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**Software Testing Day 13 – Selenium Basics**

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# Agenda

- **Introduction to Automation Testing**
- **Introduction to Selenium**
- **Introduction to Selenium IDE**
- **Selenium WebDriver.**



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# What is Automation ?

- Automation testing is a Software testing technique to test and compare the actual outcome with the expected outcome.
- This can be achieved by writing test scripts or using any automation testing tool. Test automation is used to automate repetitive tasks and other testing tasks which are difficult to perform manually.
- Automated testing is most preferable for large projects that require testing the same areas over and over
- The test automation performs testing at three different levels:
  - Unit Level Automation
    - Nunit
    - Junit
    - TestNg
  - API Testing
    - Rest Assured
    - Katalon
  - User Interface
    - Selenium
    - Cypress
    - Playwright

Notes

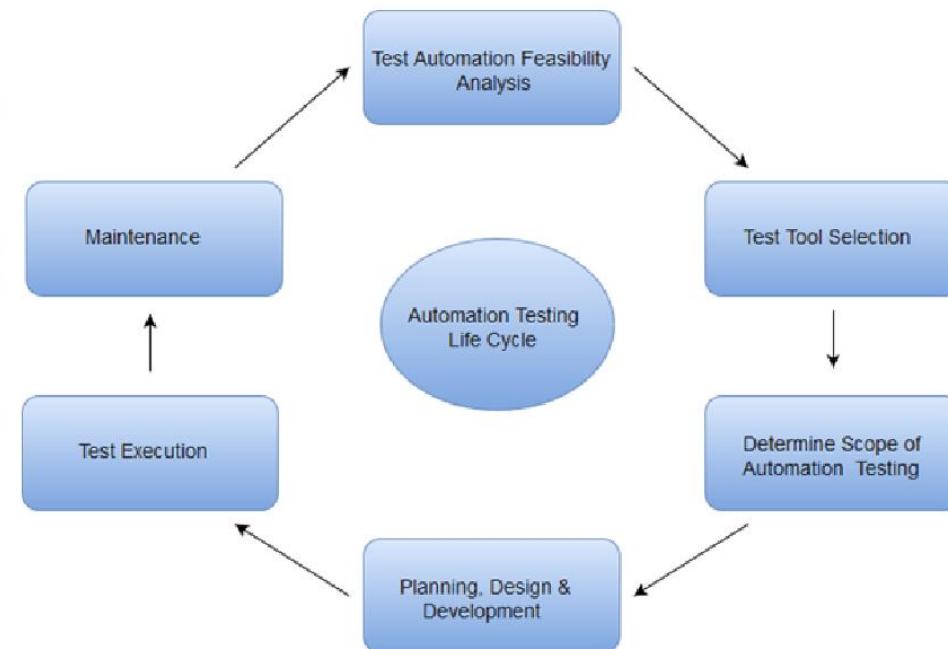
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# Automation Testing life cycle



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# Why Automation Testing?

Some of the reasons why Automation Testing is important:

- **Running Tests 24/7:** You can start the test from anywhere in the world and anytime you want to. You can even do that remotely if you don't have a lot of devices or you don't have the possibility to buy them.
- **Fewer Human Resources:** You just need a test automation engineer to write your scripts to automate your tests, instead of a lot of people doing boring manual tests over and over again.
- **Reusability:** The scripts are reusable and you don't need new scripts every time. Also, you can redo the steps that are exactly as the previous ones.
- **Bugs:** Automation helps you find bugs in the early stages of software development, reducing expenses and working hours to fix these problems as well.
- **Reliability:** Automated testing is more reliable and way quicker when running boring repetitive standardized tests which can not be skipped, but may cause errors when manually tested.

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# Manual vs Automation Testing

Features	Manual Testing	Automation Testing
<b>Accuracy &amp; Reliability</b>	Accuracy is low. Because manual tests are more prone to human error	Accuracy is high as tools and scripts are used
<b>Time required</b>	High as compared to Automation Testing	Relatively Low
<b>Investment Cost</b>	Return of Investment(ROI) is low	Return of Investment(ROI) is high
<b>Usage</b>	Suitable for Exploratory, Usability and Ad hoc Testing	Suitable for Regression Testing, Performance Testing, Load Testing
<b>Human Element</b>	It allows human observation to find out any glitches	No human observation involved
<b>Customer Experience</b>	Helps in improving the customer experience	No guarantee of positive customer experience

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# Scope of Automation tester in Market ?

- Automation Tester are Equivalent to developer and get better Salary hike as Compared to Manual Tester.
- Good number of job opportunity in Market.
- Never ending Field as Development progresses Testing has to Done.
- Every Manual Tester should have knowledge on Automation and becoming a mandatory skill in industry

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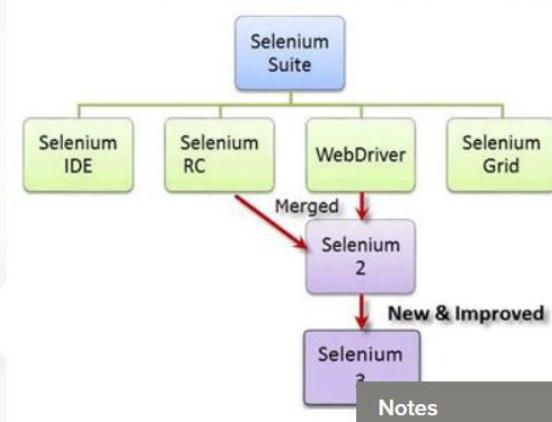
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# What is Selenium and Tools ?

- **Selenium** is a free (open-source) automated testing framework used to validate web applications across different browsers and platforms.
- You can use multiple programming languages like Java, C#, Python, etc to create Selenium Test Scripts. Testing done using the Selenium testing tool is usually referred to as **Selenium Testing**.
- Only testing web applications is possible with Selenium. You cannot use it to test desktop applications or mobile applications.
- Selenium Tools
  - Selenium Integrated Development Environment (IDE)
  - **Selenium Remote Control (RC)**
  - Selenium WebDriver
  - Selenium Grid





# Who developed Selenium?

Since Selenium is a collection of different tools, it had different developers as well. Below are the key persons who made notable contributions to the Selenium Project. Primarily, Selenium was created by Jason Huggins in 2004.

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# Selenium Architecture



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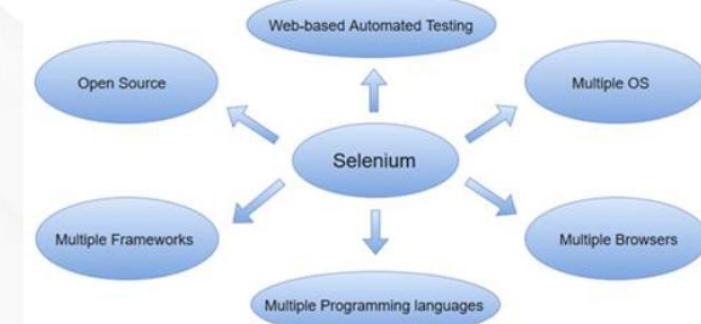
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# Why Selenium?

- Open Source Availability
- Widely used in Industry
- Multi-Browser Support
- Support for programming languages and framework
- Support Across Various Operating Systems
- Ease Of Implementation
- Reusability and Integrations
- Parallel Test Execution
- Less Hardware Usage
- Easy to Learn and Use
- Constant Updates and Good Community Support



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# Advantages of Selenium

- Selenium is pure open source, freeware and portable tool.
- Selenium supports variety of languages that include Java, Perl, Python, C#, Ruby, Groovy, Java Script, and VB Script. etc.
- Selenium supports many operating systems like Windows, Macintosh, Linux, Unix etc.
- Selenium supports many browsers like Internet explorer, Chrome, Firefox, Opera, Safari etc.
- Selenium can be integrated with ANT or Maven kind of framework for source code compilation.
- Selenium can be integrated with TestNG testing framework for testing our applications and generating reports.
- Selenium can be integrated with Jenkins for continuous integration.
- Selenium can be integrated with other open source tools for supporting other features.
- Selenium can be used for Android, IPhone, Blackberry etc. based application testing.
- Selenium supports very less CPU and RAM consumption for script execution.

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# Disadvantages of Selenium

- Selenium can test only web applications. It cannot test software applications and other desktop applications.
- Selenium cannot access the web elements outside the web applications that are under test.
- No guaranteed user support is available. We have to depend on customer communities.
- Selenium independently does not support image testing. It must be integrated with Sikuli for image testing.

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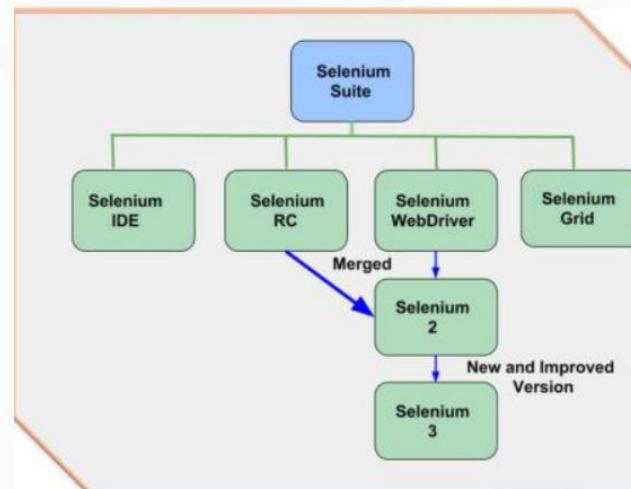
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# Versions of selenium



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# Selenium IDE

## SELENIUM IDE

- IDE stands for Integrated Development Environment.
- Which is used for Record and Play back the scripts.
- It is an Add on for Mozilla Firefox, which means we can download the Selenium IDE from Mozilla Firefox and we can Record and Run the scripts in Mozilla Firefox only.
- Selenium IDE is accountable for user actions.
- We can Run the Recorded scripts against other browsers by using Selenium RC.

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# Selenium IDE

## Benefits of Selenium IDE

Very user friendly to use and install

Has built-in test results reporting module

No programming experience is required

It is used to create and execute Test cases using Firefox or Chrome browsers

The user can easily record the Test scripts

The user can edit the Test scripts

The user can create Test Suites.

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# Selenium IDE

## Drawbacks of Selenium IDE:



- 
- It doesn't support iteration statements
  - It doesn't support error handling
  - Available only in Firefox and Chrome
  - It doesn't generate a detailed Test Reports summary.
  - It does not support Database testing
  - It does not support conditional statements

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# Selenium RC

## SELENIUM RC

- RC stands for Remote Control.
- It is a Server and launches the Browser.
- It acts as a API and Library of Selenium.
- We need to configure the Selenium RC with the supported language, then we can automate the application.

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# Selenium RC

## Selenium RC

### Pros

- Cross-browser and cross-platform
- Can perform looping and conditional operations
- Can support data-driven testing
- Has matured and complete API
- Can readily support new browsers
- Faster execution than IDE

### Cons

- Installation is more complicated than IDE
- Must have programming knowledge
- Needs Selenium RC Server to be running
- API contains redundant and confusing commands
- Browser interaction is less realistic
- Inconsistent results & Uses Javascript
- Slower execution time than WebDriver

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# Selenium Grid

Selenium Grid is used to run Automation tests on multiple browsers across multiple operating systems, machines simultaneously. It supports Parallel Testing. It is used only for Test Execution. 21 S

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# Selenium Grid

## Features



- Allows simultaneous running of tests in various web browsers, environments and machines.
- Saves time enormously.
- It speeds up the test suite completion time as it is capable of running various tests in parallel.
- Perform cross browser testing.



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# ELEMENT LOCATORS

Locators are nothing but the identifications of the elements in application. Since every product in the world is having some identifications, in the same way every element in the application also having some identifications. These identifications we called as “locators” or “Properties and Values” or “Attributes”

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# ELEMENT LOCATORS

- 1. ID**
- 2. Name**
- 3. Class**
- 4. Tagname**
- 5. Xpath**
- 6. Link text**
- 7. CSS (Cascade style sheets)**
- 8. href**

Notes



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# ELEMENT LOCATORS

- 1. ID**
- 2. Name**
- 3. Class**
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- 6. Link text**
- 7. CSS (Cascade style sheets)**
- 8. href**

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# Xpath

- **XPath is defined as XML Path**
- **XPath is unique locator of the element in application**
- **Xpath is a syntax or language for finding any element on the web page using XML path expression**
- **Xpath is used to find out the location of element on a webpage using HTML DOM Structure.**

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## Types of XPath

There are two types of XPath:

1. Absolute XPath
2. Relative XPath

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# Types of XPath

## Absolute XPath

- Identify the exact location of the element in HTML page from html tag to till the element.
- It begins with forward slash (/), which means you can select the element from the root node
- Below is the example of Absolute Xpath expression of the element.
- Ex.  
`/html/body/div[1]/div[2]/div[1]/div/div/div/div[2]/div/div[1]/form/div[1]/div[1]`

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# Types of XPath

## Relative XPath

- Relative XPath find out the element based on the unique locators
- For Relative Xpath path starts from the middle of the HTML DOM Structure
- It start with double forward slash (//) which means it can search the element anywhere at the webpage.
- Below is the example of Relative Xpath expression of the element.
- Syntax: //Tagname[@locator='value']
- Ex: //input[@name='username']

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## Relative XPath

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- Ex: //input[@name='username']



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## Types of XPath



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# Types of XPath

XPath=//tagname[@Attribute="value"]

Tag Name of the  
WebElement/node

Current node

Value of the  
attribute

Select attribute

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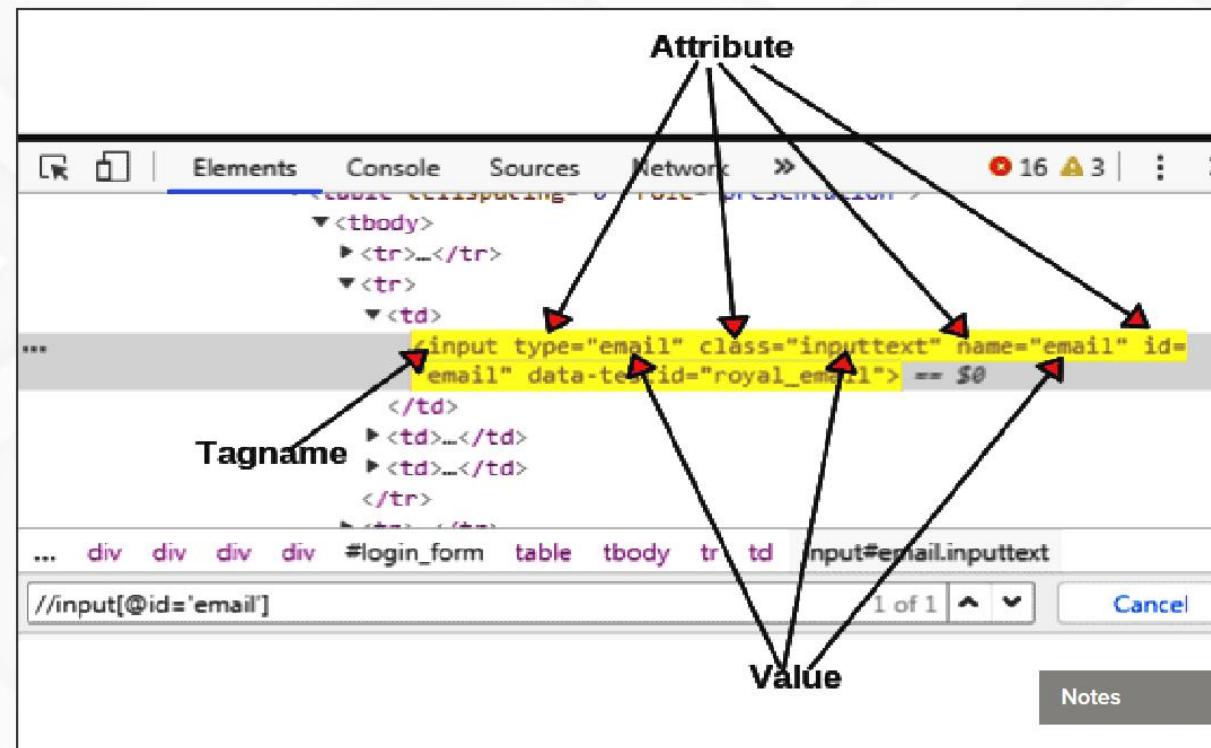
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# Types of XPath



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## Types of XPath

celenium xpath pp: - Google Search X Path in Selenium Facebook – log in or sign up +

facebook.com

facebook

Facebook helps you connect and share

Elements Console Sources Network Performance Memory Application Security Lighthouse Recorder

input#email.inputtext\_55r1\_6luy 364 x 52

Email address or phone number

Password

input#email.inputtext\_55r1\_6luy

Facebook helps you connect and share

Throttling web socket requests The Network panel now supports throttling web socket requests.

Recorder panel improvements Wait for elements to be visible in the viewport before replaying the next step.

Better Console formatting and styling

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# Types of XPath

Absolute XPath	Relative XPath
1. Identify the exact location of the element in HTML page from html tag to till the element.	1. Relative XPath find out the element based on the unique locators
2. It begins with forward slash (/)	2. It starts with double forward slash (//)
3. Not preferable in real time project.	3. Always preferable in real time project.
4. Example: <code>/html/body/div[1]/div[2]/div[1]/div/div/div/div[2]/div/div[1]/form/div[1]/div[1]</code>	4. Example: <code>//input[@name='username']</code>

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# Locators

## Selenium Locators:

Selenium locators are used to find and match the webpage elements that selenium interacts with.

Following are some locators in selenium:

### •Locating by ID

```
driver.findElement(By.id("q")).sendKeys("Selenium 3");
```

### •Locating by Name

```
driver.findElement(By.name("q")).sendKeys ("Selenium 3");
```

### •Locating by Xpath

```
driver.findElement(By.xpath("//input[@id='q'])).sendKeys("Selenium 3");
```

### •Locating Hyperlinks by Link Text

```
driver.FindElement(By.LinkText("edit this page")).Click();
```

### •Locating by DOM

```
dom =document.getElementById('signinForm')
```

### •Locating by CSS

```
driver.FindElement(By.CssSelector("#rightbar> .menu >li:nth-of-type(2) > h4"));
```

### •Locating by ClassName

```
driver.findElement(By.className("profileheader"));
```

### •Locating by TagName

```
driver.findElement(By.tagName("select")).Click();
```

### •Locating by LinkText

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

### •Locating by PartialLinkText

```
driver.findElement(By.partialLinkText(" NextP")).click();
```

Notes

A screenshot of a Microsoft Edge browser window. The title bar shows three tabs: "Lumen", "PDF to JPG Converter | Convert", and "Shubha-slack/Testing-Learning-...". The main content area displays a page from "lumen.u-next.com" titled "Locators". The page content is a tutorial on Selenium locators, listing various methods with corresponding Java code examples. The bottom of the screen shows the Windows taskbar with the Start button, a search bar, pinned icons for File Explorer, WhatsApp, and others, and system status icons for battery, signal, and network.

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# Installation of Java

## How to Install Java?

It is not difficult to install java on any platform whether it is Windows, Mac, etc. But there are a few steps to follow:

- ***Download Java***
- ***Install Java***
- ***Set Java Environment Path***
- ***Verify Java Installation***

The following are steps to ***Download & Install Java on Windows*** and these steps also remain the same for any platform other than windows.

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# Installation of Java

## *Steps to Download Java Development Kit (JDK)*

To install Java, you first need to download the installer program from Oracle. Visit the ***Download***

***Java page: <https://www.oracle.com/technetwork/java/javase/downloads/index.html>.*** Click on ***Download*** button.

Notes



# Platforms supported by selenium

## Platforms supported by Selenium

Selenium works with different Operating systems, browsers, programming languages and Testing Frameworks.

### Operating Systems:

- Microsoft Windows
- Macintosh
- Linux

### Browsers:

- Mozilla Firefox
- Google Chrome
- Internet Explorer
- Safari
- Opera etc.

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## Testing using selenium

Different types of Tests that are Supported by Selenium

The slide shows multiple tests which are supported by Selenium.



## Notes



## Launching of browsers

<https://chromedriver.chromium.org/downloads>

<https://github.com/mozilla/geckodriver/releases>

<https://developer.microsoft.com/en-us/microsoft-edge/tools/webdriver/>

```
System.setProperty("webdriver.chrome.driver", "E:\\drivers\\ChromeDrivers\\85\\chromedriver.exe");
```

```
WebDriver driver=new ChromeDriver();
```

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# Launching of browsers

**Driver Initialization Basics:**

```
Firefox WebDriver driver = new FirefoxDriver();
Chrome WebDriver driver = new ChromeDriver();
Internet Explorer WebDriver driver = new SafariDriver();
Safari Driver WebDriver driver = new InternetExplorerDriver();
```

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# Launching of browsers

**Driver Initialization Basics:**

```
Firefox WebDriver driver = new FirefoxDriver();
Chrome WebDriver driver = new ChromeDriver();
Internet Explorer WebDriver driver = new SafariDriver();
Safari Driver WebDriver driver = new InternetExplorerDriver();
```

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# Find element and elements

## findElement() and findElements()

	findElement()	findElements()
0 matches	throw exception (NoSuchElementException)	returns empty list
1 match	return the found element	returns list with one element
2+ matches	returns only the first one that found	returns list with all found elements

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# Browser Commands

## Browser Control Commands



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# Navigational Commands

## **ManipalGlobal Skills Academy**

### **Navigate to URL**

```
driver.get("http://newexample.com") driver.navigate().to("http://newexample.com")
```

- Refresh page**

```
driver.navigate().refresh()
```

- Navigate forwards in browser history**

```
driver.navigate().forward()
```

- Navigate backward in browser history**

```
driver.navigate().back()
```

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# Handle Radio buttons / check boxes

```
WebElement radio1 = driver.findElement(By.id("vfb-7-1"));
WebElement radio2 = driver.findElement(By.id("vfb-7-2"));
```

//Radio Button1 is selected  
`radio1.click();`

//Radio Button1 is de-selected and Radio button2 is selected  
`radio2.click();`

Radio

- Option 1
- Option 2
- Option 3

Radio

- Option 1
- Option 2
- Option 3

`click()` is the method to  
toggle on the radio buttons

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# Handle Check boxes buttons using selenium

## Radio button

- Radio button
- Radio button 2

## Checkbox

- Styled checkbox (Checked)
- Styled checkbox
- Styled disabled checkbox

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## VALIDATION COMMANDS IN WEBDRIVER

We are using these commands to perform validations in Webdriver.

### **isDisplayed ():**

To verify whether the element is displaying in the application or not.

Syntax: driver.findElement(By.id ("locator value")).isDisplayed();

### **isEnabled ():**

To verify whether the element is enabled in the application or not.

Syntax: driver.findElement(By.id ("locator value")).isEnabled();

### **isSelected ():**

To verify whether the check box/radio button selected or not.

Syntax: driver.findElement(By locator("value")).isSelected();

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## VALIDATION COMMANDS IN WEBDRIVER

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Syntax: driver.findElement(By.id ("locator value")).isDisplayed ();

**isEnabled ():**

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Syntax: driver.findElement(By.id ("locator value")).isEnabled();

**isSelected ():**

To verify whether the check box/radio button selected or not.

Syntax: driver.findElement(By locator("value")).isSelected();

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# Alerts in Selenium

Alerts are small popup boxes/windows which display the messages/notifications and notify the user with some information seeking some permission on certain kinds of operations

Additionally, we can also use them for warning purposes. Sometimes, the user can enter a few details in the alert box as well

For Example, The alert box displayed below requires an action from the user to press OK and accept or press Cancel and dismiss the message box

Application alerts shift your focus from the current browser window to a newly opened window and force the user to read the message displayed and act accordingly

Users will be blocked and will not be able to work further unless the alert message box gets handled

Notes

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# Handling Alerts in Selenium

**accept()** : This method clicks on the 'OK' button of the alert box

**dismiss()** : We use this method when the 'Cancel' button clicks in the alert box

**sendKeys(String string)**: This method sends data to the alert box

**getText()** : This method captures the message from the alert box

```
Alert alert = driver.switchTo().alert();
alert.accept();
alert.dismiss();
alert.sendKeys("username");
alert.getText();
```

Notes



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## Handling Prompt Alerts in Selenium

**Need to switch to the alert first**

**Get the text from the alert using prompt.getText()**

**Enter the required text using sendKeys() method**

**And finally accept the alert to complete the alert test**

```
Alert promptAlert = driver.switchTo().alert();
String alertText = promptAlert.getText();
System.out.println("Alert text is " + alertText);
// Send some text to the alert
promptAlert.sendKeys("Test User");
promptAlert.accept();
```

Notes



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## Handling Confirmation Alerts in Selenium

**Need to switch to the alert first**

**Get the text from the alert using prompt.getText()**

**And finally accept or dismiss the alert to complete the alert test**

```
Alert promptAlert = driver.switchTo().alert();
String alertText = promptAlert.getText();
System.out.println("Alert text is " + alertText);
// Send some text to the alert
promptAlert.accept();
//or
promptAlert.dismiss();
```

Notes



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# Frames

An iframe is also known as the inline frame. It is a tag used in HTML5 to embed an HTML document within a parent HTML document. An iframe tag is defined using <iframe></iframe> tags

The iframes are mainly used to insert content from external sources. For example, an advertisement displayed on a web page. They can float within the webpage, which means one can position an iframe at a specific position on a web page

```
<html>
<body>
  <div class="box">
    <iframe name="iframe1" id="IF1" height="50%" width="50%" src="https://www.browserstack.com"> </iframe>
  </div>
  <div class="box">
    <iframe name="iframe2" id="IF2" height="50%" width="50%" align="left" src="https://www.browserstack.com/"></iframe>
  </div>
</body>
</html>
```

Notes



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# Handling Frames in Selenium

For a browser to work with several elements in iframes, it is crucial for the browser to identify all the iframes

we need to use the `SwitchTo().frame` method. This method enables the browser to switch between multiple frames

`Driver.switchTo().frame(int)`

`Driver.switchTo().frame(String)`

`Driver.switchTo().frame(WE)`

`Driver.switchTo().parentFrame()`

A screenshot of a Java code editor showing the completion of a method call. The code `driver.switchTo().frame[0];` is typed, and a tooltip shows four options:

- `frame(int index) : WebDriver - TargetLocator`
- `frame(String nameOrId) : WebDriver - TargetLocator`
- `frame(WebElement frameElement) : WebDriver - TargetLocator`
- `parentFrame() : WebDriver - TargetLocator`

A "Notes" button is visible at the bottom right of the tooltip.

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# Handling Frames in Selenium

For a browser to work with several elements in iframes, it is crucial for the browser to identify all the iframes

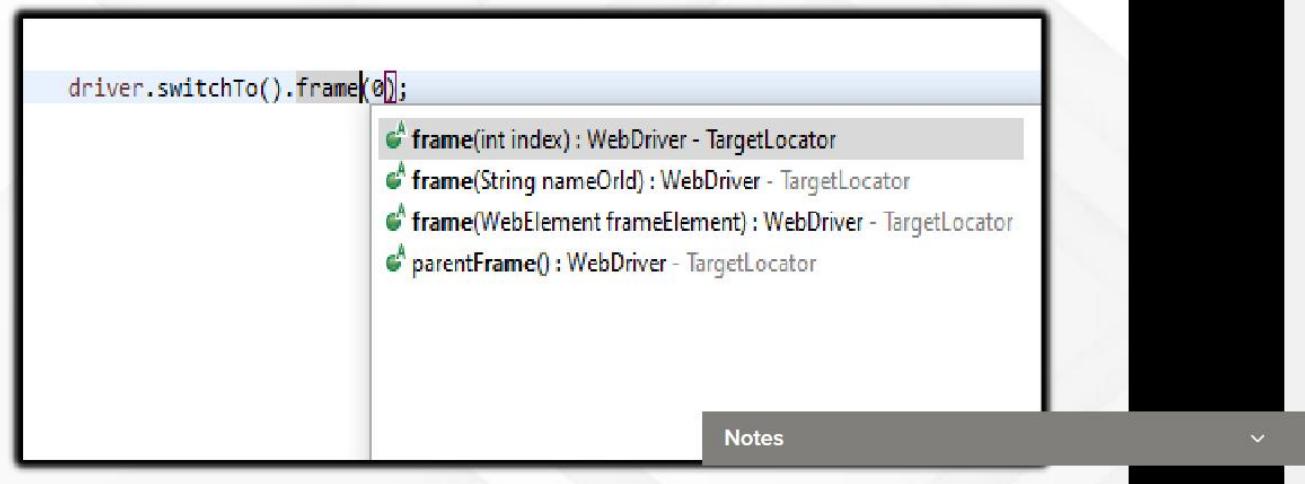
we need to use the `SwitchTo().frame` method. This method enables the browser to switch between multiple frames

`Driver.switchTo().frame(int)`

`Driver.switchTo().frame(String)`

`Driver.switchTo().frame(WebElement)`

`Driver.switchTo().parentFrame()`



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