Handling HTML tables with Selenium WebDriver is crucial for testing applications that display data in tabular formats. Tables are commonly used to represent information succinctly / summary, and interacting with them can be necessary to verify content, perform **CRUD** operations, or just read data from the table.

Here's a simple HTML setup for a table which we will use to demonstrate how to interact with it using Selenium:

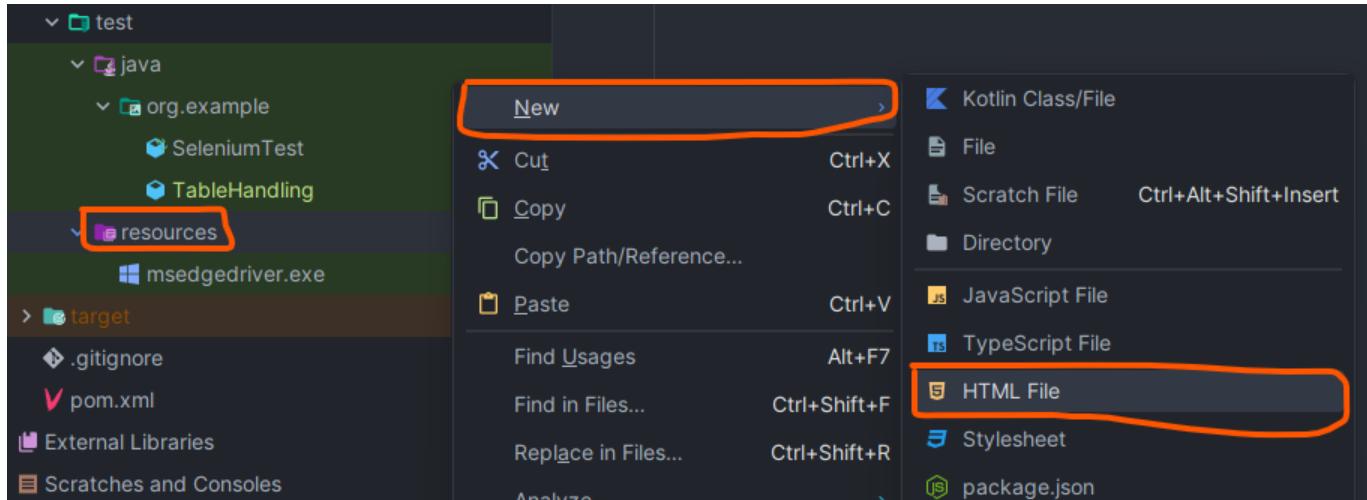


Figure: Creating an `html` file inside the `resources` test folder.

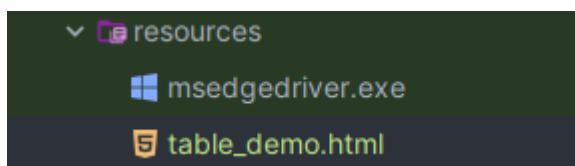


Figure: Created `table_demo.html` file

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8">
    <title>Table Interaction Testing</title>
  </head>
  <body>
    <table id="data-table" border="1px solid black">
      <thead>
        <tr>
          <th>Name</th>
          <th>Age</th>
          <th>City</th>
        </tr>
      </thead>
      <tbody>
        <tr>
          <td>Carlos</td>
          <td>20</td>
          <td>Guangzhou</td>
        </tr>
        <tr>
          <td>Jane Smith</td>
          <td>25</td>
```

```
        <td>Xian</td>
    </tr>
    <tr>
        <td>Lee</td>
        <td>35</td>
        <td>Foshan</td>
    </tr>
</tbody>
</table>
</body>
</html>
```

Selenium WebDriver Code (Java using TestNG) Java class to handle table elements:

```
package org.example;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.edge.EdgeDriver;
import org.testng.annotations.AfterClass;
import org.testng.annotations.BeforeClass;
import org.testng.annotations.Test;

import java.util.List;

public class TableHandling {

    private WebDriver driver;

    @BeforeClass
    public void setUp() {
        // System.setProperty("webdriver.edge.driver",
        "path_to_edgedriver");
        driver = new EdgeDriver();

        driver.get("http://localhost:63342/selenium_test/Lab/codes/selenium_test/s
rc/test/resources/table_demo.html?
_lijt=acb4345dflv9fivlmand66qimj&_ij_reload=RELOAD_ON_SAVE");
        driver.manage().window().maximize();
    }

    @Test
    public void testReadTTable() {
        // Locate the table
        WebElement table = driver.findElement(By.id("data-table"));

        // Fetch all row of the elements
        List<WebElement> rows = table.findElements(By.tagName("tr"));

        // print data from eaach row
    }
}
```

```

        for (WebElement row: rows) {
            List<WebElement> cols = row.findElements(By.tagName("td"));

            for (WebElement col: cols) {
                System.out.print(col.getText() + "\t\t");
            }
            System.out.println();
        }
    }

//    @AfterClass
//    public void tearDown() {
//        driver.quit();
//    }
}

```

Output

```

Default Suite          3 sec 117 ms
  selenium_test       3 sec 117 ms
    TableHandling      3 sec 117 ms
      testReadTTable   112 ms
        Tests passed: 1 of 1 test – 3 sec 117 ms
        C:\Users\SFY\.jdks\openjdk-21.0.1\bin\java.exe ...
        SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
        SLF4J: Defaulting to no-operation (NOP) logger implementation
        SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
        Apr 30, 2024 2:13:48 PM org.openqa.selenium.devtools.CdpVersionFinder findNearestMatch
        WARNING: Unable to find an exact match for CDP version 124, returning the closest version

        Carlos      20      Guangzhou
        Jane Smith  25      Xian
        Lee         35      Foshan

        =====
        Default Suite
        Total tests run: 1, Passes: 1, Failures: 0, Skips: 0
        =====

```

Selenium WebDriver Code (Python using unittest) Python class to handle table elements:

```

import unittest
from selenium import webdriver

class TableHandlingTest(unittest.TestCase):
    @classmethod
    def setUpClass(cls):
        cls.driver = webdriver.Edge('path_to_edgedriver')
        #file:///E:/Source_code/NodeJs/Software-Testing-batch-2022-
        23/Lab/codes/#selenium_test/src/test/resources/table_demo.html
        cls.driver.get('file:///path_to_your_html_file.html')
        cls.driver.maximize_window()

    def test_read_table(self):
        driver = self.driver

```

```
# Locate the table
table = driver.find_element_by_id('data-table')

# Fetch all rows of the table
rows = table.find_elements_by_tag_name('tr')

# Print data from each row
for row in rows:
    cols = row.find_elements_by_tag_name('td') # Get columns for
each row
    for col in cols:
        print(col.text, end='\t')
    print() # for new line after each row

@classmethod
def tearDownClass(cls):
    cls.driver.quit()

if __name__ == "__main__":
    unittest.main()
```

For Test Automation <https://ultimateqa.com/dummy-automation-websites/>

Selenium Wait Commands

In Selenium WebDriver, managing **synchronization** is crucial to ensure that web elements are fully loaded before operations are performed on them. This process is typically managed using different types of wait commands. The provided Java example demonstrates two common wait mechanisms: ***Implicit Wait*** and ***Thread.sleep()***.

1. Thread.sleep()

- What it does:** Pauses the entire test execution for a specified duration (in milliseconds).
- Usage:** `Thread.sleep(5000); // Halts for 5 seconds.`
- Consideration:** It waits for the full duration, regardless of whether the element is ready earlier, which may slow down test execution unnecessarily or may cause exceptions if the element is not available within the time.

Example Usage:

```
Thread.sleep(5000); // Pauses the execution for 5000 milliseconds or 5
seconds.
```

2. Implicit Wait

- **What it does:** Configures the WebDriver to wait up to a specified maximum duration for an element to appear before throwing an error, but will proceed as soon as the element is found.
- **Usage:** `driver.manage().timeouts().implicitlyWait(5, TimeUnit.SECONDS);`
- **Benefit:** More efficient than `Thread.sleep()`, as it waits only as needed up to the maximum time set.

Example Usage:

```
driver.manage().timeouts().implicitlyWait(5, TimeUnit.SECONDS);
```

This line of code configures the WebDriver to wait up to 5 seconds before throwing a `NoSuchElementException` if it does not find the element to interact with immediately.

Difference from `Thread.sleep()`:

- `Thread.sleep()` stops the **thread's** execution for the specified time irrespective of any condition. After the time is up, the script executes the next line of code.
- Implicit wait tells the **WebDriver to poll the DOM** for a certain amount of time when trying to find any element not immediately available. This wait is not bound/restricted to any condition apart from the time.

Practical Example: **WaitsDemo.java** Here, Selenium waits up to 5 seconds when trying to find any element. This is helpful in cases where elements may take some time to appear due to page load times.

```
WebDriver driver = new EdgeDriver();
// Sets an implicit wait of 5 seconds
driver.manage().timeouts().implicitlyWait(5, TimeUnit.SECONDS);
driver.get("https://www.saucedemo.com/");
// Use of implicit wait
driver.findElement(By.name("user-name")).sendKeys("mercury");
```

Conclusion: Effective use of wait commands in Selenium helps in creating reliable, robust tests by reducing the chances of encountering `exceptions` due to **missing elements**.

`Implicit waits` offer a better approach in most cases compared to `Thread.sleep()`, as they make the tests less brittle and faster, by waiting only as long as necessary.

Explicit Wait - Condition Based

Explicit wait in Selenium WebDriver is a targeted `synchronization` approach that waits for a specific condition to occur before proceeding. Unlike implicit waits, explicit waits are applied for particular **instances** and can handle various conditions. Here's how explicit waits are used:

Key Points of Explicit Wait:

- **Condition-Based:** Waits for a specific condition to be met before proceeding.

- **Customizable:** Each wait can have different conditions and time settings.
- **Efficient:** Reduces unnecessary wait times by proceeding as soon as conditions are met.

Usage: To use explicit waits, you instantiate `WebDriverWait` with a timeout value, then specify the condition you want to wait for using `ExpectedConditions`.

Example Code:

```
WebDriverWait myWait = new WebDriverWait(driver, 10); // Wait up to 10
seconds.
WebElement username =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.name("username")));
username.sendKeys("mercury");
```

Practical Example: `ExplicitwaitDemo.java` In the provided Java example, the WebDriver waits up to 10 seconds for specific elements to be visible before interacting with them:

```
public class ExplicitwaitDemo {

    public static void main(String[] args) {
        System.setProperty("webdriver.chrome.driver",
"C:/Drivers/chromedriver_win32/chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        WebDriverWait mywait=new WebDriverWait(driver,10); // Setup with a
10-second timeout.

        driver.get("https://www.saucedemo.com/");

        // Wait until the username field is visible on the page before
        sending keys.
        WebElement username =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.name("username")));
        username.sendKeys("standard_user");

        // Wait until the password field is visible on the page before
        sending keys.
        WebElement password =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.name("password")));
        password.sendKeys("secret_sauce");
    }
}
```

Explicit waits are powerful tools in Selenium for handling elements that might have unpredictable timing and conditions for availability, providing a more reliable and precise way to manage dynamic content in web

automation tasks.

Find out total links present in a web page:

<https://parabank.parasoft.com/parabank/index.htm>

```
List <WebElement> links = driver.findElements(By.tagName("a"));
System.out.println(links.size());

// Reading all the Link from the Web page and Display their names
for (WebElements e: links) {
    System.out.println(e.getText());
}
```

More Practice

```
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.edge.EdgeDriver;
import org.openqa.selenium.support.ui.ExpectedConditions;
import org.openqa.selenium.support.ui.WebDriverWait;
import org.testng.annotations.BeforeClass;
import org.testng.annotations.Test;

import java.time.Duration;

public class SauceDemoTest {

    private WebDriver driver;
    private WebDriverWait myWait;
    @BeforeClass
    void setUp() {
        driver = new EdgeDriver();
        myWait = new WebDriverWait(driver, Duration.ofSeconds(10));
        driver.get("https://www.saucedemo.com/");
    }

    @Test
    void testSwagLabs() {
        WebElement userName =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.name("username")));
        userName.sendKeys("standard_user");
        WebElement password =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.name("password")));
        password.sendKeys("secret_sauce");
        WebElement btnLogin =

```

```
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.id("login-button")));
    btnLogin.click();
}
}
```

Add assertion to make sure the login is successful.

```
@Test
void testSwagLabs() {
    // ...
    btnLogin.click();

    // Verify that after login, the URL changes to the inventory page
    Assert.assertTrue(driver.getCurrentUrl().contains("inventory"));
}
```

Class Activity

Use the **TDD** approach and test for the remain test cases.

```
public class SauceDemoTest {

    private WebDriver driver;
    private WebDriverWait myWait;
    @BeforeClass
    void setUp() {
        driver = new EdgeDriver();
        myWait = new WebDriverWait(driver, Duration.ofSeconds(10));
        driver.get("https://www.saucedemo.com/");
    }

    @Test
    void testSwagLabs() {
        WebElement userName =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.name("username")));
        userName.sendKeys("standard_user");
        WebElement password =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.name("password")));
        password.sendKeys("secret_sauce");
        WebElement btnLogin =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.id("login-button")));
        btnLogin.click();
    }
}
```

```
// Verify that after login, the URL changes to the inventory page
Assert.assertTrue(driver.getCurrentUrl().contains("inventory"));
}

@DataProvider(name="userCredentials")
public static Object[][] getUserCredentials() throws IOException,
CsvException {
    CSVReader reader = new CSVReader(new
FileReader("/Users/nashu/Desktop/Source_code/software_testing/DB-
practices/Code/jdbc_demo/Selenium_Test/src/test/resources/user_name_password.csv"));
    List<String[]> allRows = reader.readAll();
    // Remove the header, skip the first Line
    allRows.remove(0);
    // return the Array format new Object [# rows][]
    return allRows.toArray(new Object[allRows.size()][]);
}

// @DataProvider(name="userCredentials")
@ParameterizedTest
@CsvFileSource(resources = "/user_name_password.csv", numLinesToSkip =
1)
void testUserCredentials() {
    //
}

@Test(dataProvider = "userCredentials")
public void testLogin(String username, String password) {
    WebElement usernameField =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.id("user-
name")));
    usernameField.sendKeys(username);

    WebElement passwordField =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.name("passwo-
rd")));
    passwordField.sendKeys(password);

    WebElement loginBtn =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.id("login-
button")));
    loginBtn.click();

    if ("locked_out_user".equals(username)) {
        WebElement errorMessage =
myWait.until(ExpectedConditions.visibilityOfElementLocated(By.cssSelector(
".error-message-container.error")));
        Assert.assertTrue(errorMessage.getText().contains("Sorry, this
user has been locked out"),
                    "Expect error message for locked out user is not
displayed");
    } else if () {
        // ...
    }
}
```

```
    }
    else {
        // ...
    }
}
```

```
import io.github.bonigarcia.wdm.WebDriverManager;
import org.junit.jupiter.api.AfterEach;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.params.ParameterizedTest;
import org.junit.jupiter.params.provider.CsvSource;
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;
import org.openqa.selenium.support.ui.ExpectedConditions;
import org.openqa.selenium.support.ui.WebDriverWait;

class BmiCalculatorTest {

    private WebDriver driver;
    private WebDriverWait wait;

    @BeforeEach
    void setUp() {
        WebDriverManager.chromedriver().setup();
        driver = new ChromeDriver();
        driver.get("https://www.texasheart.org/heart-health/heart-
information-center/topics/body-mass-index-bmi-calculator/");
        wait = new WebDriverWait(driver, 10);
    }

    @AfterEach
    void tearDown() {
        if (driver != null) {
            driver.quit();
        }
    }

    @ParameterizedTest
    @CsvSource({
        "180, 70, 21.6",
        "160, 80, 31.2",
        "170, 65, 22.5"
    })
    void testBmiCalculator(int height, int weight, double expectedBmi) {
        WebElement heightInput =
wait.until(ExpectedConditions.visibilityOfElementLocated(By.id("heightInpu
t")));
    }
}
```

```
WebElement weightInput = driver.findElement(By.id("weightInput"));
WebElement calculateButton =
driver.findElement(By.xpath("//input[@value='Calculate']"));

heightInput.clear();
weightInput.clear();

heightInput.sendKeys(String.valueOf(height));
weightInput.sendKeys(String.valueOf(weight));
calculateButton.click();

WebElement bmiResult =
wait.until(ExpectedConditions.visibilityOfElementLocated(By.id("bmiSpan")));
double result = Double.parseDouble(bmiResult.getText());
assert Math.abs(result - expectedBmi) < 0.1 : "Expected BMI close
to " + expectedBmi + ", but got " + result;
}
```

Class Activity: More practice

<https://practicetestautomation.com/practice-test-login/>

case1: locator matches multiple elements, findElement() ----> this can be located single element
case2: locator matches multiple elements, findElements() --> this can be located multiple elements
case3: locator matches single element, findElements() ---> this can be located single element

Class Activity

Discuss the Difference between **findElement()** & **findElements()** and show case with the implementation

Alerts/popups (switch between alerts)

<https://testautomationpractice.blogspot.com/> <https://mail.rediff.com/cgi-bin/login.cgi>

driver.switchTo().alert().accept(); //closes popup by using OK button
driver.switchTo().alert().dismiss(); //closes popup by using Cancel button

```
public class AlertsDemo {
    public static void main(String[] args) throws InterruptedException {
```

```
System.setProperty("webdriver.chrome.driver","C://Drivers/chromedriver_win32/chromedriver.exe");
    WebDriver driver=new ChromeDriver();

    driver.get("https://testautomationpractice.blogspot.com/");

    driver.manage().window().maximize();// maximize the page

    driver.findElement(By.xpath("//*[@id=\"HTML9\"]/div[1]/button")).click(); //ClickMe button

    Thread.sleep(5000);

    //driver.switchTo().alert().accept(); //closes popup by using OK button
    driver.switchTo().alert().dismiss(); //closes popup by using Cancel button

}

}
```

Frames/iFrames(switch between frames)

<https://seleniumhq.github.io/selenium/docs/api/java/index.html>

```
driver.switchTo().frame(name) driver.switchTo().frame(index) driver.switchTo().frame(WebElement)

driver.switchTo().defaultContent();

packageListFrame packageFrame classFrame

driver.switchTo().frame(0);
```

```
public class FramesDemo {

    public static void main(String[] args) {

        System.setProperty("webdriver.chrome.driver","C://Drivers/chromedriver_win32/chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        driver.get("https://seleniumhq.github.io/selenium/docs/api/java/index.html");
        driver.manage().window().maximize();
```

```
        driver.switchTo().frame("packageListFrame");
        driver.findElement(By.linkText("org.openqa.selenium")).click();
//1 frame

        driver.switchTo().defaultContent(); // go back to page/focus on
the page

        driver.switchTo().frame("packageFrame");
        driver.findElement(By.linkText("WebDriver")).click(); //2 frame

        driver.switchTo().defaultContent(); // go back to page/focus on
the page

        driver.switchTo().frame("classFrame");

driver.findElement(By.xpath("/html/body/div[1]/ul/li[5]")).click(); // 3rd
frame
}

}
```

NestedIframe

```
public class NestedIframe {

    public static void main(String[] args) {

System.setProperty("webdriver.chrome.driver","C://Drivers/chromedriver_win
32/chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        driver.get("http://demo.automationtesting.in/Frames.html");

driver.findElement(By.xpath("/html/body/section/div[1]/div/div/div/div[1]/
div/ul/li[2]/a")).click();//button

        WebElement outerframe=driver.findElement(By.xpath("//*
[@id=\"Multiple\"]/iframe"));
        driver.switchTo().frame(outerframe);//switch to outer frame

        WebElement
innerframe=driver.findElement(By.xpath("/html/body/section/div/div/iframe"));
        driver.switchTo().frame(innerframe);

    }
}
```

```
    driver.findElement(By.xpath("//html/body/section/div/div/div/input")).sendKeys("Testing");

}

}
```

```
public class NestedIframe {

    public static void main(String[] args) {

        System.setProperty("webdriver.chrome.driver","C://Drivers/chromedriver_win32/chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        driver.get("http://demo.automationtesting.in/Frames.html");

        driver.findElement(By.xpath("//html/body/section/div[1]/div/div/div/div[1]/div/ul/li[2]/a")).click(); //button

        WebElement outerframe=driver.findElement(By.xpath("//*[@@id='Multiple']/iframe"));
        driver.switchTo().frame(outerframe); //switch to outer frame

        WebElement
        innerframe=driver.findElement(By.xpath("//html/body/section/div/div/iframe"));
        driver.switchTo().frame(innerframe);

        driver.findElement(By.xpath("//html/body/section/div/div/div/input")).sendKeys("Testing");

    }
}
```

Class Activity

--answer--

```
public class Wikipedia {
```

```
public static void main(String[] args) throws InterruptedException {
    System.setProperty("webdriver.chrome.driver",
"C://Drivers/chromedriver_win32/chromedriver.exe");
    WebDriver driver=new ChromeDriver();

    driver.get("https://testautomationpractice.blogspot.com/");

    driver.findElement(By.id("Wikipedia1_wikipedia-search-
input")).sendKeys("Selenium");

    driver.findElement(By.className("wikipedia-search-
button")).click();

    Thread.sleep(3000);

    List <WebElement>search_results=driver.findElements(By.xpath("//*
[@id='wikipedia-search-result-link']/a"));

    System.out.println(search_results.size());

    for(WebElement e:search_results)
    {
        String link=e.getText();
        driver.findElement(By.linkText(link)).click();
    }

    driver.quit();

}
```

Handle Windows

```
import java.util.Set;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;

public class HandleWindows {

    public static void main(String[] args) {

System.setProperty("webdriver.chrome.driver","C://Drivers/chromedriver_win
32/chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        driver.get("http://demo.automationtesting.in/Windows.html");
```

```
//String handleValue=driver.getWindowHandle();
//System.out.println(handleValue); //CDwindow-
45FEE686DED3D844347AB3AC2E7F5E41

        driver.findElement(By.xpath("//*
[@id=\"Tabbed\"]/a/button")).click();

Set <String> handlevalues=driver.getWindowHandles();

for(String h:handlevalues)
{
    //System.out.println(h);
    String title=driver.switchTo().window(h).getTitle();
    //System.out.println(title);

    if(title.equals("Sakinalium | Home"))
    {
        driver.findElement(By.xpath("//*
[@id=\"container\"]/header/div/div/div[2]/ul/li[4]/a")).click(); //contact
menu
    }
}

}
```

Date Picker

```
import java.util.Calendar;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;

public class DatePicker {

    public static WebDriver driver;

    public static void main(String[] args) {

System.setProperty("webdriver.chrome.driver","C://Drivers/chromedriver_win
32/chromedriver.exe");
        driver=new ChromeDriver();

        driver.get("https://goo.gl/RVdKM9");

        driver.manage().window().maximize();
```

```
//String year="2018";
String month="June";
String date="25";

        driver.findElement(By.xpath("//*
[@id=\"q20\"]/img")).click(); //Click on date picker element

        //selectCurrentDate();
//selectFutureDate(date,month);
selectPastDate(date,month);
}

static void selectCurrentDate()
{
    Calendar cal=Calendar.getInstance();

    int d=cal.get(Calendar.DATE); // return the current date in int
format
    String date=String.valueOf(d); //convert int to string

    driver.findElement(By.linkText(date)).click();
}

static void selectFutureDate(String d,String m)
{
    Calendar cal=Calendar.getInstance();

    int currentmonth=cal.get(Calendar.MONTH)+1; // return the current
date in int format

    for(int i=currentmonth;i>=1;i++)
    {

        driver.findElement(By.xpath("//*[@id=\"ui-datepicker-
div\"]/div/a[2]/span")).click(); //Next arrow

        String mon=driver.findElement(By.xpath("//*[@id=\"ui-
datepicker-div\"]/div/div/span")).getText();

        if(mon.equals(m))
        {
            driver.findElement(By.linkText(d)).click();
            break;
        }
    }
}

static void selectPastDate(String d,String m)
{
```

```
        Calendar cal=Calendar.getInstance();

        int currentmonth=cal.get(Calendar.MONTH)+1; // return the current
date in int format

        for(int i=currentmonth;i>=1;i--)
        {

            driver.findElement(By.xpath("//*[@id=\"ui-datepicker-
div\"]/div/a[1]/span")).click(); //Prev arrow

            String mon=driver.findElement(By.xpath("//*[@id=\"ui-
datepicker-div\"]/div/div/span")).getText();

            if(mon.equals(m))
            {
                driver.findElement(By.linkText(d)).click();
                break;
            }
        }

    }

}
```

WebTable

```
public class Webtable1 {

    public static void main(String[] args) {

        System.setProperty("webdriver.chrome.driver","C://Drivers/chromedriver_win
32/chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        driver.get("file:///C:/SeleniumPractice/sample.html");

        //int rows=driver.findElements(By.tagName("tr")).size();

        int
rows=driver.findElements(By.xpath("/html/body/table/tbody/tr")).size();
        System.out.println(rows);

        int
columns=driver.findElements(By.xpath("/html/body/table/tbody/tr[1]/th")).s
ize();
        System.out.println(columns);

        System.out.println("Product"+      +"Article"+      +"Price");
    }
}
```

```
        for(int r=2;r<=rows;r++)
        {
            for(int c=1;c<=columns;c++)
            {

                String
value=driver.findElement(By.xpath("//html/body/table/tbody/tr["+r+"]/td["+c+
+"]")).getText();
                System.out.print(value+"    ");

            }
            System.out.println();
        }

    }
}
```

```
public class WebTable2 {

    public static void main(String[] args) throws InterruptedException {

        System.setProperty("webdriver.chrome.driver",
"C://Drivers/chromedriver_win32/chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        driver.get("https://opensource-demo.orangehrmlive.com/");
        driver.manage().window().maximize();

        //login

        driver.findElement(By.id("txtUsername")).sendKeys("Admin");
        driver.findElement(By.id("txtPassword")).sendKeys("admin123");
        driver.findElement(By.id("btnLogin")).click();

        Thread.sleep(3000);

        //Admin-->Usermanagement-->Users

        driver.findElement(By.xpath("//*
[@id=\"menu_admin_viewAdminModule\"]")).click();
        driver.findElement(By.xpath("//*
[@id=\"menu_admin_UserManagement\"]")).click();
        driver.findElement(By.xpath("//*
[@id=\"menu_admin_viewSystemUsers\"]")).click();

        //Table

        int rows=driver.findElements(By.xpath("//*
```

```
[@id='resultTable']/tbody/tr").size();
    System.out.println(rows);

    int count=0;

    for(int r=1;r<=rows;r++)
    {
        String status=driver.findElement(By.xpath("//*
[@id=\"resultTable\"]/tbody/tr["+r+"]/td[5]")).getText();

        if(status.equals("Enabled"))
        {
            count++; //1 2 3.....
        }
    }

    System.out.println("Number of enabled employees:"+ count);
    System.out.println("Number of disabled employees:"+ (rows-count));

    driver.quit();
}
}
```

webpagination

```
public class WebTable3_Pagination {

    public static void main(String[] args) throws InterruptedException {

        System.setProperty("webdriver.chrome.driver",
"C://Drivers/chromedriver_win32/chromedriver.exe");
        WebDriver driver = new ChromeDriver();

        driver.get("http://www.seleniumeasy.com/test/table-pagination-
demo.html");

        driver.manage().window().maximize();

        Thread.sleep(3000);

        WebElement Paging_Element=driver.findElement(By.xpath("//*
[@id=\"myPager\"]"));

        List <WebElement>
sub_links=Paging_Element.findElements(By.tagName("a"));

        System.out.println("Total number of paging links:"+
sub_links.size());

        if(sub_links.size()>0)
```

```
{  
    System.out.println("Links are present");  
  
    for(int i=1;i<sub_links.size()-1;i++)  
    {  
        WebElement  
link=driver.findElement(By.xpath("//a[contains(text(),'"+i+"')]"));  
  
        link.click();  
  
        Thread.sleep(3000);  
  
        int rows=driver.findElements(By.xpath("//*  
[@id=\"myTable\"]/tr")).size();  
  
        for(int r=1;r<=rows;r++)  
        {  
  
            String col1=driver.findElement(By.xpath("//*  
[@id=\"myTable\"]/tr["+r+"]/td[1]")).getText();  
            String col2=driver.findElement(By.xpath("//*  
[@id=\"myTable\"]/tr["+r+"]/td[2]")).getText();  
            String col3=driver.findElement(By.xpath("//*  
[@id=\"myTable\"]/tr["+r+"]/td[3]")).getText();  
            String col4=driver.findElement(By.xpath("//*  
[@id=\"myTable\"]/tr["+r+"]/td[4]")).getText();  
            String col5=driver.findElement(By.xpath("//*  
[@id=\"myTable\"]/tr["+r+"]/td[5]")).getText();  
            String col6=driver.findElement(By.xpath("//*  
[@id=\"myTable\"]/tr["+r+"]/td[6]")).getText();  
            String col7=driver.findElement(By.xpath("//*  
[@id=\"myTable\"]/tr["+r+"]/td[7]")).getText();  
  
            System.out.println(col1+" "+col2+" "+col3+"  
"+col4+" "+col5+" "+col6+" "+col7);  
        }  
    }  
  
    else  
    {  
        System.out.println("Links not Present");  
    }  
}
```

Check Day15 Files

```
public class DoubleClickDemo2 {
```

```
public static void main(String[] args) throws InterruptedException {  
  
    System.setProperty("webdriver.chrome.driver",  
"C://Drivers/chromedriver_win32/chromedriver.exe");  
    WebDriver driver=new ChromeDriver();  
  
    driver.get("http://api.jquery.com/dblclick/");  
  
    driver.manage().window().maximize();  
  
    driver.switchTo().frame(0); //switch to frame  
  
    WebElement ele=driver.findElement(By.xpath("//html/body/div"));  
  
    Thread.sleep(5000);  
  
    Actions act=new Actions(driver);  
  
    act.doubleClick(ele).build().perform(); // Double click on element  
  
    Thread.sleep(3000);  
  
    act.doubleClick(ele).build().perform(); // Double click on element  
  
    Thread.sleep(3000);  
  
    act.doubleClick(ele).build().perform(); // Double click on element  
}  
}
```

Drag and Drop

```
public class DragAndDrop {  
  
    public static void main(String[] args) throws InterruptedException {  
  
        System.setProperty("webdriver.chrome.driver",  
"C://Drivers/chromedriver_win32/chromedriver.exe");  
        WebDriver driver=new ChromeDriver();  
  
        driver.get("http://www.dhtmlgoodies.com/scripts/drag-drop-  
custom/demo-drag-drop-3.html");  
  
        driver.manage().window().maximize();  
  
        WebElement source_element=driver.findElement(By.id("box6"));  
        //Italy – source element  
  
        WebElement  
target_element=driver.findElement(By.id("box106")); //Rome – target element
```

```
        Actions act=new Actions(driver);

        Thread.sleep(5000);

        act.dragAndDrop(source_element, target_element).build().perform();
//Drag and drop

    }

}
```

KeyboardActions

```
public class KeyboardActions {

    public static void main(String[] args) throws InterruptedException {

        System.setProperty("webdriver.chrome.driver",
"C://Drivers/chromedriver_win32/chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        driver.get("http://the-internet.herokuapp.com/key_presses");

        driver.manage().window().maximize();

        Thread.sleep(5000);

        Actions act=new Actions(driver);

        act.sendKeys(Keys.ENTER).build().perform();

        Thread.sleep(3000);

        act.sendKeys(Keys.ESCAPE).build().perform();

        Thread.sleep(3000);

        act.sendKeys(Keys.SPACE).build().perform();

        Thread.sleep(3000);

        act.sendKeys(Keys.DELETE).build().perform();
    }

}
```

MouseHover

```
public class MouseHover {  
  
    public static void main(String[] args) throws InterruptedException {  
  
        System.setProperty("webdriver.chrome.driver",  
"C://Drivers/chromedriver_win32/chromedriver.exe");  
        WebDriver driver=new ChromeDriver();  
  
        driver.get("https://opensource-demo.orangehrmlive.com/");  
  
        driver.manage().window().maximize();  
  
        //login  
  
        driver.findElement(By.id("txtUsername")).sendKeys("Admin");  
        driver.findElement(By.id("txtPassword")).sendKeys("admin123");  
        driver.findElement(By.id("btnLogin")).click();  
  
        Thread.sleep(3000);  
  
        //Admin-->Usermanagement-->Users  
  
        WebElement admin=driver.findElement(By.xpath("//*[  
[@id=\"menu_admin_viewAdminModule\"]]"));  
        WebElement usermgnt=driver.findElement(By.xpath("//*[  
[@id=\"menu_admin_UserManagement\"]]"));  
        WebElement users=driver.findElement(By.xpath("//*[  
[@id=\"menu_admin_viewSystemUsers\"]]"));  
  
        Actions act=new Actions(driver);  
  
        act.moveToElement(admin).moveToElement(usermgnt).moveToElement(users).click().build().perform();  
  
    }  
}
```

MultipleKeyPressDemo

```
public class MultipleKeyPressDemo {
```

```
public static void main(String[] args) throws InterruptedException {
    System.setProperty("webdriver.chrome.driver",
"C:/Drivers/chromedriver_win32/chromedriver.exe");
    WebDriver driver=new ChromeDriver();

    driver.get("http://newtours.demoaut.com/");
    driver.manage().window().maximize();

    Thread.sleep(5000);

    Actions act=new Actions(driver);

    act.sendKeys(Keys.CONTROL+"a").build().perform();
}

}
```

ResizingDemo

```
public class ResizingDemo {

    public static void main(String[] args) throws InterruptedException {
        System.setProperty("webdriver.chrome.driver",
"C://Drivers/chromedriver_win32/chromedriver.exe");
        WebDriver driver = new ChromeDriver();

        driver.get("https://jqueryui.com/resizable/");
        driver.manage().window().maximize();

        driver.switchTo().frame(0); //switch to frame

        WebElement element=driver.findElement(By.xpath("//*
[@id=\"resizable\"]/div[3]"));

        Thread.sleep(3000);

        Actions act=new Actions(driver);

        act.moveToElement(element).dragAndDropBy(element,200,
150).build().perform(); //resizing

    }

}
```

RightClickDemo

```
public class RightClickDemo {  
  
    public static void main(String[] args) throws InterruptedException {  
  
        System.setProperty("webdriver.chrome.driver",  
"C://Drivers/chromedriver_win32/chromedriver.exe");  
        WebDriver driver=new ChromeDriver();  
  
        driver.get("http://swisnl.github.io/jQuery-  
contextMenu/demo.html");  
  
        driver.manage().window().maximize();  
  
        Actions act=new Actions(driver);  
  
        WebElement  
button=driver.findElement(By.xpath("//html/body/div/section/div/div/p/s  
pan"));  
  
        act.contextClick(button).build().perform(); //Right click on  
button  
  
        driver.findElement(By.xpath("/html/body/ul/li[3]/span")).click();  
  
        Thread.sleep(5000);  
  
        Alert alert=driver.switchTo().alert();  
  
        System.out.println("Text present on alert window is:"  
+alert.getText());  
        alert.accept(); // this closes alert window  
  
    }  
}
```

ScrollingDemo

```
public class ScrollingDemo {  
  
    public static void main(String[] args) throws InterruptedException {  
  
        System.setProperty("webdriver.chrome.driver",  
"C://Drivers/chromedriver_win32/chromedriver.exe");  
        WebDriver driver=new ChromeDriver();
```

```
driver.get("https://www.countries-ofthe-world.com/flags-of-the-world.html");

driver.manage().window().maximize();

Thread.sleep(5000);

//Create JavascriptExecutor variable
JavascriptExecutor js=(JavascriptExecutor)driver;

//Approach1 – number of pixels
// js.executeScript("window.scrollBy(0,2000)","");

//Approach2 – till we found certain element on the web page

//WebElement flag=driver.findElement(By.xpath("//*[@@id=\"content\"]/div[2]/div[2]/table[1]/tbody/tr[86]/td[1]/img"));
//js.executeScript("arguments[0].scrollIntoView()",flag);

//Appraoch3 – till end of the page

js.executeScript("window.scrollBy(0,document.body.scrollHeight)");

}

}
```

SliderDemo

```
public class SliderDemo {

    public static void main(String[] args) throws InterruptedException {
        System.setProperty("webdriver.chrome.driver",
"C://Drivers/chromedriver_win32/chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        driver.get("https://jqueryui.com/slider/");

        driver.manage().window().maximize();

        driver.switchTo().frame(0);

        WebElement slider=driver.findElement(By.xpath("//*[@id=\"slider\"]/span"));

        Thread.sleep(3000);
```

```
        Actions act=new Actions(driver);

        act.moveToElement(slider).dragAndDropBy(slider,400,
0).build().perform(); //moving the slider

    }

}
```

TooltipDemo

```
public class TooltipDemo {

    public static void main(String[] args) {

        System.setProperty("webdriver.chrome.driver",
"C://Drivers//chromedriver_win32//chromedriver.exe");
        WebDriver driver=new ChromeDriver();

        driver.get("https://jqueryui.com/tooltip/");
        driver.manage().window().maximize();

        driver.switchTo().frame(0);

        WebElement agebox=driver.findElement(By.id("age"));
        String tooltiptext=agebox.getAttribute("title");

        System.out.println(tooltiptext);

        if(tooltiptext.equals("We ask for your age only for statistical
purposes."))
        {
            System.out.println("Tooltip test passed");
        }
        else
        {
            System.out.println("Tooltip test failed");
        }

    }

}
```

Data Driver Testing (DDT) Using csv format (excel)

Agenda

- Read data from CSV
 - Write data into CSV
 - Data Driven Testing
-

Apache POI API

```
public class XLUtils {

    public static FileInputStream fi;
    public static FileOutputStream fo;
    public static XSSFWorbook wb;
    public static XSSFSheet ws;
    public static XSSFRow row;
    public static XSSFCell cell;

    public static void setExcelFile(String xlfile, String xlsheet) throws
Exception {

    try {

        FileInputStream ExcelFile = new FileInputStream(xlfile);
        wb = new XSSFWorbook(ExcelFile);
        ws = wb.getSheet(xlsheet);
    } catch (Exception e){
        throw (e);
    }
}

public static int getRowCount(String xlfile, String xlsheet) throws
IOException
{
    fi=new FileInputStream(xlfile);
    wb=new XSSFWorbook(fi);
    ws=wb.getSheet(xlsheet);
    int rowcount=ws.getLastRowNum();
    wb.close();
    fi.close();
    return rowcount;
}

public static int getCellCount(String xlfile, String xlsheet, int
rownum) throws IOException
{
    fi=new FileInputStream(xlfile);
    wb=new XSSFWorbook(fi);
    ws=wb.getSheet(xlsheet);
    row=ws.getRow(rownum);
```

```
        int cellcount=row.getLastCellNum();
        wb.close();
        fi.close();
        return cellcount;
    }

    public static String getCellData(String xlfile,String xlsheet,int rownum,int colnum) throws IOException
    {
        fi=new FileInputStream(xlfile);
        wb=new XSSFWorkbook(fi);
        ws=wb.getSheet(xlsheet);
        row=ws.getRow(rownum);
        cell=row.getCell(colnum);
        String data;
        try
        {
            DataFormatter formatter = new DataFormatter();
            String cellData = formatter.formatCellValue(cell);
            return cellData;
        }
        catch (Exception e)
        {
            data="";
        }
        wb.close();
        fi.close();
        return data;
    }

    public static void setCellData(String xlfile,String xlsheet,int rownum,int colnum,String data) throws IOException
    {
        fi=new FileInputStream(xlfile);
        wb=new XSSFWorkbook(fi);
        ws=wb.getSheet(xlsheet);
        row=ws.getRow(rownum);
        cell=row.createCell(colnum);
        cell.setCellValue(data);
        fo=new FileOutputStream(xlfile);
        wb.write(fo);
        wb.close();
        fi.close();
        fo.close();
    }

}
```

```
public class ReadingExcel {

    public static void main(String[] args) throws IOException {

        FileInputStream file=new
FileInputStream("C://SeleniumPractice/data3.xlsx");

        XSSFWorkbook workbook=new XSSFWorkbook(file);

        XSSFSheet sheet=workbook.getSheet("Sheet1");

        //Counting rows
        int rownum=sheet.getLastRowNum();// retuns number of rows
        int colcount=sheet.getRow(0).getLastCellNum(); // returns number
of cells present in a row

        System.out.println(rownum);
        System.out.println(colcount);

        for(int r=0;r<=rownum;r++)
        {

            XSSFRow row=sheet.getRow(r);

            for(int c=0;c<colcount;c++)
            {
                //XSSFCell cell=row.getCell(c);
                // value=cell.toString();
                String value=row.getCell(c).toString();
                System.out.print(value+"   ");

            }

            System.out.println();

        }

    }

}
```

```
public class WritingExcel {

    public static void main(String[] args) throws IOException {

        FileOutputStream file=new
FileOutputStream("C://SeleniumPractice/testdata123.xlsx");

        XSSFWorkbook workbook=new XSSFWorkbook();
```

```
XSSFSheet sheet=workbook.createSheet("data");

for(int i=0;i<=5;i++)
{
    XSSFRow row=sheet.createRow(i);

    for(int j=0;j<3;j++)
    {
        row.createCell(j).setCellValue("welcome");
    }
}

workbook.write(file);

System.out.println("Writing excel is completed");

}

}
```

```
public class UserRegistration {

    public static void main(String[] args) throws Exception {

        System.setProperty("webdriver.gecko.driver","C://Drivers/geckodriver-
v0.19.1-win64/geckodriver.exe");
        WebDriver driver=new FirefoxDriver(); // opens the browser

        driver.get("http://newtours.demoaut.com/mercuryregister.php");

        String path="C://SeleniumPractice/Registration.xlsx";

        XLUtils.setExcelFile(path,"Sheet1");

        int noofrows=XLUtils.getRowCount(path, "Sheet1");

        for(int row=1;row<=noofrows;row++)
        {
            String First_name=XLUtils.getCellData(path, "Sheet1", row, 0);
            String Last_name= XLUtils.getCellData(path, "Sheet1", row, 1);
            String phone=XLUtils.getCellData(path, "Sheet1", row, 2);
            String email=XLUtils.getCellData(path, "Sheet1", row, 3);
            String address=XLUtils.getCellData(path, "Sheet1", row, 4);
            String city=XLUtils.getCellData(path, "Sheet1", row, 5);
            String state=XLUtils.getCellData(path, "Sheet1", row, 6);
            String pincode=XLUtils.getCellData(path, "Sheet1", row, 7);
            String country=XLUtils.getCellData(path, "Sheet1", row, 8);
            String username=XLUtils.getCellData(path, "Sheet1", row, 9);
            String password=XLUtils.getCellData(path, "Sheet1", row, 10);
        }
    }
}
```

```
driver.findElement(By.linkText("REGISTER")).click();

//registration process start
driver.findElement(By.linkText("REGISTER")).click();

//contact information
driver.findElement(By.name("firstName")).sendKeys(First_name);
driver.findElement(By.name("lastName")).sendKeys(Last_name);
driver.findElement(By.name("phone")).sendKeys(phone);
driver.findElement(By.name("userNmae")).sendKeys(email);

//mailing information
driver.findElement(By.name("address1")).sendKeys(address);
driver.findElement(By.name("address2")).sendKeys(address);
driver.findElement(By.name("city")).sendKeys(city);
driver.findElement(By.name("state")).sendKeys(state);
driver.findElement(By.name("postalCode")).sendKeys(pincode);
Select dropcountry=new
Select(driver.findElement(By.name("country")));
dropcountry.selectByVisibleText(country);

//user information
driver.findElement(By.name("email")).sendKeys(username);
driver.findElement(By.name("password")).sendKeys(password);

driver.findElement(By.name("confirmPassword")).sendKeys(password);

driver.findElement(By.name("register")).click(); //submit

Thread.sleep(2000);

//validation

if (driver.getPageSource().contains("Thank you for
registering")) {
    System.out.println(" Registration Completed for " + row +
" record");
}

else
{
    System.out.println(" Registration Failed for " + row +
" record");
}

}
```

```
    }  
}  
}
```

```
public class FixedDepositCalculator {  
  
    public static void main(String[] args) throws Exception {  
  
        System.setProperty("webdriver.chrome.driver","C://Drivers/chromedriver_win  
32/chromedriver.exe");  
        WebDriver driver=new ChromeDriver();  
  
        driver.get("https://www.moneycontrol.com/fixed-  
income/calculator/state-bank-of-india-sbi/fixed-deposit-calculator-SBI-  
BSB001.html");  
  
        driver.manage().window().maximize();  
  
        String path="C://SeleniumPractice/caldata.xlsx";  
  
        XLUtils.setExcelFile(path, "Sheet1");  
  
        int rowcount=XLUtils.getRowCount(path, "Sheet1");  
  
        for(int i=1;i<=rowcount;i++)  
        {  
  
            int princ=Integer.parseInt(XLUtils.getCellData(path, "Sheet1",  
i, 0));  
            int rateofinterest=  
Integer.parseInt(XLUtils.getCellData(path,"Sheet1",i, 1));  
            int per= Integer.parseInt(XLUtils.getCellData(path,"Sheet1",i,  
2));  
            String fre=XLUtils.getCellData(path, "Sheet1", i,3);  
            double  
exp_mvalue=Double.parseDouble(XLUtils.getCellData(path,"Sheet1",i,4));  
  
            driver.findElement(By.id("principal")).sendKeys(String.valueOf(princ));  
  
            driver.findElement(By.id("interest")).sendKeys(String.valueOf(rateofintere  
st));  
  
            driver.findElement(By.id("tenure")).sendKeys(String.valueOf(per));  
  
            Select perioddrp=new  
Select(driver.findElement(By.id("tenurePeriod")));  
            perioddrp.selectByVisibleText("year(s)");  
        }  
    }  
}
```

```
        Select frequency=new  
Select(driver.findElement(By.id("frequency")));  
        frequency.selectByVisibleText(fre);  
  
        driver.findElement(By.xpath("//*[  
[@id='fdMatVal']/div[2]/a[1]/img")).click();  
  
        String act_mvalue=driver.findElement(By.xpath("//*[  
[@id='resp_matval']/strong")).getText();  
  
        if(exp_mvalue==Double.parseDouble(act_mvalue))  
{  
            System.out.println("test passed");  
        }  
        else  
{  
            System.out.println("test failed");  
        }  
  
        driver.findElement(By.xpath("//*[  
[@id='fdMatVal']/div[2]/a[2]/img")).click(); // clear button  
  
        Thread.sleep(3000);  
    }  
  
}
```

Hands on Practice

```
public class AutomationTestingPracticeForm {  
    public static void main(String[] args) throws InterruptedException {  
  
        System.setProperty("webdriver.chrome.driver",  
"C:/Drivers/chromedriver_win32/chromedriver.exe");  
        WebDriver driver = new ChromeDriver();  
  
        driver.get("https://testautomationpractice.blogspot.com/");  
  
        driver.manage().timeouts().implicitlyWait(10, TimeUnit.SECONDS);  
  
        driver.switchTo().frame(0); //Switch to frame  
  
        driver.manage().window().maximize();  
        driver.findElement(By.xpath("//*[@id='RESULT_TextField-  
1']").sendKeys("Oliver"); //Enter FirstName  
        driver.findElement(By.xpath("//*[@id='RESULT_TextField-  
1']"))  
    }  
}
```

```
2'"]).sendKeys("Twist");//Enter LName
    driver.findElement(By.id("RESULT_TextField-3")).sendKeys("12345678");//Enter Phone Number
    driver.findElement(By.id("RESULT_TextField-4")).sendKeys("Canada");//Enter Country
    driver.findElement(By.id("RESULT_TextField-5")).sendKeys("Toronto");//Enter City
    driver.findElement(By.id("RESULT_TextField-6")).sendKeys("Oliver@gmail.com");//Enter Email

    Select Options = new
Select(driver.findElement(By.id("RESULT_RadioButton-7")));//Select
dropdown

    List <WebElement> list = Options.getOptions();//Print all options
    for(WebElement e:list) {
        System.out.println(e.getText());

    }
    System.out.println(Options.getOptions().size());// Get the number
of options of dropdown
    Options.selectByVisibleText("Morning"); // Select an option

    driver.findElement(By.id("RESULT_RadioButton-
8_1")).click();//Select Gender Radio button

    driver.findElement(By.xpath("//*[@id='RESULT_CheckBox-
9_2']")).click();//Select Check box
    driver.findElement(By.xpath("//*[@id='RESULT_CheckBox-
9_4']")).click();// Select another Check box

    driver.switchTo().defaultContent(); //Here You have to come out of
first frame to continue rest of the elements

driver.findElement(By.xpath("//div[@id='HTML4']/div/div/fieldset/label[3]/
span")).click();//Radio button, Location => London

    driver.findElement(By.xpath("//*
[@id=\"HTML4\"]/div[1]/div/fieldset[2]/label[4]/span[1]")).click();
//Check box Hotel Ratings: 5 star

    driver.findElement(By.xpath("//*
[@id=\"HTML4\"]/div[1]/div/fieldset[3]/label[4]/span[1]")).click();
//Check box Bed Type=> King

    //Tool Tip Capture

    String tooltip1=driver.findElement(By.xpath("//*
[@id=\"HTML8\"]/div[1]/p[1]/a")).getAttribute("title");
    System.out.println(tooltip1);
```

```
String tooltip2=driver.findElement(By.xpath("//*
[@id=\"HTML8\"]/div[1]/p[2]/a")).getAttribute("title");
System.out.println(tooltip2);

//Alert

driver.findElement(By.xpath("//*
[@id=\"HTML9\"]/div[1]/button")).click();
driver.switchTo().alert().accept(); //close alert by using OK
button
//driver.switchTo().alert().dismiss(); //close alert by using
cancel button

//Date Picker – Current Date
driver.findElement(By.id("datepicker")).click();
driver.findElement(By.linkText("19")).click();

//Select menu

//Select class wont work here
//Select speed=new Select(driver.findElement(By.id("speed")));
//speed.selectByVisibleText("Fast");

driver.findElement(By.xpath("//*[@id=\"speed-
button\"]/span[1]")).click(); //Click on Combo =>Select a speed
driver.findElement(By.xpath("//*[@id=\"ui-id-4\"]")).click();
//Click on Fast option

driver.findElement(By.xpath("//*[@id=\"files-
button\"]/span[1]")).click(); //click on Combo => Select a file
driver.findElement(By.xpath("//*[@id=\"ui-id-8\"]")).click();
//click on option 'Doc file'

driver.findElement(By.xpath("//*[@id=\"number-
button\"]/span[1]")).click(); //Click on combo => Select a number
driver.findElement(By.xpath("//*[@id=\"ui-id-14\"]")).click();
//click on option 5

//HTML Table

int rows=driver.findElements(By.xpath("//*
[@id=\"HTML1\"]/div[1]/table/tbody/tr")).size();

System.out.println("BookName"+        "+Author"+
"+Subject"+      +"Price"); //Header
System.out.println("-----");
//Header

for(int r=2;r<=rows;r++)
{
    String bookname=driver.findElement(By.xpath("//*
[@id=\"HTML1\"]/div[1]/table/tbody/tr["+r+"]/td[1]")).getText(); //Book
```

```
Name
    String author=driver.findElement(By.xpath("//*
[@id=\"HTML1\"]/div[1]/table/tbody/tr["+r+"]/td[2"])).getText(); //Book
Name
    String subject=driver.findElement(By.xpath("//*
[@id=\"HTML1\"]/div[1]/table/tbody/tr["+r+"]/td[3"])).getText(); //Book
Name
    String price=driver.findElement(By.xpath("//*
[@id=\"HTML1\"]/div[1]/table/tbody/tr["+r+"]/td[4"])).getText(); //Book
Price
    System.out.println(bookname+"      "+author+
"+subject"      "+price);
}

//Drag and Drop

WebElement source=driver.findElement(By.xpath("//*
[@id=\"draggable\"]"));
WebElement target=driver.findElement(By.xpath("//*
[@id=\"droppable\"]"));

Actions act=new Actions(driver);
act.dragAndDrop(source, target).build().perform();;

//Resizable

WebElement resize=driver.findElement(By.xpath("//*
[@id=\"resizable\"]/div[3"]));
act.dragAndDropBy(resize, 300, 300).build().perform();

//Slider
WebElement slider=driver.findElement(By.xpath("//*
[@id=\"slider\"]/span"));
act.dragAndDropBy(slider, 400, 0).build().perform();

}
```

```
public class DownloadFilesusingchrome {

    public static void main(String[] args) throws InterruptedException {

        //download files in required location using chrome

        HashMap<String, Object> chromePrefs = new HashMap<String, Object>();
        chromePrefs.put("profile.default_content_settings.popups", 0);
```

```
chromePrefs.put("download.prompt_for_download", "false");

chromePrefs.put("download.default_directory", "C:\\Downloadedfiles");
//configure path

    ChromeOptions options = new ChromeOptions();
    options.setExperimentalOption("prefs", chromePrefs);

    DesiredCapabilities cap = DesiredCapabilities.chrome();
    cap.setCapability(CapabilityType.ACCEPT_SSL_CERTS, true);
    cap.setCapability(ChromeOptions.CAPABILITY, options); // end of
code

System.setProperty("webdriver.chrome.driver", "C://Drivers/chromedriver_win
32/chromedriver.exe");
    WebDriver driver=new ChromeDriver(cap);

    driver.get("http://demo.automationtesting.in/FileDownload.html");

    driver.manage().window().maximize();

    //download text file
    driver.findElement(By.id("textbox")).sendKeys("testing txt file
download");
    driver.findElement(By.id("createTxt")).click();
    driver.findElement(By.id("link-to-download")).click();

    Thread.sleep(5000);

    if(isFileExist("C://Downloadedfiles/info.txt"))
    {
        System.out.println(" file exists");
    }
    else
    {
        System.out.println("file not exists");
    }

    //download pdf file
    driver.findElement(By.id("pdfbox")).sendKeys("testing pdf
downlaod");
    driver.findElement(By.id("createPdf")).click();
    driver.findElement(By.id("pdf-link-to-download")).click();

    Thread.sleep(5000);

    if(isFileExist("C://Downloadedfiles/info.pdf"))
    {
        System.out.println(" file exists");
    }
    else
    {
```

```
        System.out.println("file not exists");
    }

}

static boolean isFileExist(String path)
{
    File f=new File(path);

    if(f.exists())
    {
        return true;
    }
    else
    {
        return false;
    }
}

}
```

```
public class DownloadFilesusingfirefox {

    public static void main(String[] args) throws InterruptedException {

        FirefoxProfile profile=new FirefoxProfile();

        profile.setPreference("browser.helperApps.neverAsk.saveToDisk",
"text/plain,application/pdf"); // set Mime type according to your file
format
        profile.setPreference("browser.download.manager.showWhenStarting",
false);

        //download files in desired location

profile.setPreference("browser.download.dir","C:\\Downloadedfiles");
        profile.setPreference("browser.download.folderList", 2);
        profile.setPreference("pdfjs.disabled", true); // only for pdf
file

        FirefoxOptions option=new FirefoxOptions();
        option.setProfile(profile);

System.setProperty("webdriver.gecko.driver","C://Drivers/geckodriver-
v0.19.1-win64/geckodriver.exe");
```

```
WebDriver driver=new FirefoxDriver(option);

driver.get("http://demo.automationtesting.in/FileDownload.html");

driver.manage().window().maximize();

//download text file
driver.findElement(By.id("textbox")).sendKeys("testing txt file
download");
driver.findElement(By.id("createTxt")).click();
driver.findElement(By.id("link-to-download")).click();

Thread.sleep(5000);

if(isFileExist("C://Downloadedfiles/info.txt"))
{
    System.out.println(" file exists");
}
else
{
    System.out.println("file not exists");
}

//download pdf file
driver.findElement(By.id("pdfbox")).sendKeys("testing pdf
downlaod");
driver.findElement(By.id("createPdf")).click();
driver.findElement(By.id("pdf-link-to-download")).click();

Thread.sleep(5000);

if(isFileExist("C://Downloadedfiles/info.pdf"))
{
    System.out.println(" file exists");
}
else
{
    System.out.println("file not exists");
}

static boolean isFileExist(String path)
{
    File f=new File(path);

    if(f.exists())
    {
        return true;
    }
    else
    {
        return false;
    }
}
```

```
}
```

```
public class FileUpload {  
  
    public static void main(String[] args) throws InterruptedException,  
FindFailed {  
  
    System.setProperty("webdriver.chrome.driver","C://Drivers/chromedriver_win  
32/chromedriver.exe");  
    WebDriver driver=new ChromeDriver();  
  
    driver.get("http://demo.automationtesting.in/Register.html");  
  
    driver.manage().window().maximize();  
  
    driver.findElement(By.xpath("//*[@id='imagesrc']")).click();  
  
    String imagesfilepath="C:\\SeleniumPractice\\Fruites\\\";  
    String  
inputfilepath="C:\\SeleniumPractice\\Fruites\\inputfiles\\\";  
  
    Screen s = new Screen();  
  
    Pattern fileInputTextBox = new Pattern(imagesfilepath +  
"FileTextBox.PNG");  
    Pattern openButton = new Pattern(imagesfilepath +  
"OpenButton.PNG");  
  
    Thread.sleep(5000);  
  
    s.wait(fileInputTextBox, 20);  
    s.type(fileInputTextBox,inputfilepath+"apple.jpg");  
    s.click(openButton);  
  
}  
}
```