Selenium Notes

1. *What is Selenium ?*

Selenium is an open source web automation tool.

Limitation of Selenium :

- It doesn't support windows based application directly. However, third party tool **(eg: AutoIt)** can be integrated with selenium to automate windows based applications.

Note :

1. Selenium community developed specific tool called **WINIUM** to automate windows based applications.
2. Selenium community also developed tools to test mobile applications,
    - **Selendroid** - it supports only Android platform
    - **Appium** - it supports Android platform, MAC, Windows etc.

Note :

All the selenium related resources and documents can be found on the below website.

http://www.seleniumhq.org

Here, hq stands for head quarter.

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2. *Why Selenium is so popular and demanding ?*

Selenium is popular and demanding due to the following features.

1. it is an open source tool freely available on internet
2. No project cost involved
3. No licence required
4. Can be easily customized to integrate with other Test Management tools like ALM, Bugzilla etc.
5. It supports almost 13 different software languages
    - Java
    - C#
    - Ruby
    - Python
    - Perl
    - Php
    - Javascript
    - Javascript (Node JS)
    - Haskell
    - R
    - Dart
    - TCL
    - Objective - C

6. It supports almost all the browsers.(Firefox, Chrome, Internet Explorer etc) and hence, cross browser testing/compatibility testing can be performed using selenium.
7. It supports almost all the Operating System (MAC, Windows, LINUX etc) and hence, cross platform testing can also be performed.

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3. What are the different flavours of Selenium ?

- **Selenium Core** (Developed by a company called **Thought Works** way back in 2004)
- **Selenium IDE** (supports only Mozilla Firefox - supports record and playback feature)
- **Selenium RC** (Remote Control - Version is 1.x) (Used for parallel execution of automation scripts on multiple remote systems)
- **Selenium WebDriver** (Version is 2.x and 3.x)

Note :

Selenium WebDriver version 3.x is no longer capable of running Selenium RC directly, rather it does through emulation and via an interface called WebDriverBackedSelenium.

But, **it does support Selenium Grid directly.**

Selenium Grid :

1. It is one of the component of selenium that is used to run automation scripts on multiple system simultaneously.
2. It is used to carry out compatibility testing on multiple browsers and platforms.

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4. What are the key/Important topics of Selenium ?

- **Automation Framework -** guidelines and rules to write selenium code
- **GitHub** - Central Repository to store code
- **Maven** - build dependency tool for auto update of selenium version
- **Selenium Grid** - to test on multiple OS and browsers
- **Jenkins** - Continuous Integration
- T**estNG** - framework for generation of Test Reports and running multiple test scripts in one go

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5. What are the Softwares required for Selenium ?

1. **Eclipse IDE** - Oxygen (Stable version)
2. **JDK 1.8**
3. **Selenium Server-Standalone**-3.7.1 (Stable version)

   *(Download it from the given url : **http://www.seleniumhq.org/download**)*

4. Driver Executables

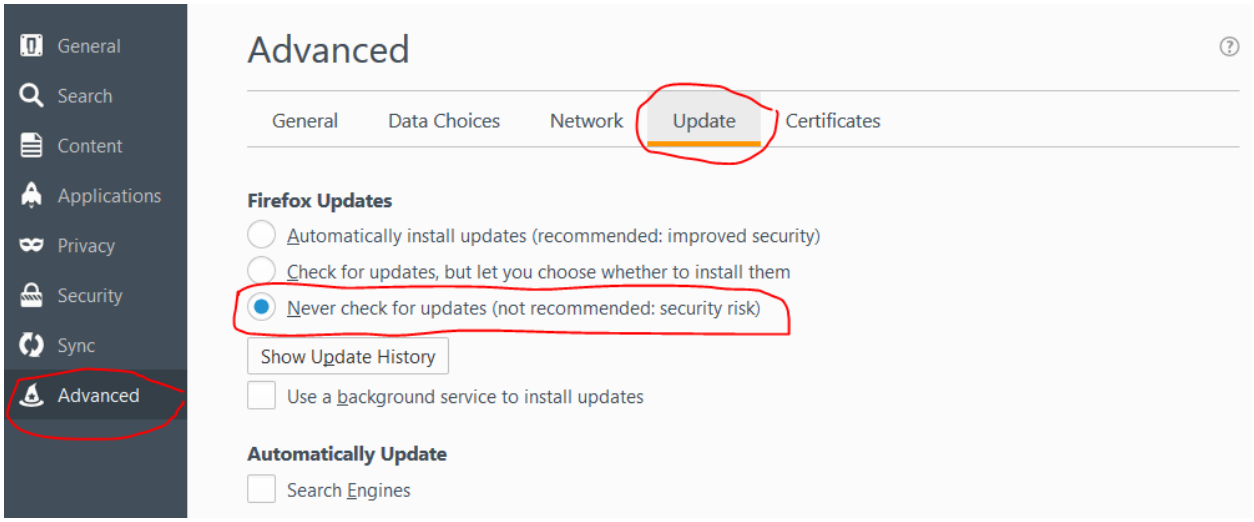
- For Firefox Browser
  - the name of the driver executable is : **geckodriver.exe**
  - Url to download : https://github.com/mozilla/geckodriver/releases
  - Version **0.19** is recommended for firefox browser with version 56.0 (selenium jar - 3.7.1)
- For Chrome browser
  - the name of the driver executable is : **chromedriver.exe**
  - Url to download : https://chromedriver.storage.googleapis.com/index.html?path=2.31/
  - Stable version of chrome version is 62.0 (Use chromedriver.exe with version 2.33)

5. Browsers:

Firefox (Version 57.0)

Chrome (Version 62.0)

Note : To stop auto update of firefox browser version, Make sure to disconnect the internet connection and then install 54.0 version, now go to Setting/Option in firefox browser and check the below checkbox - Never check for updates.



6. Application Under Test (AUT)

Application Name : actiTIME

Online url : https://demo.actitime.com/login.do

Offline url : https://localhost:8080/login.do

To download actiTIME application ,

https://www.actitime.com/download.php

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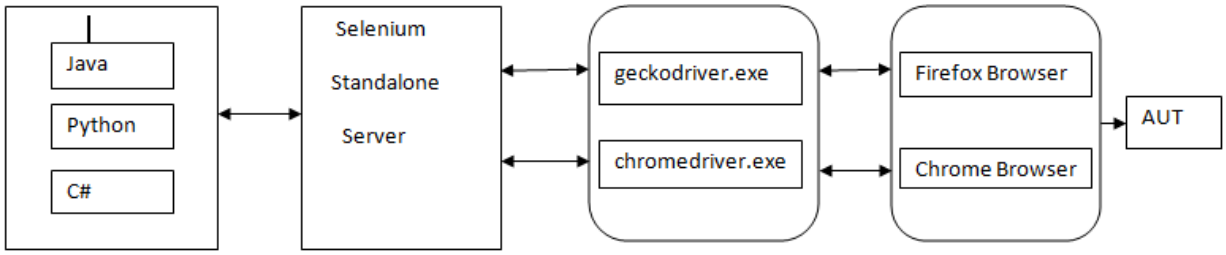
6. Selenium Architecture - High Level ?

OR

How selenium performs automation testing on browser ?



Client Binding **Driver Executables** **Browser**

OR **.jar file** **uses**

Language Binding **JSON Wire Protocol**

1. **Since selenium supports multiple languages such as Java, Python, C# etc, we can develop automation scripts in all the supported languages. This is know as language binding or Client binding.**
2. **When we execute the selenium code, request goes to the Selenium Standalone Server (also known as Selenium WebDriver Server), which further process the request based on the input received from the client binding and perform specific actions on the respective browsers using the browser specific driver executables,**

   Eg : geckodriver.exe for firefox browser and

   chromedriver.exe for chrome browser and so on…

3. **Driver executables uses a protocol called JSON Wire protocol to communicate with related browsers. (JSON stands for Java Script Object Notation)**

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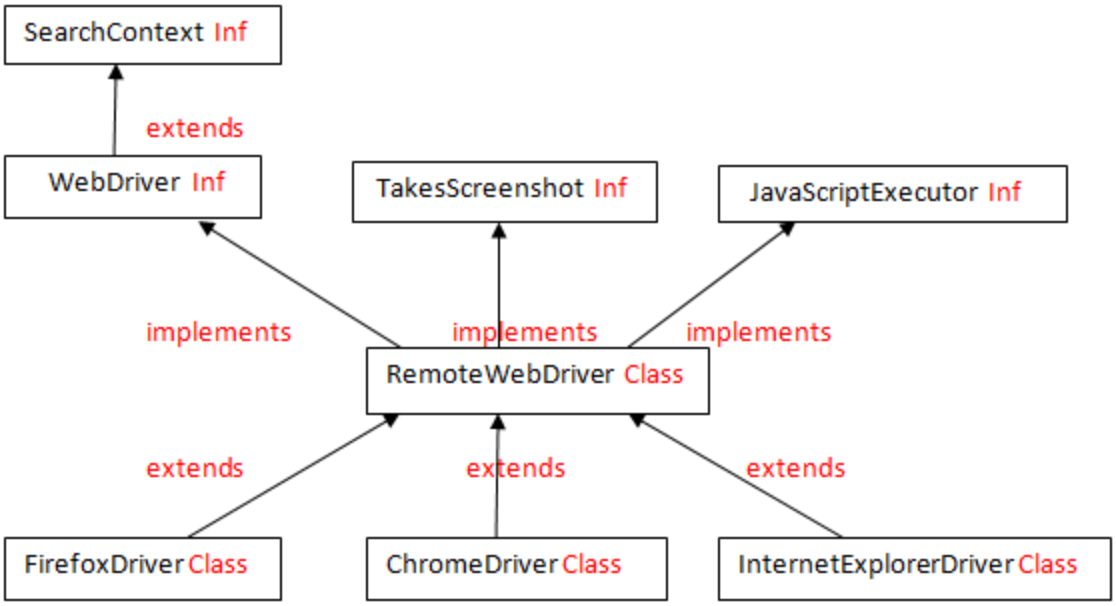
7. Selenium Java Architecture - Detailed Level



1. **SearchContext is the supermost interface present in selenium webdriver.**
2. **An interface called WebDriver extends SearchContext interface.**
3. **A total of 13 interfaces are available in selenium, which is implemented by a super most class called RemoteWebDriver**
4. **RemoteWebDriver is again extended by few browser specific child classes such as,**
    - **FirefoxDriver class to automate on firefox browser.**
    - **ChromeDriver class to automate on Chrome browser,**
    - **InternetExplorerDriver class to automate on IE and so on…….**

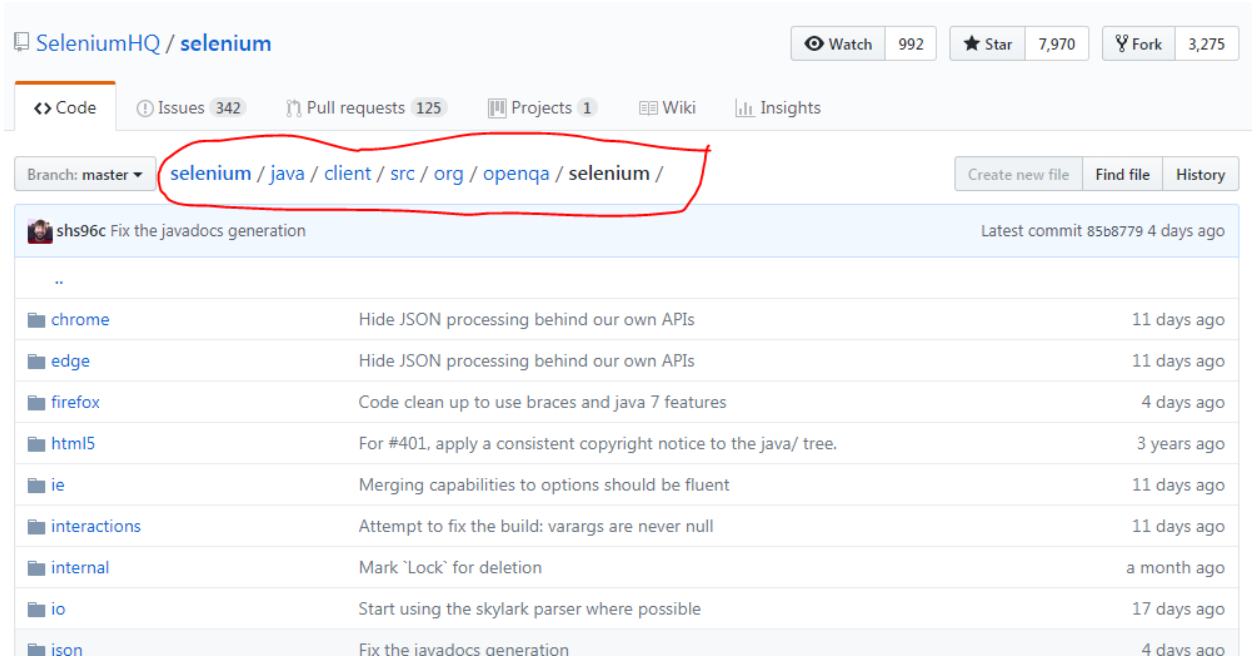
NOTE :

All the above mentioned **interfaces and classes** are present in a package called **"org.openqa.selenium".**

To view any information about Selenium interfaces, classes and methods, navigate to the below page.

https://github.com/SeleniumHQ/selenium/tree/master/java/client/src/org/openqa/selenium

Highlighted below in red is the navigation path.



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8. *List down all the methods present in below interfaces of Selenium WebDriver.*

Methods of SearchContext interface :

1. **findElement()**
2. **findElements()**

Methods of WebDriver interface :

1. **close()**
2. **get()**
3. **getTitle()**
4. **getPageSource()**
5. **getCurrentUrl()**
6. **getWindowHandle()**
7. **getWindowHandles()**
8. **manage()**
9. **navigate()**
10. **quit()**
11. **switchTo()**

Methods of TakesScreenshot interface :

1. **getScreenshotAs(args)**

Methods of JavascriptExecutor interface :

1. **executeScript()**
2. **executeAsyncScript() - we dont use this for automation**

Methods of WebElement interface :

1. **clear()**
2. **click()**
3. **getAttribute()**
4. **getCssValue()**
5. **getLocation()**
6. **getRect()**
7. **getSize()**
8. **getTagName()**
9. **getText()**
10. **isDisplayed()**
11. **isEnabled()**
12. **isSelected()**
13. **sendKeys()**
14. **submit()**

9. *Why we upcast the browser related child class to WebDriver, and not RemoteWebDriver class (RemoteWebDriver being the super most class in selenium) ?*

Upcasting Example :

WebDriver driver = new FirefoxDriver();

- Converting a child class object to super type is called Upcasting.
- In selenium, we use upcasting so that we can execute the same script on any browser.
- In selenium, we can upcast browser object to RemoteWebDriver, WebDriver, TakesScreenshot , JavascriptExecutor etc, but a standard practice is to upcast to WebDriver interface.
- This is as per the Selenium coding standard set by the Selenium community. As a testimonial, navigate to the below selenium community site and check for the text as mentioned in the image below.

Url - http://www.seleniumhq.org/projects/webdriver/

WebDriver is the name of the key interface against which tests should be written in Java, the implementing classes one should use are listed as below:

ChromeDriver, EventFiringWebDriver, FirefoxDriver, HtmlUnitDriver, InternetExplorerDriver, PhantomJSDriver, RemoteWebDriver, SafariDriver

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10. Where did you use Upcasting in Selenium ?

WebDriver driver = new FirefoxDriver();

Explain the above statement..

1. WebDriver is an interface in Selenium that extends the supermost interface called SearchContext.
2. driver is the upcasted object or WebDriver interface reference variable.
3. " = " is an assignment operator.
4. new is a keyword using which object of the FirefoxDriver class is created.
5. FirefoxDriver() is the constructor of FirefoxDriver class which initialises the object and it will also launch the firefox browser.

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11. Steps to install/integrate selenium server to the java project

1. Launch eclipse and go to package explorer [navigation path :- Window menu → Show View → Package Explorer]
2. Create a java project [File → New→ Java Project]
3. Right click on Java Project and add a new folder with name "driver" [File → New→ Folder]
4. copy **geckodriver.exe** file from your system and paste it into this driver folder
5. Similarly, create another folder with name **"jar"**and copy **Selenium Standalone Server.jar** file into this jar folder.
6. Expand the jar folder and right click on **Selenium Standalone Server.jar** file → select **Build Path** → select **Add to Build Path**
7. As soon as you add any .jar files to build path, a new folder will be available called **"Reference Libraries"** under the package explorer section and you can see the .jar file is added to this **"Reference Libraries"**
8. To remove the .jar file from the java build path, go to the Reference Libraries → select the .jar file → right click → select build path → Remove from build path.
9. Other way of adding .jar file to java build path is : right click on the project → build path → configure build path → Libraries tab → Add External jars → select the .jar file → Apply → ok

12. *This program demonstrates Upcasting concept (FirefoxDriver class object to WebDriver interface) and accessing various methods of WebDriver interface*

```
package qspiders;

import org.openqa.selenium.WebDriver;

import org.openqa.selenium.firefox.FirefoxDriver;


public class UpcastingToWebDriver_LaunchBrowser {

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

            //setting the path of the gecko driver executable

            System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

            //Launch the firefox browser

            WebDriver driver = new FirefoxDriver();

            //Enter the url

            driver.get("http://www.google.com");

            //Get the title of the google page and print it on the console

            String title = driver.getTitle();

            System.out.println("the title of the page is :"+ title);

            //Get the URL of the google page and print it on the console

            String currentUrl = driver.getCurrentUrl();

            System.out.println("the URL of the page is :"+ currentUrl);

            //Get the source code  of the google page and print it on the console

            String pageSource = driver.getPageSource();

            System.out.println("the source code  of the page is :"+ pageSource);

            //Halt the program execution for 2 seconds

            Thread.sleep(2000);

            // Close the browser

            driver.close();

             }
```

}

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Capturing Screenshot

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Question : **How to capture screenshots in Selenium ?**

Answer : **We capture screenshots in Selenium using *getScreenshotAs()* method of *TakesScreenshot* interface.**

Steps to take screenshot:

1. Create an object of specific browser related class (eg : FirefoxDriver) and then upcast it to WebDriver object (eg : driver)

2. Typecast the same upcasted driver object to TakesScreenshot interface type.

3. Using the typecasted object, we call getScreenshotAs(OutputType.FILE) which in turn returns the source file object.

4. Using the File IO operations (i.e FileUtils class), we store the screenshots to desired location in the project.

Selenium Code :

```
package pack1;
import java.io.File;
import java.io.IOException;
import java.util.Date;
import org.apache.commons.io.FileUtils;
import org.openqa.selenium.OutputType;
import org.openqa.selenium.TakesScreenshot;
```

```
public class CaptureScreenshot_ActiTIMEPage extends BaseClass{
	public static void main(String[] args) throws IOException {
		//Creating an object of Date class
		Date d = new Date();
		//Printing the actual date
		String date1 = d.toString();
		System.out.println(date1);
		//replacing the colon present in the date timestamp format to "_" using replaceAll()
		//method of String class
		String date2 = date1.replaceAll(":", "_");
		System.out.println(date2);
		//Enter the url
		driver.get("https://localhost:8080/login.do");

		//Typecasting the driver object to TakesScreenshot interface type.
		TakesScreenshot ts = (TakesScreenshot) driver;

		//getting the source file using getScreenshotAs() method and storing in a file
		File srcFile = ts.getScreenshotAs(OutputType.FILE);

		/*Created a folder called "screenshot" in the project directory
		Created another file by concatenating the date value  which has "_" in it
		(Underscore is the accepted character while creating a file in the project )*/

		File destFile = new File(".\\screenshot\\"+date2+"__actiTIMELoginPage.png");

		/*copyFile() method is a static method present in FileUtils class of JAVA
		storing the screenshot in the destination location*/

		FileUtils.copyFile(srcFile, destFile);

		//closing the browser
		driver.close();
	}
}
```

Question : ***Why capturing screenshot of the web pages is important in the project ?***

Answer :

- **We capture screenshots in order to debug the failed test scripts.**
- **It actually helps the automation test engineer to find the exact root cause of the issue in the application at the earliest.**

Following are the possible scenarios after the script is failed:

- **Whenever an automation script is failed, we first manually execute the steps to check whether there is any issue in the application or the issue is with the script.**
- **If the script fails due to an issue in the script itself, we fix the script and re-run it till it is passed.**
- **If there is an issue in the application due to which the script is failed, then we log defect against the same issue. In this way, automation team gets credibility in the project.**

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Handling Browser navigation

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Question : ***How to navigate within the browser ?***

Answer : **Using navigate() methods.**

```
public class BrowserNavigationExample {
	public static void main(String[] args) throws InterruptedException {
		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
		WebDriver driver = new FirefoxDriver();
		//Enter the url
		driver.get("http://localhost:8080/login.do");
		driver.navigate().to("http://www.gmail.com");
		Thread.sleep(3000);
		driver.navigate().back();
		Thread.sleep(3000);
		driver.navigate().forward();
		Thread.sleep(3000);
```

```
                driver.navigate().refresh();
                driver.close();
        }
}
```

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Handling Mouse and Keyboard Operations

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Question : ***How to handle mouse movement and keyboard Operations ?***

Answer :

- *We handle mouse movement in Selenium using mouseMove() method of Robot Class.*
- *Similarly, to handle keyboard operations, we use KeyPress() and KeyRelease() methods of Robot Class*

Selenium Code to demonstrate an example of Mouse movement and Keyboard operation :

```
package test;

import java.awt.AWTException;

import java.awt.Robot;

import java.awt.event.KeyEvent;

import org.openqa.selenium.WebDriver;

import org.openqa.selenium.firefox.FirefoxDriver;

public class Keyboard_Mouse_Operations {

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

                System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

                //1. Launch the browser

                WebDriver driver = new FirefoxDriver();

                //2. enter the url -
```

```
                driver.navigate().to("http://localhost:8080/login.do");

                Thread.sleep(5000);

                //Creating an object of Robot Class

                Robot r = new Robot();

                //move the mouse by x and y coordinate

                r.mouseMove(300, 500);

                //press ALT key from keyboard

                r.keyPress(KeyEvent.VK_ALT);

                //press F key from keyboard

                r.keyPress(KeyEvent.VK_F);

                //Release F key from keyboard

                r.keyRelease(KeyEvent.VK_F);

                //Release Alt key from keyboard

                r.keyRelease(KeyEvent.VK_ALT);

                Thread.sleep(3000);

                //Press W key from keyboard to open a new private window

                r.keyPress(KeyEvent.VK_W);

                //Release W key from keyboard

                r.keyRelease(KeyEvent.VK_W);

                Thread.sleep(3000);

                // It will close only the current browser window

                //driver.close();

                // It will close all the browser windows opened by Selenium

                driver.quit();

 }}

**********************************************************************************************
**********
```

Identification of WebElements using Locators

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What is an WebElement ?

1. **Any element present on a web page is called as web element.**

2. **Developers use HTLM code to develop web pages.**

3. **For testing purpose, we can also create web page using HTML code.**

4. **In order to create a web page, we need to write HTML code in any text pad (eg : notepad and save the file with .html extension)**

Create a sample web page using HTML as mentioned below.

```
<html>
    <body>
        UN : <input type="text" id = "username" value = "admin">
        PWD: <input type="text" id= "pass" value = "manager">
        <a href="http://localhost:8080/login.do"> Click ActiTIME Link</a>
    </body>
</html>
```

In the above HTML tree, every element should have one of the 3 options.

1. **Tagname (this is mandatory for all the elements)**
2. **Attributes (Optional)**
3. **Text (Optional)**

Example of Tagname in the above HTML Tree structure:

- **html,**
- **body,**
- **input,**
- **a**

Example of Attributes in the above HTML Tree structure:

- **type = "text"**
- **id = “username”**
- **value = "admin"**

Format : **attributeName = "attributeValue"**

Example of Text in the above HTML Tree structure:

- **Click ActiTIME link**

What are Locators ?

- **Locators are used to identify the web elements on the web page.**
- **We have 8 types of locators in Selenium using which findElement() methods identifies elements on the web page:**
  1. **id**
  2. **name**
  3. **tagName**
  4. **className**
  5. **linkText**
  6. **partialLinkText**
  7. **xpath**
  8. **cssSelector**
- **findElement() method returns the address of the web elements on the web page and the return type is WebElement.**
- **If the specified locators returns multiple elements, then findElement() method returns the address of the first matching element.**
- **If the specified locators returns No element, then findElement() method throws an exception called "NoSuchElementException".**

Note :

In below Selenium code snippet,

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

1. `driver.findElement(By.id(""));`
2. `driver.findElement(By.name(""));`
3. `driver.findElement(By.tagName(""));`
4. `driver.findElement(By.class(""))`
5. `driver.findElement(By.linkText(""))`
6. `driver.findElement(By.partialLinkText(""))`
7. `driver.findElement(By.xpath(""))`

8. driver.findElement(By.cssSelector(""))

1. (By is an abstract class and all the locators specified/highlighted above are static methods of By class and hence, we call directly by using <classname.staticConcrete> methods

Below is the code to demonstrate the usage of locators in selenium while identifying the web elements on the web page:

```
package pack1;

import org.openqa.selenium.By;

import org.openqa.selenium.WebDriver;

import org.openqa.selenium.WebElement;

import org.openqa.selenium.firefox.FirefoxDriver;


public class LocatorsExample{

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

            System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

            WebDriver driver = new FirefoxDriver();

            // Enter the URL of your own created sample web page

            driver.get("file:///C:/Users/admin/Desktop/UN.html");

            // Used "id" locator to find USERNAME text box

            WebElement unTB = driver.findElement(By.id("user"));

            //Clear the existing value present in the text box

            unTB.clear();

            // Enter value into the USERNAME text box

            unTB.sendKeys("ajit.biswas@gmail.com");

            // Used "name" locator to find Password text box

            WebElement passTB = driver.findElement(By.name("n1"));

            //Clear the existing value present in the text box

            passTB.clear();
```

```
        //Halt the program execution for 2 seconds
        Thread.sleep(2000);
        // Enter value into the Password text box
        passTB.sendKeys("Qspiders123");
        // Find the address of ActiTIME Link and click
        driver.findElement(By.linkText("Click ActiTIME link")).click();
        Thread.sleep(2000);
}}
```

Important notes on LinkText and PartialLinkText locator

- **Out of all the locators, linkText and PartialLinkText are used to identify only the links present on the webpage.(elements whose tagname is "a" -- a stands for anchor)**
- **LinkText locator should be used when the text of the link is constant**
- **PartialLinkText locator should be used when certain part of the link text is getting changed everytime the page is loaded. i.e for partially dynamically changing text, we use partialLinkText locator**
- **To handle those elements whose text changes completely, we can't use partialLInkText locator. It should be handled by another locator called "xpath"**
- **If we use try to use these 2 locators on other type of elements (except Links), then we get "NoSuchElementException"**

Steps to install firebug and firepath add-ons in Firefox browser :

1. **We need to install firebug and firepath addons in firefox browser to write cssSelector expression and then evaluate whether the expression is correct or not.**
2. **To install firebug addon in firefox browser :**

   TOOLS -- > ADD-ONS → EXTENSIONS → search firebug -- > and click on Install -- Restart the browser.

3. **To install firepath addon in firefox browser :**

   TOOLS -- > ADD-ONS → EXTENSIONS → search firepath -- > and click on Install -- Restart the browser.

Steps to write and evaluate cssSelector expression in firefox browser :

1. **Navigate to the web page -- > right click anywhere on the web page → select inspect element with firebug or Press F12 from keyboard.**
2. **Go to firepath tab and select CSS option.**

3. **Type the cssSelector expression and hit Enter key from the keyboard, it will highlight the corresponding matching element on the web page.**

Steps to write and evaluate cssSelector expression in Chrome browser :

1. **In order to write cssSelector expression in chrome browser, we don't need any add-ons as such.**
2. **Navigate to the web page -- > right click anywhere on the web page → Press F12 from keyboard or select inspect element, it will open the Developer tool section with Elements tab selected by default.**
3. **Press Ctrl+F and write the cssSelector expression, it will highlight the source code of the matching element.**
4. **Place the cursor on the highlighted source code, it will highlight the corresponding element present on the web page.**

cssSelector locator :

1. **It is one of the locator in Selenium using which we identify web elements on the web page.**
2. **It stands for Cascading Style Sheet.**
3. **The standard syntax for cssSelector expression is**

tagName[attributeName = 'attributeValue']

OR

here, tagName is not mandatory.

[attributeName = "attributeValue"]

Sample Element html code for Login button:

<input type="textbox" id= "ID123" class = "inputText" value="Login">

Following are the 4 different ways of writing cssSelector expression for above mentioned Login button :

CssSelector Expression using type as an attribute :: input[type='textbox']

Actual code to identify Login button using FindElement() method:

driver.findElement(By.cssSelector("input[type='textbox']"))

CssSelector Expression using id as an attribute : input[id='ID123']

Actual code to identify Login button using FindElement() method:

driver.findElement(By.cssSelector("input[id='ID123']"))

CssSelector Expression using class as an attribute : input[class='inputText']

Actual code to identify Login button using FindElement() method:

driver.findElement(By.cssSelector("input[class='inputText']"))

CssSelector Expression using value as an attribute : input[value='Login']

Actual code to identify Login button using FindElement() method:

driver.findElement(By.cssSelector("input[value='Login']"))

Important Note :

While deriving cssSelector expression, we can use either one attribute or multiple attributes till we found unique matching element on the web page.

eg : input[type='textbox'][id='ID123'][class='inputText'][value='Login']

4. CssSelector can also be written using ID and Class. Here, ID is represented by " # " and className is represented by dot operator(.)

Sample Element html code for Login button:

<input type="textbox" id= "ID123" class = "inputText" value="Login">

4.1 CssSelector expression for the above Login button can be written using ID as

input#ID123 (syntax = Tagname#id)

OR

#ID123 (syntax = #id) [note : tagname is not mandatory]

Actual code to identify Login button using FindElement() method is below :

driver.findElement(By.cssSelector("#ID123"))

4.2 CssSelector expression for the above Login button can be written using ID as shown below

input.inputText (syntax = tagname.classname)

OR

".inputText" (syntax = .classname) [note : tagname is not mandatory]

Actual code to identify Login button using FindElement() method:

driver.findElement(By.cssSelector(".inputText"))

Limitation of cssSelector :

1. **It does not support text i.e we can identify element using text of the element.**
2. **It does not support backward traversing.**
3. **It doesn't support index**

XPATH :

1. **xpath is one of the locator in selenium using which we identify objects or elements on the web page and perform specific actions to carry out automation testing.**
2. **xpath is the path of an element in the html tree.**
3. **xpath are of 2 types.**

   3.1) Absolute xpath

   3.2) Relative xpath

Absolute xpath :

1. **It refers to the path of the element right from the root node to the destination element.**
2. **While writing the absolute xpath, We use single forward slash (/) to traverse through each immediate child element in the html tree.**

3. **In the below sample html tree,**

document

|_____html

|

---- body

|

------> a

Absolute xpath can be written in the following ways.

html/body/a

or

./html/body/a

(Note :- here, dot (.) refers to the current document or the current web page, using dot here is optional)

4. Using absolute xpath in selenium code as shown below.

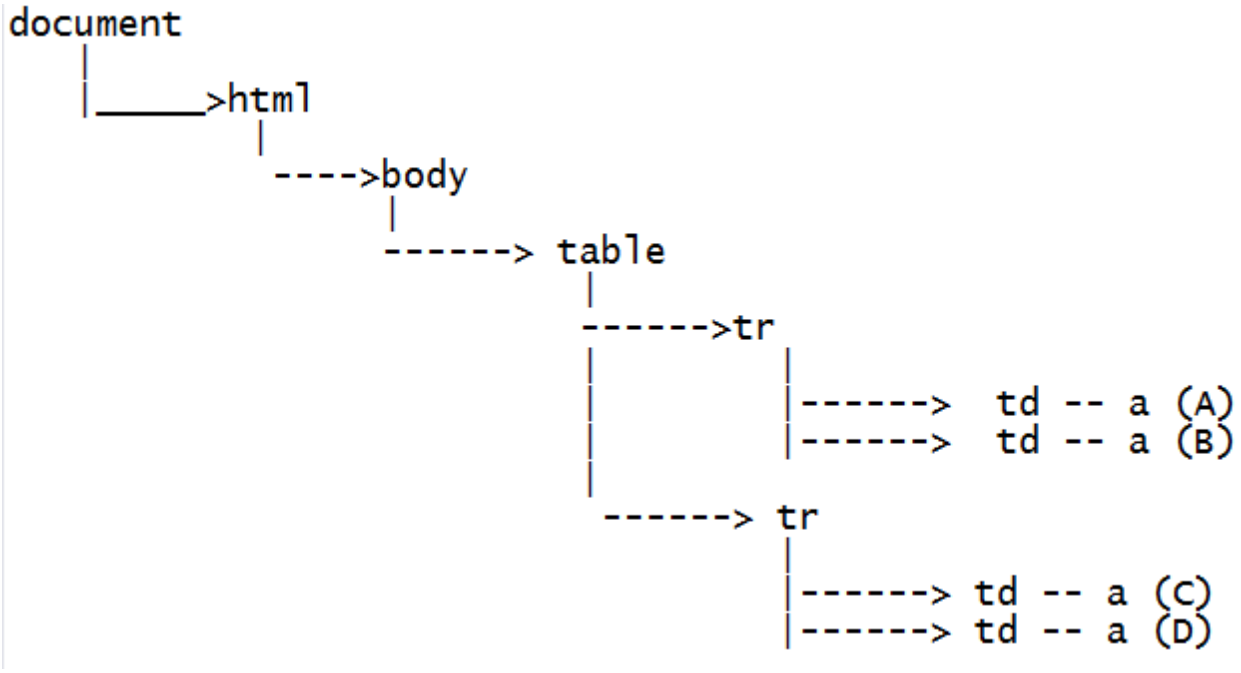
driver.findElement(By.xpath("html/body/a")).click();

5. In xpath, if there are multiple siblings with same tagname, then the index starts from 1.

6.In case of multiple siblings with same tagname, if we don't use index, then it considers ALL the siblings.

7. We can join multiple xpath using pipeline operator (|)

Considering the below sample html tree, write Absolute xpath and Relative xpath expressions.



Fill in the table with Absolute xpath expressions using the sample html tree given above.

Absolute xpath expressions	Matching Element
	A
	B
	C
	D
	AB
	CD

	AC
	BD
	AD
	BC
	ABC
	ABD
	ABCD

Relative xpath :

1. **In Absolute xpath, we write the path of the element right from the root node and hence, the expression for absolute xpath is lengthy.**
2. **In order to reduce the length of the expression, we go for Relative xpath.**
3. **In Relative xpath, we use double forward slash (//), which represents any descendant.**

Fill in the table with relative xpath expressions using the sample html tree given above.

Relative xpath expressions	**Matching Element**
	A
	B
	C
	D
	AB
	CD
	AC
	BD
	AD
	BC
	ABC
	ABD

	ABCD

Interview questions :

1. **what is the difference between '/' and '//' ?**

Answer : "/" refers to the immediate child element in the html tree.

"//" refers to any element in the html tree. It also represent any descendant.

2. What are the types of xpath?

Ans: Absolute and Relative xpath.

3. Derive an xpath which matches all the links present on a web page ?

Ans : //a

4. Derive an xpath which matches all the image present on a web page ?

Ans : //img

5. Derive an xpath which matches all the links and images present on a web page ?

Ans : //a | //img

6. Derive an xpath which matches all the 2nd links present on a web page ?

//a[2]

7. Derive an xpath which matches all the links present inside a table present on a web page ?

//table//a

8. Difference between "//a"and "//table//a " ?

Ans : //a → refers to all the links present on the webpage.

//table//a → refers to all the links present within all the tables present on the webpage.

xpath by Attribute :

1. **xpath expression can be written using attribute of the web element.**
2. **Based on the situation, we would use either single attribute or multiple attributes to find an element on a web page.**
3. **Using single attribute in xpath expression, if it returns one matching element, then we would use single attribute only.**

4. **In case, by using single attribute in xpath expression, if it returns multiple matching elements on the web page, then we would go for using multiple attributes in the xpath expression till we get one matching element.**

xpath expression using Attribute :

1. **using single attribute :**

Syntax : **//tagname[@attributeName = 'attributeValue']**

//tagname[NOT(@attributeName = 'attributeValue')]

Sample application : actiTIME application

url : https://demo.actitime.com/login.do

Write xpath for below few elements on above actiTIME login page :

Web Element	xpath Expression
username textbox	//input[@id='username']
password textbox	//input[@name='pwd']
login button	//a[@id='loginButton']/div
checkbox	//input[@type='checkbox']
clock image	//td[@id='logoContainer']/div/img

Usage in selenium code :

driver.findElement(By.xpath("paste any xpath here from above table"))

2. **Using multiple attribute :**

xpath Syntax :

- **//tagName[@AN1='AV1'][@AN2='AV2']**
- **//tagName[@AN1='AV1'] | //tagName[@AN2='AV2']**

Element : View licence link

html code after inspecting the element using F12 key:

View License

xpath expression using "href" and "onclick" attributes :

//a[@href='javascript:void(0)' and @onclick='openLicensePopup();']

Usage in selenium code :

driver.findElement(By.xpath("//a[@href='javascript:void(0)']

[@onclick='openLicensePopup();']"))

Assignment :

Write xpath expression for below 7 elements present on actiTIME login page

Elements :

1. **UserName**
2. **Password**
3. **Login Button**
4. **Check box**
5. **Actitime Image**
6. **View Licence link**
7. **actiTIME Inc link**

Use the below format (Sample example for actiTIME Inc Link):

html code for <actiTIME Inc.> :

actiTIME Inc.

xpath syntax

//tagname[@AN1 = 'AV1']

1. using href attribute:

//a[@href = 'http://www.actitime.com']

2. using target attribute

//a[@target = '_blank']

Note: Use all the attributes of an element to write xpath expression

xpath expression using text() function :

1. In the html code of an element, if attribute is duplicate or attribute itself is not present, then use text() function to identify the element.
2. In order to use text() function, the element should have text in the element's html code.

Syntax :

//tagName[text()='text value of the element']

OR

//tagName[.='text value of the element']

Note : Instead of text(), we can use dot (.) , the problem here with using dot (.) is sometimes, it returns the hidden element also present on the webpage. which might confuse the user. So the best practice is to use text() instead of using dot.

xpath expression using text() function for below elements present on actiTIME login page.

Web Element	xpath Expression using text() function
login button	//div[text()='Login ']
actiTIME 2017.4 link	//nobr[text()='actiTIME 2017.4']
actiTIME Inc link	//a[text()='actiTIME Inc.']

xpath expression using contains() function :

1. In the html code of an element, if the attribute value or the text is changing partially, then use contains() function to identify the element.
2. In order to use contains() function, the element should have either attribute value or text value.

Syntax :

- //tagName[contains(@attributeName,'attributeValue')]
- //tagName[contains(text(),'text value of the element')]

xpath expression using contains() function for below elements present on actiTIME login page.

Web Element	xpath Expression using contains() function	Using
actiTIME 2017.4 link	//nobr[contains(text(),'actiTIME 2017')] This will work for any version that starts with 2017 eg: 2017.1, 2017.2 etc	contains() with text()
Clock Image	//img[contains(@src,'timer')]	contains() with attribute

3. We use contains() function when the text value is very lengthy or the attribute value is very lengthy.

eg: xpath to identify error message present on actitime login page (Click on login button without entering username and password to get the error message)

//span[contains(text(),'invalid')]

Program to illustrate xpath by attributes, text() function, contains() function and their usages with attributes and text values.

```
public class XpathUsingAttribute_Actitime extends BaseClass{
        public static void main(String[] args) throws InterruptedException {
                System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
                WebDriver driver = new FirefoxDriver();
                //Enter the url of actiTIME application
                driver.get("http://localhost:8080/login.do");
                //xpath using multiple attributes
                String xp = "//input[@class='textField'][ @id = 'username']";
                Thread.sleep(2000);
                //Enter admin into username text box
                driver.findElement(By.xpath(xp)).sendKeys("admin");
                Thread.sleep(2000);
                //find password element using xpath by attribute and enter manager in to password textbox.

                driver.findElement(By.xpath("//input[@name='pwd']")).sendKeys("manager");
                Thread.sleep(2000);
                //find an image on the web page whose attributes (src)contains a value called timer
```

```
        WebElement clock = driver.findElement(By.xpath("//img[contains(@src,'timer')]"));
        //store the width value of the clock image into a variable called widthValue
        String widthValue = clock.getAttribute("width");
        //Print the width of the clock image
        System.out.println("the width is :"+widthValue);
        //Print the height of the clock image
        System.out.println("the height of the clock element is : "+ clock.getAttribute("height"));
        //xpath using text() function
        driver.findElement(By.xpath("//div[text()='Login ']")).click();
        Thread.sleep(2000);
        //xpath using contains() function and text() function
        driver.findElement(By.xpath("//a[@id='loginButton']//div[contains(text(),'Login')]")).click();
        Thread.sleep(2000);
        driver.close();
    }
}
```

xpath expression using starts-with() function :

1. We use starts-with() function to identify those elements whose text value starts with some specified value.

   *xpath using **contains()** function:*

   //[contains(text(),'actiTIME')] - this xpath will return 6 matching element on login page of actiTIME application.

   *xpath using **starts-with()** function,*

   //[starts-with(text(),'actiTIME')] - this xpath will return only 3 matching element on login page of actiTIME application as the text value of these 3 elements starts with “actiTIME” text

Handling completely dynamic links :

1. When the text value of the elements is completely changing, then we can't use functions like "contains()", "starts-with()" etc to handle those elements.
2. In such cases, we identify the dynamically changing element using the nearby unique element. We call this concept as independent dependent xpath.

Steps to derive xpath expression using Independent dependent concept :

1. Identify the independent element on the webpage and inspect the element to view the source code and then derive the xpath expression.
2. Place your cursor on the independent element source code and move the mouse pointer upward till it highlights both the independent and dependent elements which is the common parent element.

   Add /.. to the xpath of independent element already noted down in step 1 to

   get the xpath of common parent.

3. Use mouse pointer to navigate from common parent to the desired dependent

   element and derive the xpath of the dependent element.

4. Write the xpath from Independent element to Common parent and then write

   the xpath from Common parent to dependent element.

   Example 1:

   Write xpath to identify **version** of Java Language present in Selenium Download page.

   //td[.='Java']/../td[2]

   Example 2:

   Write xpath to identify **Release data** of Java Language present in Selenium Download

   page.

   //td[.='Java']/../td[3]

   Example 3:

   Write xpath to identify **Download link** of Java present in Selenium Download

   page.

   //td[.='Java']/../td[4]/a

   Note :

   - In case, if the column number of **Download link** changes, then the above xpath will fail to identify the link as we are hard coding the column position as 4 in the above case.

In order to handle this, we will write xpath in such a way that it works irrespective of the column position as shown below.

//td[.='Java']/..//a[.='Download']

Program 1 :

Write a script to click on the download link of Java in Selenium website

Scenario :

1. Login in to Selenium official website

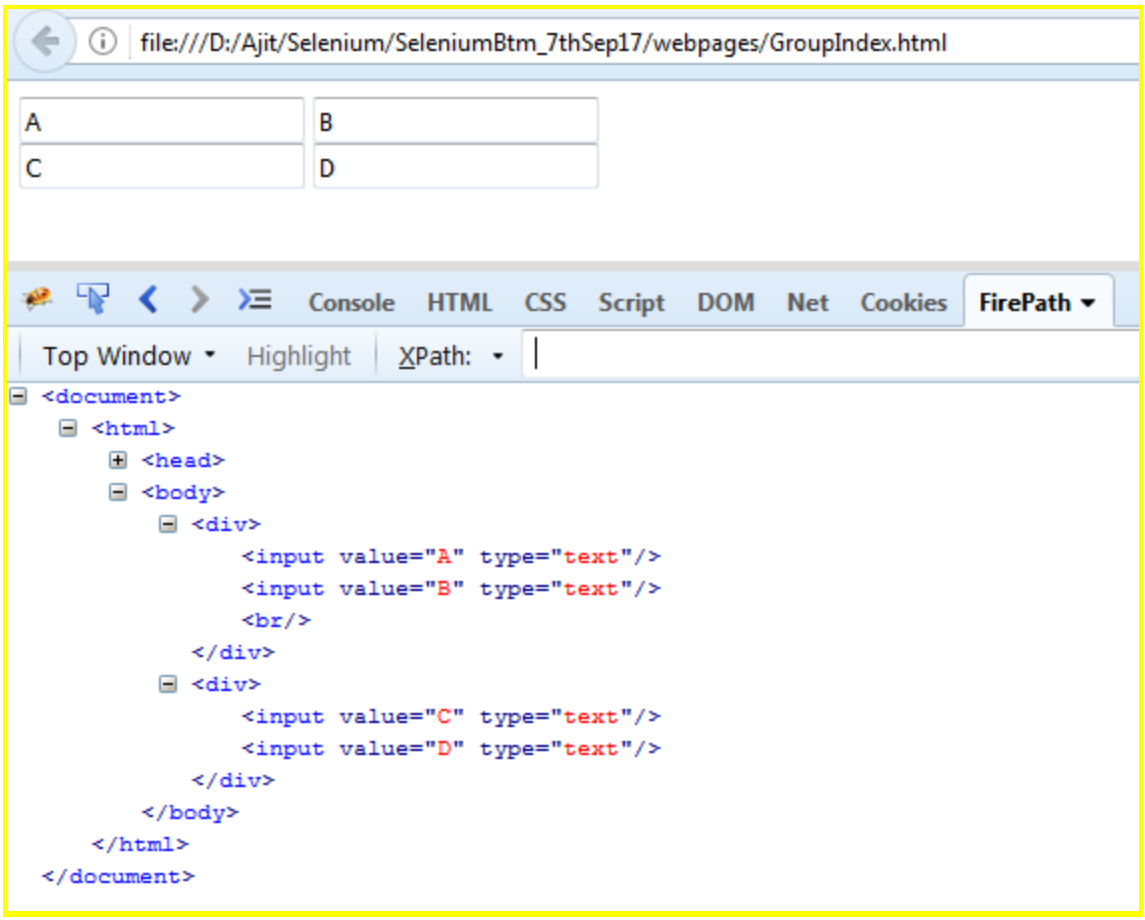
   Url : http://www.seleniumhq.org/download

2. Click on the Download link for Java language.

```
public class Independent_Dependent_Xpath_Seleniumsite_javaDownload{

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

        System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

         WebDriver driver = new FirefoxDriver();

        // enter the url

         driver.get("http://www.seleniumhq.org/download/");

         Thread.sleep(3000);

        // xpath using independent and dependent concept

    driver.findElement(By.xpath("//td[.='Java']/..//a[.='Download']")).click();

   }

}
```

Group Index :

Sample Html tree :



xpaths using Group Index to identify the elements in the above sample tree:

xpath using Group Index	Matching Element
//input	ABCD
(//input)[1]	A
(//input)[2]	B
(//input)[3]	C
(//input)[4]	D
(//input)[last()]	D
(//input)[last()-1]	C
//input[1]	AC
(//input[1])[1]	A
(//input[1])[2]	C
(//input[1])[last()]	C
//input[2]	BD
(//input[2])[1]	B
(//input[2])[2]	D
(//input[2])[last()]	D

1. In Group index, we write xpath expression within the braces and then we write the index outside the braces.
2. Internally, it executes the xpath expression first and stores the result in an xpath array whose index starts with 1
3. last() is a function that is used to retrieve the last element present in the xpath array.

Program 2 :

Click on the **Set by default** link of **testing** present in **type of work (Setting tab)** of actiTIME application

Scenario :

3. Login in to actime application

   Url : http://localhost:8080/login.do

   UN - admin, PWD - manager

4. click on Settings
5. Click on the Types of Work link present in the window
6. click on the Set by Default link for a type of work called “testing”

Use the below hints :

1. Use groupIndex concept to find **Setting** Element and
2. Independent and dependent concept to find **Set by Default** link

```
public class Xpaths_Independent_dependent_actitime_setbydefault {

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

    System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

            WebDriver driver = new FirefoxDriver();

            driver.get("http://localhost:8080/login.do");

            driver.findElement(By.id("username")).sendKeys("admin");

            driver.findElement(By.name("pwd")).sendKeys("manager");

           //click on login button

            driver.findElement(By.xpath("//div[.='Login ']")).click();

            Thread.sleep(4000);

           //Click on settings tab on home page
           driver.findElement(By.xpath("(//div[@class='popup_menu_label'])[1]")).click();

            Thread.sleep(2000);

           //Click on Types of Work link

            driver.findElement(By.xpath("//a[.='Types of Work']")).click();

            Thread.sleep(4000);

           //Click on testing link present under Type of work column

            driver.findElement(By.xpath("//a[.='testing']/../..//a[.='set by default']")).click();

            driver.close();

    }

}
```

Create a html file as shown below.

TableforXPATH.html - Notepad

File Edit Format View Help

```
<table border="1">

<tr>
<td> CV</td>
<td> <input type="checkbox"/></td>
</tr>
<tr>
<td> CV</td>
<td> <input type="checkbox"/></td>
</tr>
<tr>
<td> CV</td>
<td> <input type="checkbox"/></td>
</tr>
<tr>
<td> CV</td>
<td> <input type="checkbox"/></td>
</tr>
<tr>
<td> CV</td>
<td> <input type="checkbox"/></td>
</tr>

</table>
```

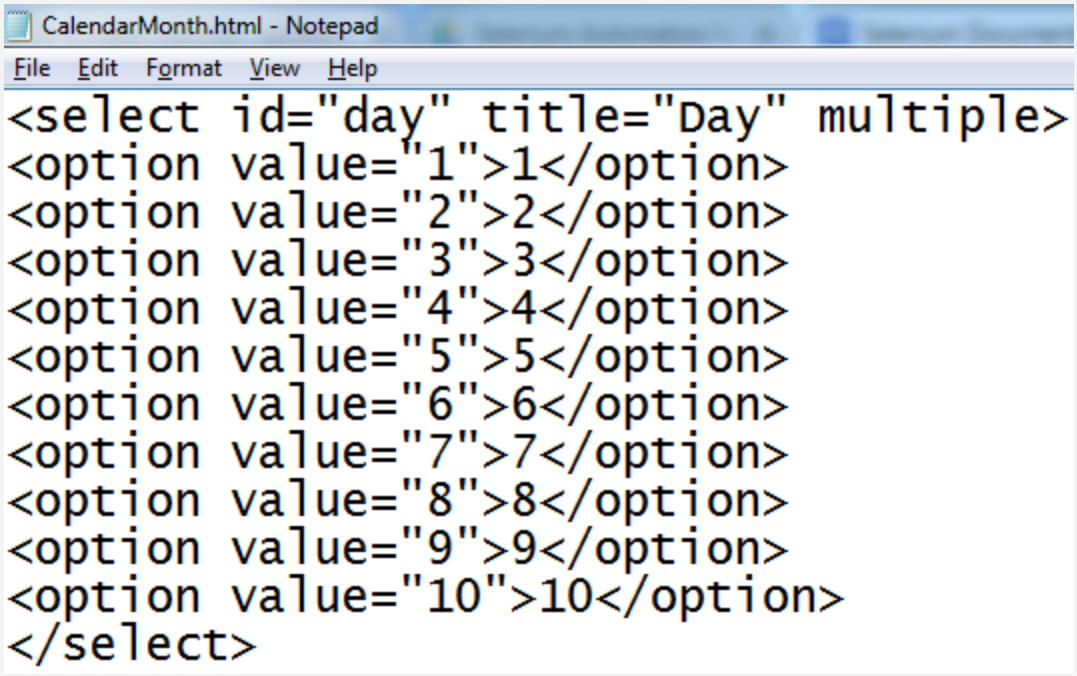
Xpath expression using GroupIndex concept :

XPATH using Group Index	Matching Element
//input[@type='checkbox']	ABCDE
(//input[@type='checkbox'])[1]	A
(//input[@type='checkbox'])[LAST()]	E
(//input[@type='checkbox'])[POSITION()=3]	C
(//input[@type='checkbox'])[POSITION()>=3]	CDE
(//input[@type='checkbox'])[POSITION() < 3]	AB
(//input[@type='checkbox'])[POSITION() = 1 OR Position() = last()]	AE

Xpath Axes :

1. In xpath, navigating from one element to another element is called ***traversing***.
2. In order to traverse from one element to another, we use xpath axes.
3. We have the following 6 xpath axes in selenium.
    - child
    - descendant
    - parent
    - ancestor
    - preceding-sibling
    - following-sibling

Create a .html file with the below html code



Following are the syntax to use all the xpath axes in Selenium.

child Axes:

eg : /html → can be written using ***child*** axes as → child::html

descendant Axes:

eg : //option[5] → can be written using ***descendant*** axes as → descendant::option[5]

parent Axes:

eg : //option[5]/.. → can be written using ***parent*** axes as → descendant::option[5]/parent::select

ancestor Axes:

eg : //option[5]/../.. → can be written using ancestor axes as → descendant::option[5]/ancestor::body

preceding-sibling Axes:

eg : → xpath using ***preceding-sibling*** axes → descendant::option[5]/preceding-sibling::option[1] - it will select 4 in the list box

following-sibling Axes:

eg : → xpath using ***following-sibling*** axes → descendant::option[5]/following-sibling::option[1] - it will select 6 in the list box

Following table illustrates a detailed level understanding of all the xpath axes :

xpath axes type	xpath using axes	xpath using shortcut	Matching Element (Months)
child	html/body/select/child::option[5]	html/body/select/option[5]	5
descendant	descendant::option[5]	//option[5]	5
parent	descendant::option[5]/..	//option[5]/..	It will highlight SELECT tag
ancestor	//option[5]/ancestor::html	no short cut available for ancestor axes	It will highlight HTML tag
preceding-sibling	//option[5]/preceding-sibling::option	No short cut available for preceding-sibling axes	1 2 3 4
	//option[5]/preceding-sibling::option[1]		4
	//option[5]/preceding-sibling::option[2]		3
	//option[5]/preceding-sibling::option[3]		2
	//option[5]/preceding-sibling::option[4]		1
	//option[5]/preceding-sibling::option[last()]		1
	//option[5]/preceding-sibling::option[last()-1]		2
	//option[5]/preceding-sibling::option[position()=1]		4
	//option[5]/preceding-sibling::option[position()=last()]		1
following-sibling	//option[5]/following-sibling::option[1]	No short cut available for preceding-sibling axes	6
	//option[5]/following-sibling::option[2]		7
	//option[5]/following-sibling::option[3]		8
	//option[5]/following-sibling::option[4]		9
	//option[5]/following-sibling::option[last()]		10
	//option[5]/following-sibling::option[position()=last()]		10

Difference between CssSelector and Xpath

CssSelector	Xpath
It is faster	It is slower
text() function is not supported	text() function is supported
backward traversing is not supported	backward traversing is supported
groupIndex is not supported	groupIndex is supported

Imp Note :

In CssSelector, we traverse through the element using this symbol " > "

Interview Questions :

How do you ensure the required page is displayed or not ?

We can use following checkpoints to validate the required page is displayed or not.

1. using title of the page
2. using URL of the page
3. using any unique element on the page

Write a program to validate Actitime application home page using TITLE of the page

```
public class VerifyhomepageUsingTitle {
		public static void main(String[] args) throws InterruptedException {
		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
		 WebDriver driver = new FirefoxDriver();
		 driver.get("http://localhost:8080/login.do");
		  driver.findElement(By.id("username")).sendKeys("admin");
		driver.findElement(By.name("pwd")).sendKeys("manager");
		driver.findElement(By.xpath("//div[.='Login ']")).click();
		Thread.sleep(3000);
		String expectedTitle = "Enter Time";
		String actualTitle = driver.getTitle();
		//If actual title contains "Enter Time" text then home page is displayed.
		if (actualTitle.contains(expectedTitle)) {
		System.out.println("Home page is displayed");
		} else{
		System.out.println("Home page is NOT displayed");
		}
	}
}
```

*Write a program to validate Actitime application home page using **Current URL** of the page*

```
public class VerifyhomepageUsingUrl {
```

```
	public static void main(String[] args) throws InterruptedException {
	System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
			WebDriver driver = new FirefoxDriver();
			 driver.get("http://localhost:8080/login.do");
			 driver.findElement(By.id("username")).sendKeys("admin");
			 driver.findElement(By.name("pwd")).sendKeys("manager");
			 driver.findElement(By.xpath("//div[.='Login ']")).click();
			 Thread.sleep(3000);
			 String expectedUrl = "submit";
			 String actualUrl = driver.getCurrentUrl();
			 if (actualUrl.contains(expectedUrl)) {
			 System.out.println("Home page is displayed");
			} else{
			System.out.println("Home page is NOT displayed");
			}
	}
}
```

*Write a program to validate Actitime application home page using **any UNIQUE element** on the page*

```
public class VerifyhomepageUsingUniqueElement {
	public static void main(String[] args) throws InterruptedException {
	System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
	 WebDriver driver = new FirefoxDriver();
	 driver.get("http://localhost:8080/login.do");
	 driver.findElement(By.id("username")).sendKeys("admin");
	driver.findElement(By.name("pwd")).sendKeys("manager");
	driver.findElement(By.xpath("//div[.='Login ']")).click();
	Thread.sleep(3000);
	WebElement logoutBtn = driver.findElement(By.xpath("//a[.='Logout']"));
	if (logoutBtn.isDisplayed()) {
```

```
		System.out.println("Home page is displayed");
		} else{
		System.out.println("Home page is NOT displayed");
		}
}
}
```

Write a program to validate Username and Password fields on Actitime login page are aligned or not ?

```
public class VerifyUNandPWDalignment extends BaseClass{
	public static void main(String[] args) {
		driver.get("http://localhost:8080/login.do");
		WebElement unTB = driver.findElement(By.id("username"));
		int un_x = unTB.getLocation().getX();
		int un_width = unTB.getSize().getWidth();
		int un_height = unTB.getSize().getHeight();
		WebElement pwTB = driver.findElement(By.name("pwd"));
		int pw_x = pwTB.getLocation().getX();
		int pw_width = pwTB.getSize().getWidth();
		int pw_height = pwTB.getSize().getHeight();
		if (un_x == pw_x && un_width==pw_width && un_height==pw_height) {
			System.out.println("Username and password text box are aligned");
		} else {
			System.out.println("Username and password text box are NOT aligned");
		}
	}
}
```

Assignment :

*Write a program to validate Username and Password fields on **Facebook login page** are aligned or not ?*

```
public class VerifyFB_UNandPWDfieldsAreAligned_intheSameRow {
```

```
	public static void main(String[] args) throws InterruptedException {
		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
		WebDriver driver = new FirefoxDriver();
		driver.get("https://www.facebook.com/");
		WebElement unTB = driver.findElement(By.id("email"));
		// get the y-coordinate of username field
		int username_Ycordinate = unTB.getLocation().getY();
		System.out.println(username_Ycordinate);
		WebElement pwdTB = driver.findElement(By.name("pass"));
		// get the y-coordinate of password field
		int password_Ycordinate = pwdTB.getLocation().getY();
		System.out.println(password_Ycordinate);
		//check whether the Y-coordinate of username and  password field are same
		if (username_Ycordinate==password_Ycordinate) {
		System.out.println("Both username and password fields are displayed in the same row");
		}else{
		System.out.println("username and password fields are NOT aligned in the same row");
		}
	}
}
```

*Write a program to validate **the height and width of Username and Password** fields on **Facebook login page** are same or not ?*

```
public class VerifyActime_UNandPassword_HeightandWidth {
	public static void main(String[] args) throws InterruptedException {
		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
		WebDriver driver = new FirefoxDriver();
		driver.get("http://localhost:8080/login.do");
		//find the username field
```

```
                WebElement unTB = driver.findElement(By.id("username"));
                //store the height of username
                int username_height = unTB.getSize().getHeight();
                //store the width of username
                int username_width = unTB.getSize().getWidth();
                System.out.println(username_height);
                System.out.println(username_width);
                //find the password field
                WebElement pwdTB = driver.findElement(By.name("pwd"));
                //store the height of password
                int password_height = pwdTB.getSize().getHeight();
                //store the width of password
                int password_width = pwdTB.getSize().getWidth();
                System.out.println(password_height);
                System.out.println(password_width);
                //check the height and width of username and password fields are same
                if (username_height==password_height && username_width==password_width) {
                System.out.println("Username and password fields are aligned”);
                }else{
                System.out.println("Username and password fields are NOT aligned");
                }


                }
        }
}
```

*Write a script to validate that **the username field** on **Facebook login page** is **smaller** than the **Mobile Number field** ?*

```
public class VerifyFB_Usernamefield_lessthanMobileNumberField {
        public static void main(String[] args) {
```

```
		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

		WebDriver driver = new FirefoxDriver();

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

		WebElement unTB = driver.findElement(By.id("email"));

		int username_width = unTB.getSize().getWidth();

		System.out.println(username_width);

		//Identify the mobile number text box

		WebElement mobileNumTB = driver.findElement(By.xpath("//input[contains(@aria-label,'Mobile
		number or email address')]"));

		int mobNumWidth = mobileNumTB.getSize().getWidth();

		System.out.println(mobNumWidth);

		//Compare the width of both username and mobilenumber text box

		if (username_width==mobNumWidth) {

		System.out.println("Size of Both username and password fields are same" +username_width+" =
		" + mobNumWidth);

		}else{

		System.out.println("Size of username and password fields are NOT same that is : "
		+username_width+" Not equals to " + mobNumWidth);

		}

	}

}
```

Interview Question :

Write a script to enter a text into the focussed element (eg : textbox).

```
	public class EnterTextintoFocussedElement {

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

			System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

			WebDriver driver = new FirefoxDriver();

			driver.get("http://localhost:8080/login.do");

			//entering text into the focussed element
```

```
                    driver.switchTo().activeElement().sendKeys("admin");

                }

        }
```

How do you remove value present in username text box of Actitime application ?

Using **clear()** method of WebElement interface.

Selenium code :

```
public class RemoveValuefromText_usingClearMethod{

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

                driver.get("http://localhost:8080/login.do");

                driver.findElement(By.id("username")).sendKeys("ajit");

                Thread.sleep(2000);

                String value = driver.findElement(By.id("username")).getAttribute("value");

                System.out.println("Value present inside the text box is : "+value);

                driver.findElement(By.id("username")).clear();

                Thread.sleep(2000);

                driver.findElement(By.id("username")).sendKeys("againEnteredAjit");

                Thread.sleep(2000);

                        driver.findElement(By.id("username")).sendKeys(Keys.CONTROL+"a"+Keys.DELETE); //
                this line will actually delete the value if there is no space in the text entered

                // if there is a space between two words in the username field, we have to use the below lines of
                code

                driver.findElement(By.id("username")).sendKeys(Keys.CONTROL+"a") ;

                driver.findElement(By.id("username")).sendKeys(Keys.DELETE);

                Thread.sleep(2000);

                }

}
```

How do you remove value present in username text box of Actitime application without using clear() method ?

Using **sendKeys()** method of WebElement interface.

Selenium code : *driver.findElement(By.id("username")).**sendKeys(Keys.CONTROL + "a" + Keys.DELETE);***

```
public class RemoveValuefromText_usingClearMethod{
	public static void main(String[] args) throws InterruptedException {
		driver.get("http://localhost:8080/login.do");
		driver.findElement(By.id("username")).sendKeys("ajit");
		Thread.sleep(2000);
		String value = driver.findElement(By.id("username")).getAttribute("value");
		System.out.println("Value present inside the text box is : "+value);
		driver.findElement(By.id("username")).clear();
		Thread.sleep(2000);
		driver.findElement(By.id("username")).sendKeys("againEnteredAjit");
		Thread.sleep(2000);
		driver.findElement(By.id("username")).sendKeys(Keys.CONTROL+"a"+Keys.DELETE);
		Thread.sleep(2000);
		}
}
```

*Write a script to print the **tooltip text** of the checkbox present on the login page of Actitime application ?*

Using **getAttribute()** method of WebElement interface.

Selenium code below :

```
public class PrintTooltip_Actitime_RememberCheckbox {
	public static void main(String[] args) {
		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
		WebDriver driver = new FirefoxDriver();
		driver.get("http://localhost:8080/login.do");
		//find the Keep me Logged in Checkbox
		WebElement Checkbox = driver.findElement(By.id("keepLoggedInCheckBox"));
		//get the tooltip text using getAttribute() method and store in a variable
		String tooltipText = Checkbox.getAttribute("title");
		System.out.println(tooltipText);
		driver.close();
```

```
}}
```

Write a script to check "Keep me Logged in" checkbox on the login page of Actitime application is selected or not ?

Using **isSelected()** method of WebElement interface.

Selenium code below :

```
public class CheckBox_selectedorNot{
	public static void main(String[] args) {
		driver.get("http://localhost:8080/login.do");
		WebElement KeepMeLogIN_Checkbox = driver.findElement(By.name("remember"));
		//select the checkbox
		KeepMeLogIN_Checkbox.click();
		/Using the isSelected() method, it checks whether the checkbox is selected or
		not :  if it is already selected, it return true and if not selected, then it returns
		false/
		if (KeepMeLogIN_Checkbox.isSelected()) {
			System.out.println("Checkbox is selected");
		}else{
			System.out.println("Checkbox is NOT selected");
		}
	}
}
```

*Write a script to check **"Username"** textbox on the login page of Actitime application is enabled or not ?*

Using **isEnabled()** method of WebElement interface.

Selenium code below :

```
public class VerifyUNtextboxisEnabledinActitime {
	public static void main(String[] args) {
		driver.get("http://localhost:8080/login.do");
		WebElement UN = driver.findElement(By.id("username"));
		if (UN.isEnabled()) {
			System.out.println("Username text box is enabled");
```

```
                }else {
                        System.out.println("Username text box is disabled");
                }
                driver.close();
        }
}
```

*Write a script to **print the version** of actitime on login page of Actitime application*

Using **getText()** method of WebElement interface.

Selenium code below :

```
public class PrintVersion_ActitimeLoginPage extends BaseClass{
                public static void main(String[] args) {
                driver.get("http://localhost:8080/login.do");
                String xpathforVersion = "//nobr[contains(text(),'actiTIME')]";
                String version = driver.findElement(By.xpath(xpathforVersion)).getText();
                System.out.println("Version of actitime on login page is : " + version);
        }
}
```

*Write a script to verify that **View License link** on login page of Actitime application is a link or not ?*

Using **getTagName()** method of WebElement interface.

Selenium code below :

```
public class VerifyViewLicense_isaLinkOnActitimepage extends BaseClass {
                public static void main(String[] args) {
                driver.get("http://localhost:8080/login.do");
                String tagName = driver.findElement(By.id("licenseLink")).getTagName();
                if (tagName.equals("a")) {
                        System.out.println("View LIcence is a link");
                } else{
                        System.out.println("View LIcence is NOT a link");
                }
```

```
                driver.close();
        }
}
```

*Write a script to verify that **KeepMeLoggedIn checkbox** on login page of Actitime application is a checkbox or not ?*

Using **getAttribute()** method of WebElement interface.

Selenium code below :

```
public class VerifyKeepMeLoggedInisaCheckboxinActitime extends BaseClass{
        public static void main(String[] args) {
        driver.get("http://localhost:8080/login.do");
        String elementType = driver.findElement(By.id("keepLoggedInCheckBox")).getAttribute("type");
        System.out.println(elementType);
        if (elementType.equalsIgnoreCase("checkbox")) {
                System.out.println("it is a checkbox");
        }else{
                System.out.println("it is NOT  a checkbox");
        }}}
```

*Write a script to demonstrate different options to **click on a button or on a link (Or any element)***

Using the below methods of WebElement interface.

1. click()
2. sendkeys()
3. submit()

Selenium code below :

```
public class diffwaysofClickingonaButton{
        public static void main(String[] args) throws InterruptedException {
                System.setProperty("webdriver.gecko.driver", "./driver/geckodriver.exe");
                WebDriver driver = new FirefoxDriver();
                driver.get("https://demo.vtiger.com");
                String xp = "//button[.='Sign in']";
                //1. using click() method
```

```
                driver.findElement(By.xpath(xp)).click();
                //2. using sendkeys
                driver.findElement(By.xpath(xp)).sendKeys(Keys.ENTER);
                /3. using submit() method
                this method will work only and only if if the element has an attribute called type= 'submit'/
                driver.findElement(By.xpath(xp)).submit();
        }}
```

*Write a script to verify the **color of the error message** on Actitime login page when user clicks on Login button without entering username and password ?*

Using **getCssValue()** method of WebElement interface.

Selenium code below :

```
 public class VerifyErrormessageonActimeloginpage {
        public static void main(String[] args) {
                System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
                WebDriver driver = new FirefoxDriver();
                driver.get("http://localhost:8080/login.do");
                //click on Login button
                driver.findElement(By.xpath("//div[.='Login ']")).click();
                //find the error message element
                WebElement errMsg =

                driver.findElement(By.xpath("//span[contains(.,'invalid')]"));
                // get the text of the error message
                String errtext = errMsg.getText();
                //print the error message
                System.out.println("error message is :"+errtext);
                //get the value of color and store  in a variable
                String c = errMsg.getCssValue("color");
                //convert the color from string type to hexa form
                String ColorasHex = Color.fromString(c).asHex();
                System.out.println("hexadecimal format : "+ColorasHex);

                if(ColorasHex.equals(“#ce0100”)){

                System.out.println(“Error message is in red color”);
```

```
}else{

System.out.println("Error message is in red color");

}

//get the size of the font of error message
String fontSize = errMsg.getCssValue("font-size");
//get the weight of the font of error message
String fontWeight = errMsg.getCssValue("font-weight");
System.out.println("Size of the font is :" + fontSize);
System.out.println("Weight of the font is :" + fontWeight);
driver.close();
        }
}
```

JavascriptExecutor

It is one of the interface in selenium which has below 2 methods.

1. executeScript()
2. executeAsyncScript()

We use JavascriptExecutor when we fail to perform some actions using selenium.

*Write a script to **enter a text** in a **textbox** which is in **disabled mode** ?*

Using **sendKeys()** of **WebElement *interface***, *if we try to enter, we get **InvalidElementStateException***

Using **executeScript()** of ***JavascriptExecutor*** *interface, we can enter text in a disabled textbox.*

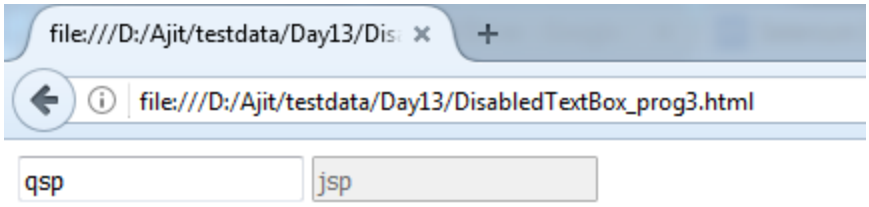
Create a sample webpage using the below html source code wherein the second textbox is disabled as shown below.

DisabledTextBox_prog3.html - Notepad

File Edit Format View Help

```
<input id="t1" type="text" value = "qsp">
<input id="t2" type="text" value = "jsp" disabled = true>
```

The webpage looks like this.



Selenium code below :

```
public class enterText_intoDisabledTextbox {
        public static void main(String[] args) throws InterruptedException {
                System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
                WebDriver driver = new FirefoxDriver();
                driver.get("file:///D:/Ajit/testdata/Day13/DisabledTextBox_prog3.html");
                //Typecast the driver object to JavascriptExecutor interface type
                JavascriptExecutor js = (JavascriptExecutor) driver;
                Thread.sleep(2000);
                //enter "admin" in first textbox using javascript
                js.executeScript("document.getElementById('t1').value='admin'");
                Thread.sleep(2000);
                //clear the value in second textbox using javascript
                js.executeScript("document.getElementById('t2').value=''");
                //enter "manager" in second textbox using javascript
                js.executeScript("document.getElementById('t2').value='manager'");
                //change the second text box to button type using Javascript
                js.executeScript("document.getElementById('t2').type='button'");
        }}
```

what are the usage of JavascriptExecutor ?

1. to scroll on the webpage.
2. to handle the disabled elements
3. to use as an alternate solution when selenium inbuilt methods (eg : clear(), click(), sendKeys()) doesn't work

In Selenium, we don't have any method to scroll up or down on the webpage, in such case, we can use **JavascriptExecutor.**

Steps to run javascript manually on browser webpage

1. Open the required page in the browser and press F12 from keyboard.
2. Navigate to Console tab, type the javascript statement and press Enter key

*Write a script to **scroll up and down** on Selenium official website*

Using executeScript() of *JavascriptExecutor interface*

Selenium code below :

```
public class ScrollUpandDown {

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

		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

		WebDriver driver = new FirefoxDriver();

		driver.get("http://seleniumhq.org/download");

		//typecasting driver object to JavascriptExecutor interface type

		JavascriptExecutor js = (JavascriptExecutor) driver;

		for (int i = 1; i < 10; i++) {

			//scroll down on the webpage

			js.executeScript("window.scrollBy(0, 1000)");

			Thread.sleep(3000);

		}

		for (int i = 1; i < 10; i++) {

			//scroll up on the webpage

			js.executeScript("window.scrollBy(0, -1000)");

			Thread.sleep(3000);

		}}}
```

*Write a script to **scroll down to a specific element (Applitool webelement)** on Selenium official website*

Using executeScript() of *JavascriptExecutor interface*

Selenium code below :

```
public class ScrollUpandDowntospecificElementonWebpage {
	public static void main(String[] args) throws InterruptedException {
		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
		WebDriver driver = new FirefoxDriver();
		driver.get("http://seleniumhq.org/download");
		//click on the close icon  of the yellow color background pop up
		driver.findElement(By.id("close")).click();
		// find the Applitools element on the webpage
		WebElement ele = driver.findElement(By.xpath("//img[contains(@src,'applitools')]"));
		// get the X-coordinate and store in a variable
		int x = ele.getLocation().getX();
		// get the Y-coordinate and store in a variable
		int y = ele.getLocation().getY();
		JavascriptExecutor js = (JavascriptExecutor) driver;
		//Scroll to Applitools element's  x and y coordinate
		js.executeScript("window.scrollBy("+x+", "+y+")");
		Thread.sleep(3000);
	}}
```

Assignment : *Write a script to scroll down to the bottom of the page ?*

Using **executeScript() of *JavascriptExecutor*** *interface*

Selenium code below :

```
public class NavigatetoBottomofthePage {
	public static void main(String[] args) throws InterruptedException {
		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
		WebDriver driver = new FirefoxDriver();
		driver.get("http://www.seleniumhq.org/download/");
		driver.findElement(By.id("close")).click();
		//select an element which is present at the bottom of the page
		WebElement element = driver.findElement(By.id("footerLogo"));
```

```
int x = element.getLocation().getX();

int y = element.getLocation().getY();

System.out.println("X coordinate is :"+x + " and Y coordinate is :"+ y);

JavascriptExecutor js = (JavascriptExecutor) driver;

js.executeScript("window.scrollBy("+x+","+y+")");

Thread.sleep(3000);

element.click();

}}
```

****

HANDLING FRAMES

****

What is frame ?

1. Webpage present inside another webpage is called embedded webpage.
2. In order to create frame or embedded webpage, developer uses a tag called **iframe.**
3. In order to perform any operation on any element present inside a frame, we first have to switch the control to frame.
4. We switch to frame using the below statement

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

5. frame() is an overloaded method which accepts the following arguments.

frame(index)

frame(id)

frame(name)

frame(WebElement)

6. If the specified frame is not present, we get an exception called “NoSuchFrameException”

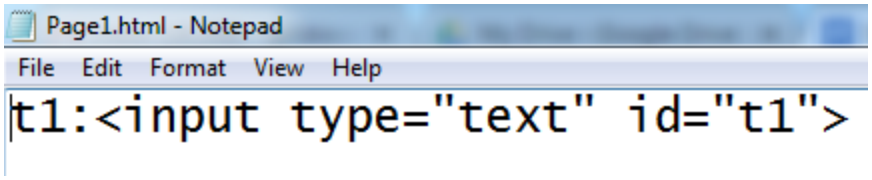
7. In order to exit from the frame, we use the following statements.

driver.switchTo().defaultContent(); → it will take you to the main page

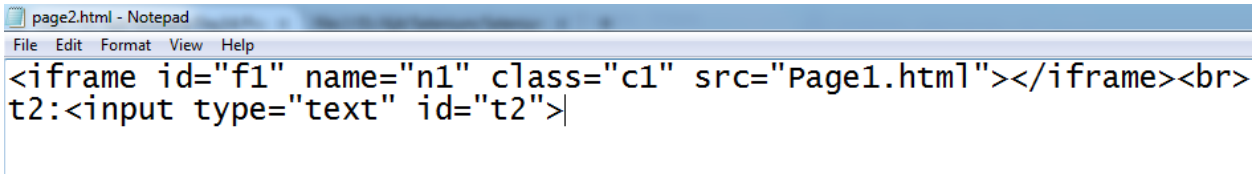
driver.switchTo().parentFrame(); → it will take you to the immediate parent frame

8. Easiest way to verify that an element is present within a frame is to right click on the element and verify that **this frame** option is displayed in the context menu.

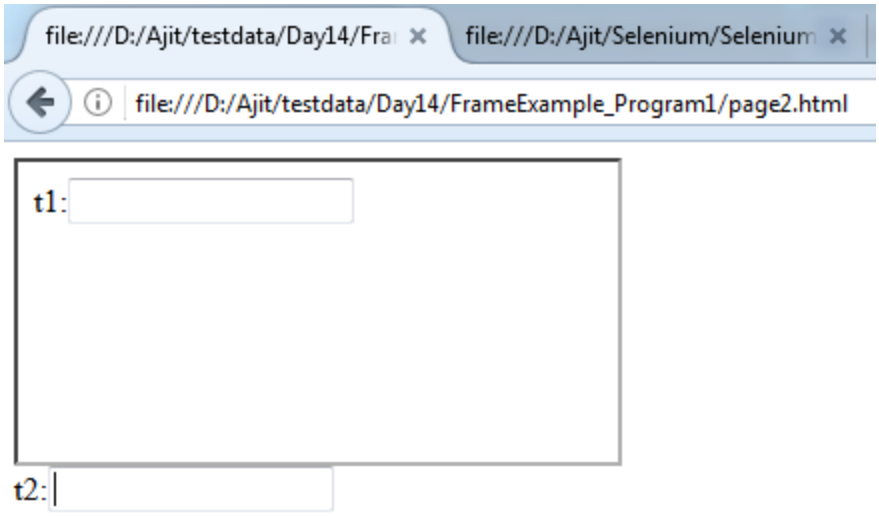
Create a sample webpage using the below html source code and save the file as Page1.html



Create another sample webpage using the below html source code and save the file as Page2.html



The webpage looks like this. Here, t1 is inside the frame and t2 is outside the frame on the webpage



Write a script to enter a text into an element which is present inside a frame ?

Selenium code:

```
public class Frame_Demo{

        public static void main(String[] args) {

                System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

                WebDriver driver = new FirefoxDriver();

                driver.get("file:///D:/Ajit/Selenium/SeleniumBtm_7thSep17/webpages/Frame_Page2.html");

                //using index of the frame - [ int value] [ index of frames starts with zero]

                driver.switchTo().frame(0);

                driver.findElement(By.id("t1")).sendKeys("a");

                driver.switchTo().defaultContent();
```

```
		driver.findElement(By.id("t2")).sendKeys("a");
		//using id attribute of the frame -string
		driver.switchTo().frame("f1");
		driver.findElement(By.id("t1")).sendKeys("b");
		driver.switchTo().defaultContent();
		driver.findElement(By.id("t2")).sendKeys("b");
		//using name attribute of the frame -string
		driver.switchTo().frame("n1");
		driver.findElement(By.id("t1")).sendKeys("c");
		driver.switchTo().defaultContent();
		driver.findElement(By.id("t2")).sendKeys("c");
		//using address of the frame -webelement
		WebElement f = driver.findElement(By.className("c1"));
		driver.switchTo().frame(f);
		driver.findElement(By.id("t1")).sendKeys("d");
		driver.switchTo().defaultContent();
		driver.findElement(By.id("t2")).sendKeys("d");
		driver.close();
	}
}
```

ACTIONS Class :

*How do you handle **Context Menu** in Selenium ?*

OR

*Write a script to right click on **"ActiTIME Inc."** link on actitime login page and then open it in new window ?*

*Using **contextClick()** method of Actions class*

Selenium code:

```
public class ContextClickusingActionsClass {
	//ContextClick does not work on firefox browser - pls do it on chromebrowser
	public static void main(String[] args) throws AWTException, InterruptedException {
```

```
        System.setProperty("webdriver.chrome.driver", ".\\driver\\chromedriver.exe");
        //open the browser
        WebDriver driver = new ChromeDriver();
        //enter the url
        driver.get("http://localhost:8080/login.do");
        //find the ActiTIME Inc. link
        WebElement link = driver.findElement(By.linkText("actiTIME Inc."));
        //right click (context click) on actitime link
        Actions actions = new Actions(driver);
        actions.contextClick(link).perform();
        Thread.sleep(3000);
        //press 'w' from the keyboard for opening in a new window
        Robot r = new Robot();
        r.keyPress(KeyEvent.VK_W);
        r.keyRelease(KeyEvent.VK_W);
        //quit() method closes all the browsers opened by Selenium
        driver.quit();
    }}
```

Imp Note :

Whenever we call any method of Actions class, we have to explicitly call perform() method of Actions class. Otherwise, it will not perform any action on the browser.

Assignment :

Automate the following scenario using contextClick() method of Actions Class.

Scenario Steps :

1. ***Login in to gmail***
2. ***Based on the subject of a mail, Right click on the mail***
3. ***Select Archive option***

Selenium Code:

```
public class gmail_contextClickDemo_mailArchive {
```

```
public static void main(String[] args) throws InterruptedException {
        System.setProperty("webdriver.chrome.driver", ".\\driver\\chromedriver.exe");
        WebDriver driver = new ChromeDriver();
        driver.get("https://www.gmail.com");
        //enter email id
        driver.findElement(By.xpath("//input[@type='email']")).sendKeys("enter your username");
        //click on Next button
        driver.findElement(By.xpath("//span[.='Next']")).click();
        Thread.sleep(3000);
        //enter password id
        driver.findElement(By.xpath("//input[@type='password']")).sendKeys("enter ");
        //click on Next button
        driver.findElement(By.xpath("//span[.='Next']")).click();
        Thread.sleep(10000);
        //Write xpath expression for the mail item based on a subject
        String xp = "(//b[contains(.,'Following Openings (for Bangalore)')])[2]";
        //get the address of the mail item which you want to archive
        WebElement mail = driver.findElement(By.xpath(xp));
        //print the subject of the mail
        System.out.println(mail.getText());
        //Creating an object of Actions class
        Actions actions = new Actions(driver);
        //using Actions class object and contextClick() method, right click on the mail item
        actions.contextClick(mail).perform();
        Thread.sleep(6000);
        //click on Archive to archive the mail
        driver.findElement(By.xpath("(//div[@class='J-N-JX aDE aDD'])[1]")).click();
}}
```

Program :

*How do you **mouse hover** on any element on a web page ?*

*Answer : Using **moveToElement() of Actions** class*

Automate the following scenario using **moveToElement()** method of **Actions** Class.

Scenario Steps :

1. *Login in to http://www.actimind.com*
2. *Mouse hover on "About Company" menu*
3. *Click on Sub Menu - "Basic Facts"*

Selenium Code:

```
public class DropdownMenu {

        public static void main(String[] args) {

                System.setProperty("webdriver.chrome.driver", ".\\driver\\chromedriver.exe");

                //open the browser

                WebDriver driver = new ChromeDriver();

                driver.get("http://www.actimind.com/");

                //find the menu "About Company"

                String xp = "//span[.='About Company']";

                WebElement menu = driver.findElement(By.xpath(xp));

                //mouse hover on "About Company" menu

                Actions actions = new Actions(driver);

                actions.moveToElement(menu).perform();

                //click on submenu "Basic Facts"

                WebElement submenu = driver.findElement(By.linkText("Basic Facts"));

                submenu.click();

        }}
```

Scenario Steps :

4. *Login in to http://www.actimind.com*
5. *Mouse hover on "*AREAS OF EXPERTISE*" menu*
6. *Click on Sub Menu - "*Cloud Applicationss*"*

Selenium Code:

```
public class MouseHover{

        public static void main(String[] args) {

                driver.get("http://www.actimind.com/");

                Actions action = new Actions(driver);

                //movetoElement -  used for mouse hover

                //Mouse hover on "AREAS OF EXPERTISE" menu

                WebElement AreaOfExpertise = driver.findElement(By.xpath("//a[contains(text(),'AREAS OF
                EXPERTISE')]"));

                action.moveToElement(AreaOfExpertise).perform();

                //Click  on "AREAS OF EXPERTISE" menu

                WebElement cloudApp = driver.findElement(By.linkText("Cloud Applicationss"));

                action.moveToElement(cloudApp).click().perform();

                //composite multiple actions can be achieved using the below statement

                //action.moveToElement(AreaOfExpertise).moveToElement(cloudApp).click().build().perform();

        }}
```

Program :

*How do you **mouse hover** on any element on a web page ?*

*Answer : Using **moveToElement() of Actions** class*

Automate the following scenario using **moveToElement()** method of **Actions** Class.

Scenario Steps :

1. *Login in to **http://www.istqb.in***
2. *mouse hover on Foundation tab*
3. *mouse hover on Enrollment*
4. *mouse hover on Corporate Enrollment*
5. *click on Corporate Enrollment*

Selenium Code:

```
public class DropdownMenu {

        public static void main(String[] args) {

                System.setProperty("webdriver.chrome.driver", ".\\driver\\chromedriver.exe");

                //open the browser
```

```
                WebDriver driver = new ChromeDriver();

                driver.get("http://www.istqb.in/");

                WebElement foundation = driver.findElement(By.xpath("//span[.='FOUNDATION']"));

                Actions actions = new Actions(driver);

                //mouse hover on Foundation tab

                actions.moveToElement(foundation).perform();

                Thread.sleep(3000);

                WebElement enrollment = driver.findElement(By.xpath("(//span[text()='ENROLLMENT'])[1]"));

                //mouse hover on Enrollment

                actions.moveToElement(enrollment).perform();

                Thread.sleep(3000);

                WebElement corporateEnrol = driver.findElement(By.xpath("//span[text()='CORPORATE
                ENROLLMENT']"));

                //mouse hover on Corporate Enrollment

                actions.moveToElement(corporateEnrol).perform();

                Thread.sleep(3000);

                //click on Corporate Enrollment

                driver.findElement(By.xpath("//span[text()='ONLINE ENROLLMENT']")).click();

                driver.close();

}}
```

Program :

*How do you handle **DRAG and DROP** feature on a web page ?*

*Answer : Using **dragAndDrop()** method of **Actions** class*

Selenium Code:

```
public class DragAndDropExample {

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

                System.setProperty("webdriver.chrome.driver", ".\\driver\\chromedriver.exe");

                WebDriver driver = new ChromeDriver();

                driver.get("http://www.dhtmlgoodies.com/submitted-scripts/i-google-like-drag-drop/index.html
                ");
```

```
                String xp1 = "//h1[.='Block 1']";
                WebElement block1 = driver.findElement(By.xpath(xp1));
                String xp2 = "//h1[.='Block 3']";
                WebElement block3 = driver.findElement(By.xpath(xp2));
                Actions actions = new Actions(driver);
                // drag block 1 element and drop it on block 2 element
                actions.dragAndDrop(block1, block3).perform();
        }
}
```

Program :

*How do you handle **DRAG and DROP** feature on a web page ?*

***Answer :** Using **dragAndDropBy()** method of **Actions** class*

//hint - first find out the x-coordinate and height of block 3 and then add 10 points to it and then do it

Selenium Code:

```
public class DragAndDropbyOffset_Example {
        public static void main(String[] args) throws InterruptedException {
                System.setProperty("webdriver.chrome.driver", ".\\driver\\chromedriver.exe");
                WebDriver driver = new ChromeDriver();
                driver.get("http://www.dhtmlgoodies.com/submitted-scripts/i-google-like-drag-drop/index.html
                ");
                //write xpath for Block 1
                String xp1 = "//h1[.='Block 1']";
                WebElement block1 = driver.findElement(By.xpath(xp1));
                //write xpath for Block 3
                String xp2 = "//h1[.='Block 3']";
                WebElement block3 = driver.findElement(By.xpath(xp2));
                //Create an object of Actions class and pass driver object as an argument
                Actions actions = new Actions(driver);
```

```
//call the dragAndDropBy() method of Actions class

actions.dragAndDropBy(block1, block3.getLocation().getX()+10,
block3.getSize().getHeight()+10).perform();

}}
```

****

HANDLING POP UP

****

In selenium, pop up are categorized into following types.

1. Javascript Popup
2. Hidden Division popup
3. File Upload popup
4. File download popup
5. Child browser popup
6. Window popup

1. *Javascript Pop up :*

This pop up is subdivided into below mentioned 3 pop ups.

1. **Alert pop up**
2. **Confirmation pop up**
3. **Prompt pop up**

1. Alert Pop up :

Characteristics features :

- **We can't inspect this pop up.**
- **We can't move this kind pop up.**
- **This pop up will have white color background with black color font.**
- **This pop up will have only one "OK" button**

How to handle Alert pop up

In order to handle the alert pop up, we first have to switch to alert window using the below statement.

driver.switchTo().alert();

After transferring the control to alert window, we can use the following methods of

"Alert" interface.

getText() → to get the text present on the alert window.

accept() / dismiss() → to click on OK button on the alert window.

2. Confirmation Pop up :

Characteristics features :

- **We can't inspect this pop up.**
- **We can't move this kind pop up.**
- **This pop up will have white color background with black color font.**
- **This pop up will have two buttons :- "OK" button and "Cancel" button.**

How to handle Prompt Alert pop up

- **In order to handle the alert pop up, we first have to switch to alert window using the below statement.**

  driver.switchTo().alert();

- **After transferring the control to alert window, we can use the following methods of "Alert" interface.**

  getText() → to get the text present on the alert window.

  sendKeys() → to enter a text in the textbox on the alert window.

  accept() → to click on "OK" button on the alert window.

dismiss() → to click on "Cancel" button on the alert window.

Selenium Code : to handle prompt alert popup on browser

```
import org.openqa.selenium.Alert;
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;
public class Alert_Promptpopup {
	public static void main(String[] args) throws InterruptedException {
		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
		WebDriver driver = new FirefoxDriver();
		//Enter the url
		driver.get("http://www.tizag.com/javascriptT/javascriptprompt.php");
		//find this button : "Say my name"
		driver.findElement(By.xpath("//input[@value='Say my name!']")).click();
		Thread.sleep(2000);
		//Switch to alert pop up
		Alert alert = driver.switchTo().alert();
		Thread.sleep(2000);
		//print the text present on the alert pop up
		System.out.println(alert.getText());
		Thread.sleep(2000);
		//enter your name in the text box present on the alert pop up
		alert.sendKeys("ajit");
		Thread.sleep(2000);
		//click on OK button
		alert.accept();
```

```
                Thread.sleep(2000);
                //print the text present on the second alert pop up
                System.out.println(alert.getText());
                //click on Cancel button
                alert.dismiss();
        }
}
```

2. Hidden Division Popup

How to handle geo location and notification in chrome

```
public class HiddenDivisionPopup_CalendarPopup_cleartrip_selectTodaysDate extends BaseClass {
        public static void main(String[] args) throws InterruptedException {
                Date d = new Date();
                String str = d.toString();
                String[] str2 = str.split(" ");
                String today = str2[2];
                System.setProperty("webdriver.chrome.driver", "./driver/chromedriver.exe");
                        ChromeOptions option = new ChromeOptions();
                        option.addArguments("--disable-notifications");
                        option.addArguments("--disable-geolocation");
                        option.addArguments("--ignore-certificate-errors");
                        WebDriver driver = new ChromeDriver(option);
                        driver.get("https://www.cleartrip.com/");
                        Thread.sleep(3000);
                        driver.findElement(By.xpath("(//input[@placeholder='Pick a date'])[1]")).click();
                        Thread.sleep(3000);
                        driver.findElement(By.linkText("24")).click();
```

```
	}
}
```

How to handle geo location and notification in Firefox Browser ?

```
public class Day15_Program2_HiddenDivisionPopup_CalendarPopup_cleartrip_selectTodaysDate extends BaseClass {

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

		Date d = new Date();

		String str = d.toString();

		String[] str2 = str.split(" ");

		String today = str2[2];

			System.setProperty("webdriver.gecko.driver", "./driver/geckodriver.exe");

			DesiredCapabilities cap = DesiredCapabilities.firefox();

			FirefoxProfile profile = new FirefoxProfile();

			profile.setPreference("geo.enabled", false);

			cap.setCapability(FirefoxDriver.PROFILE, profile);

			WebDriver driver = new FirefoxDriver(cap);

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

			Thread.sleep(3000);

			driver.findElement(By.xpath("(//input[@placeholder='Pick a date'])[1]")).click();

			Thread.sleep(3000);

			driver.findElement(By.linkText("24")).click();

		}
}
```

3. File Upload Pop up

```
package test;

import java.awt.AWTException;

import org.openqa.selenium.By;
```

```
import org.openqa.selenium.WebDriver;

import org.openqa.selenium.firefox.FirefoxDriver;

public class FileUploadPopup_Demo  {

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

		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

		WebDriver driver = new FirefoxDriver();

		driver.get("http://nervgh.github.io/pages/angular-file-upload/examples/simple");

		Thread.sleep(2000);

		driver.findElement(By.xpath("//input[@multiple='']")).sendKeys("D:\\Ajit\\testdata\\Absolut
		e xpath examples.xlsx");

		Thread.sleep(2000);

		driver.findElement(By.xpath("//button[@ng-click=\"item.upload()\"]")).click();

		Thread.sleep(2000);

		driver.close();

}}
```

4. File Download Pop up

Characteristic features:

- **We can move this popup but we can't inspect it.**
- **This pop up will have 2 radio buttons : Open with and Save File**

How to handle File Download pop up:

- **In Google Chrome browser, when we click on Download link of Java language present on Selenium official website, it doesn't show any file download pop up on the screen, instead, it automatically starts downloading the file in default location on the system. (i.e downloads folder)**
- **But, in firefox browser, on clicking on the same download link, we get a file download pop up on the screen. In order to handle this pop up, we use setPreference() method of FirefoxProfile class.**
- **setPreference() is used to change the settings of Firefox browser.**
- **setPreference() method is an overloaded method which takes 2 parameters (KEY, VALUE).**

  "*Key" will always be a String,*

  "Value" can be either String or int or boolean

- **For more information on Key , we can refer the following websites.**

  http://kb.mozillazine.org/About:config_entries#Browser

Following example demonstrates how to use key and value with setPreference() method.

```
FirefoxProfile profile = new FirefoxProfile();
// If the file type is .zip, then don't display the popup, instead, download it directly.
String key = "browser.helperApps.neverAsk.saveToDisk";
String value = "application/zip";
profile.setPreference(key, value);
// 0 - save to desktop, 1 - save to downloads folder (default value),
// 2 - save the downloaded file to other folders in the system
profile.setPreference("browser.download.folderList", 2);
profile.setPreference("browser.download.dir", "D:\\");
```

In the above example, "application/zip" refers to MIME types. (Multi purpose Internet Mail Extension), which says what kind of file you want to download.

For a detailed level information on MIME types (or the type of file to be downloaded), visit the following website.

https://www.freeformatter.com/mime-types-list.html

Program : Write a script to download the selenium-java present on selenium official website without opening the file download pop up and save it to specific folder in any drive in your system.

Selenium Code:

```
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.firefox.FirefoxDriver;
import org.openqa.selenium.firefox.FirefoxProfile;
import org.openqa.selenium.remote.DesiredCapabilities;
public class FileDownload {
    public static void main(String[] args) throws InterruptedException {
        System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
```

```
//Create an object of FirefoxProfile class
FirefoxProfile profile = new FirefoxProfile();
//Set the Key so that it will not show the file download pop up on the screen
String key = "browser.helperApps.neverAsk.saveToDisk";
//Set the type of file which you want to download
String value = "application/zip";
//using setPreference() method, change the setting
profile.setPreference(key, value);
// 0 - save to desktop, 1 - save to download folder( default), 2 - save to any other //location
profile.setPreference("browser.download.folderList", 2);
//save the file to the given folder location
profile.setPreference("browser.download.dir", "D:\\Ajit\\Others");
//Use DesiredCapabilities class to modify the firefox settings as shown below
DesiredCapabilities cap = DesiredCapabilities.firefox();
cap.setCapability(FirefoxDriver.PROFILE, profile);
//Launch the firefox browser with the above modified settings
WebDriver driver = new FirefoxDriver(cap);
//Enter selenium official website url
driver.get("http://www.seleniumhq.org/download/");
//Use following-sibling axes in Xpath to find the download link for selenium java
driver.findElement(By.xpath("//td[text()='Java']//following-sibling::td[3]/a")).click();
Thread.sleep(3000);
}}
```

Note : After the script is executed, verify that the file is downloaded in the specified folder location.

How do you download in Chrome Browser where in you will not get the file download pop up ?

```
package qspiders;

import java.util.HashMap;
import org.openqa.selenium.By;
```

```
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;
import org.openqa.selenium.chrome.ChromeOptions;
import org.openqa.selenium.remote.DesiredCapabilities;

public class FileDownloadInChromeBrowser {
	public static void main(String[] args) throws InterruptedException {
		System.setProperty("webdriver.chrome.driver","./driver/chromedriver.exe");
		//Create Hashmap object and assign the profile settings
		HashMap<String, Object> chromePrefs = new HashMap<String, Object>();
		chromePrefs.put("profile.default_content_settings.popups", 0);
		chromePrefs.put("download.default_directory", "D:\\");
		//Assign this chromePrefs object with ChromeOptions object
		ChromeOptions options = new ChromeOptions();
		options.setExperimentalOption("prefs", chromePrefs);
		//Create Capability object and assign the option object
		DesiredCapabilities cap = DesiredCapabilities.chrome();
		cap.setCapability(ChromeOptions.CAPABILITY, options);
		WebDriver driver = new ChromeDriver(cap);
		driver.get("http://www.seleniumhq.org/download/");
		Thread.sleep(3000);
		String xp = "//td[.='Java']/following-sibling::td/a[.='Download']";
		driver.findElement(By.xpath(xp)).click();
	}
}
```

Child Browser Pop up:

Characteristic features :

- We can move this pop up.
- We can also inspect it.

- this pop up is very colorful and will have both minimise and maximise buttons.

How to handle Child browser pop up ?

- We handle child browser popup by using **getWindowHandle()** and **getWindowHandles()** methods of **WebDriver** interface.
- In Selenium, every browser will have an unique window handle id.
- In **firefox browser**, window handle is an **integer value**, whereas in **Chrome browser, it is an unique alpha numeric string.**

Difference between getWindowHandle() and getWindowHandles() ?

- getWindowHandle() returns the window handle id of the **current browser window.**
- getWindowHandles() returns the window handle id of **all the browser windows.**

Program to print the window handle of a browser window ?

Selenium Code :

```
import org.openqa.selenium.WebDriver;

import org.openqa.selenium.firefox.FirefoxDriver;

public class Print_windowHandle {

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

		System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

		WebDriver driver = new FirefoxDriver();

		driver.get("http://localhost:8080/login.do");

		//get the window handle id of the browser

		String windowHandle = driver.getWindowHandle();

		System.out.println(windowHandle);

	}}
```

Program to print the window handle id of browser ?

Selenium Code :

```
import org.openqa.selenium.WebDriver;

import org.openqa.selenium.firefox.FirefoxDriver;

public class Print_windowHandle {

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

                System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");

                WebDriver driver = new FirefoxDriver();

                driver.get("http://localhost:8080/login.do");

                //get the window handle id of the browser

                String windowHandle = driver.getWindowHandle();

                System.out.println(windowHandle);

        }}
```

Program :

Scenario :

Write a script to automate the following scenarios:

1. **Count the number of browser windows opened by selenium**
2. **Print the window handle of all the browser windows**
3. **Print the title of all the browser windows ?**
4. **Close all the browser windows.**

Selenium Code :

```
public class ChildBrowserPopUp extends BaseClass{

        public static void main(String[] args) {
```

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

                //using getWindowHandles(), get a set of window handle IDs

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

                //using size(), get the count of total number of browser windows

                int count = allWindowHandles.size();

                System.out.println("Number of browser windows opened on the system is : "+ count);

                for (String windowHandle : allWindowHandles) {

                        //switch to each browser window

                        driver.switchTo().window(windowHandle);

                        String title = driver.getTitle();

                        //print the window handle id of each browser window

                        System.out.println("Window handle id of page -->"+ title +" -->  is : "+windowHandle);

                        //close all the browsers one by one

                        driver.close();

                }

                        /*Instead of using driver.close(), we can use driver.quit() to close all the browsers at
                        once*/

                        //driver.quit();

}}
```

Program :

Write a script to close only the main browser window and not the child browser windows.

Selenium Code :

```
public class CloseMainBrowserOnly extends BaseClass{

        public static void main(String[] args) {

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

                //get the window handle id of the parent browser window
```

```
String parentWindowhandleID = driver.getWindowHandle();

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

int count = allWindowHandles.size();

System.out.println("Number of browser windows opened on the system is : "+ count);

for (String windowHandle : allWindowHandles) {

        //switch to each browser window

        driver.switchTo().window(windowHandle);

        /* compare the window id with the Parent browser window id, if both are equal, then
        only close the main browser window.*/

        if (windowHandle.equals(parentWindowhandleID)) {

                driver.close();

        System.out.println("Main Browser window with title -->"+ title +" --> is closed");

        }}}}
```

Program :

Write a script to close all the child browser windows except the main browser.

Selenium Code :

```
public class CloseALLChildbrowsersONLY extends BaseClass{

        public static void main(String[] args) {

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

                //get the window handle id of the parent browser window

                String parentWindowhandleID = driver.getWindowHandle();

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

                int count = allWindowHandles.size();

                System.out.println("Number of browser windows opened on the system is : "+ count);

                for (String windowHandle : allWindowHandles) {

                        //switch to each browser window
```

```
                driver.switchTo().window(windowHandle);

                String title = driver.getTitle();

                /* compare the window id of all the browsers with the Parent browser window id, if it is not equal, then only close the browser windows.*/

                if (!windowHandle.equals(parentWindowhandleID)) {

                        driver.close();

                        System.out.println("Child Browser window with title -->"+ title +" --> is closed");

                }}}}
```

Program :

Write a script to close the specified browser window ?

Selenium Code :

```
public class CloseAnySpecifiedBrowser extends BaseClass{

        public static void main(String[] args) {

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

                //Set the expected title of the browser window which you want to close

                String expected_title = "Tech Mahindra";

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

                int count = allWindowHandles.size();

                System.out.println("Number of browser windows opened on the system is : "+ count);

                for (String windowHandle : allWindowHandles) {

                        //switch to each browser window

                        driver.switchTo().window(windowHandle);

                        String actual_title = driver.getTitle();

                        //Checks whether the actual title contains the specified expected title

                        if (actual_title.contains(expected_title)) {
```

```
                    driver.close();

                System.out.println("Specified Browser window with title -->"+ actual_title +" --> is
                closed");

                }

            }

        }

}
```

Program :

Write a script to navigate between multiple tabs and perform some action on each tabs ?

Selenium Code :

```
public class HandleTabs_using_getWindowHandles extends BaseClass {

        public static void main(String[] args) {

            //enter actitime login url

            driver.get("http://localhost:8080/login.do");

            //get the window handle id of the parent browser window

            String parentwindowHandle = driver.getWindowHandle();

            //enter username

            driver.findElement(By.id("username")).sendKeys("admin");

            //enter password

            driver.findElement(By.name("pwd")).sendKeys("manager");

            //click on actiTIME INC link

            driver.findElement(By.xpath("//a[text()='actiTIME Inc.']")).click();

            //get the number of windows currently opened on the system

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

            //switch to all the browser windows

            for (String wh : allwhs) {
```

```
                driver.switchTo().window(wh);
            }
            //get the title of the tab
            String childtitle = driver.getTitle();
            System.out.println("Title of the child tab is :"+ childtitle);
            //close the child tab
            driver.close();
            //switch back to the main browser window
            driver.switchTo().window(parentwindowHandle);
            //close the main browser window
            driver.findElement(By.xpath("//div[text()='Login ']")).click();
            //closing the parent window
            driver.close();
    }
```

Window Pop Up:

In Selenium, if the pop up displayed on the application doesn't belong to the following types,

- **JavaScript popup,**
- **Hidden Division pop up,**
- **File Upload pop up,**
- **File Download pop up,**
- **Child Browser pop up,**

then it belongs to a category called WINDOW POP UP

Characteristic features of Window pop up:

- **We can move some of the window popups and some of them, we can't.**
- **We can't inspect this pop up.**

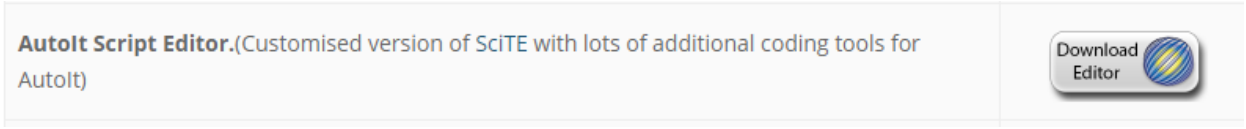
How to handle Window Popup ?

- In selenium, there is no option to handle window pop up, hence, we have to use some third party tool like AUTOIT to handle this kind of pop up. We can also use ROBOT class to handle this pop up.
- But, by using ROBOT class, we can't achieve much functionalities, as it has limited option eg: we can't identify the object properties present on the window pop up.
- Hence, we use another third party automation tool called AUTO IT.

What is AUTO IT ?

- It is a open source window based automation tool.
- It can be downloaded from below mentioned site :

  https://www.autoitscript.com/site/autoit/downloads



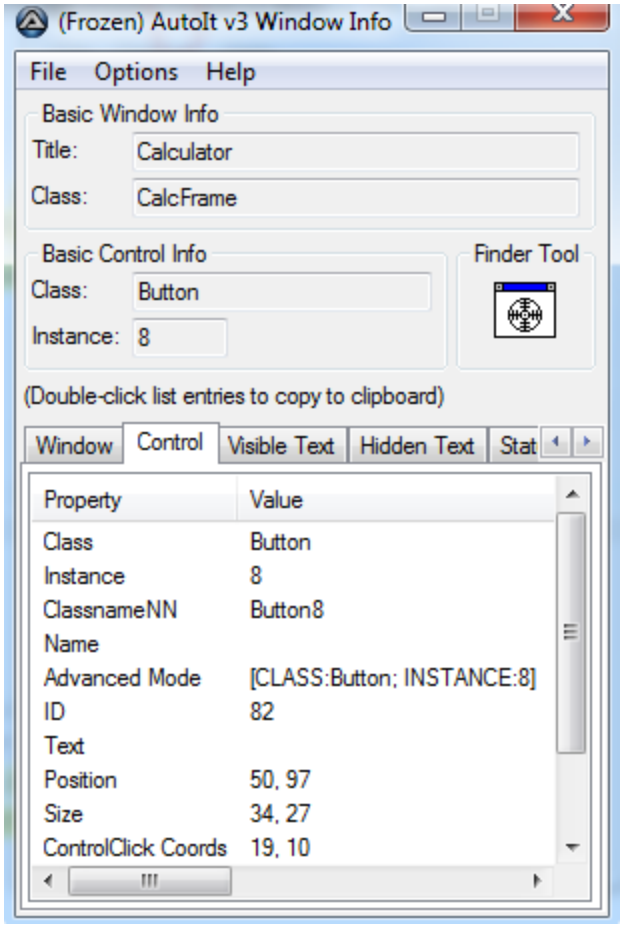
- Download the above Editor on your system.
- Double click on the Setup file.
- Follow the default instruction to install autoIT.

How Auto IT identifies objects on window popup ?

- Elements present on window pop up are known as ***CONTROLS***.
- In order to inspect these controls, AutoIT uses AutoIT Window Info".
- In order to open "AutoIT Window Info", navigate to the below path.

  Go to Start → All Programs → AutoIT V3 → Select AutoIT Window Info.

- As a result, the below window opens up.



- **In the above image, drag the *"Finder Tool"* option and drop it on any element/control present on the window pop up for which you want to identify the properties.**
- **It will display the properties of the same controls such as *Class, Name, ID and Text.***
- **These properties are also known as CONTROL ID, using which AutoIT locates elements/controls on window pop up.**
- **General syntax for using single Control ID is :**

  [Control ID : Value]

- **We can use multiple Control IDs as well using semicolon as the delimiter to identify the controls using below syntax.**

[Control ID 1: Value1 ; Control ID 2 : Value2 ; Control ID 3 ; Value3]

Steps to write and execute AutoIT script :

- **Navigate to the below path and open the Editor to write the autoIT script**

Go to Start → All Programs → AutoIt → Select *SciTE Script Editor*

- **Write the autoIT script and save the file with .au3 extension**
- **Go to Tool → Select Compile and compile script. As a result, it will generate an .exe file**
- **Navigate to the folder location where .exe file is located and double click on this .exe file to execute the autoIT script.**
- **We can also execute the script from eclipse by using RunTime class of Java**

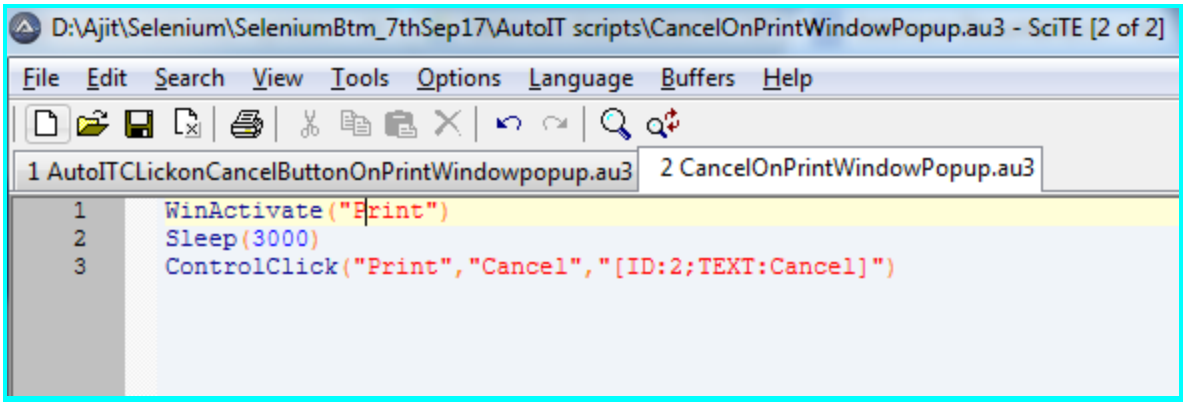
RunTime.getRunTime.exec("path of the compiled au3.exe file");

Automate the following scenario using AutoIT :

1. **Navigate to actiTIME login page.**
2. **By default, username text box will be active.**
3. **Press Control + P using Robot class and ensure the print window popup is displayed**
4. **On the Print window, click on Cancel button by using AutoIT**

Selenium Code:

Write the below lines of code in AutoIT editor, save with .au3 extension.



Go to tools → select compile and as a result, .exe file gets generated.

Now, write the below selenium code to run the .exe file

```
public class AutoIT_Example {

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

        System.setProperty("webdriver.gecko.driver", ".\\driver\\geckodriver.exe");
```

```
WebDriver driver = new FirefoxDriver();

driver.get("http://localhost:8080/login.do");

Thread.sleep(3000);

//Press Control + P from keyboard using Robot class

Robot r = new Robot();

r.keyPress(KeyEvent.VK_CONTROL);

r.keyPress(KeyEvent.VK_P);

r.keyRelease(KeyEvent.VK_P);

r.keyRelease(KeyEvent.VK_CONTROL);

//Using Runtime class, to run the .exe file

Runtime run = Runtime.getRuntime();

run.exec("D:\\Ajit\\Selenium\\SeleniumBtm_7thSep17\\AutoIT
scripts\\CancelOnPrintWindowPopup.exe");

//close the browser

driver.close();

}}
```

How to upload a file using AutoIT?

Code below:

*FileUploadUsingAutoIT_HandleWindowPopup.java

```java
package qspiders;
import java.io.IOException;
import org.openqa.selenium.By;
public class FileUploadUsingAutoIT_HandleWindowPopup extends BaseClass{
    public static void main(String[] args) throws IOException, InterruptedException {

        driver.get("http://nervgh.github.io/pages/angular-file-upload/examples/simple/");
        driver.findElement(By.xpath("(//input[@uploader='uploader'])[2]")).click();
        Thread.sleep(2000);
        Runtime.getRuntime().exec(".\\AutoIT\\FileUploadDemo.exe");
    }
}
```

Open the auto it script editor and write the below script.

D:\Ajit\Selenium\LatestWeekendBatch\SeleniumEveningNov15\AutoIT\FileUploadDemo.au3 - SciTE

File Edit Search View Tools Options Language Buffers Help

```
WinActivate("File Upload")
Sleep(2000)
ControlFocus("File Upload","","[CLASS:Edit; INSTANCE:1]")
ControlSetText("File Upload","","[CLASS:Edit; INSTANCE:1]","C:\Users\admin\Desktop\Test Yantra Sel batch.txt")
ControlClick("File Upload","","[CLASS:Button; INSTANCE:1]")
```

Summary of the different popups in selenium and how to handle those is mentioned below.

Popup Type	Solution
Javascript - Alert	driver.switchTo().alert() **Methods:** accept(), dismiss(), getText(), sendKeys()
Hidden Division pop up	findElement()
File Upload pop up	BrowseButton.sendKeys("Absolute path of the file")
File Download pop up	FirefoxProfile.setPreference(Key, Value)
Child Browser pop up	driver.getWindowHandles(); driver.switchTo().window("window handle ID")
Window pop up	Robot Class / Auto IT tool

what is findElements() ?

- **findElements() method is present in SearchContext interface, the super most interface in Selenium.**

- findElements() identifies the elements on the webpage based on the locators used.
- It returns a list of webElements if it find the matching element.
- If it does not find any matching web element on the web page, it returns an empty list.

Program :

Write a script to find the total number of links, number of visible links and number of hidden links present on actitime login page.

Selenium Code :

```
public class findElements_Example extends BaseClass {
	public static void main(String[] args) throws InterruptedException {
		driver.get("http://localhost:8080/login.do");
		//findElements() method returns list of web element
		List<WebElement> allLinks = driver.findElements(By.tagName("a"));
		//get the total number of link elements
		int totalLinks = allLinks.size();
		System.out.println("total number of links present on the web page is : "+totalLinks);
		int visibleLinkCount = 0;
		int hiddenLinkCount = 0;
		//using foreach loop, iterate through all the links
		for (WebElement link : allLinks) {
			//if the link is displayed, then print the text of the link
			if (link.isDisplayed()) {
				visibleLinkCount++;
				System.out.println(visibleLinkCount+" --> "+link.getText());
			}else{
				hiddenLinkCount++;
```

```
                }
            }
            System.out.println("Total number of visible links :" + visibleLinkCount);
            System.out.println("Total number of hidden links :" + hiddenLinkCount);
            driver.close();
}}
```

Assignment :

Automate the following scenario

- **Login in to actitime**
- **click on Tasks**
- **Count the total number of checkbox present on the page**
- **Select all the checkbox**
- **Deselect all the checkboxes in reverse order**
- **Select first and last checkbox**

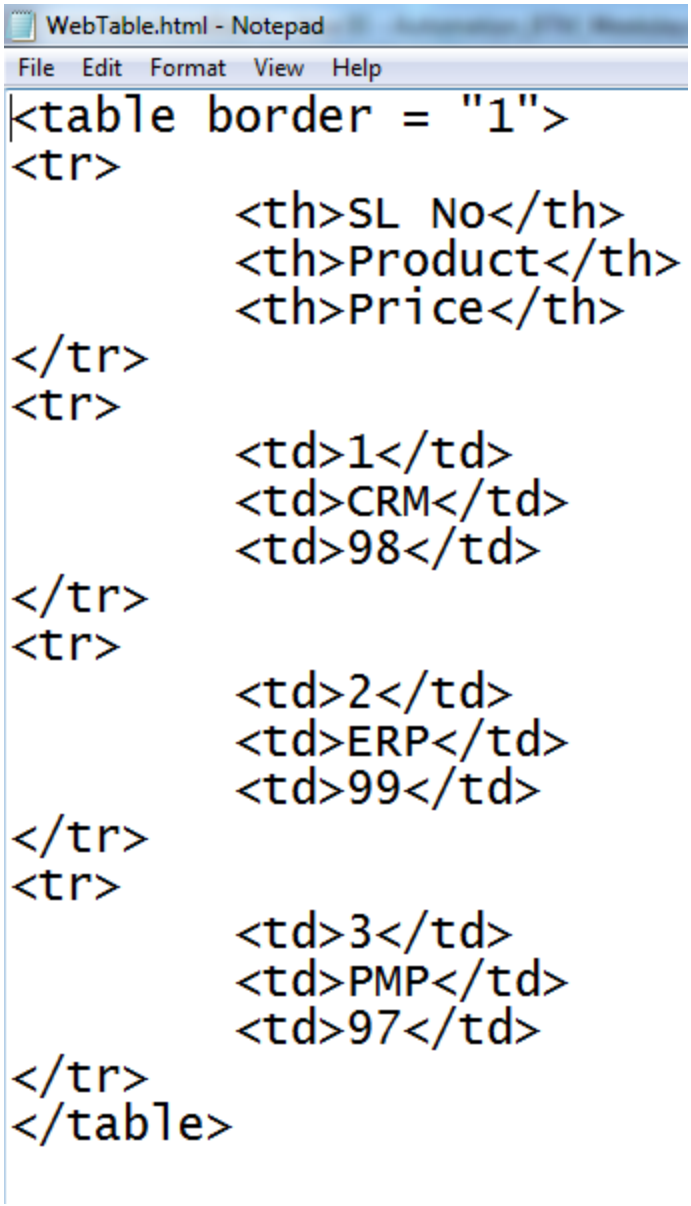
Selenium Code:

Copy code here.

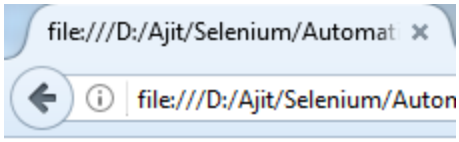
WebTable :

Table present on the web page is called WebTable.

Create a webtable as shown below.



The webpage looks like this as shown below.



SL No	Product	Price
1	CRM	98
2	ERP	99
3	PMP	97

Program :

In the below webtable, find the following scenarios :

- **print the total number of ROWS present**
- **print the total number of COLUMNS present**
- **print the total number of CELLS present**
- **print ONLY the NUMERIC values present**
- **Count the TOTAL number of NUMERIC values present**
- **print the SUM of all the numeric values in the table**

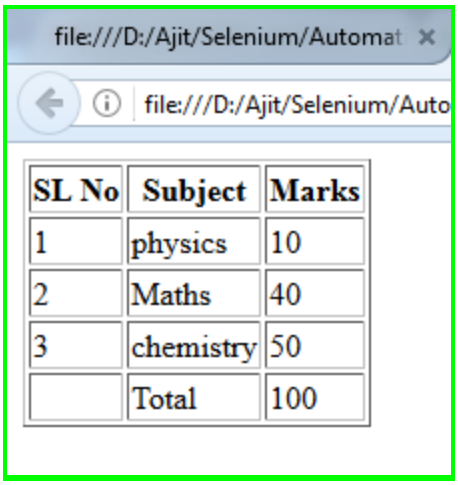
Selenium Code:

```
public class WebTable_Example extends BaseClass{
        public static void main(String[] args) {

                driver.get("D:\Ajit\Selenium\SeleniumBtm_7thSep17\webpages\WebTable.html");
                //Count Total number of rows present in the table
                List<WebElement> allRows = driver.findElements(By.xpath("//tr"));
                int totalRows = allRows.size();
                System.out.println("total number of rows present in the table is :"+ totalRows);
                //count total number of columns
```

```
List<WebElement> allColumns = driver.findElements(By.xpath("//th"));

int totalColumns = allColumns.size();

System.out.println("Total number of columns in the table is :" + totalColumns);

//Count number of cells present in the table

List<WebElement> allCells = driver.findElements(By.xpath("//th|//td"));

int totalCells = allCells.size();

System.out.println("Total number of cells present in the table is :" + totalCells);

//Print ONLY the numbers

int countNumberValue = 0;

int sum=0;

for (WebElement cell : allCells) {

        String cellValue = cell.getText();

        try{

                int number = Integer.parseInt(cellValue);

                System.out.print(" "+number);

                countNumberValue++;

                sum = sum+number;

        }catch (Exception e) {

        }

}

System.out.println("Total count of numeric values is :"+countNumberValue);

System.out.println("Total sum of all the numeric values is :"+sum);

//close the browser

driver.close();

    }

}
```

Assignment :

Write a script to verify that the sum of marks present in the below table is same as the Total marks.



SL No	Subject	Marks
1	physics	10
2	Maths	40
3	chemistry	50
	Total	100

HTML code to create the sample webpage is below.

WebTable_StudentMarks.html - Notepad

File Edit Format View Help

```
<table border = "1">
<tr>
        <th>SL No</th>
        <th>Subject</th>
        <th>Marks</th>
</tr>
<tr>
        <td>1</td>
        <td>physics</td>
        <td>10</td>
</tr>
<tr>
        <td>2</td>
        <td>Maths</td>
        <td>40</td>
</tr>
<tr>
        <td>3</td>
        <td>chemistry</td>
        <td>50</td>
</tr>
<tr>
        <td></td>
        <td>Total</td>
        <td>100</td>
</tr>
</table>
```

Selenium Code :

copy the code here.

How to handle Auto Suggestion list box ?

Answer : Using findElements() method

Program :

Automate the following scenario :

- **Navigate to google page**
- **Enter Selenium in google search text box**
- **Print the list of auto suggestion values**
- **Click on a specified link (Selenium Interview Questions) displayed in the dropdown**

Selenium Code :

```
public class AutosuggestionEx_GoogleSearch extends BaseClass{

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

                driver.get("http://www.google.com");

                //Enter Selenium in google search text box

                driver.findElement(By.id("lst-ib")).sendKeys("selenium");

                Thread.sleep(2000);

                List<WebElement> allOptions =
                driver.findElements(By.xpath("//*[contains(text(),'selenium')]"));

                int count = allOptions.size();

                System.out.println("Number of values present in the dropdown is : " + count);

                String expectedValue="selenium interview questions";

                //Print all the auto suggestion values

                for (WebElement option : allOptions) {

                        String text = option.getText();

                        System.out.println("   "+text);

                //Click on Java Interview Questions
```

```
                if (text.equalsIgnoreCase(expectedValue)) {
                        option.click();
                        break;
                }
}
```

How to select List Box ?

- In Selenium, we handle listbox using **Select** class.
- Select class is present in org.openqa.selenium.support.ui package.
- Select class has a parameterized constructor which accepts an argument of WebElement object (List box element)
- Following are the available methods of Select class
    - ➔ selectByIndex()
    - ➔ selectByValue()
    - ➔ selectByVisibleText()
    - ➔ deSelectByIndex()
    - ➔ deSelectByValue()
    - ➔ deSelectByVisibleText()
    - ➔ isMultiple()
    - ➔ getOptions()
    - ➔ getAllSelectedOptions()
    - ➔ getFirstSelectedOption()
    - ➔ deSelectAll()

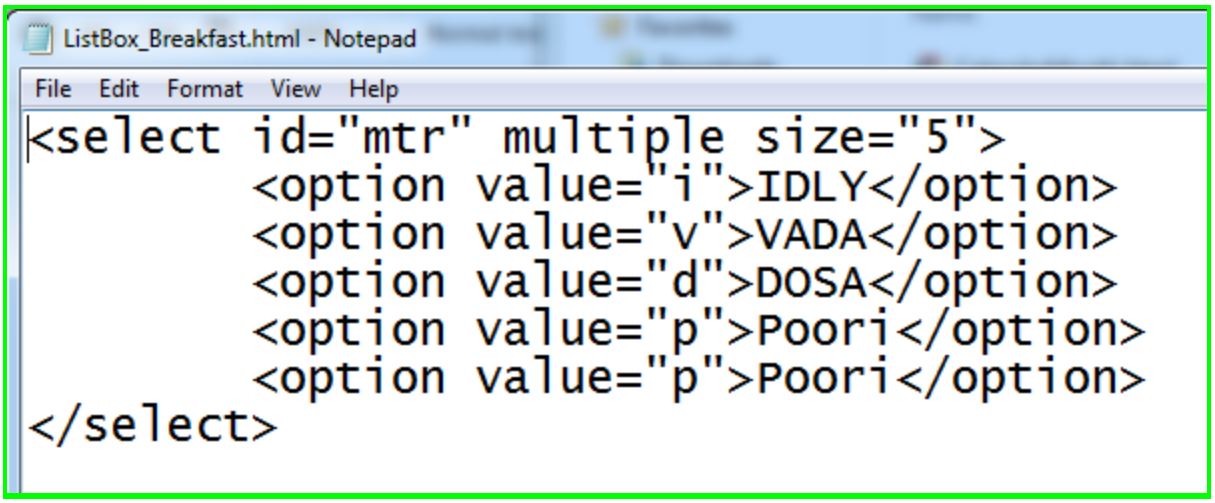
- We can use the following deSelect() methods only on multi select listbox. If we try to use it on single select list box, then it throws ***UnsupportedOperationException***
    - ➔ deSelectByIndex()
    - ➔ deSelectByValue()
    - ➔ deSelectByVisibleText()

➔ **deSelectAll()**

Program:

Write a script to select few elements in the list box.

Create a sample webpage



Selenium Code :

```
public class ListBoxExample extends BaseClass{

        public static void main(String[] args) {

                driver.get("file:///D:/Ajit/Selenium/SeleniumBtm_7thSep17/webpages/ListBox_Breakfast.html");

                WebElement list = driver.findElement(By.id("mtr"));

                //Create an object of Select class and pass the address of list box as an argument

                Select s = new Select(list);

                //getOptions() method returns a list of all the elements of the list box

                List<WebElement> options = s.getOptions();

                int size = options.size();

                System.out.println("Number of elements present inside the listbox is : "+ size);

                //Print all the elements present in the list box

                for (WebElement webElement : options) {
```

```
		String text = webElement.getText();

		System.out.println(text);

}

//selectByIndex() selects an element based on the Index, here index starts with 0

s.selectByIndex(0);

//selectByValue() method selects an element based on its value attribute.

s.selectByValue("v");

/*selectByVisibleText() method selects an element based on the actual text that is visible to the user. For instance, if there are multiple Poori present inside the listbox , it will select all the Poori elements.*/

s.selectByVisibleText("Poori");

System.out.println("************Print all selected options***********");

List<WebElement> allSelectedOptions = s.getAllSelectedOptions();

int size2 = allSelectedOptions.size();

System.out.println("Number of items that is selected in the list box is : "+size2);

System.out.println(" Selected items are printed below ");

for (WebElement webElement : allSelectedOptions) {

		System.out.println(webElement.getText());

}

System.out.println("check whether it is a multiple select listbox or not");

boolean multiple = s.isMultiple();

System.out.println(multiple +" yes , it is multi select");

if (multiple) {

		//Print the first selected option in the list box

		WebElement firstSelectedOption = s.getFirstSelectedOption();

                                                System.out.println(firstSelectedOption.getText()+"
		is the first selected item in the list box");

		//deselect the item present in 0th index.
```

```
                s.deselectByIndex(0);
                //Print the first selected option in the list box
                WebElement firstSelectedOption1 = s.getFirstSelectedOption();
                System.out.println(firstSelectedOption1.getText()+" is the first selected item");
                //deselect an item which has an attribute called value and its value is "v"
                s.deselectByValue("v");
                //Print the first selected option in the list box
                WebElement firstSelectedOption2 = s.getFirstSelectedOption();
                System.out.println(firstSelectedOption2.getText()+" is the first selected item");
                s.deselectByVisibleText("Poori");
        }
    }
}
```

Program:

Write a script to print the content of the list box in sorted order.

Selenium Code :

```
public class PrintListValues_SortedOrder extends BaseClass{

        public static void main(String[] args) throws InterruptedException {
        driver.get("file:///D:/Ajit/Selenium/SeleniumBtm_7thSep17/webpages/ListBox_Breakfast.html");

        WebElement listElement = driver.findElement(By.id("mtr"));

        Select s = new Select(listElement);

        List<WebElement> allOptions = s.getOptions();

        int count = allOptions.size();

        System.out.println(count);
```

```
		System.out.println("-----print the values in the list ----");
		ArrayList<String> list = new ArrayList<String>();
		for (WebElement option : allOptions) {
			String text = option.getText();
			System.out.println(text);
			list.add(text);
		}
		Collections.sort(list);
		System.out.println("-----print the value in sorted order----");
		for (String value : list) {
			System.out.println(value);
}}}
```

Program:

Write a script to print the UNIQUE content of the list box.

Hint : Use HashSet<>

Selenium Code :

```
public class printUniqueElementinthelistbox  extends BaseClass{
public static void main(String[] args) throws InterruptedException {

driver.get("file:///D:/Ajit/Selenium/SeleniumBtm_7thSep17/webpages/ListBox_Breakfast.html");
		WebElement listElement = driver.findElement(By.id("mtr"));
		Select s = new Select(listElement);
		List<WebElement> allOptions = s.getOptions();
		int count = allOptions.size();
```

```
                System.out.println(count);
                System.out.println("-----print the values in the list ----");
                HashSet<String> allElements = new HashSet<String>();
                for (WebElement option : allOptions) {
                        String text = option.getText();
                        System.out.println(text);
                        allElements.add(text);
                }
                System.out.println(allElements);
        }
}
```

Program:

Write a script to print the UNIQUE content of the list box in SORTED order.

Hint : Use TreeSet<>

Selenium Code :

```
public class printUniqueElement_Sorted  extends BaseClass{
public static void main(String[] args) throws InterruptedException {

driver.get("file:///D:/Ajit/Selenium/SeleniumBtm_7thSep17/webpages/ListBox_Breakfast.html");
                WebElement listElement = driver.findElement(By.id("mtr"));
                Select s = new Select(listElement);
                List<WebElement> allOptions = s.getOptions();
                int count = allOptions.size();
                System.out.println(count);
                System.out.println("-----print the values in the list ----");
                TreeSet<String> allElements = new TreeSet<String>();
                for (WebElement option : allOptions) {
                        String text = option.getText();
                        System.out.println(text);
```

```
                    allElements.add(text);
                }
                System.out.println(allElements);
        }
}
```

Program:

Write a script to check whether listbox has duplicate or not ?

Selenium Code :

```
public class checklisthasDUPLICATEvalues_HashSet  extends BaseClass{
   public static void main(String[] args) {

                driver.get("file:///D:/Ajit/Selenium/AutomationByBhanuSir_BTM/testdataFiles/ListBox_Breakfast.html");
      WebElement listbox = driver.findElement(By.id("mtr"));
      Select s = new Select(listbox);
      List<WebElement> allOptions = s.getOptions();
      int count1 = allOptions.size();
      System.out.println("Number of elements in the list is :" +count1);
      HashSet<String> allElementText = new HashSet<String>();
      for (int i = 0; i < count1; i++) {
         String text = allOptions.get(i).getText();
         System.out.println(text);
         allElementText.add(text);
      }
      int count2 = allElementText.size();
      System.out.println("Number of elements in the hashset is :" +count2);
      if (count1==count2) {
```

```
        System.out.println("list box has NO duplicate values");
    }
    else{
        System.out.println("list box has  duplicate values");
    }
    System.out.println(allElementText);
    driver.close();
  }}}
```

Program:

Write a script to print the duplicate item in the list ?

Selenium Code :

```
public class PrinttheDUPLICATEItem_intheList_HashSet  extends BaseClass{
  public static void main(String[] args) {

            driver.get("file:///D:/Ajit/Selenium/AutomationByBhanuSir_BTM/testdataFile
            s/ListBox_Breakfast.html");
    WebElement listbox = driver.findElement(By.id("mtr"));
    Select s = new Select(listbox);
    List<WebElement> allOptions = s.getOptions();
    int count1 = allOptions.size();
    System.out.println("Number of elements in the list is :" +count1);
    HashSet<String> allElementText = new HashSet<String>();
    for (int i = 0; i < count1; i++) {
        String text = allOptions.get(i).getText();
                    /*allElementText.add(text) returns true if the element is not already
                    added, and it returns false if the same element is trying to be added
                    twice.  */
```

```
            if (!allElementText.add(text)) {
                System.out.println(text +" is the duplicate item in the list box");
            }
        }
        System.out.println(allElementText.size());
        // it will print all the unique values in the HashSet object
        System.out.println(allElementText);
        driver.close();
    }
}
```

Program :

Print the number of occurrance of Poori in the list box.

Selenium Code

```
package qspiders;
import java.util.HashMap;
import java.util.List;
import java.util.Set;

import org.openqa.selenium.By;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.support.ui.Select;
public class HashMapExample_printtheOcuuranceOfPoori extends BaseClass{
        public static void main(String[] args) {

driver.get("file:///D:/Ajit/Selenium/SeleniumBtm_7thSep17/webpages/ListBox_Breakfast.html"
);
```

```
WebElement list = driver.findElement(By.id("mtr"));
Select  s = new Select(list);
List<WebElement> allElements = s.getOptions();

HashMap<String, Integer> hashMapObj = new HashMap<String, Integer>();
for (WebElement element : allElements) {
        String text = element.getText();
        if (hashMapObj.containsKey(text)) {
                Integer value = hashMapObj.get(text);
                value++;
                hashMapObj.put(text, value);
        }else{
                hashMapObj.put(text, 1);
        }
}
Set<String> allKeys = hashMapObj.keySet();
for (String key : allKeys) {
        Integer value = hashMapObj.get(key);
        System.out.println(key +" -->"+ value);

        if (value>1) {
                System.out.println("Occurance of " + key + " is :" + value);
}}}}
```

Program:

Write a script to check whether listbox has duplicate or not ?

Selenium Code :

```
public class checklisthasDUPLICATEvalues_HashSet  extends BaseClass{

   public static void main(String[] args) {


                driver.get("file:///D:/Ajit/Selenium/AutomationByBhanuSir_BTM/testdataFile
                s/ListBox_Breakfast.html");

      WebElement listbox = driver.findElement(By.id("mtr"));

      Select s = new Select(listbox);

      List<WebElement> allOptions = s.getOptions();

      int count1 = allOptions.size();

      System.out.println("Number of elements in the list is :" +count1);

      HashSet<String> allElementText = new HashSet<String>();

      for (int i = 0; i < count1; i++) {

         String text = allOptions.get(i).getText();

         System.out.println(text);

         allElementText.add(text);

      }

      int count2 = allElementText.size();

      System.out.println("Number of elements in the hashset is :" +count2);

      if (count1==count2) {

         System.out.println("list box has NO duplicate values");

      }

      else{

         System.out.println("list box has  duplicate values");

      }

      System.out.println(allElementText);
```

```
    driver.close();
  }}}
```

Program:

Write a script to print the duplicate item in the list ?

Selenium Code :

```
public class PrinttheDUPLICATEItem_intheList_HashSet  extends BaseClass{
  public static void main(String[] args) {

            driver.get("file:///D:/Ajit/Selenium/AutomationByBhanuSir_BTM/testdataFile
            s/ListBox_Breakfast.html");
    WebElement listbox = driver.findElement(By.id("mtr"));
    Select s = new Select(listbox);
    List<WebElement> allOptions = s.getOptions();
    int count1 = allOptions.size();
    System.out.println("Number of elements in the list is :" +count1);
    HashSet<String> allElementText = new HashSet<String>();
    for (int i = 0; i < count1; i++) {
      String text = allOptions.get(i).getText();
                  /*allElementText.add(text) returns true if the element is not already
                  added, and it returns false if the same element is trying to be added
                  twice.  */
      if (!allElementText.add(text)) {
        System.out.println(text +" is the duplicate item in the list box");
      }
    }
    System.out.println(allElementText.size());
    // it will print all the unique values in the HashSet object
```

```
        System.out.println(allElementText);
        driver.close();
    }
}
```

Program :

Print the number of occurrance of Poori in the list box.

Selenium Code

```
package qspiders;
import java.util.HashMap;
import java.util.List;
import java.util.Set;

import org.openqa.selenium.By;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.support.ui.Select;
public class HashMapExample_printtheOcuuranceOfPoori extends BaseClass{
        public static void main(String[] args) {

driver.get("file:///D:/Ajit/Selenium/SeleniumBtm_7thSep17/webpages/ListBox_Breakfast.html"
);
                WebElement list = driver.findElement(By.id("mtr"));
                Select  s = new Select(list);
                List<WebElement> allElements = s.getOptions();

                HashMap<String, Integer> hashMapObj = new HashMap<String, Integer>();
```

```
		for (WebElement element : allElements) {
			String text = element.getText();
			if (hashMapObj.containsKey(text)) {
				Integer value = hashMapObj.get(text);
				value++;
				hashMapObj.put(text, value);
			}else{
				hashMapObj.put(text, 1);
			}
		}
		Set<String> allKeys = hashMapObj.keySet();
		for (String key : allKeys) {
			Integer value = hashMapObj.get(key);
			System.out.println(key +" -->"+ value);

			if (value>1) {
				System.out.println("Occurance of " + key + " is :" + value);
}}}}
```

Page Object Model - Framework Design pattern

Definition :

Page object model is a page factory design pattern. We implement this model in our automation framework because of the following advantages listed below.

Advantages of POM :

- **Easy to Maintain**

- Easy readability of scripts
- Reduce or eliminate duplicacy
- Re-usability of code
- Reliability
- It is the object repository
- we achieve encapsulation using this pom framework.

Pom class for Actitime Login page.

```
package pages;

import org.openqa.selenium.WebDriver;

import org.openqa.selenium.WebElement;

import org.openqa.selenium.support.FindBy;

import org.openqa.selenium.support.PageFactory;

public class LoginPage {

	//Declaration

	@FindBy(id="username")

	private WebElement unTB;

	@FindBy(name="pwd")

	private WebElement pwTB;

	@FindBy(xpath="//div[.='Login ']")

	private WebElement loginBtn;

	//Initialisation

	public LoginPage(WebDriver driver){

		PageFactory.initElements(driver, this);

	}

	//Utilisation
```

```
	public void setUsername(String un){
		unTB.sendKeys(un);
	}
	public void setPassword(String pw){
		pwTB.sendKeys(pw);
	}
	public void clickLogin(){
		loginBtn.click();
}}
```

TESTNG Framework

Testng is a framework that we implement in our Selenium automation framework for following advantages.

- **Data Driven testing can be achieved (Data parameterisation is possible using testng)**
- **we can execute the test scripts in batch (i.e multiple test scripts at one go)**
- **we can also execute selected test scripts based on priority.**
- **we can execute the test case group wise or module wise**
- **generation of Automatic HTML reports**
- **We can integrate testng with Maven as well**
- **Due to certain annotations that testng provides, it has become so powerful**

Write a program to check the sequence in which the annotations of Testng class gets executed.

Selenium code below :

_____

```
package testngpackage;
```

```
import org.testng.annotations.BeforeMethod;

import org.testng.annotations.AfterMethod;

import org.testng.annotations.BeforeClass;

import org.testng.Reporter;

import org.testng.annotations.AfterClass;

import org.testng.annotations.BeforeTest;

import org.testng.annotations.AfterTest;

import org.testng.annotations.BeforeSuite;

import org.testng.annotations.AfterSuite;

public class BaseTestNg {

 @BeforeMethod

  public void beforeMethod() {

  Reporter.log("beforeMethod", true);

  }

 @AfterMethod

  public void afterMethod() {

  Reporter.log("afterMethod", true);

  }

  @BeforeClass

  public void beforeClass() {

  Reporter.log("beforeClass", true);

  }

  @AfterClass
```

```
 public void afterClass() {
            Reporter.log("afterClass", true);
}
 @BeforeTest
 public void beforeTest() {
            Reporter.log("beforeTest", true);
 }
 @AfterTest
 public void afterTest() {
            Reporter.log("afterTest", true);
 }
@BeforeSuite
 public void beforeSuite() {
            Reporter.log("beforeSuite", true);
}
 @AfterSuite
 public void afterSuite() {
            Reporter.log("afterSuite", true);
}}
```

Demonstration on few parameters of @Test annotation as shown below.

```
package demotest;
```

```
import org.testng.Reporter;

import org.testng.annotations.Test;

public class DemoA {

	@Test(priority=1, groups={"user", "smoke"})

	public void CreateUser(){

		Reporter.log("CreateUser", true);

	}

	@Test(priority=2, invocationCount=1, enabled=true, groups={"user"})

	public void editUser(){

		Reporter.log("editUser", true);

	}

	@Test(priority=3, groups={"user"})

	public void deleteUser(){

		Reporter.log("deleteUser", true);

	}

	@Test(priority=1, groups={"product", "smoke"})

	public void createProduct(){

		Reporter.log("createProduct", true);

	}

	@Test(priority=2, invocationCount=1, enabled=true, groups={"product"})

	public void editProduct(){

		Reporter.log("editProduct", true);

	}
```

```
	@Test(priority=3, groups={"product"})
	public void deleteProduct(){
		Reporter.log("deleteProduct", true);
	}
}
```

Convert the above testng class to create testng.xml suite file as shown below

How to convert a testng class to testng.xml suite file ?

Right click on the testng class → TestNg ---> Convert to testng

Below xml file is created with the following data.

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE suite SYSTEM "http://testng.org/testng-1.0.dtd">
<suite name="Suite">
 <test name="Test">
 <groups>
 <run>
 <include name="user"></include>
 <exclude name="user"></exclude>
 </run>
  </groups>
  <classes>
      <class name="testngpackage.DemoA"/>
```

```
  </classes>
 </test> <!-- Test -->
</suite> <!-- Suite →
```

Launch Multiple browser using Testng.xml suite file parameters

We can create multiple test blocks to work on multiple browsers in automation project.

Example is shown below.

```
package testngpackage;
import java.io.FileInputStream;
import java.io.FileNotFoundException;
import java.io.IOException;
import java.util.Properties;
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.firefox.FirefoxDriver;
import org.testng.Reporter;
import org.testng.annotations.Parameters;
import org.testng.annotations.Test;
public class LaunchFirefoxAndChromeTogether {
        static{
```

```
System.setProperty("webdriver.gecko.driver", "./driver/geckodriver.exe");

System.setProperty("webdriver.chrome.driver", "./driver/chromedriver.exe");

}

WebDriver driver;

@Test

@Parameters({"browser"})

public void loginFFandCHROME(String browser) throws InterruptedException, IOException{

        //Reporter.log(browser, true);

        if (browser.equals("firefox")) {

                driver = new FirefoxDriver();

        } else {

                driver = new ChromeDriver();

        }

        FileInputStream configPath = new FileInputStream(".\\config.properties");

        Properties prop = new Properties();

        prop.load(configPath);

        String url = prop.getProperty("URL");

        driver.get(url);

        WebElement un = driver.findElement(By.id("username"));

        for (int i = 0; i < 10; i++) {

                un.sendKeys("admin" + i);

                Thread.sleep(2000);

                un.clear();
```

```
                }

                driver.close();

        }

}
```

Use the below testng.xml suite file

```
<?xml version="1.0" encoding="UTF-8"?>

<!DOCTYPE suite SYSTEM "http://testng.org/testng-1.0.dtd">

<suite name="Suite" parallel="tests">

 <test name="TestFirefox">

 <parameter name="browser" value="firefox"></parameter>

  <classes>

   <class name="testngpackage.LaunchFirefoxAndChromeTogether"/>

  </classes>

 </test> <!-- Test -->

 <test name="TestChrome">

 <parameter name="browser" value="chrome"></parameter>

  <classes>

   <class name="testngpackage.LaunchFirefoxAndChromeTogether"/>

  </classes>

 </test> <!-- Test -->

</suite> <!-- Suite →
```

Parameterisation using @DataProviders

1. **DataProvider is an annotation in testng using which we can create data bank.**
2. **THis databank can used across any testng class , thus achieiving data parameterisation.**

Executing the same script with multiple sets of data is called data parameterisation.

From Testng Class by creating our own data bank using DataProvider annotation

From Testng class

1. We use DataProvider annotation to create the data bank,

2. We utilise this data from any testng methods by using

"dataProvider" parameter as an argument to "Test" annotation.

code :

```
package scripts;

import org.testng.Reporter;

import org.testng.annotations.DataProvider;

import org.testng.annotations.Test;

public class DataProviderExample{

   @DataProvider

   public Object[][] dataBank(){

            Object[][] data = new Object[2][2];

            data[0][0] = "admin1";

            data[0][1] = "manager1";

            data[1][0] = "admin2";

            data[1][1] = "manager2";

            return data;
```

```
}

@Test(dataProvider="dataBank")

public void useDataBank(String un, String pwd){

        Reporter.log(un + " --> "+ pwd, true);

}

}
```

SELENIUM GRID

To run the same scripts on multiple browsers and multiple systems parallely, we use Selenium Grid.

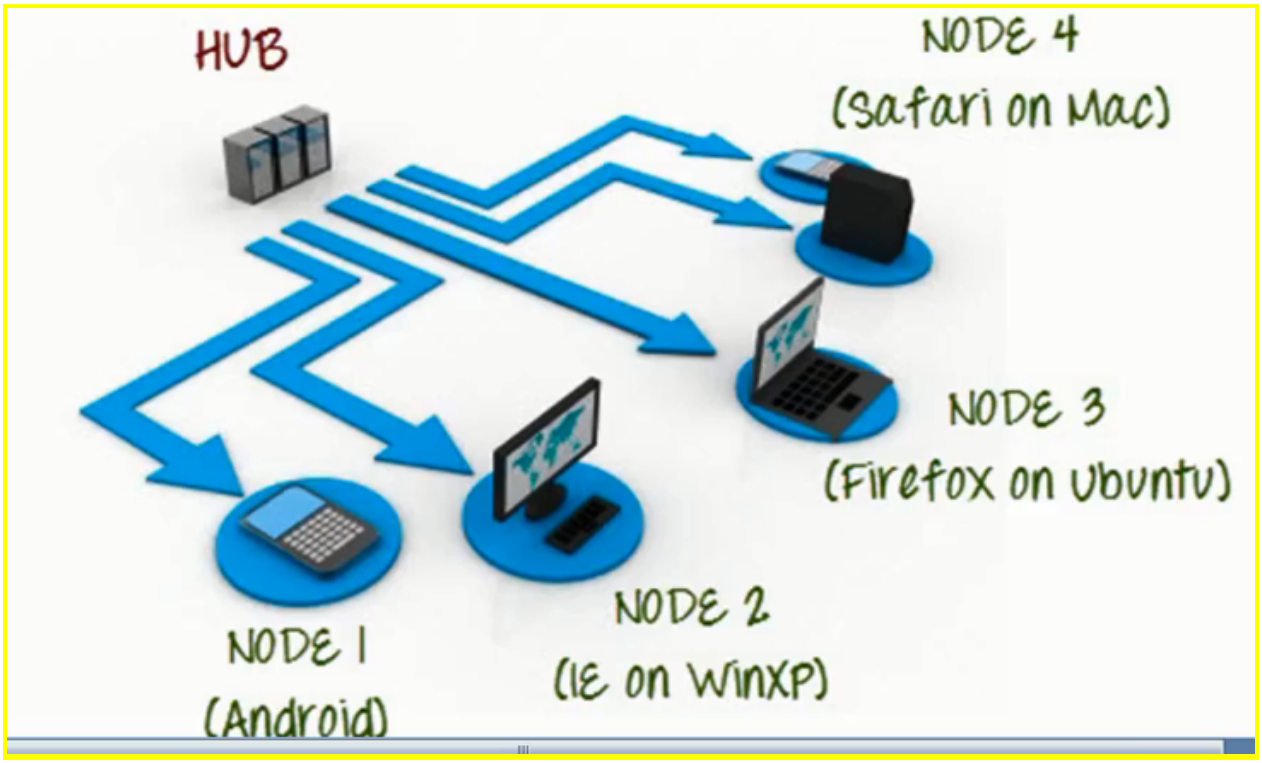
Here, there will be 2 types of system.

1. **HUB**
2. **NODE.**

Node is the remote system on which you run the automation scripts.

In node system, JDK and Browser should be installed and we should also know the ip address.

It Is used for Cross browser compatibility testing and cross platform testing on multiple Operating systems.



Steps to setup NODE system :

1. **Download selenium server jar file and browser specific driver executables files such as chromedriver.exe and geckodriver.exe files in to a folder.**
2. **In the same folder, create a batch file with .bat extension and write the following command.**

   java -Dwebdriver.gecko.driver=geckodriver.exe -Dwebdriver.chrome.driver=chromedriver.exe -jar selenium-standalone-server.jar

3. Double click on the Run.bat file and it should display the following message in the command prompt window.

Selenium server is up and running.

HUB :

It is centralised system where the script is present. It is also used to control the execution.

We run the scripts from HUB and it will connect to remote system called NODE.

It will open the browser and perform action in the node and the result will be stored in the HUB machine.

Steps to set up HUB:

1. **Hub will have all the softwares which is required for a typical selenium machine.**
2. **Update the selenium code to execute the scripts in remote system as shown below.**

To work on selenium grid, we have to create an object of RemoteWebDriver class which accepts 2 arguments, both are object type. First argument is an object of URL class and second argument is an object of DesiredCapabilities class.

```
package demotest;

import java.net.MalformedURLException;

import java.net.URL;

import org.openqa.selenium.WebDriver;

import org.openqa.selenium.remote.DesiredCapabilities;

import org.openqa.selenium.remote.RemoteWebDriver;

import org.testng.annotations.Parameters;

import org.testng.annotations.Test;

public class SeleniumGridDemo {

        @Test

        @Parameters({"node","browser"})

        public void LaunchFireFoxAndChrome(String node, String browser) throws MalformedURLException{

                URL whichSystem = new URL(node);

                DesiredCapabilities whichbrowser = new DesiredCapabilities();

                whichbrowser.setBrowserName(browser);

                WebDriver driver = new RemoteWebDriver(whichSystem, whichbrowser);

        }}
```

Update the testng.xml suite file to run in multiple browsers and multiple systems.

_____

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE suite SYSTEM "http://testng.org/testng-1.0.dtd">
<suite name="Suite" parallel="tests">
 <test name="TestFirefox">
 <parameter name="node" value="http://localhost:4444/wd/hub"></parameter>
 <parameter name="browser" value="firefox"></parameter>
  <classes>
   <class name="testngpackage.SeleniumGridExample"/>
  </classes>
 </test> <!-- Test -->
 <test name="TestChrome">
 <parameter name="node" value="http://localhost:4444/wd/hub"></parameter>
 <parameter name="browser" value="chrome"></parameter>
  <classes>
   <class name="testngpackage.SeleniumGridExample"/>
  </classes>
 </test> <!-- Test -->
</suite> <!-- Suite -->
```

_____

SELENIUM FRAMEWORK

Framework is set of rules and guidelines which should be followed by all the automation engineers in the team while automating an application.

There are 3 major status as mentioned below.

1. **Automation Framework Design**
2. **Automation Framework Implementation**
3. **Automation Framework Execution**

Questions : Which framework have you developed/implemented in your project ?

We have implemented Hybrid driven framework, which is a combination of POM driven framework, testng framework, data driven framework, method driven framework and modular driven framework.

POM Driven Framework :

1. **In POM driven framework, we have created POM pages for all the page of our application under test.**
2. **In our application, we have 20 pages in total and for all these 20 pages, we have created 20 pom classes. All these pom classes, we have created in a single package called scripts.**
3. **In each POM class, we declared the elements present on that particular page using @FindBy annotation. As an argument to FindBy annotation, we can use any one of the locator using which, element can be uniquely identified on the web page.**
4. **Once elements are declared, we initialise all the elements declared above using PageFactory.initElements() method, which accepts 2 arguments - both are of type object. First argument is WebDriver driver object and second argument is this (which represent the current class object), we write this statement inside the constructor, so that when the object of this pom class is created from another class, it will invoke the constructor and initialise all the elements which are declared in the pom class.**
5. **Once elements are declared and initialized, we utilise all the elements by creating respective setter methods. This is what we have done on a high level inside a pom class.**

TESTNG FRAMEWORK :

1. **Based on the number of test cases, we will create that many number of Testng class. In our project, we had close to 678 regression test cases and we have developed 678 testng class with one test method in each class.**

2. **In test method, we create object of respective POM class and using this reference variable, we keep calling the relevant method of pom class based on the manual test steps. This is how, we have automated our scripts using testng framework.**

Data Driven Framework :

1. **Executing the same scripts with multiple set of data is called data parameterisation. We used Excel file to get data from external source and utilised it in the scripts.**
2. **Using apache poi related jar, we implemented this data driven technique to achieve data parameterisation in our framework. Hence, our framework is also a data driven framework.**

Modular Driven Framework :

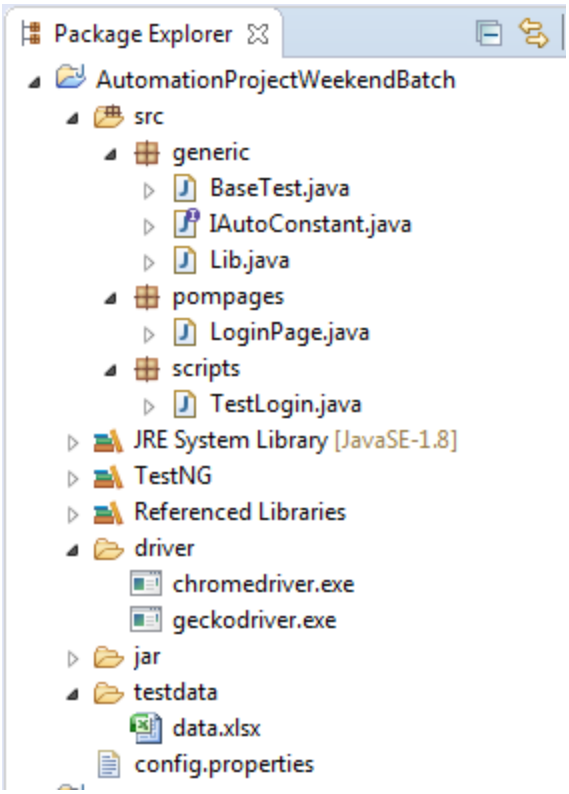
1. **Module wise execution of test scripts is known as modular driven framework.**
2. **In our project, when ever we develop a test method while automating a test case, we tag it to some group based on the module name.**
3. **Now, if any test script fails during normal execution cycle, we log defects and once developer fix the issue, we ensure that all the related test scripts of this particular module are executed and passed. This process of execution of module wise test scripts is known as modular driven framework.**

Method Driven Framework :

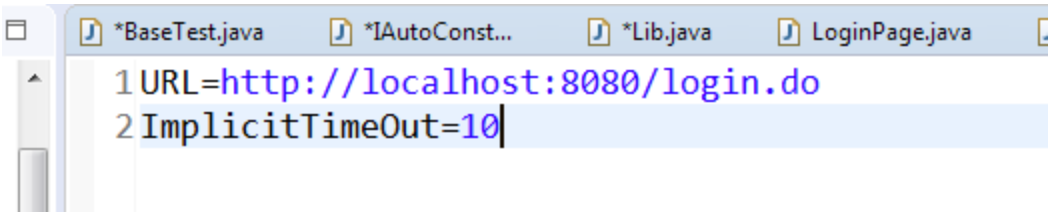
1. **We created few generic methods to access data from external sources like Excel file, config file, etc.**
2. **And furthermore, based on the manual regression test case steps, we call the relevant method of pom class from the testng class, In this way , our framework is a kind of method driven framework as well.**

In our way, the framework that we have implemented is a HYBRID framework.

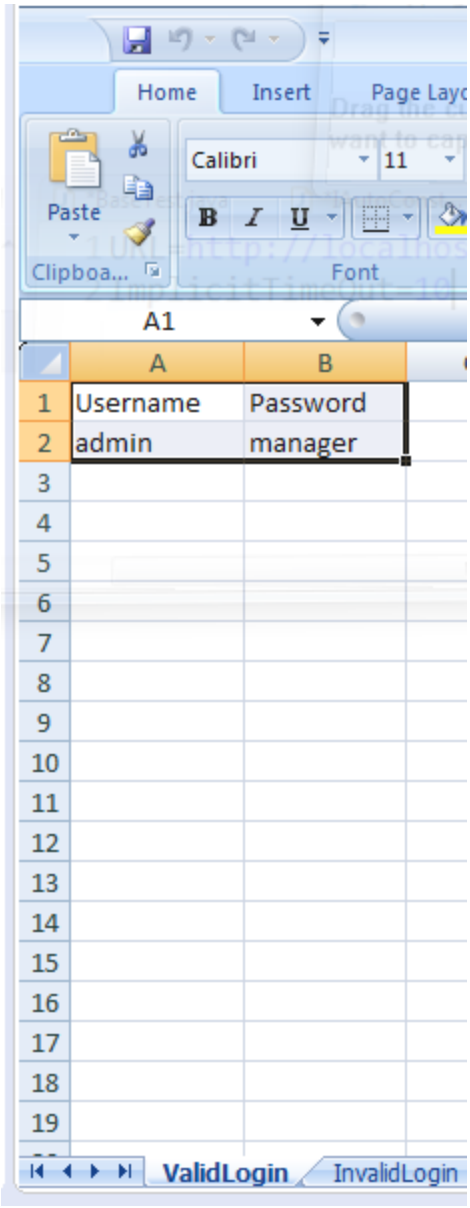
Project Framework Folder Structure is mentioned below.



Config.Properties snapshot below :



data.xlsx snapshot below:



BaseTest.java Code

---

package generic;

import java.util.concurrent.TimeUnit;

import org.openqa.selenium.WebDriver;

```
import org.openqa.selenium.firefox.FirefoxDriver;

import org.testng.annotations.AfterMethod;

import org.testng.annotations.BeforeMethod;

public class BaseTest implements IAutoConstant{

	public static WebDriver driver;

	static{

		System.setProperty(GECKO_KEY, GECKO_VALUE);

		System.setProperty(CHROME_KEY, CHROME_VALUE);

	}

	@BeforeMethod

	public void openApplication(){

		 driver = new FirefoxDriver();

		 String url = Lib.getProperty(CONFIG_PATH, "URL");

		driver.get(url);

		String ITO = Lib.getProperty(CONFIG_PATH, "ImplicitTimeOut");

		int timeoutPeriod = Integer.parseInt(ITO);

		driver.manage().timeouts().implicitlyWait(timeoutPeriod, TimeUnit.SECONDS);

	}

	@AfterMethod

	public void closeApplication(){

		driver.close();

	}

}
```

_____

IAutoConstant Interface code below

```
package generic;

public interface IAutoConstant {

	String CONFIG_PATH = ".\\config.properties";

	String EXCEL_PATH = ".\\testdata\\data.xlsx";

	String GECKO_KEY = "webdriver.gecko.driver";

	String GECKO_VALUE = ".\\driver\\geckodriver.exe";

	String CHROME_KEY = "webdriver.chrome.driver";

	String CHROME_VALUE = ".\\driver\\chromedriver.exe";

}
```

_____

Lib.java class file to create all project related generic functions.

```
package generic;

import java.io.FileInputStream;

import java.util.Properties;

import org.apache.poi.ss.usermodel.Workbook;

import org.apache.poi.ss.usermodel.WorkbookFactory;

public class Lib implements IAutoConstant{

	public static Workbook wb;

	public static String getProperty(String CONFIG_PATH, String key){

		String property = "";

		Properties prop = new Properties();
```

```
		try {
			prop.load(new FileInputStream(CONFIG_PATH));
			property = prop.getProperty(key);
		} catch (Exception e) {
		}
		return property;
}
public static int getRowCount(String EXCEL_PATH, String sheet){
		int rowCount = 0;
		try {
			wb = WorkbookFactory.create(new FileInputStream(EXCEL_PATH));
			rowCount = wb.getSheet(sheet).getLastRowNum();
		} catch (Exception e) {
		}
		return rowCount;
}
public static String getCellValue(String EXCEL_PATH, String sheet, int row, int column){
		String value = "";
		try {
			wb = WorkbookFactory.create(new FileInputStream(EXCEL_PATH));
			value = wb.getSheet(sheet).getRow(row).getCell(column).toString();
		} catch (Exception e) {
		}
```

```
            return value;
        }
```

---

pompackage - LoginPage.java

```
package pompages;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.support.FindBy;
import org.openqa.selenium.support.PageFactory;
public class LoginPage {
        //declaration
        @FindBy(id="username")
        private WebElement unTB;
        @FindBy(name="pwd")
        private WebElement pwTB;
        @FindBy(xpath="//div[.='Login ']")
        private WebElement loginBtn;
        //initialisation
        public LoginPage(WebDriver driver){
            PageFactory.initElements(driver, this);
        }
        //Utilisation
        public void setUsername(String un){
```

```
                unTB.sendKeys(un);
        }
        public void setPassword(String pw){
                pwTB.sendKeys(pw);
        }
        public void clickLogin(){
                loginBtn.click();
        }
}
```

TestNg Class - TestLogin

```
package scripts;
import org.testng.annotations.Test;
import generic.BaseTest;
import generic.Lib;
import pompages.LoginPage;
public class TestLogin extends BaseTest{
        @Test
        public void testLogin(){
                LoginPage l = new LoginPage(driver);
                String un = Lib.getCellValue(EXCEL_PATH, "ValidLogin", 1, 0);
                String pw = Lib.getCellValue(EXCEL_PATH, "ValidLogin", 1, 1);
                l.setUsername(un);
```

```
                l.setPassword(pw);

                l.clickLogin();

        }}
```

Take Screenshots when a test method is failed

In BaseTest.java file, write below code

```
package generic;

import java.io.File;

import java.io.IOException;

import java.util.Date;

import java.util.concurrent.TimeUnit;

import org.apache.commons.io.FileUtils;

import org.openqa.selenium.OutputType;

import org.openqa.selenium.TakesScreenshot;

import org.openqa.selenium.WebDriver;

import org.openqa.selenium.firefox.FirefoxDriver;

import org.testng.annotations.AfterMethod;

import org.testng.annotations.BeforeMethod;

public class BaseTest implements IAutoConstant{

        public static WebDriver driver;

        static{

                System.setProperty(GECKO_KEY, GECKO_VALUE);

                System.setProperty(CHROME_KEY, CHROME_VALUE);
```

```
}

@BeforeMethod

public void openApplication(){

	driver = new FirefoxDriver();

	String url = Lib.getProperty(CONFIG_PATH, "URL");

	driver.get(url);

	String ITO = Lib.getProperty(CONFIG_PATH, "ImplicitTimeOut");

	int timeoutPeriod = Integer.parseInt(ITO);

	driver.manage().timeouts().implicitlyWait(timeoutPeriod, TimeUnit.SECONDS);

}

@AfterMethod

public void closeApplication(){

	driver.close();

}

public void takeScreenshot(String testname){

	Date d = new Date();

	String currentdate = d.toString().replaceAll(":", "_");

	TakesScreenshot ts = (TakesScreenshot) driver;

	File srcFile = ts.getScreenshotAs(OutputType.FILE);

	File destFile = new File(".\\screenshots\\"+currentdate+"\\"+testname+"_screenshot.png");

	try {

		FileUtils.copyFile(srcFile, destFile);

	} catch (IOException e) {
```

```
                    e.printStackTrace();
                }
        }
        }
```

Create a class called TestListener.java

```
package generic;
import org.testng.ITestContext;
import org.testng.ITestListener;
import org.testng.ITestResult;
public class TestngListeners implements ITestListener {
        BaseTest b = new BaseTest();
        @Override
        public void onTestStart(ITestResult result) {
                // TODO Auto-generated method stub
        }
        @Override
        public void onTestSuccess(ITestResult result) {
                // TODO Auto-generated method stub
        }
        @Override
        public void onTestFailure(ITestResult result) {
```

```
            String testmethodName = result.getName();

            b.takeScreenshot("TestValidLogin");

        }

        @Override

        public void onTestSkipped(ITestResult result) {

            // TODO Auto-generated method stub

        }

        @Override

        public void onTestFailedButWithinSuccessPercentage(ITestResult result) {

            // TODO Auto-generated method stub

        }

        @Override

        public void onStart(ITestContext context) {

            // TODO Auto-generated method stub

        }

        @Override

        public void onFinish(ITestContext context) {

            // TODO Auto-generated method stub

        }

}
```

Create testng.xml suite file as shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<!DOCTYPE suite SYSTEM "http://testng.org/testng-1.0.dtd">

<suite name="Suite">

<listeners>

<listener class-name="generic.TestngListeners"></listener>

</listeners>

  <test name="Test">

    <classes>

      <class name="scripts.TestLogin"/>

    </classes>

  </test> <!-- Test -->

</suite> <!-- Suite -->
```

Update the TestLogin.java class as shown below

```
package scripts;

import org.testng.annotations.Test;

import org.testng.asserts.SoftAssert;


import generic.BaseTest;

import generic.Lib;

import pompages.LoginPage;

public class TestLogin extends BaseTest{

		@Test

		public void testLogin(){
```

```
        LoginPage l = new LoginPage(driver);

        String un = Lib.getCellValue(EXCEL_PATH, "ValidLogin", 1, 0);

        String pw = Lib.getCellValue(EXCEL_PATH, "ValidLogin", 1, 1);

        String expectedTitle = Lib.getCellValue(EXCEL_PATH, "ValidLogin", 1, 2);

        l.setUsername(un);

        l.setPassword(pw);

        l.clickLogin();

        String actualtitle = driver.getTitle();

        SoftAssert s = new SoftAssert();

        s.assertEquals(actualtitle, expectedTitle);

        s.assertAll();

    }

}
```

Run the suite.xml file

MAVEN PROJECT :

Apache Maven is a software project management and build dependency management tool for Selenium/java frameworks.

Why Maven ?

- Central repository to get dependencies
- maintaining common structure across the organization
- Flexibility in integrating with CI tools like JENKINS
- Plugins for Test framework execution

POM.xml is the heart of Maven project.

POM.XML file dependencies

_____

```
<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>AutomationProjectWeekendBatch</groupId>
 <artifactId>AutomationProjectWeekendBatch</artifactId>
 <version>0.0.1-SNAPSHOT</version>
 <build>
  <sourceDirectory>src</sourceDirectory>
  <plugins>
   <plugin>
    <artifactId>maven-compiler-plugin</artifactId>
    <version>3.5.1</version>
    <configuration>
     <source>1.8</source>
     <target>1.8</target>
    </configuration>
   </plugin>
   <plugin>
    <groupId>org.apache.maven.plugins</groupId>
    <artifactId>maven-surefire-plugin</artifactId>
    <version>2.20.1</version>
```

```
      <configuration>
        <suiteXmlFiles>
          <suiteXmlFile>testng.xml</suiteXmlFile>
        </suiteXmlFiles>
      </configuration>
    </plugin>
  </plugins>
 </build>
 <dependencies>
          <dependency>
                  <groupId>org.seleniumhq.selenium</groupId>
                  <artifactId>selenium-server</artifactId>
                  <version>3.7.1</version>
          </dependency>
          <dependency>
   <groupId>org.testng</groupId>
   <artifactId>testng</artifactId>
   <version>6.11</version>
   <scope>test</scope>
</dependency>
          <dependency>
   <groupId>org.apache.poi</groupId>
   <artifactId>poi</artifactId>
```

```
    <version>3.17</version>
</dependency>
<dependency>
    <groupId>org.apache.poi</groupId>
    <artifactId>poi-ooxml</artifactId>
    <version>3.17</version>
</dependency>
<dependency>
    <groupId>org.apache.poi</groupId>
    <artifactId>poi-scratchpad</artifactId>
    <version>3.17</version>
</dependency>
<dependency>
    <groupId>org.apache.poi</groupId>
    <artifactId>poi-ooxml-schemas</artifactId>
    <version>3.17</version>
</dependency>
<dependency>
    <groupId>org.apache.poi</groupId>
    <artifactId>poi-excelant</artifactId>
    <version>3.17</version>
</dependency>
<dependency>
```

```
    <groupId>commons-codec</groupId>
    <artifactId>commons-codec</artifactId>
    <version>1.11</version>
</dependency>
<dependency>
    <groupId>commons-io</groupId>
    <artifactId>commons-io</artifactId>
    <version>2.6</version>
</dependency>
<dependency>
    <groupId>commons-logging</groupId>
    <artifactId>commons-logging-api</artifactId>
    <version>1.1</version>
</dependency>
<dependency>
    <groupId>com.github.virtuald</groupId>
    <artifactId>curvesapi</artifactId>
    <version>1.05</version>
</dependency>
<dependency>
    <groupId>org.apache.xmlbeans</groupId>
    <artifactId>xmlbeans</artifactId>
    <version>2.6.0</version>
```

```
</dependency>
<dependency>
   <groupId>org.apache.logging.log4j</groupId>
   <artifactId>log4j-core</artifactId>
   <version>2.9.1</version>
</dependency>
<dependency>
   <groupId>org.apache.logging.log4j</groupId>
   <artifactId>log4j-api</artifactId>
   <version>2.9.1</version>
</dependency>
 </dependencies>
</project>
```

Solutions in case of maven issues

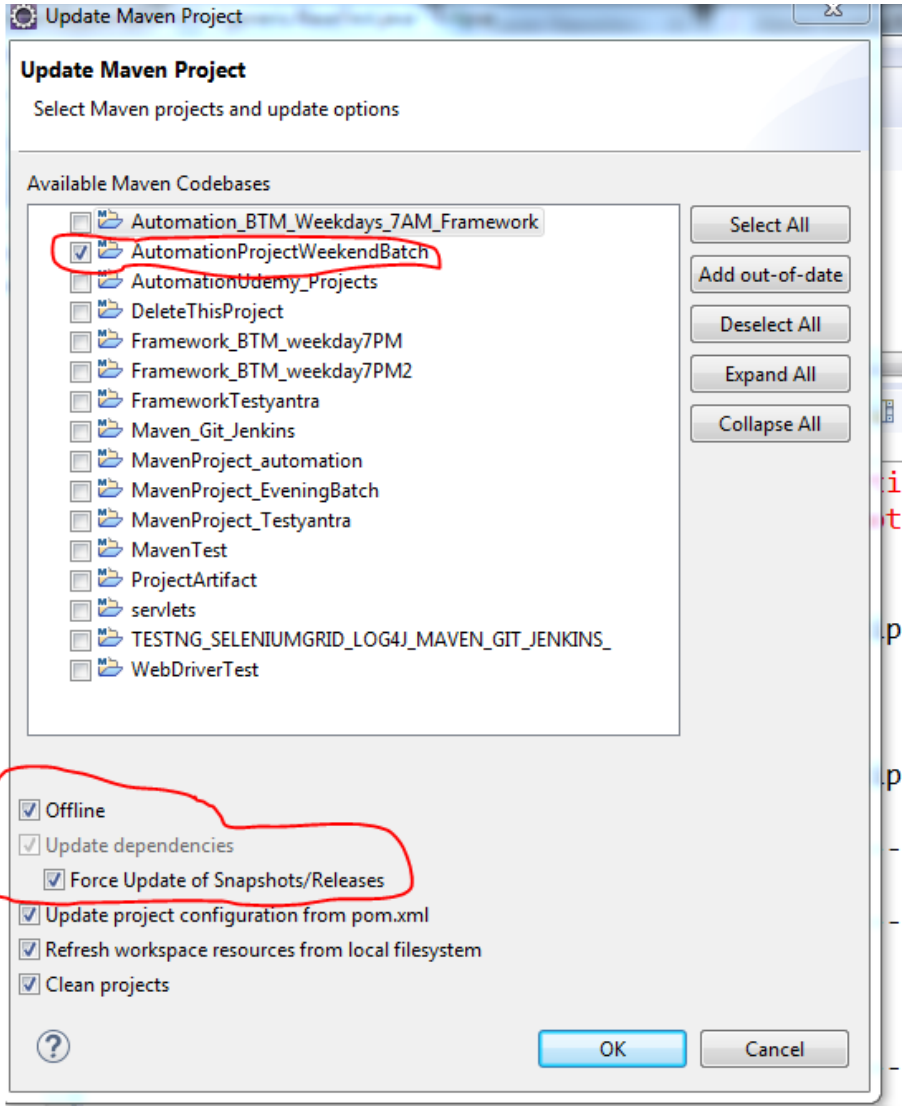
1. No compiler added to the build

Solution : Windows - preference -- Java - Installed JREs → navigate to location wherer your jdk1.8 is iintalled (c--program files --java - JDK)

2. MOJOException

Right click on the project → maven → update project → Select the project and select the highlighted options:

- offline checkbox
- force update of snapshots



Note : Still if it doesnt work, delete the .m2 folder from the below location.

C://users/admin/.m2

JENKINS

It is a continuous integration tool widely used by software project.

Advantages of Jenkins :

1. **We can schedule the time for automation framework suite execution.**

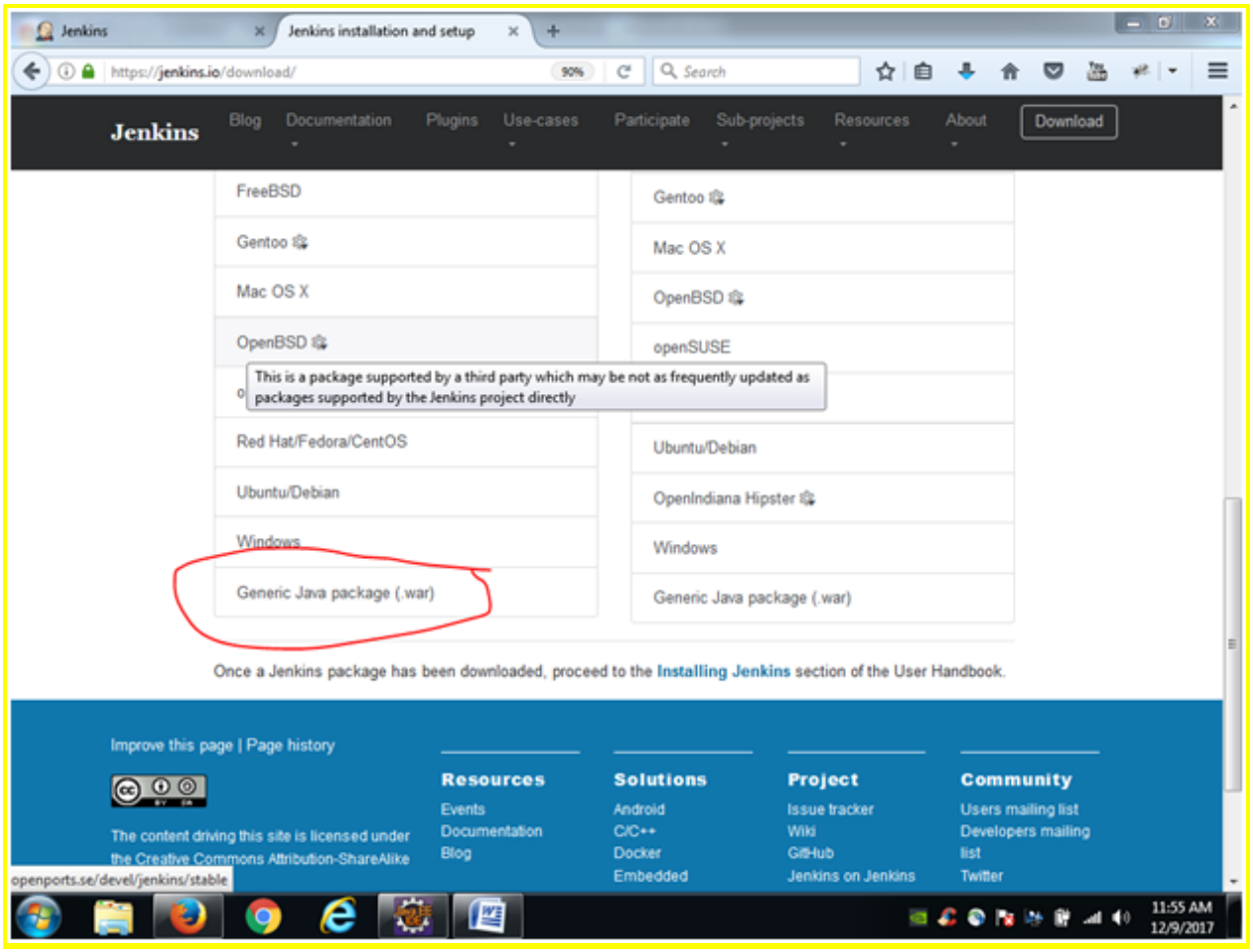
2. **Automatic kick off of automation suite execution as soon as the build gets deployed from DEV environment to QA environment.**

How to download jenkins

URL :

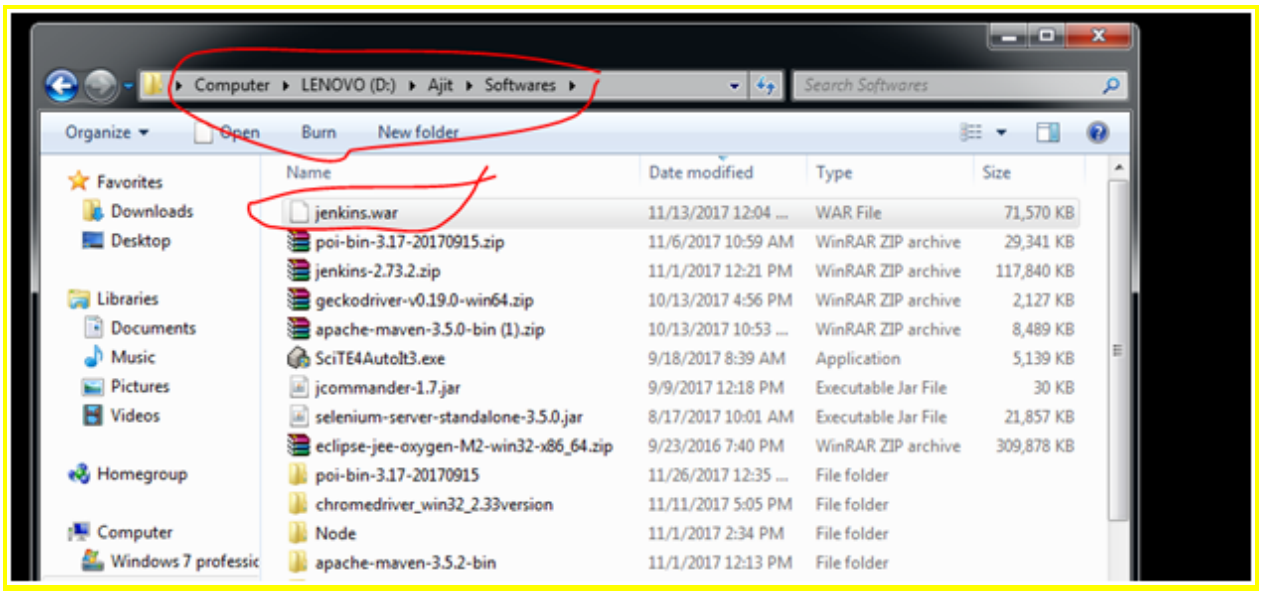
https://jenkins.io/download/

click on the link highlighted below.



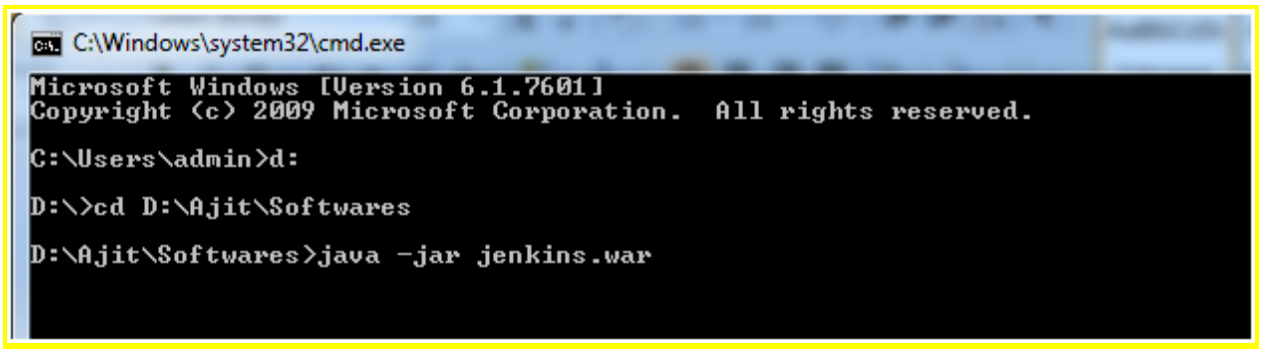
How to start the Jenkins server from Command promt ?

Navigate to the below localton where ur jenkins.war is placed.



Open the command promt

And type the below command



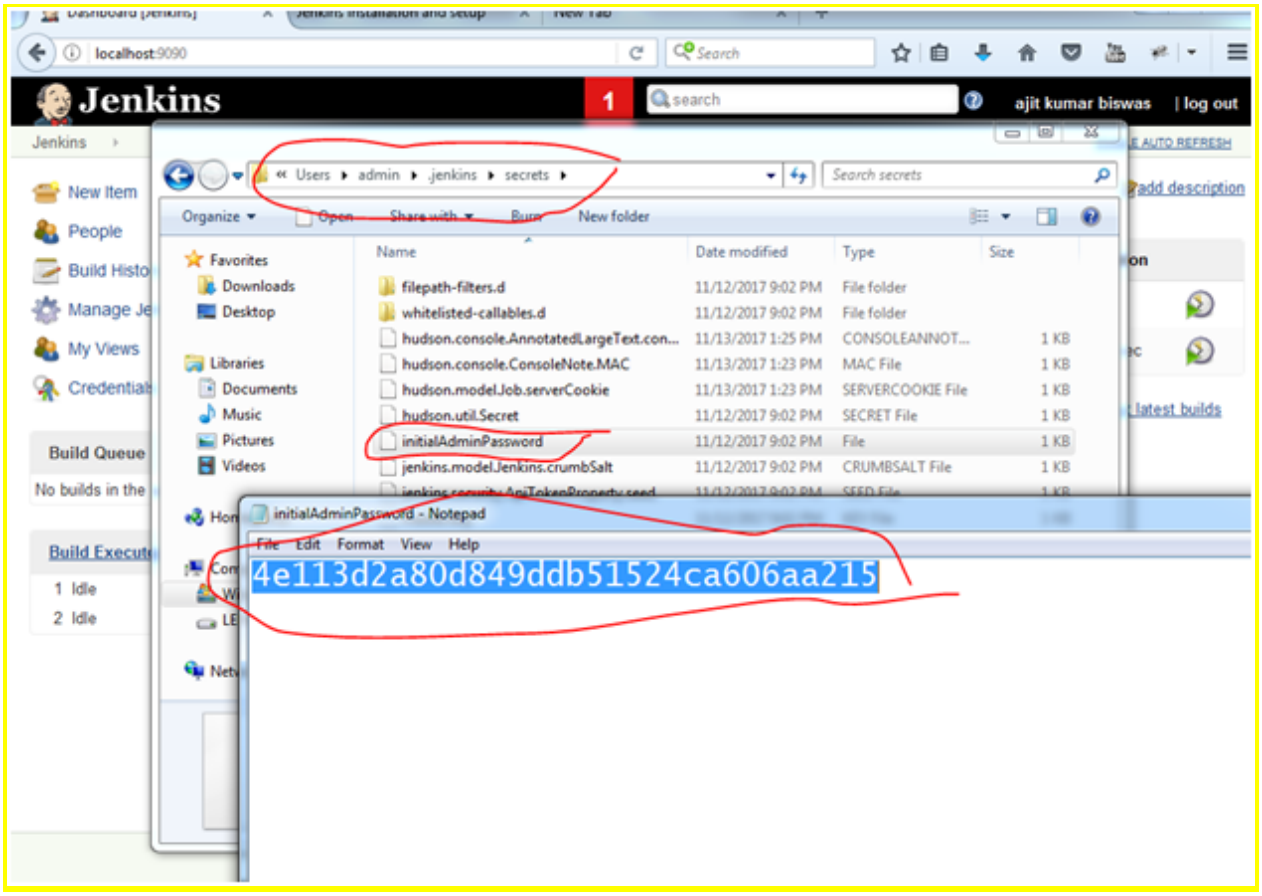
It will say – Jenkins Is up and running

Now open the jenins dashboard.

Login to Jenkins using the below username and password

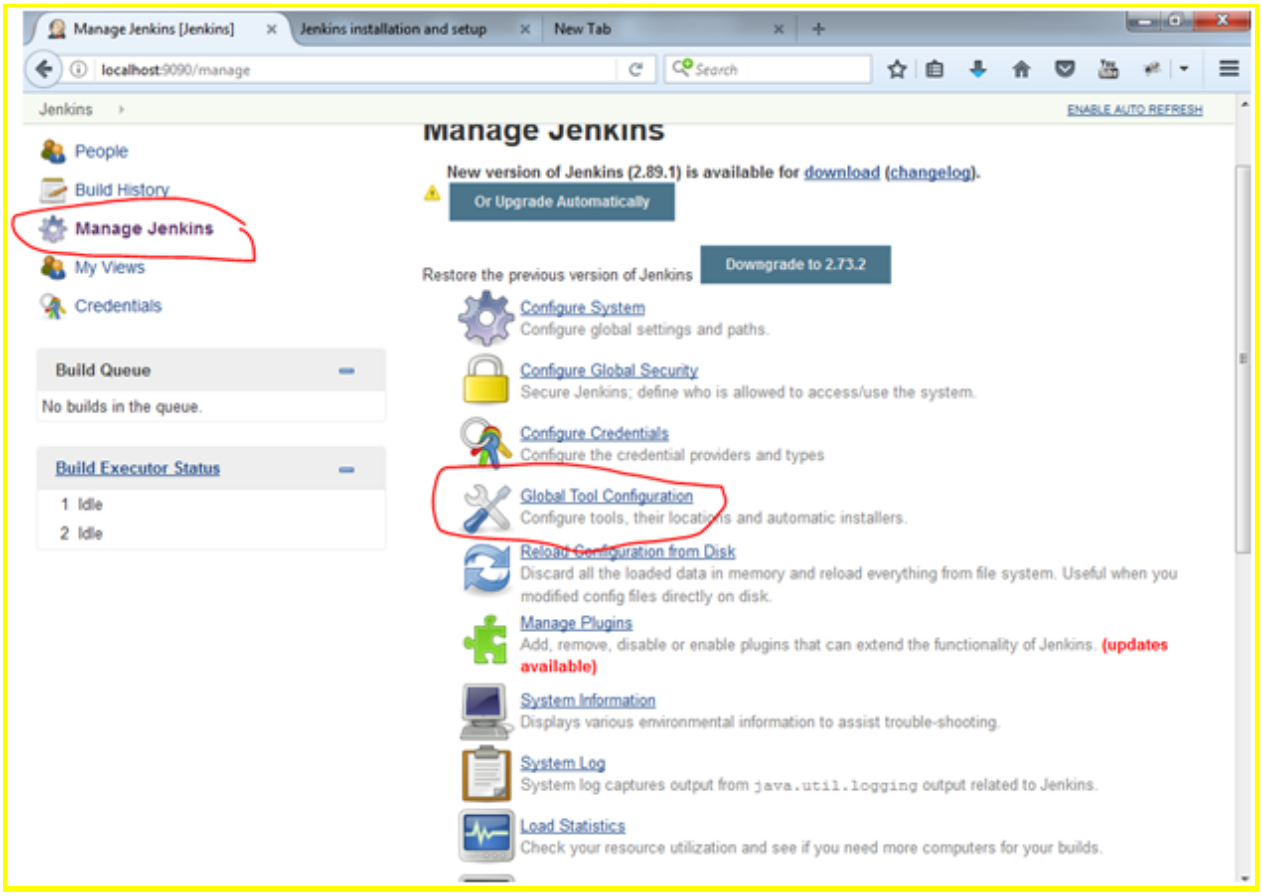
Username : admin

Password is below;

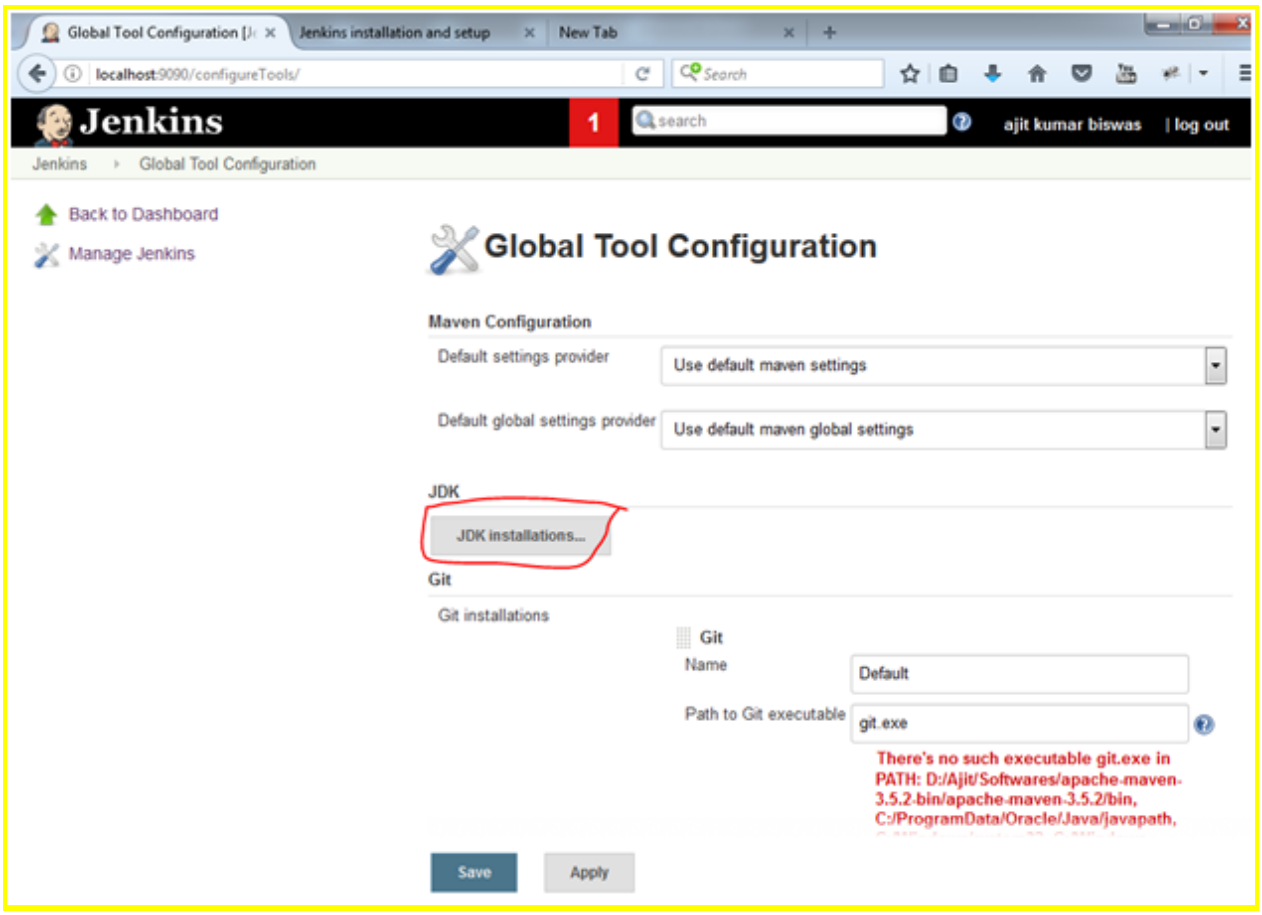


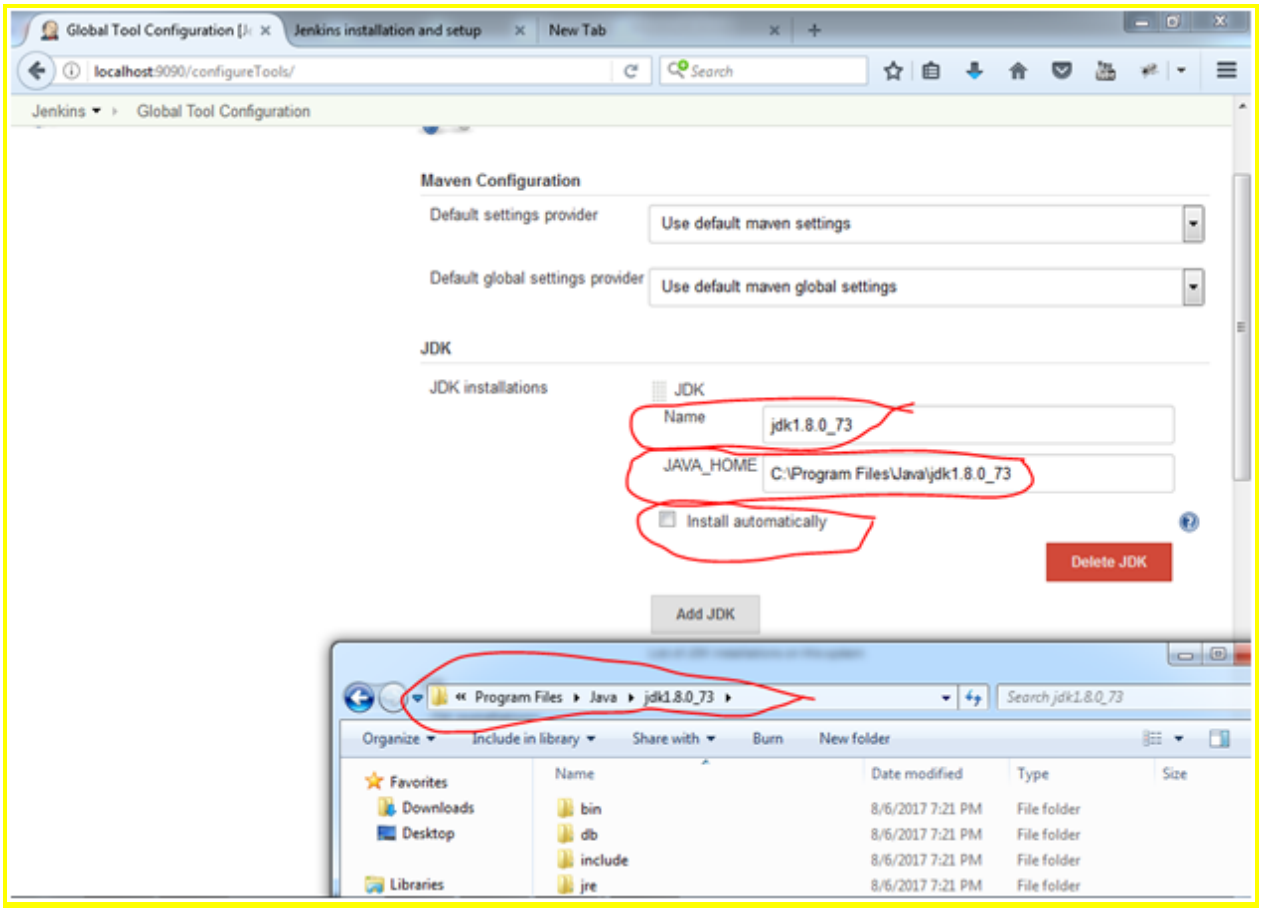
Jenkins dashboard page.

Click on Manage Jenkins and global tool configuration

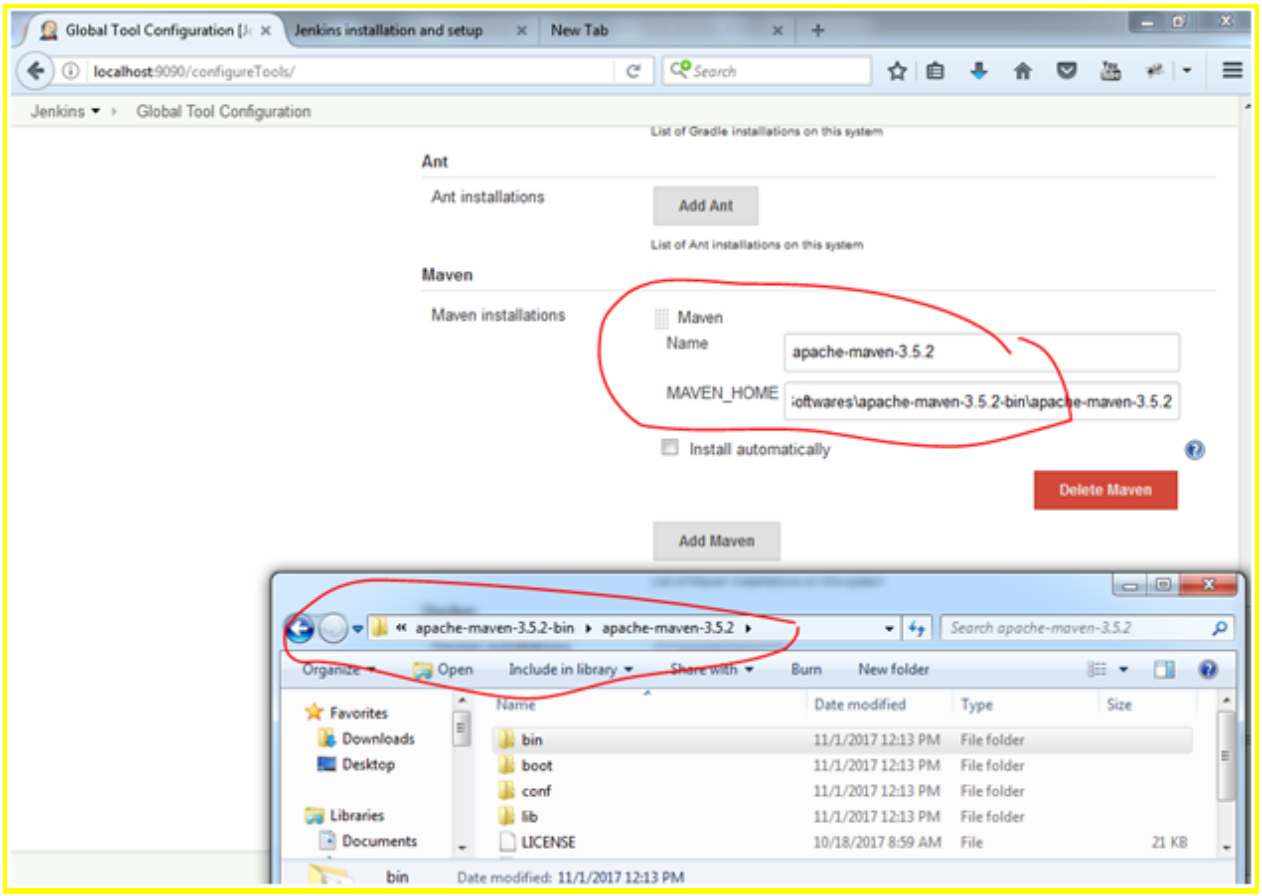


Add JDK to jenkins

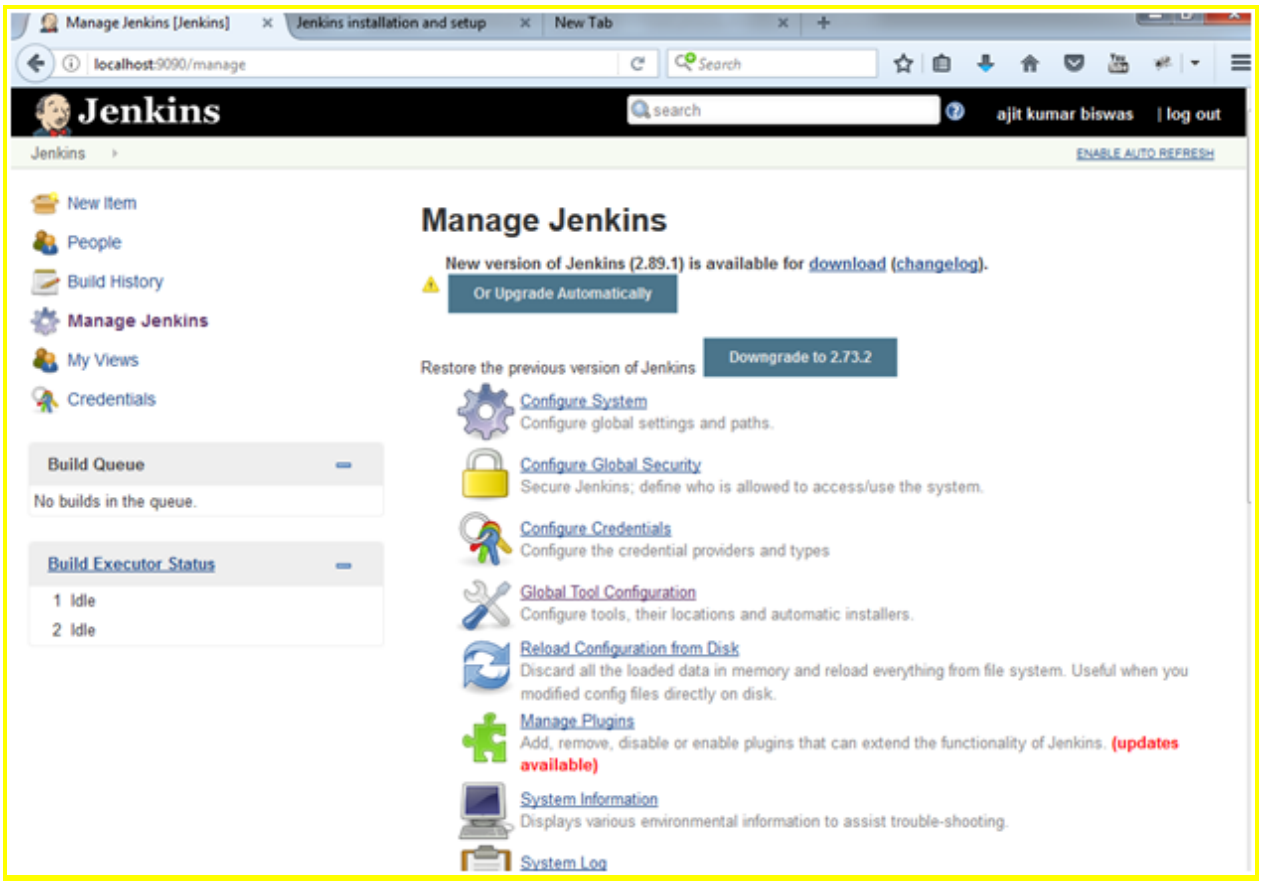

Global Tool Configuration [J
Jenkins installation and setup
New Tab
localhost:9090/configureTools/
Search
Jenkins
1
search
ajit kumar biswas
| log out
Jenkins
Global Tool Configuration
Back to Dashboard
Manage Jenkins
Global Tool Configuration
Maven Configuration
Default settings provider
Use default maven settings
Default global settings provider
Use default maven global settings
JDK
JDK installations...
Git
Git installations
Git
Name
Default
Path to Git executable
git.exe
There's no such executable git.exe in PATH: D:/Ajit/Softwares/apache-maven-3.5.2-bin/apache-maven-3.5.2/bin, C:/ProgramData/Oracle/Java/javapath,
Save
Apply



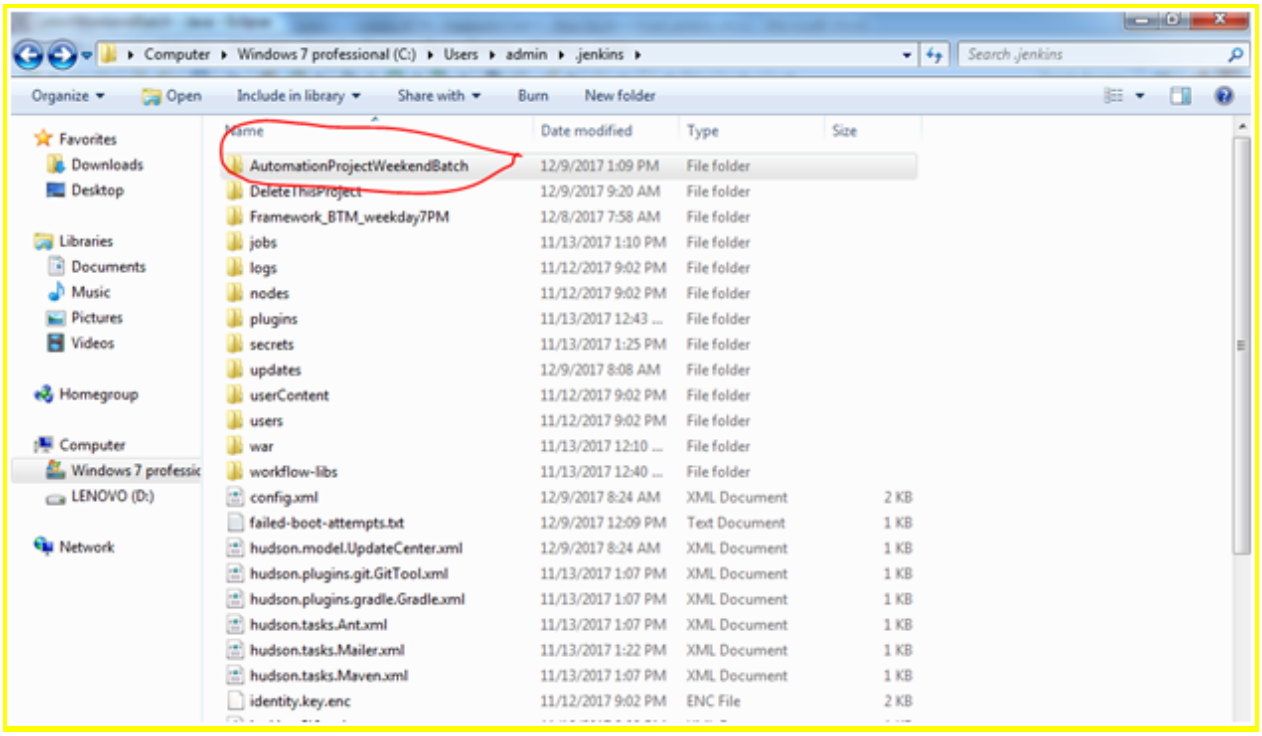
Add Maven Path as shown below.



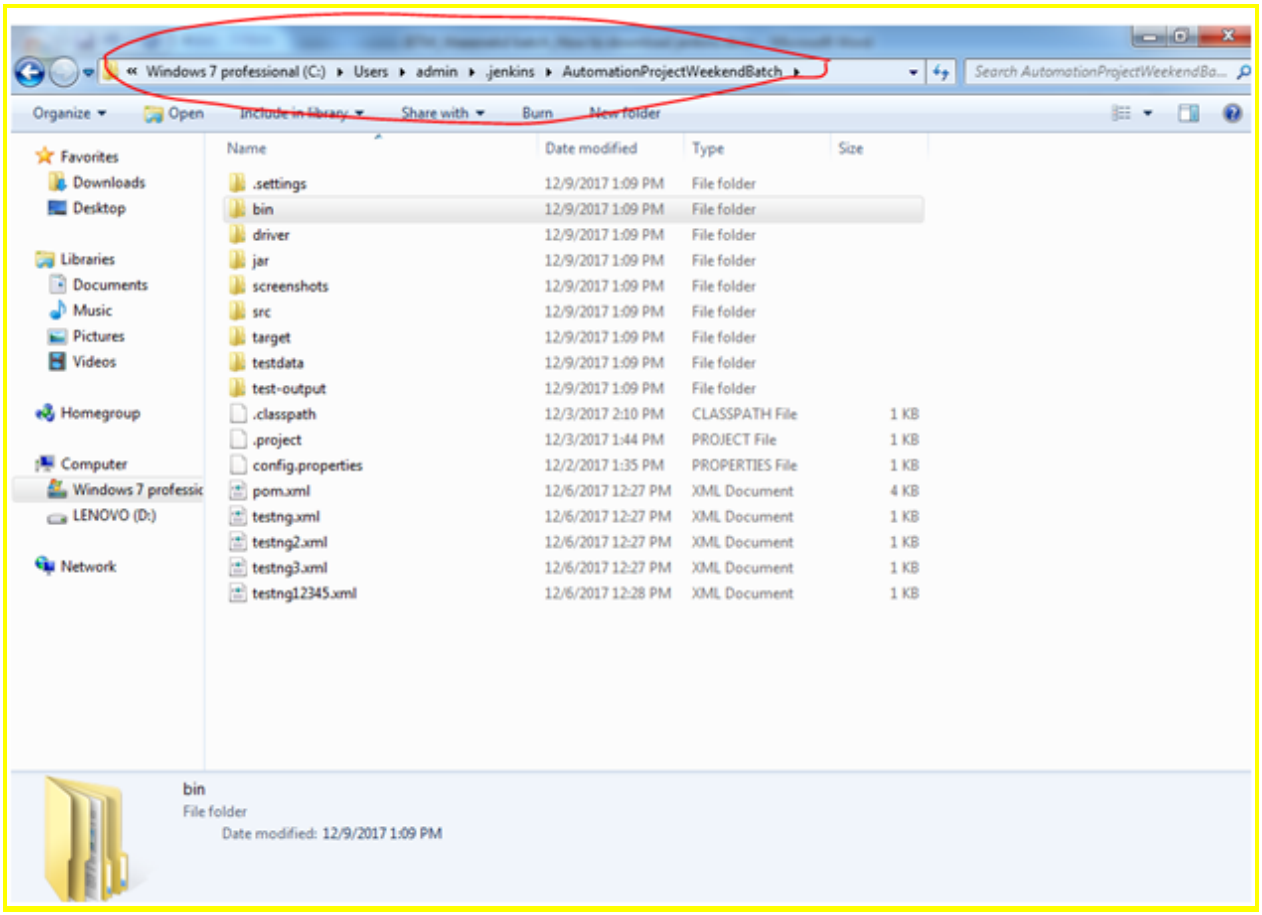
Once you save, u get this page.



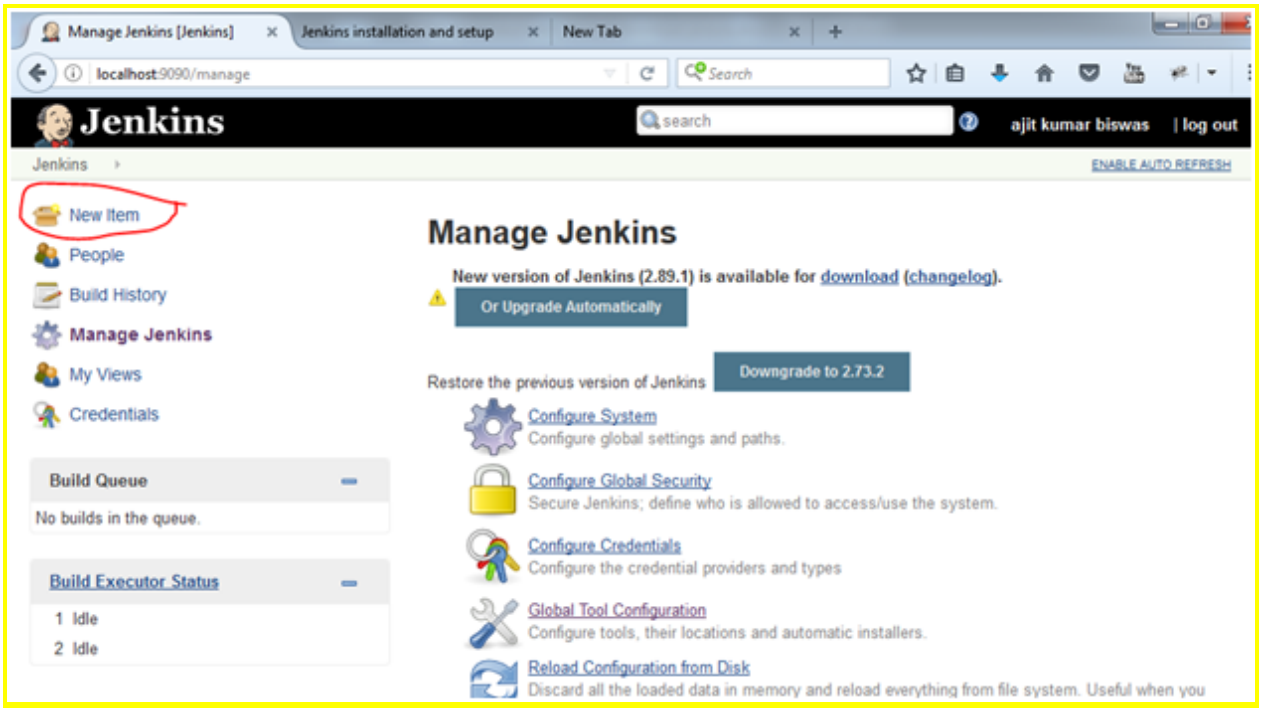
Copy the project that you want to execute from Jenkins as shown below



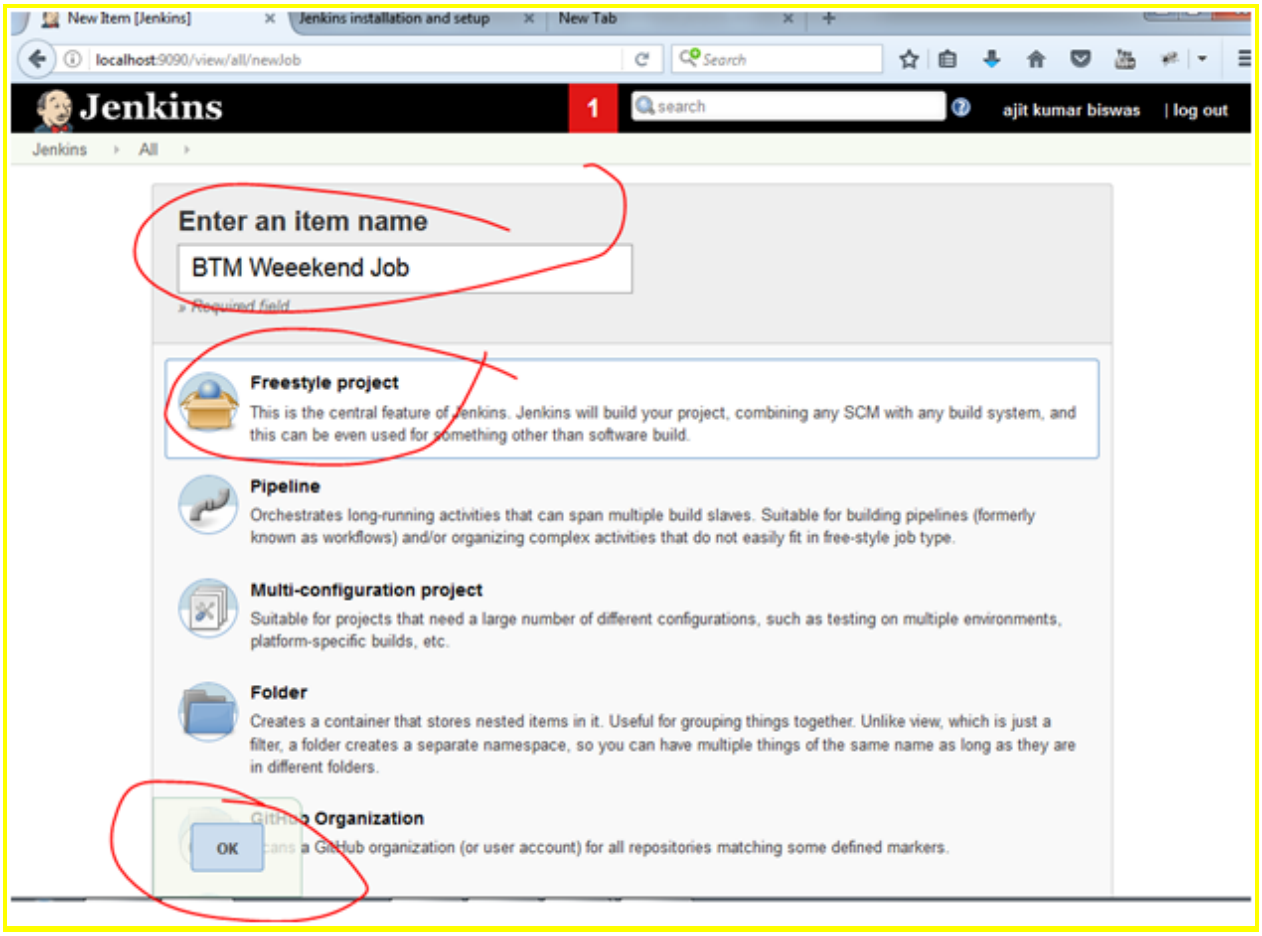
Copy the path till the project name

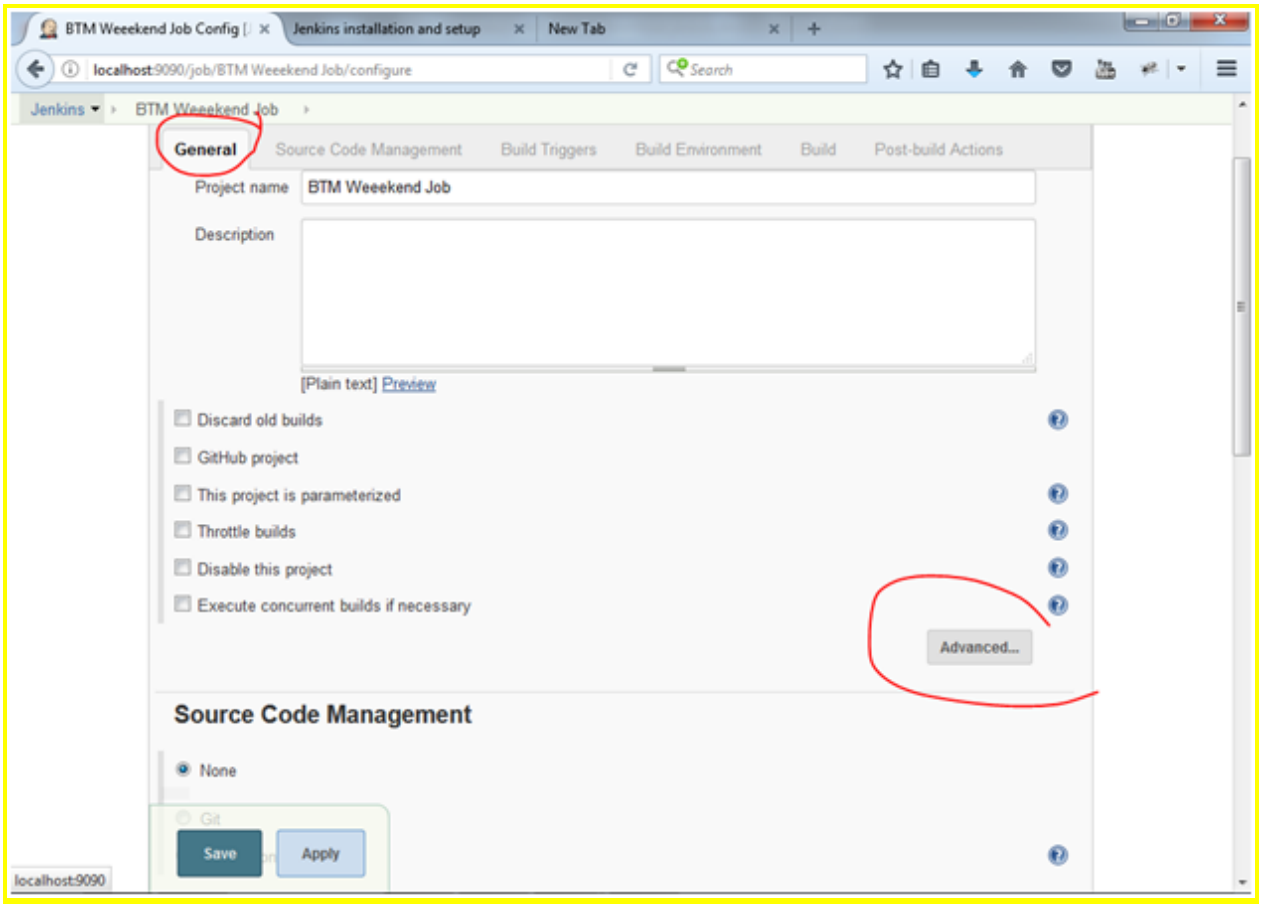


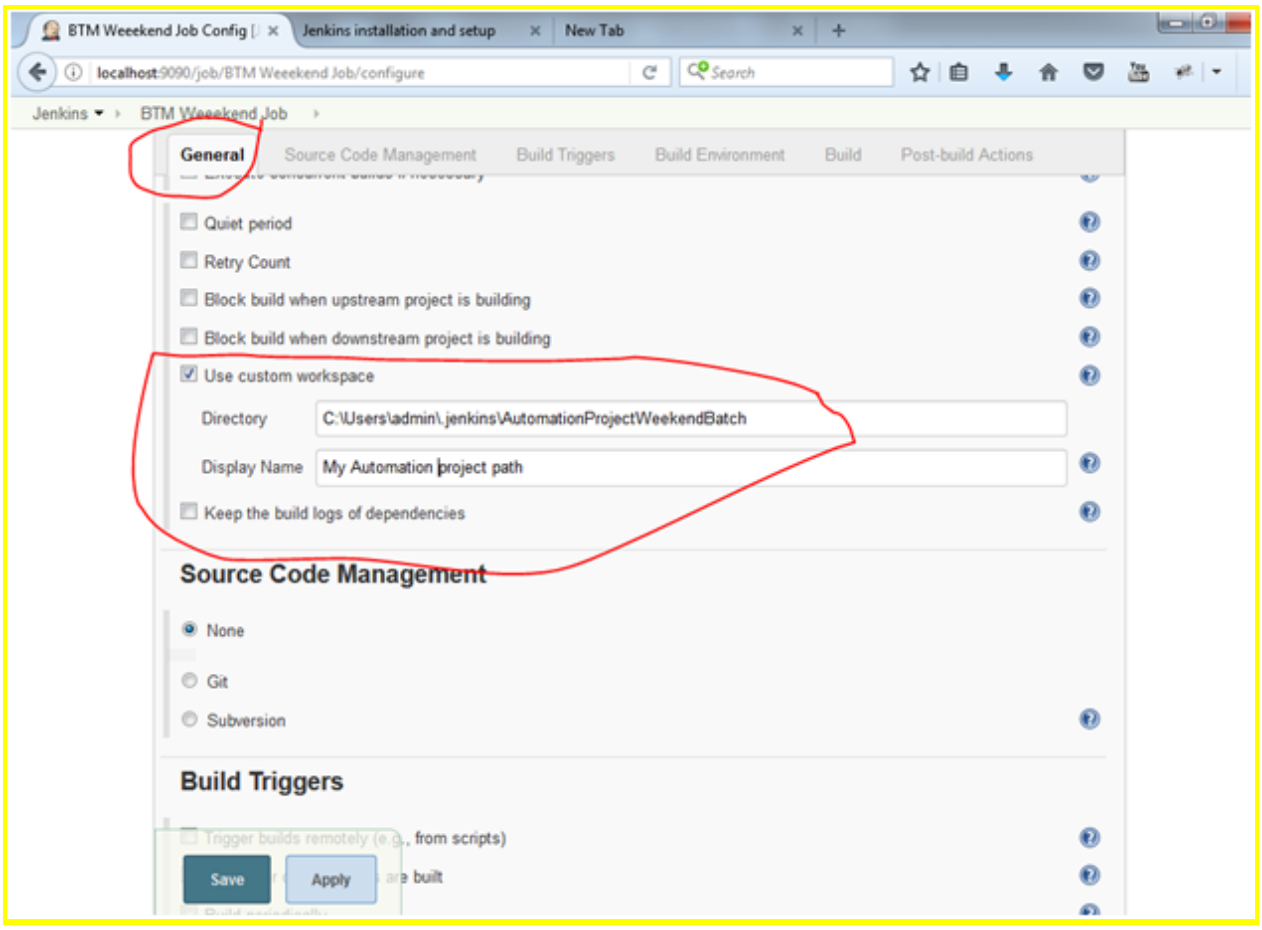
Create a new job by clicking on new ITEM



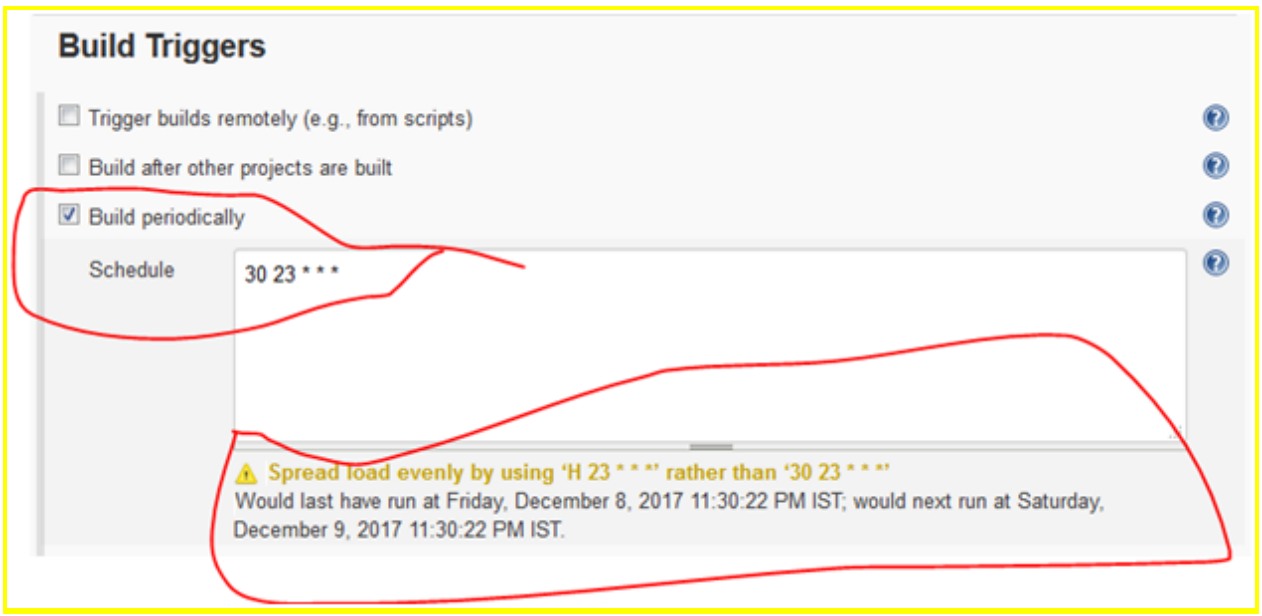
Enter name and click on free style project and click on OK button

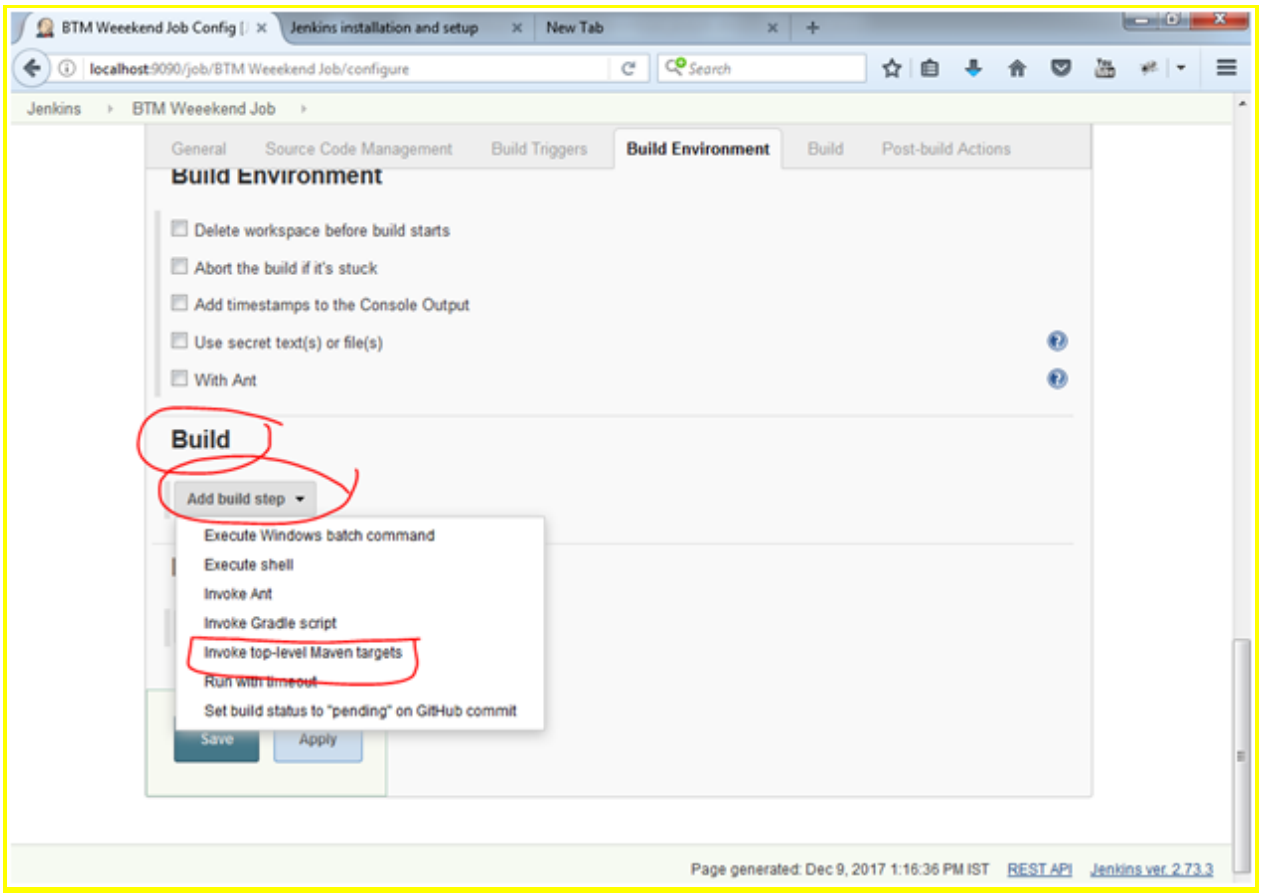

New Item [Jenkins]
Jenkins installation and setup
New Tab
localhost:9090/view/all/newJob
Search
Jenkins
1
search
ajit kumar biswas
| log out
Jenkins
All
Enter an item name
BTM Weeekend Job
» Required field
Freestyle project
This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and this can be even used for something other than software build.
Pipeline
Orchestrates long-running activities that can span multiple build slaves. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.
Multi-configuration project
Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform-specific builds, etc.
Folder
Creates a container that stores nested items in it. Useful for grouping things together. Unlike view, which is just a filter, a folder creates a separate namespace, so you can have multiple things of the same name as long as they are in different folders.
Organization
a GitHub organization (or user account) for all repositories matching some defined markers.
OK

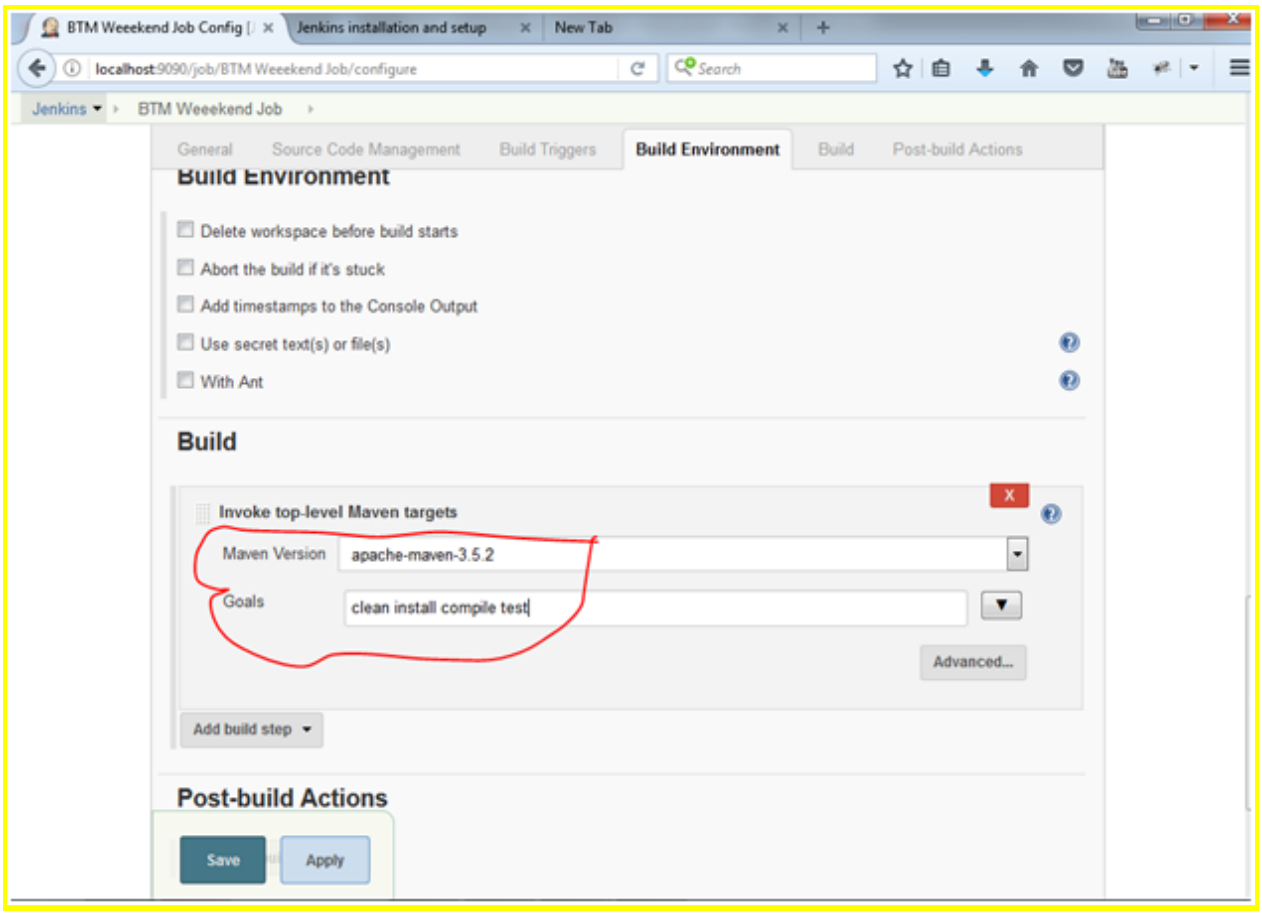

BTM Weeekend Job Config
Jenkins installation and setup
New Tab
localhost:9090/job/BTM Weeekend Job/configure
Search
Jenkins
BTM Weeekend Job
General
Source Code Management
Build Triggers
Build Environment
Build
Post-build Actions
Project name
BTM Weeekend Job
Description
[Plain text] Preview
Discard old builds
GitHub project
This project is parameterized
Throttle builds
Disable this project
Execute concurrent builds if necessary
Advanced...
Source Code Management
None
Git
Save
Apply
localhost:9090



how to schedule suite execution time.

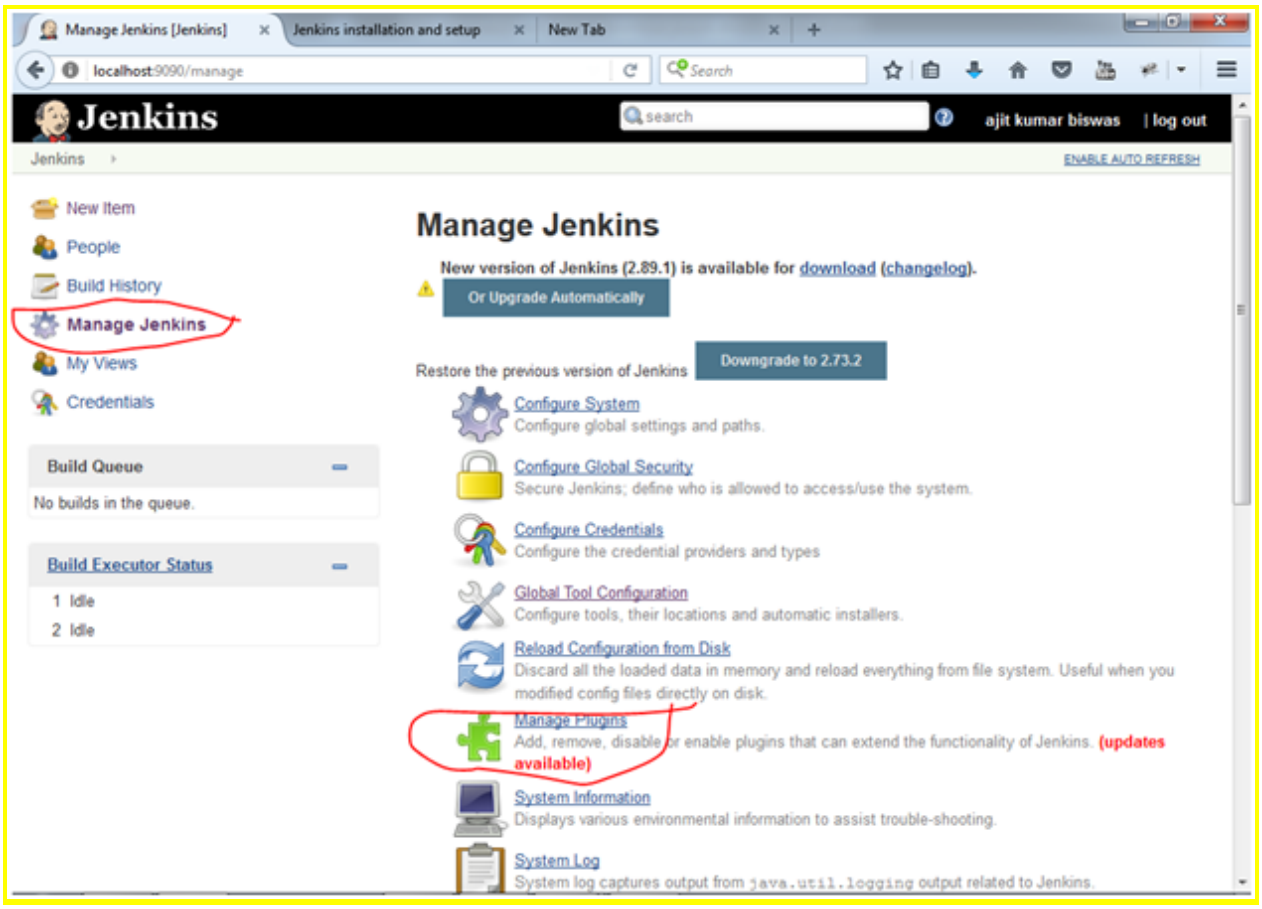



BTM Weeekend Job Config
Jenkins installation and setup
New Tab
localhost:9090/job/BTM Weeekend Job/configure
Search
Jenkins
BTM Weeekend Job
General
Source Code Management
Build Triggers
Build Environment
Build
Post-build Actions
Build Environment
Delete workspace before build starts
Abort the build if it's stuck
Add timestamps to the Console Output
Use secret text(s) or file(s)
With Ant
Build
Add build step
Execute Windows batch command
Execute shell
Invoke Ant
Invoke Gradle script
Invoke top-level Maven targets
Run with timeout
Set build status to "pending" on GitHub commit
Save
Apply
Page generated: Dec 9, 2017 1:16:36 PM IST
REST API
Jenkins ver. 2.73.3



Save the above

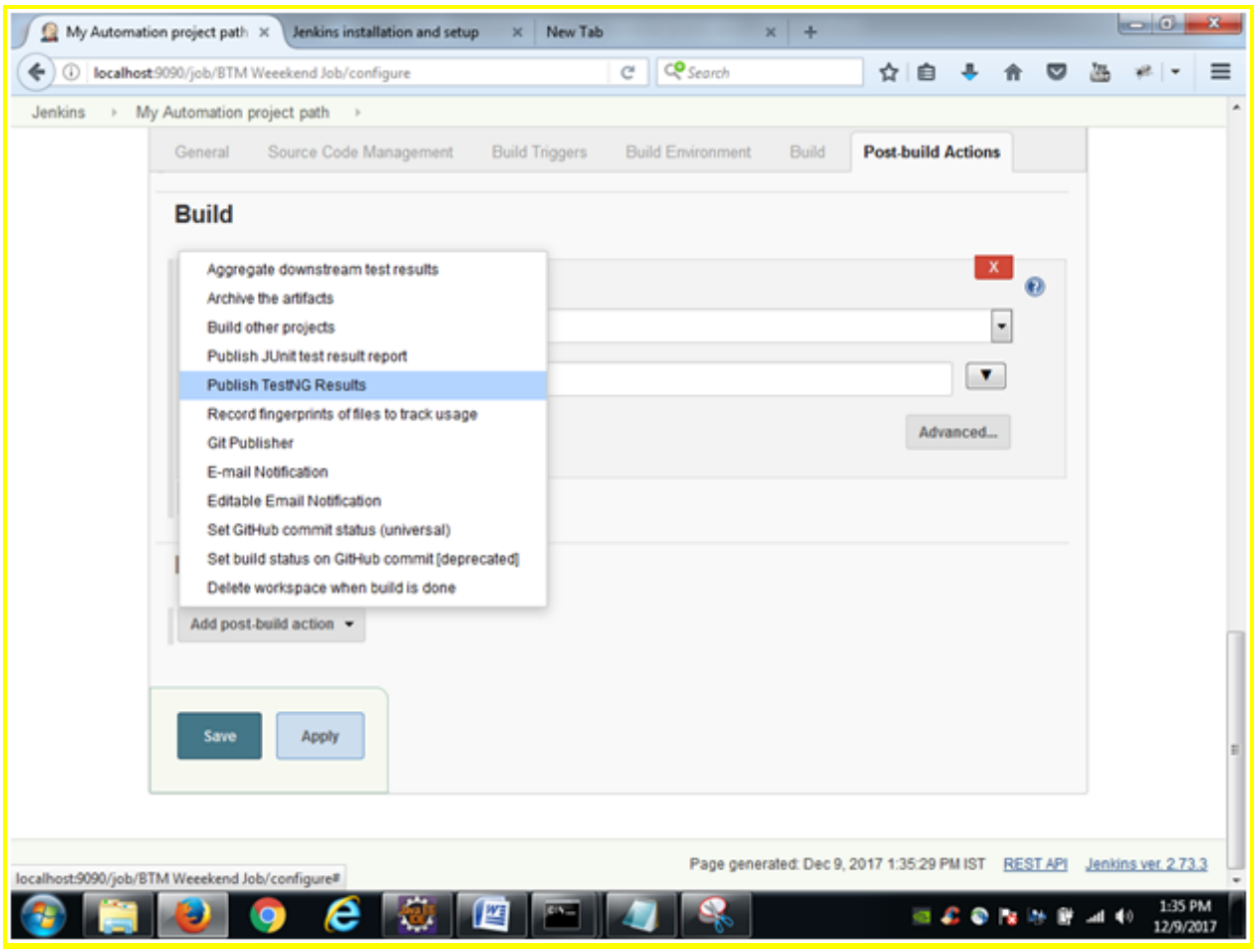
Install testing results plugin

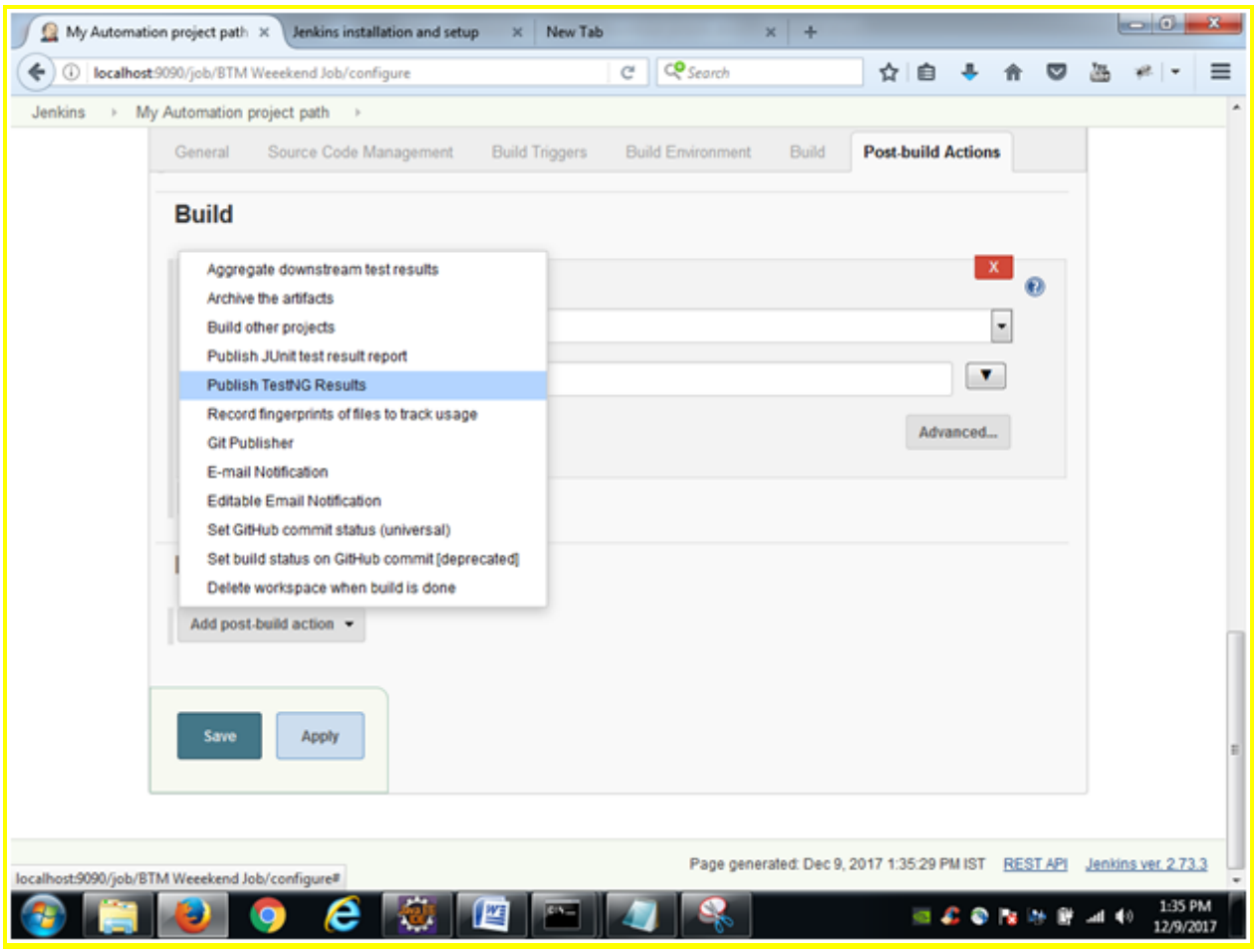


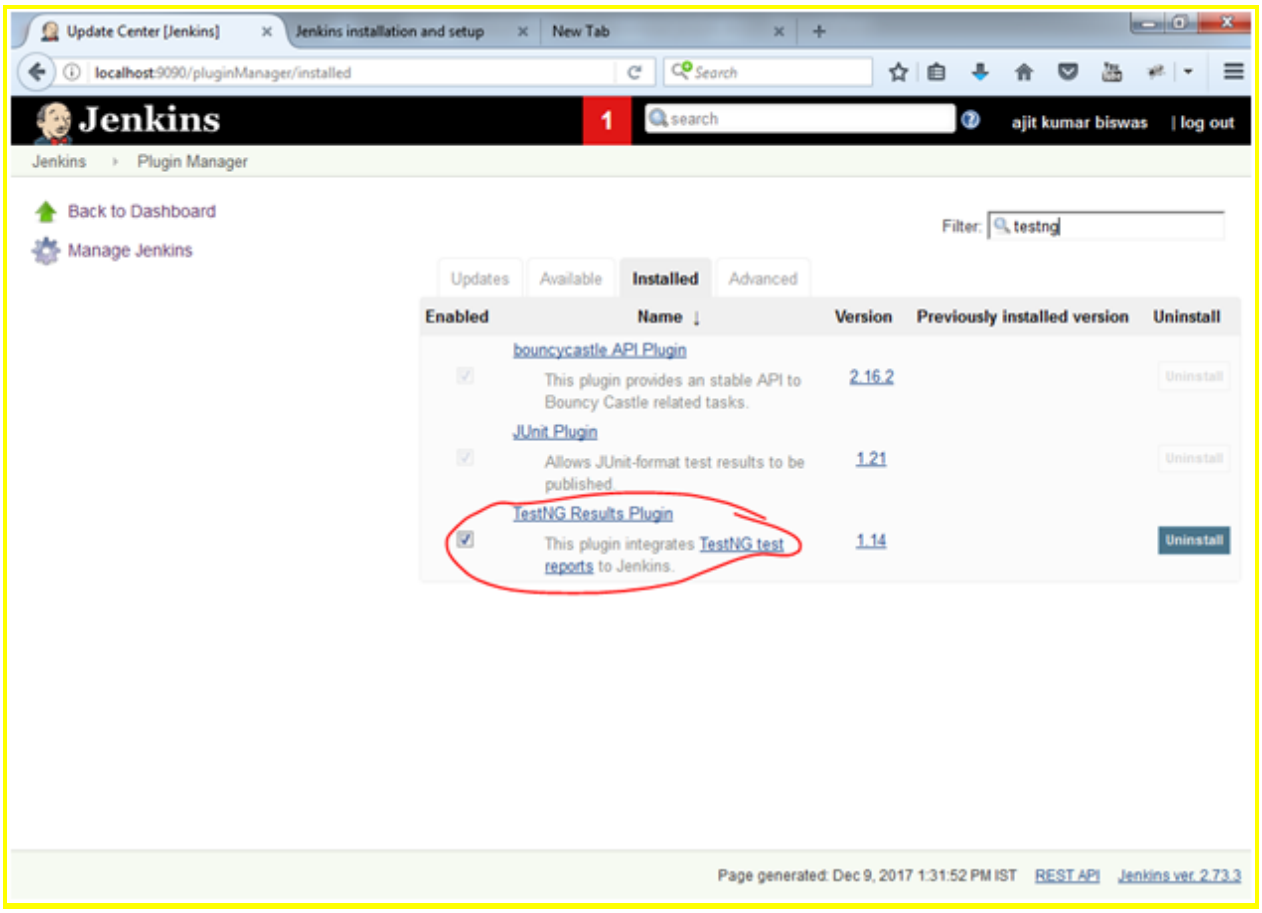
Navigate to available tab and search Testng Result plugin and install ..

Select the job and click on configure..

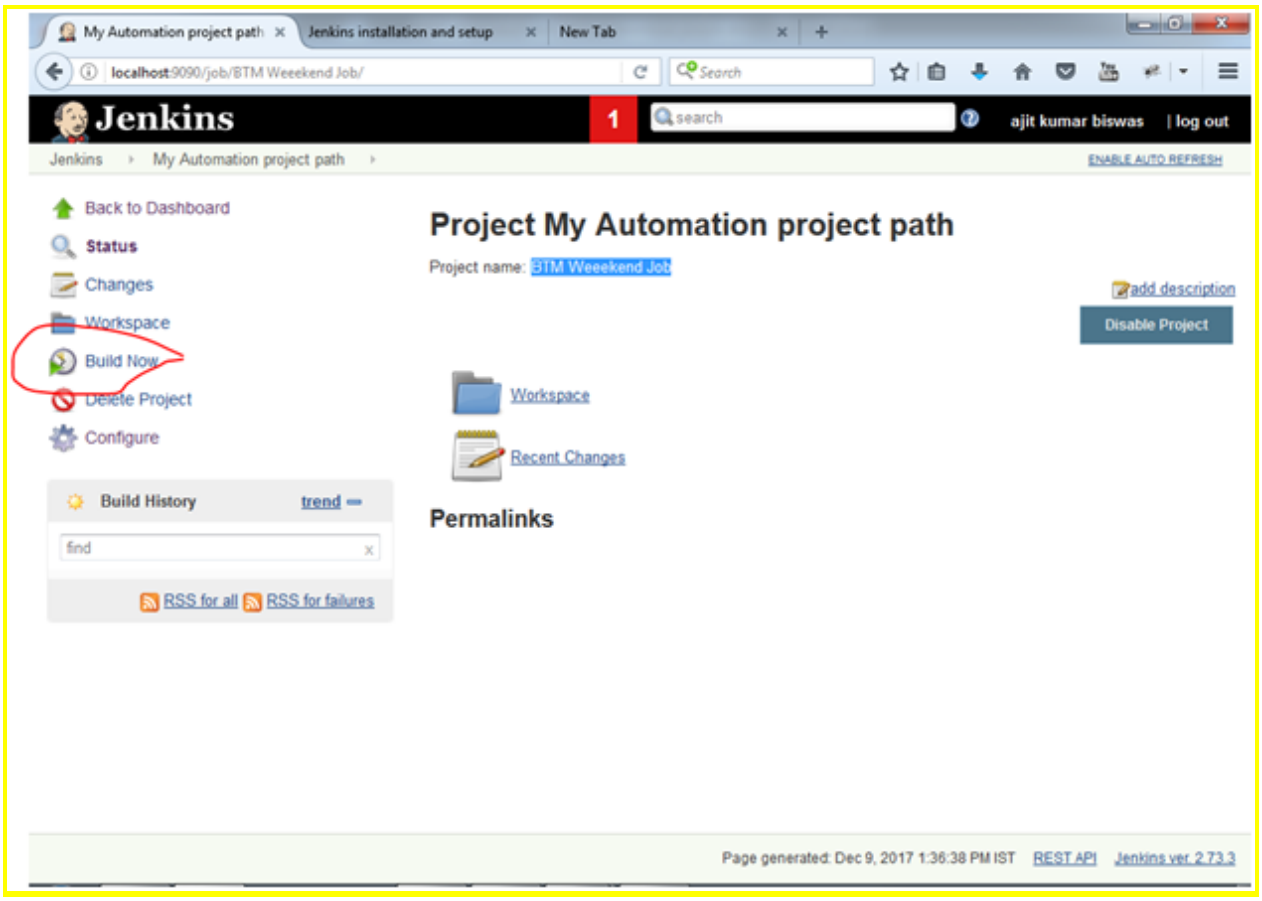
Select below and save


My Automation project path
Jenkins installation and setup
New Tab
localhost:9090/job/BTM Weeekend Job/configure
Search
Jenkins
My Automation project path
General
Source Code Management
Build Triggers
Build Environment
Build
Post-build Actions
Build
Aggregate downstream test results
Archive the artifacts
Build other projects
Publish JUnit test result report
Publish TestNG Results
Record fingerprints of files to track usage
Git Publisher
E-mail Notification
Editable Email Notification
Set GitHub commit status (universal)
Set build status on GitHub commit [deprecated]
Delete workspace when build is done
Advanced...
Add post-build action
Save
Apply
Page generated: Dec 9, 2017 1:35:29 PM IST
REST API
Jenkins ver. 2.73.3
localhost:9090/job/BTM Weeekend Job/configure#
1:35 PM
12/9/2017

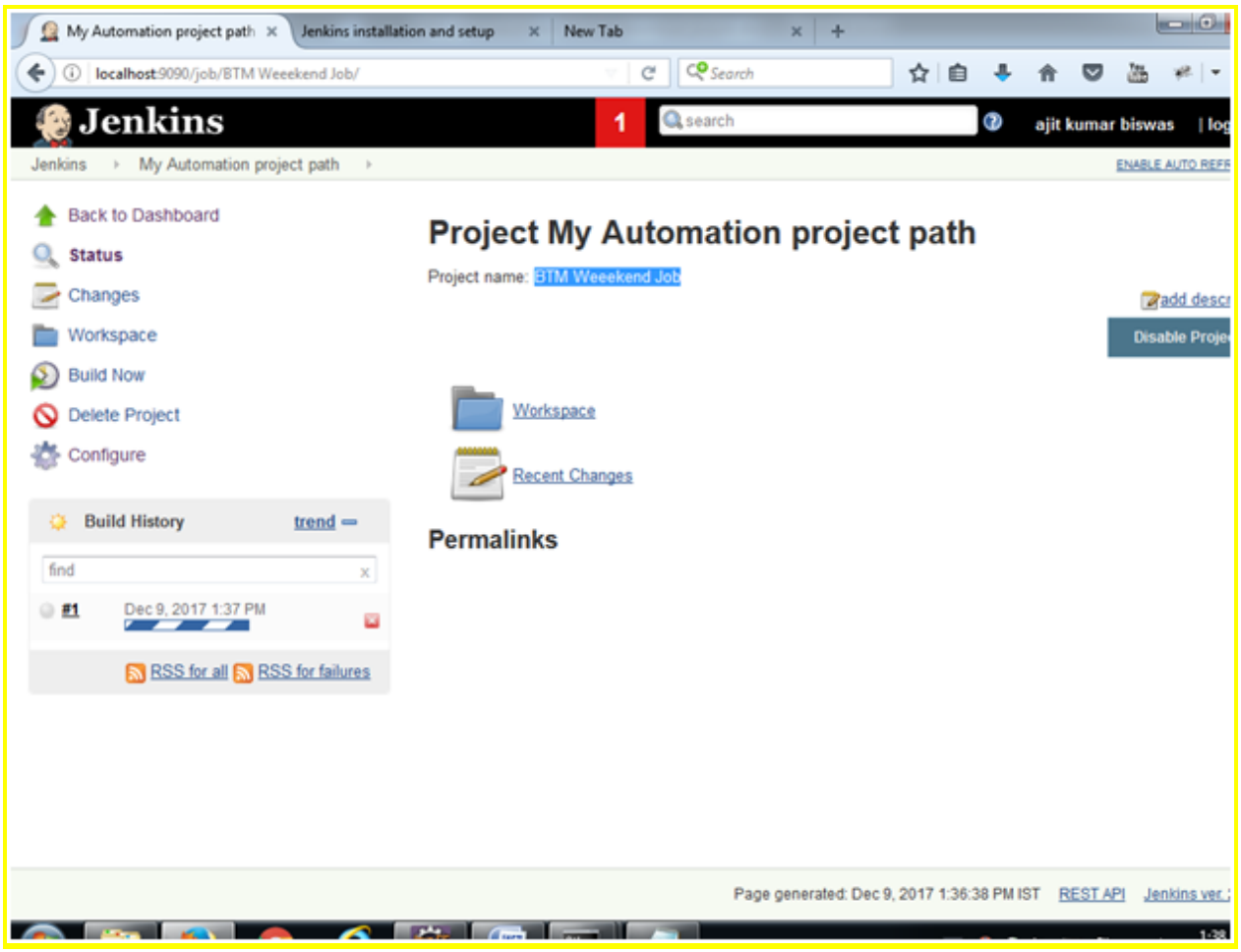

My Automation project path
Jenkins installation and setup
New Tab
localhost:9090/job/BTM Weeekend Job/configure
Search
Jenkins
My Automation project path
General
Source Code Management
Build Triggers
Build Environment
Build
Post-build Actions
Build
Aggregate downstream test results
Archive the artifacts
Build other projects
Publish JUnit test result report
Publish TestNG Results
Record fingerprints of files to track usage
Git Publisher
E-mail Notification
Editable Email Notification
Set GitHub commit status (universal)
Set build status on GitHub commit [deprecated]
Delete workspace when build is done
Advanced...
Add post-build action
Save
Apply
Page generated: Dec 9, 2017 1:35:29 PM IST
REST API
Jenkins ver. 2.73.3
localhost:9090/job/BTM Weeekend Job/configure#
1:35 PM
12/9/2017



Click on Build now



Job is running and in progress as shown below.



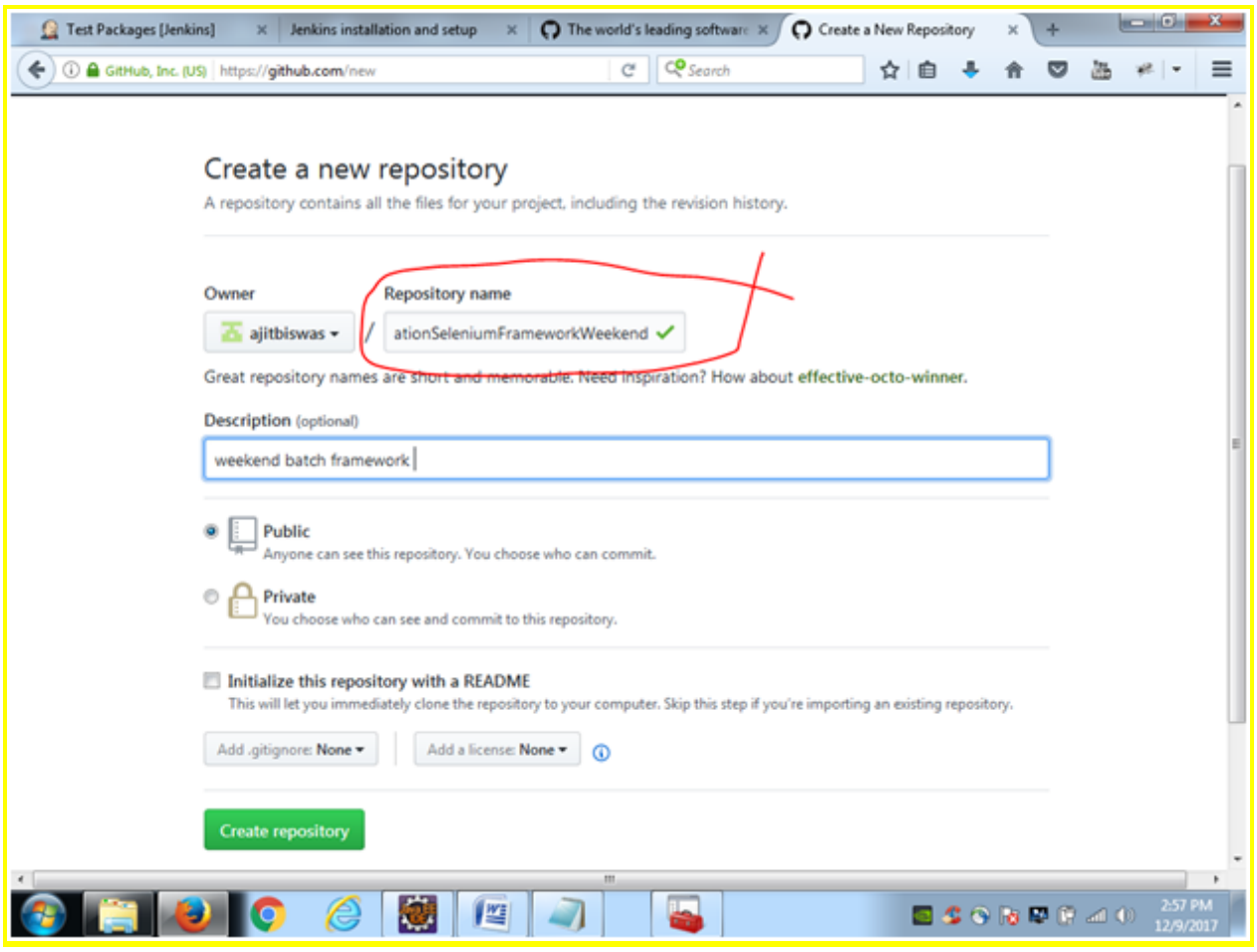
GITHUB SETUP

Go to

www.github.com

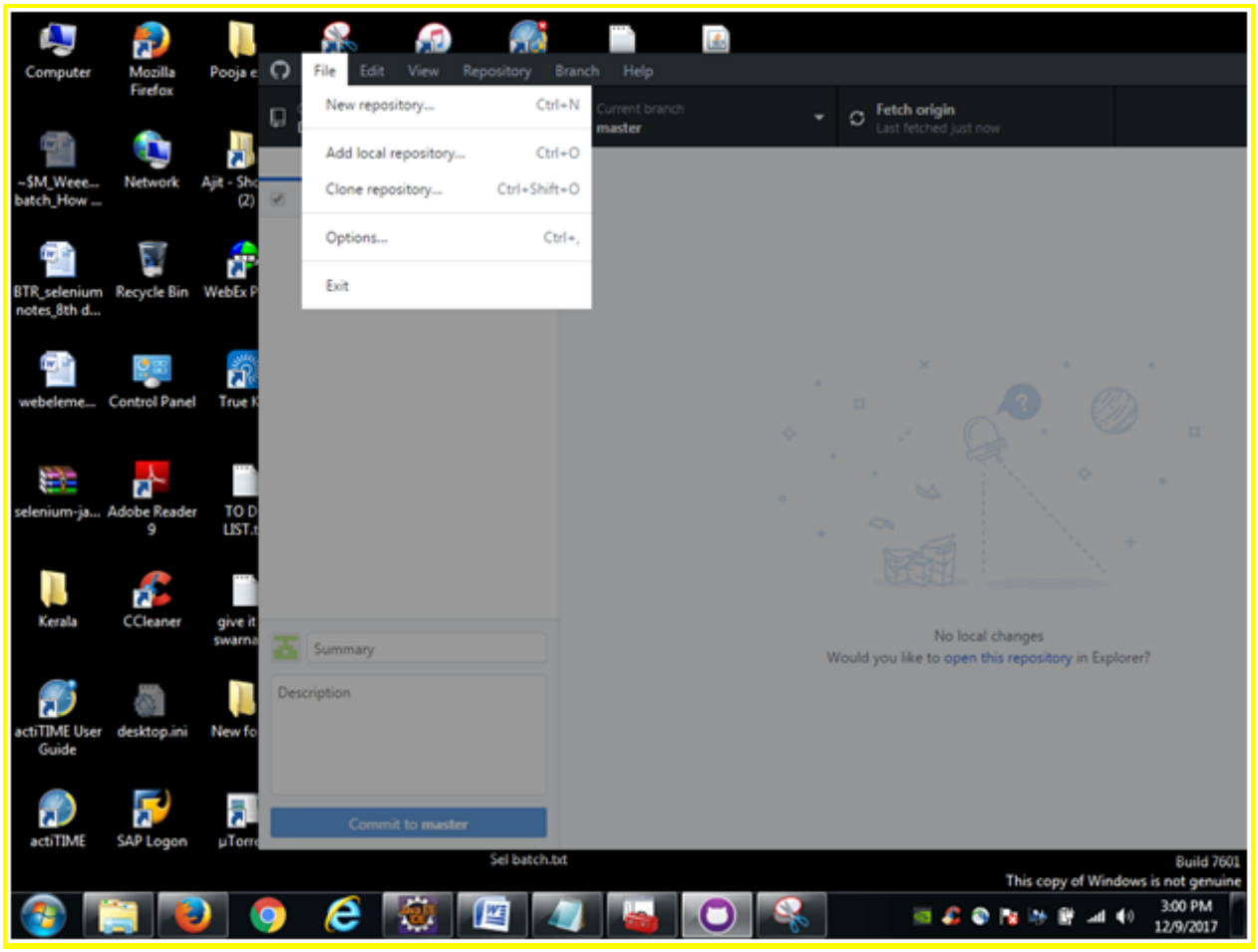
register and sign in

click on New Repository



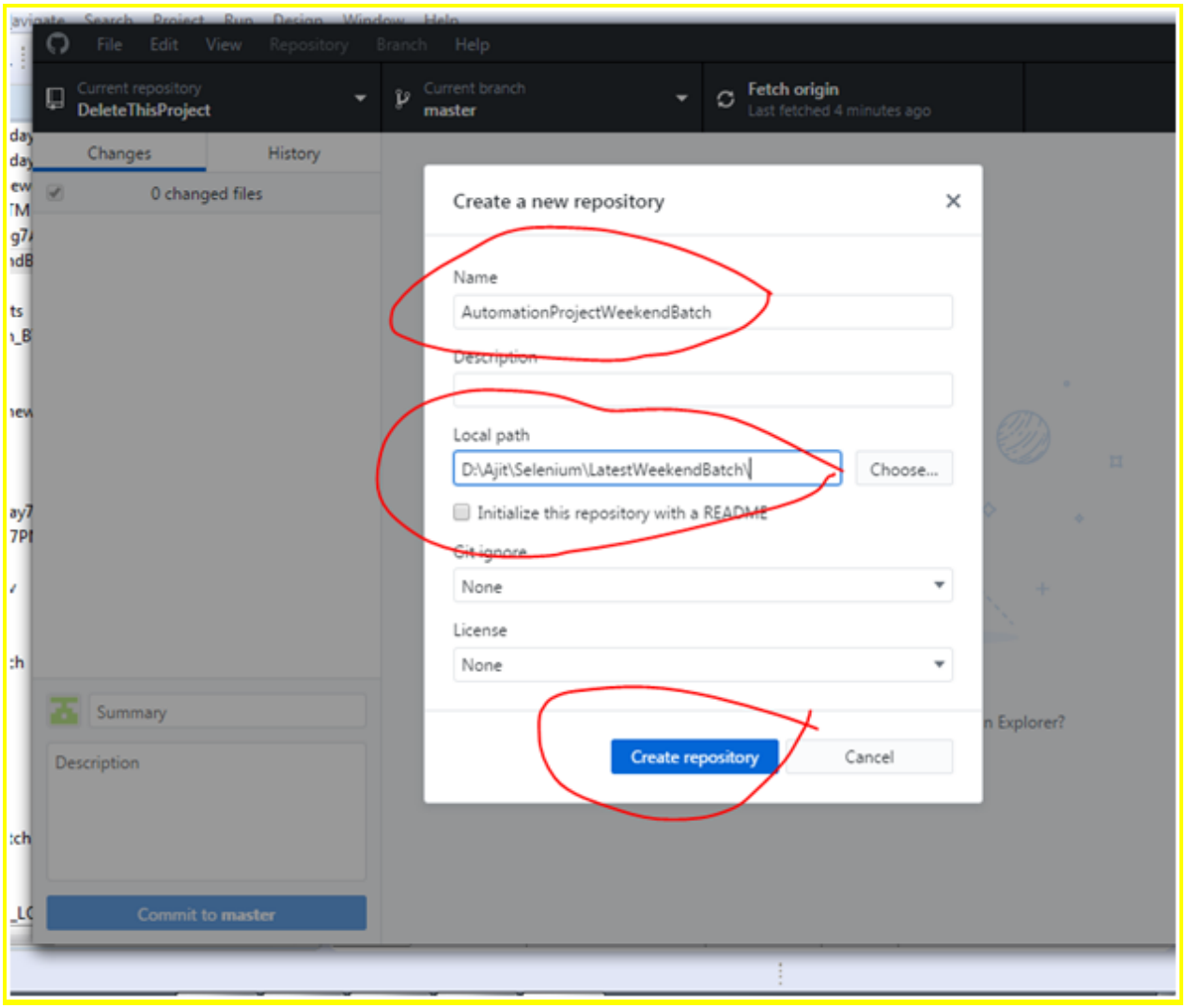
Now launch the github desktop.exe

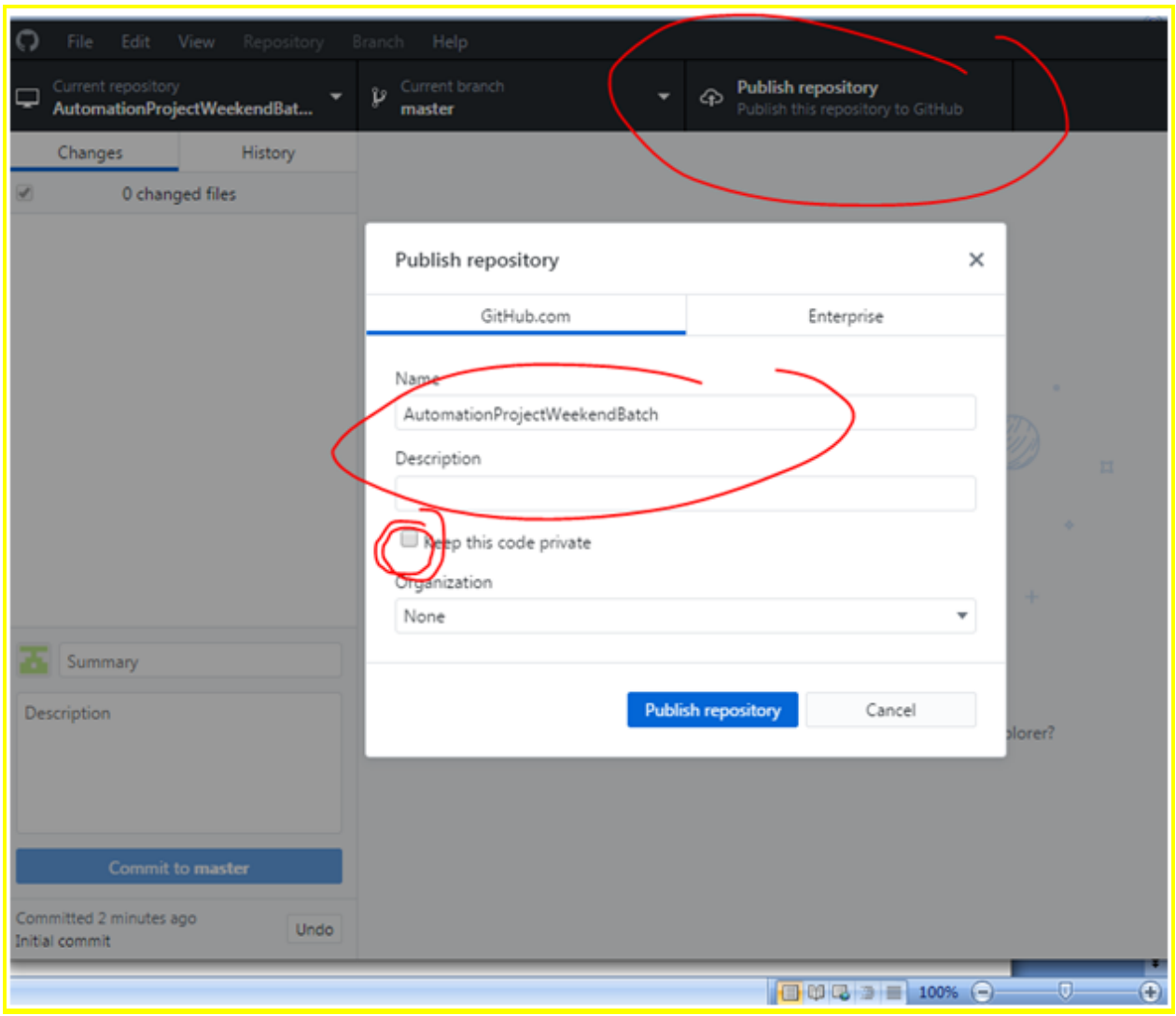
File – New Repository



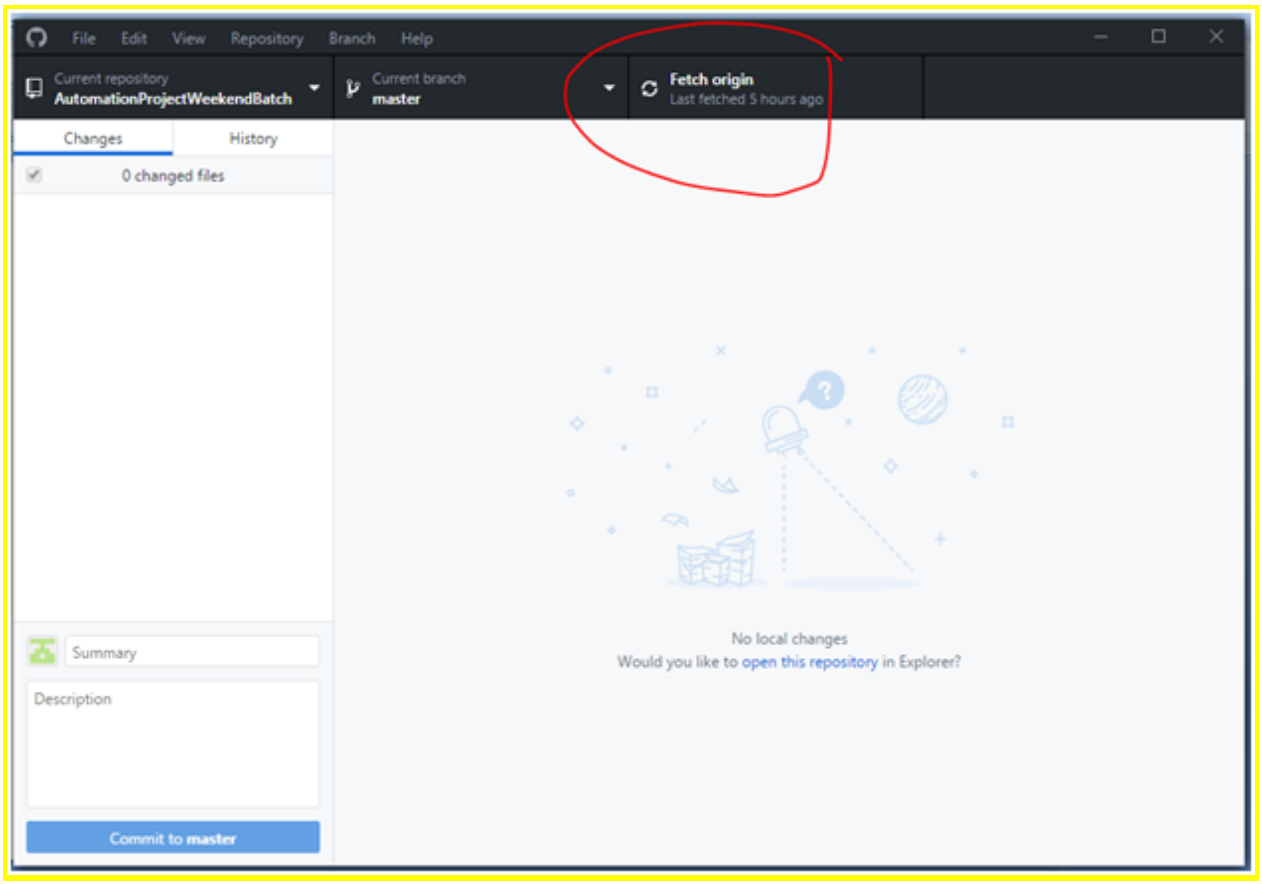
Enter project name which we want to upload under NAME text box

And Local path is the actual workspace where in our project is located.

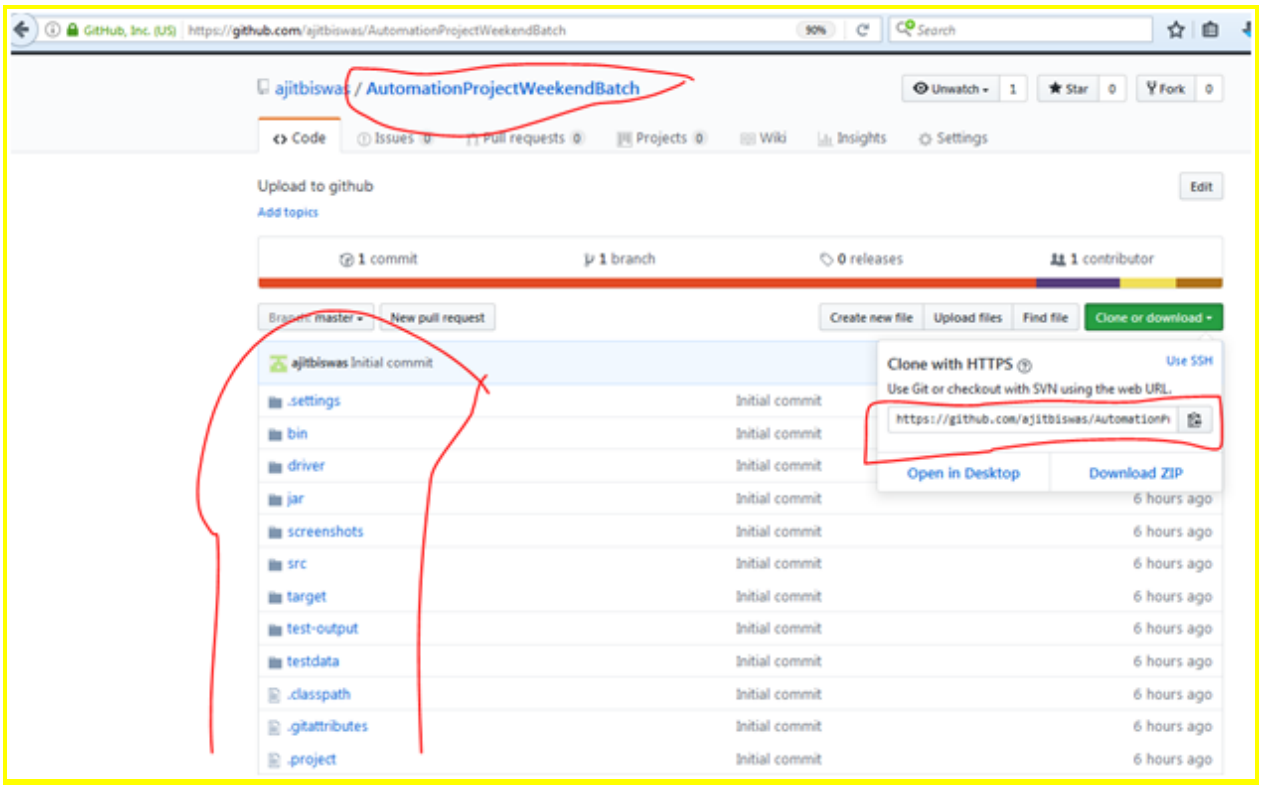

File Edit View Repository Branch Help
Current repository
DeleteThisProject
Current branch
master
Fetch origin
Last fetched 4 minutes ago
Changes
History
0 changed files
Summary
Description
Commit to master
Create a new repository
Name
AutomationProjectWeekendBatch
Description
Local path
D:\Ajit\Selenium\LatestWeekendBatch\
Choose...
Initialize this repository with a README
Git ignore
None
License
None
Create repository
Cancel



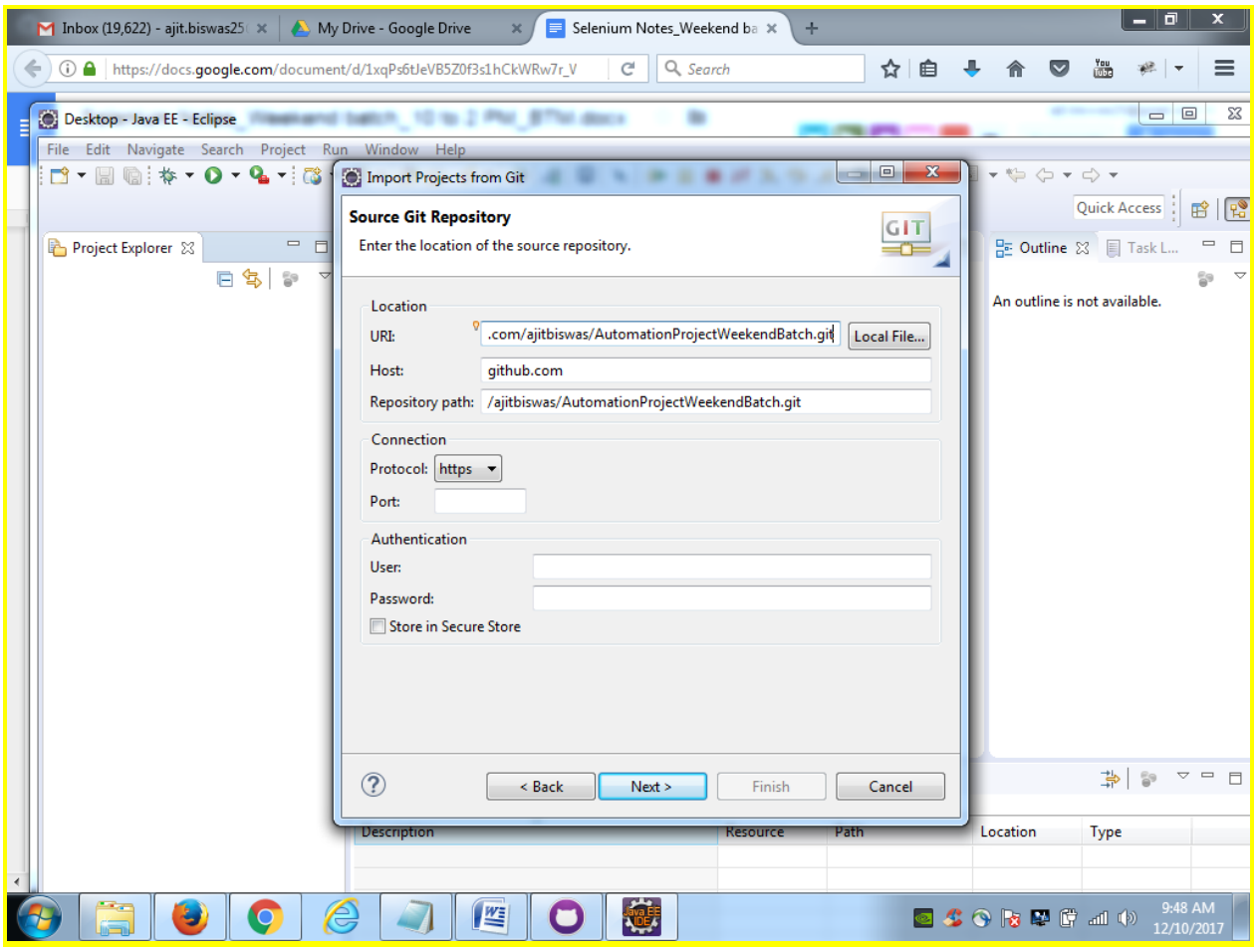
Once it is uploaded successfully, u will get something like this as shown below.



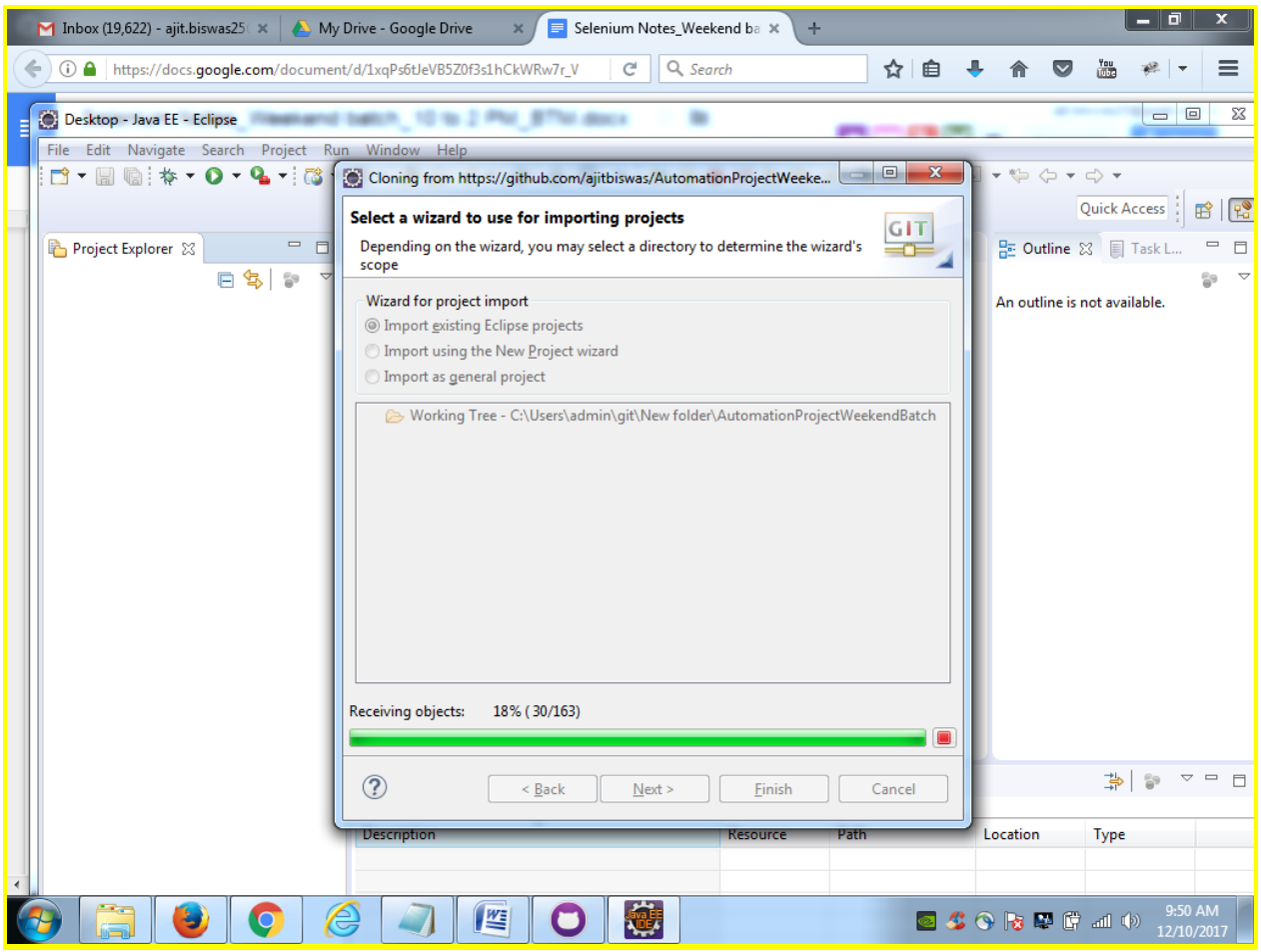
Now, go to the github , you will see that project is successfully uploaded to the central as shown below



Copy the URI above and import the project in Elcipse.

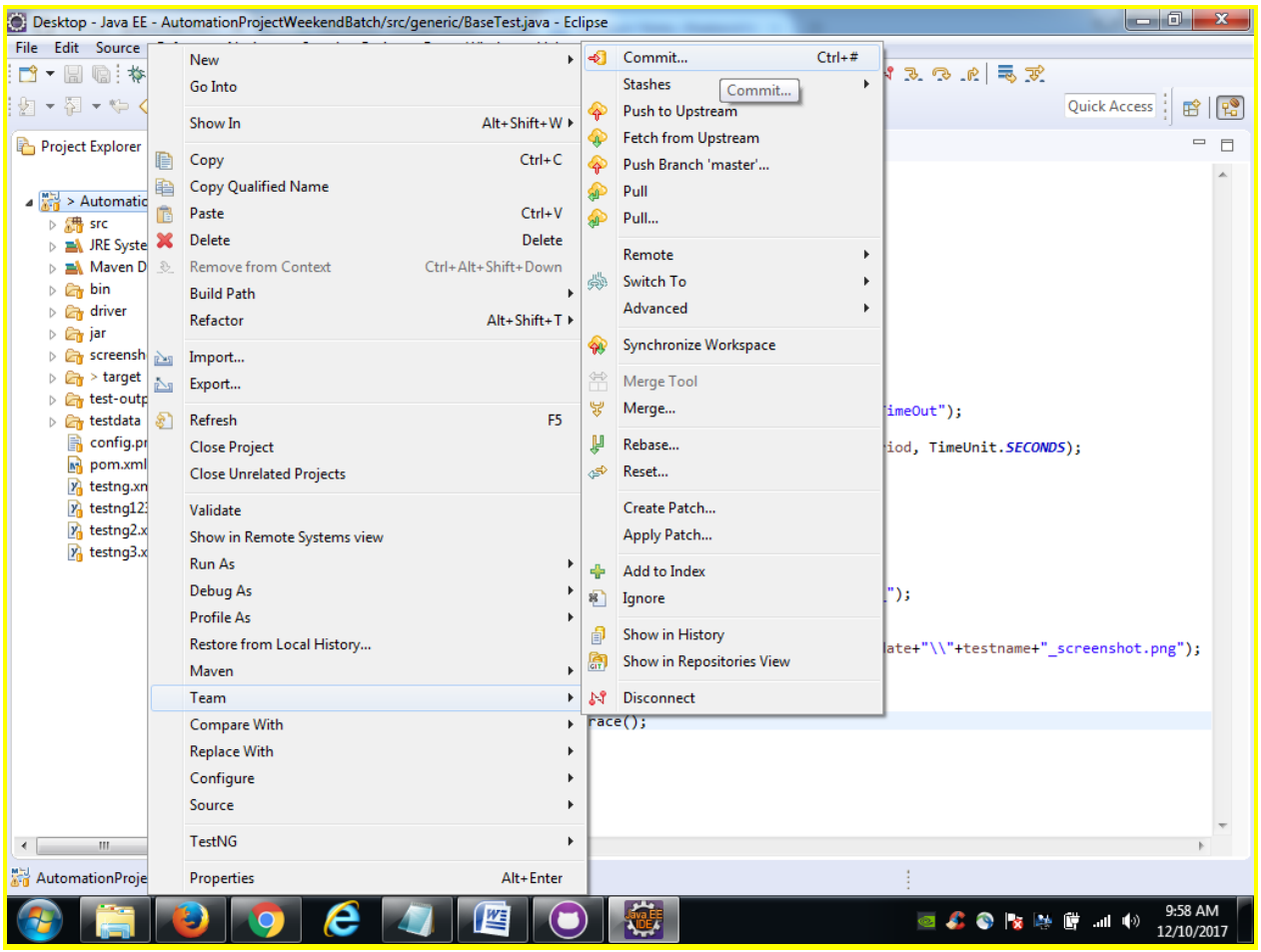


It will start downloading the projet from GIthub to the local system in eclipse.

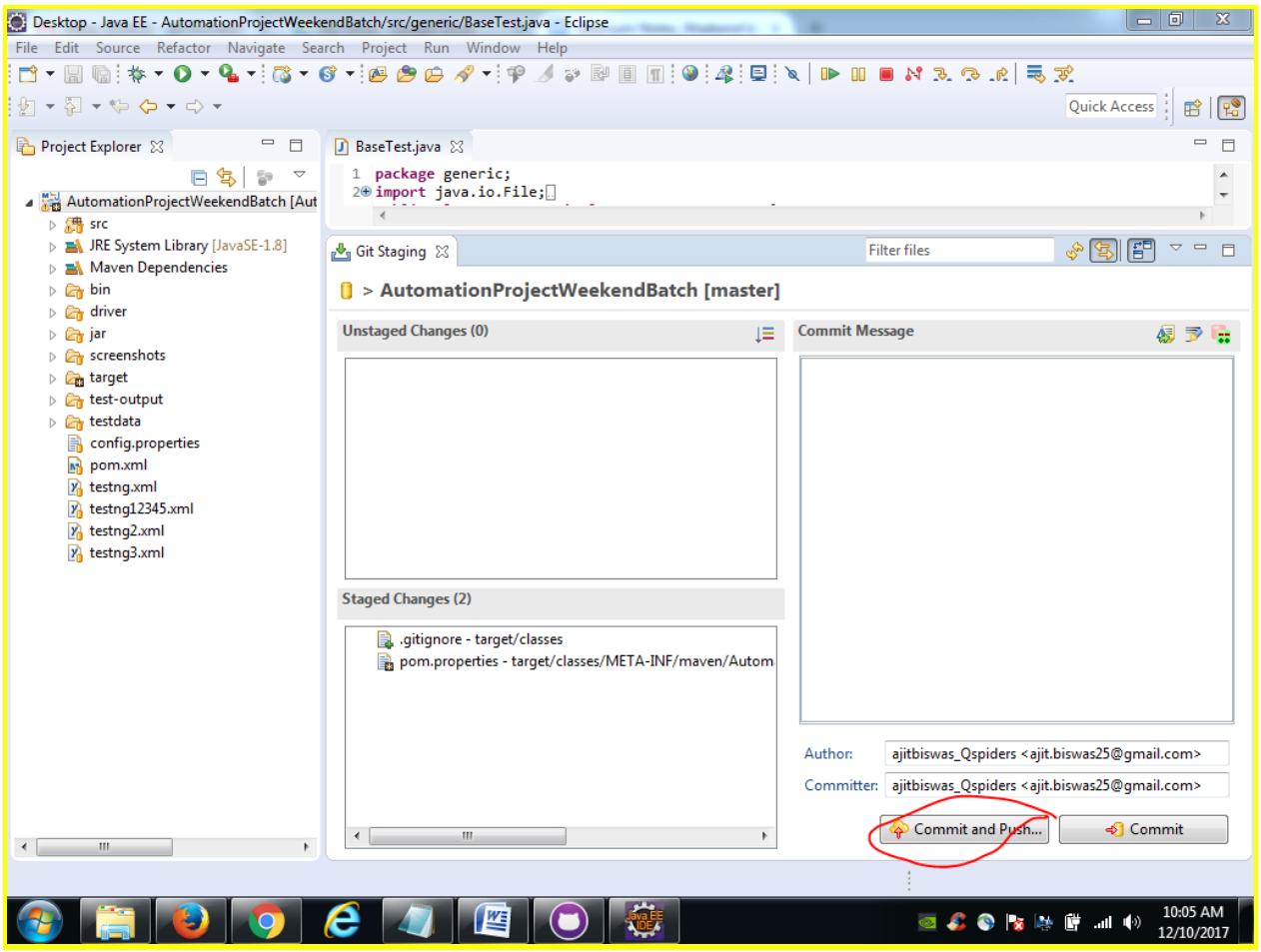


Once imported, we will do some changes and we will upload it back to github by using below navigation.

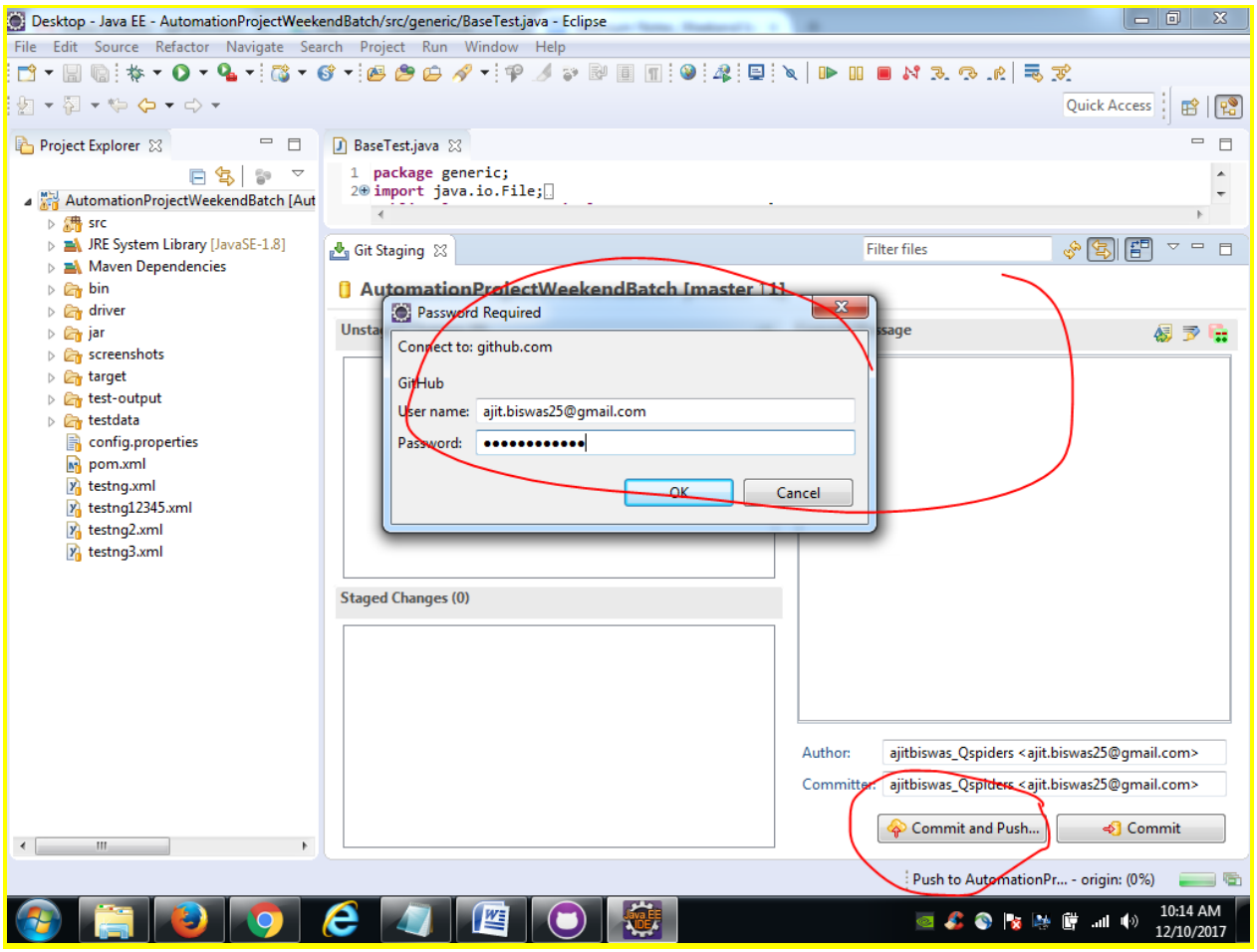
Right click on the project -- TEAM -- COMMIT



now commit and push



Now checkout the latest code from Github and get it in your local system.



LOG4J :

Paste the below settings in log4j2.xml file

```
<?xml version="1.0" encoding="UTF-8"?>

<Configuration status="WARN">

<Properties>

<Property name="basePath">./logs</Property>

</Properties>

    <Appenders>

    <RollingFile name="File" fileName="${basePath}/prints.log"
filePattern="${basePath}/prints-%d{yyyy-MM-dd}.log">
```

```
    <PatternLayout pattern="%d{HH:mm:ss.SSS} [%t] %-5level %logger{36} - %msg%n"/>
    <SizeBasedTriggeringPolicy size="500" />
     </RollingFile>
    <Console name="Console" target="SYSTEM_OUT">
    <PatternLayout pattern="%d{HH:mm:ss.SSS} [%t] %-5level %logger{36} - %msg%n"/>
   </Console>
  </Appenders>
  <Loggers>
    <Root level="trace">
    <AppenderRef ref="File"/>
   </Root>
  </Loggers>
</Configuration>
```

Database connection using Selenium

To be continued/…..

****

List of Exceptions

****

1. IllegalStateException [Java - Unchecked] (driver exe path not set)
2. InterruptedException [Java - Checked] (Thread.sleep)
3. IOException[Java-Checked][File handling scenario]
4. AWTException [Abstract Window Toolkit] [java - checked] [While handling Robot object]

5. NoSuchElementException[Selenium - unchecked][unable to locate the element]
6. JavascriptException[Selenium-Unchecked][on clicking on a button using submit() and the button don't have an attribute called type='submit']
7. NoSuchFrameException[Unchecked - selenium] [when specified frame is not present on the webpage]
8. NoSuchWindowException[Unchecked - selenium] no such window: target window already closed
9. NoAlertPresentException [Selenium - unchecked] [When no alert is present]
10. NoSuchSessionException: Session ID is null [Unchecked - Selenium] when driver.quit is called and then you are trying to access any browser

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URL for the automation framework

https://github.com/ajitbiswas/AutomationProjectWeekendBatch.git