



Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

Aim: To Setup and Run Selenium Tests in Jenkins Using Maven

Objective: Objective is to setup enables seamless integration of automated testing into the CI/CD pipeline, facilitating faster feedback loops and promoting a culture of continuous improvement in software development.

Theory:

Jenkins is the leading open-source continuous integration tool developed by Hudson lab. It is cross-platform and can be used on Windows, Linux, Mac OS and Solaris environments. Jenkins is written in Java. It has taken the place as one of the best open-source tools that allow continuous integration and build management.

Running Selenium tests in Jenkins allows you to run your tests every time your software changes and deploy the software to a new environment when the tests pass. Jenkins can schedule your tests to run at specific time. You can save the execution history and Test Reports. Jenkins supports Maven for building and Testing a project in continuous integration

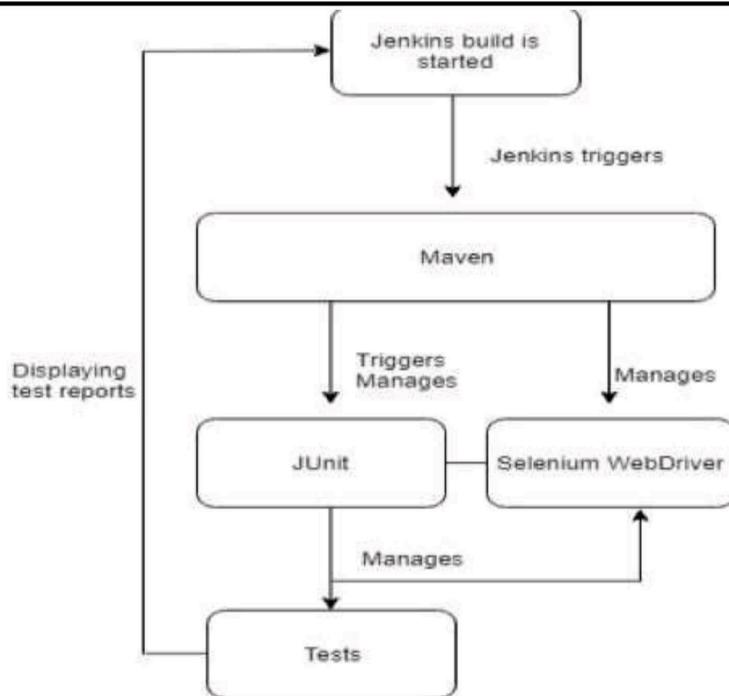
Maven is a powerful project / build management tool, based on the concept of a POM (Project Object Model) that includes project information and configuration information for Maven such as construction directory, source directory, dependency, test source directory, Goals, plugins, etc.

Integrating Maven with Selenium provides following benefits Apache Maven provides support for managing the full lifecycle of a test project. Maven is used to define project structure, dependencies, build, and test management. Using pom.xml(Maven) you can configure dependencies needed for building testing and running code. Maven automatically downloads the necessary files from the repository while building the project.



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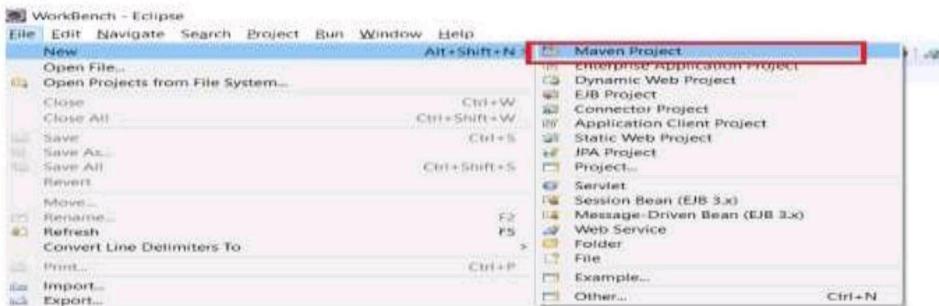
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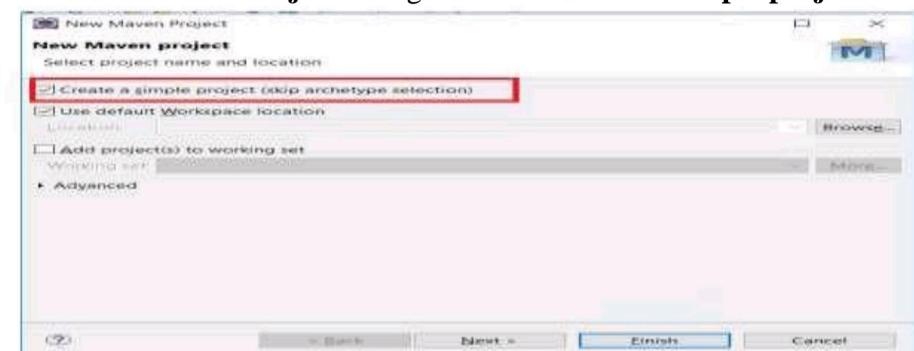
Steps:

---Create a Maven Selenium script---

1. In Eclipse IDE, create a new project by selecting **File | New | Maven Project** from Eclipse menu.



2. On the **New Maven Project** dialog select the **Create a simple project** and click **Next**

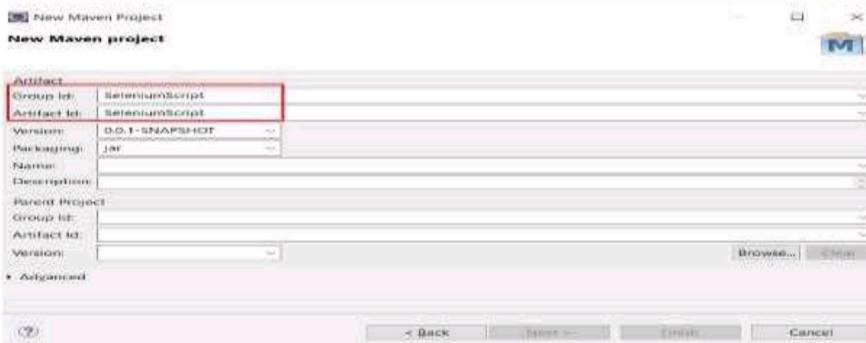


3. Enter **SeleniumScript** in **Group Id:** and **Artifact Id:** and click **Finish**

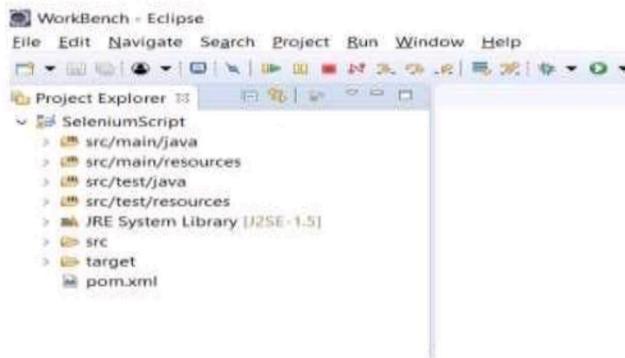


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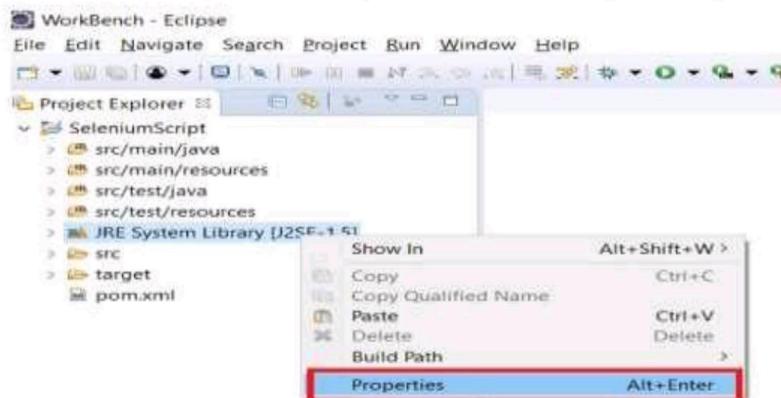
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4. Eclipse will create webdriverTest.



5. Right click on JRE System Library and select the Properties option from the menu.

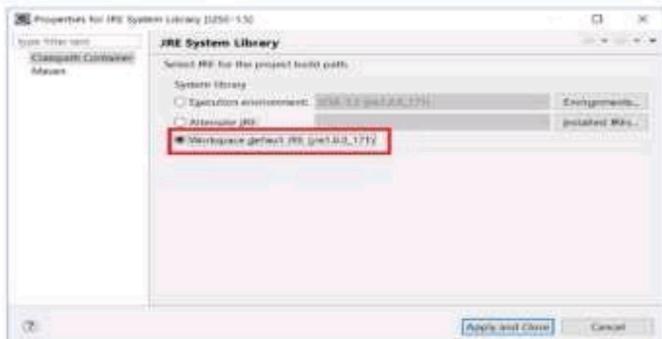


6. On the Properties for JRE System Library dialog box , make sure Workspace default JRE is selected and click ok.

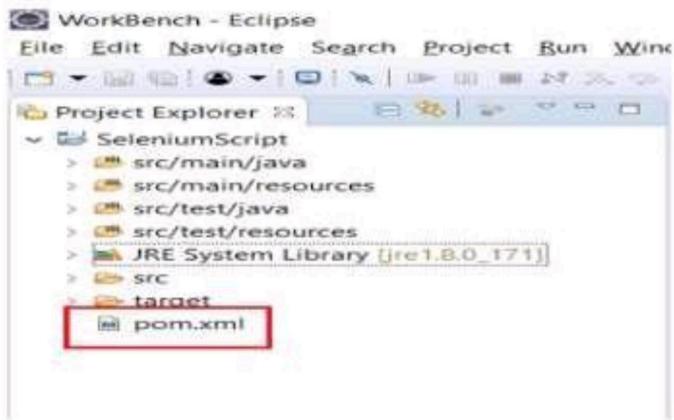


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7. Select pom.xml from project explorer.



8. Add selenium, Maven, TestNG, Junit dependencies to pom.xml in the code.

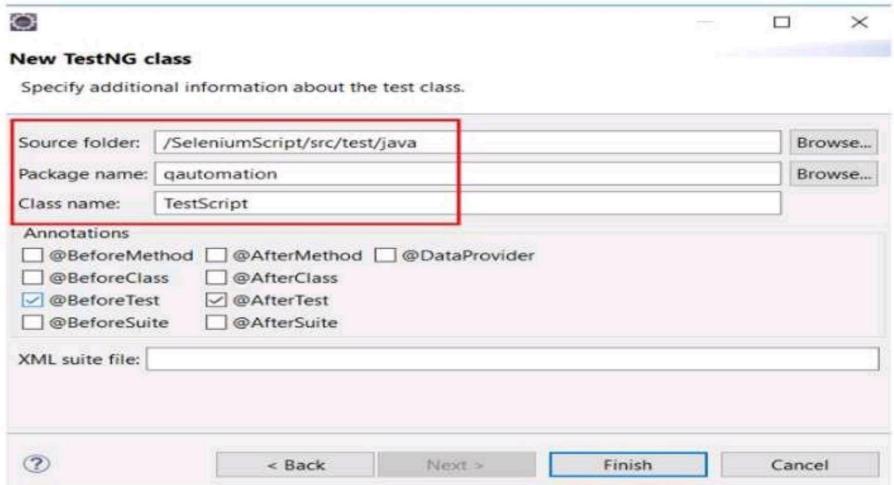
```
<dependencies>
    <dependency>
        <groupId>junit</groupId>
        <artifactId>junit</artifactId>
        <version>3.8.1</version>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>org.seleniumhq.selenium</groupId>
        <artifactId>selenium-java</artifactId>
        <version>2.45.0</version>
    </dependency>
    <dependency>
        <groupId>org.testng</groupId>
        <artifactId>testng</artifactId>
        <version>6.8</version>
        <scope>test</scope>
    </dependency>
</dependencies>
```

9. Create a new file TestNG class File|New|Others|TestNG|TestNG Class. Enter Package name as “Qautomation” and “TestScript” in the Name:textbox and click on the Finish button.

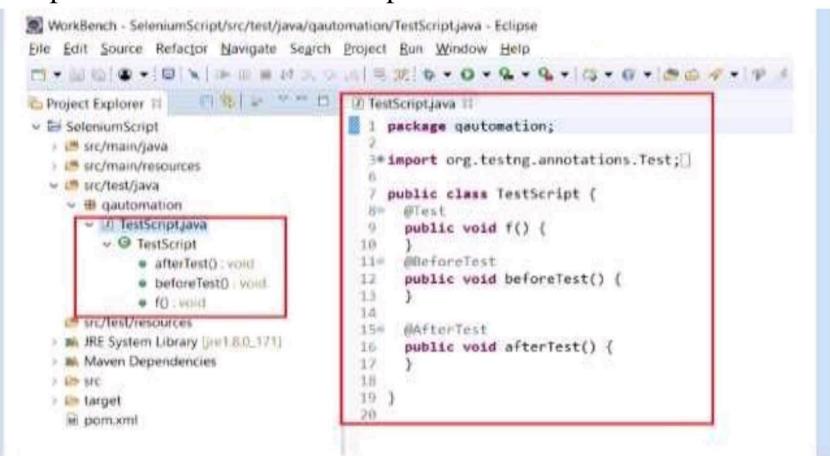


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10. Eclipse will create the TestScript class



```
package qautomation;
import org.testng.annotations.Test;
import org.testng.annotations.BeforeTest;
import java.util.HashMap;
import java.util.Map;
import java.util.concurrent.TimeUnit;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;
import org.openqa.selenium.chrome.ChromeOptions;
import org.openqa.selenium.firefox.FirefoxDriver;
import org.openqa.selenium.firefox.FirefoxOptions;
import org.openqa.selenium.firefox.FirefoxProfile;
import org.openqa.selenium.ie.InternetExplorerDriver;
```



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```
import org.openqa.selenium.DesiredCapabilities;
import org.testng.Assert;
import org.testng.annotations.AfterTest;
public class TestScript {
    public static WebDriver driver=null;
    public String browser = System.getProperty("browser");
    public String url = System.getProperty("URL");

    @BeforeTest
    public void beforeTest() {

        if(browser.equalsIgnoreCase("Chrome"))
        {
            System.setProperty("webdriver.chrome.driver",
            System.getProperty("user.dir")+"\\chromedriver.exe");
            Map<String, Object> prefs = new HashMap<String, Object>();
            ChromeOptions options = new ChromeOptions();
            options.setExperimentalOption("prefs", prefs);
            options.addArguments("--disable-arguments");
            options.addArguments("--test-type");
            options.addArguments("test");
            options.addArguments("disable-infobars");
            driver = new ChromeDriver(options);
        }
        else if(browser.equalsIgnoreCase("FireFox"))
        {
            System.setProperty(FirefoxDriver.SystemProperty.DRIVER_USE_MARIONETTE
            , "true");
            System.setProperty(FirefoxDriver.SystemProperty.BROWSER_LOGFILE,Syste
            m.getProperty("user.dir")+"\\FireFoxLogs.txt");
            System.setProperty("webdriver.gecko.driver",
            System.getProperty("user.dir")+"\\geckodriver_v23.exe");
            FirefoxProfile profile = new FirefoxProfile();
            profile.setAcceptUntrustedCertificates(false);
            FirefoxOptions options = new FirefoxOptions().setProfile(profile);
            driver = new FirefoxDriver(options);
            driver.manage().timeouts().implicitlyWait(20, TimeUnit.SECONDS);
            driver.manage().window().maximize();
        }
        else if (browser.equalsIgnoreCase("IE"))
        {
            System.setProperty("webdriver.ie.driver",
            System.getProperty("user.dir")+"\\IEDriverServer351.exe");
            DesiredCapabilities caps = DesiredCapabilities.internetExplorer();
```



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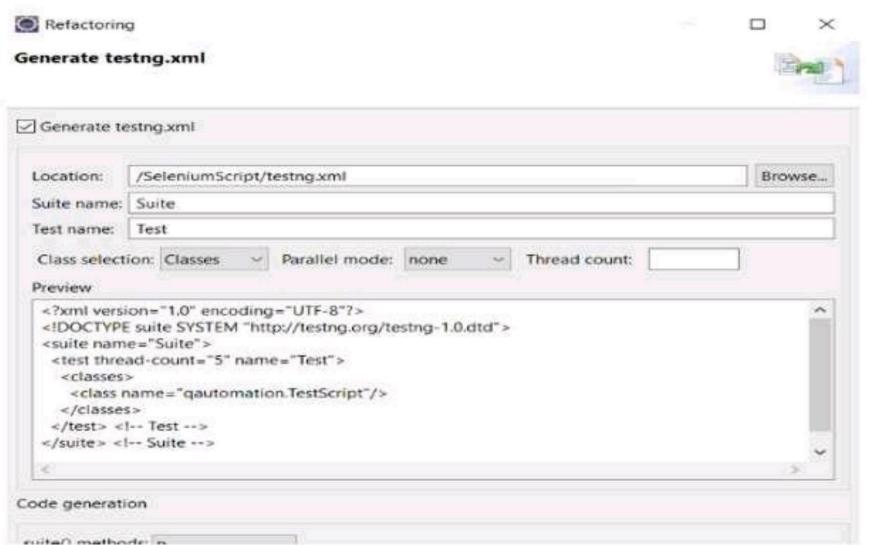
```
caps.setCapability(InternetExplorerDriver.INTRODUCE_FLAKINESS_BY_IGNO
RING_SECURITY_DOMAINS,true);
caps.setCapability(InternetExplorerDriver.IGNORE_ZOOM_SETTING,true);
caps.setCapability(InternetExplorerDriver.UNEXPECTED_ALERT_BEHAVIOR,
"accept");
caps.setCapability(InternetExplorerDriver.REQUIRE_WINDOW_FOCUS,true);
caps.setCapability(InternetExplorerDriver.INITIAL_BROWSER_URL,"http://www.
google.com/");
driver = new InternetExplorerDriver(caps);
driver.manage().timeouts().implicitlyWait(20, TimeUnit.SECONDS);
driver.manage().window().maximize();
}
driver.manage().timeouts().implicitlyWait(20, TimeUnit.SECONDS);
driver.manage().window().maximize();
}
@Test
public void TestApplication() {
driver.get(url);
String title = driver.getTitle();
System.out.println("Title="+title);
Assert.assertTrue(title.contains("QAutomation"));
}
@AfterTest
public void afterTest() {
driver.quit();
}
}
```

12. Right click on the WebdriverTest and select TestNG| Convert to TestNG. Eclipse will create testing.xml which says that you need to run only one test with the name TestApplication.



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13. Adding dependencies and plugins

Additionally we need to add

1. Maven-compiler-plugin
2. Maven-surefire-plugin
3. Testng.xml

-----Integrating your test to Jenkins-----

1. Launch and login into jenkins URL – <http://localhost:8080/>



2. Click on new item and enter an appropriate name for the new job , select Maven Project and click on save.



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The screenshot shows the Jenkins dashboard with a search bar at the top. Below it, there is a section titled "Enter an item name" with a dropdown menu showing "Recent items". A list of project types is displayed:

- Freestyle project:** This is the central flavor of Jenkins. Jenkins will build your project, containing any SCM with any build system, and this can be used for something other than software builds.
- Maven project:** Build a Maven project. Jenkins takes advantage of your POM files and drastically reduces the configuration.
- Pipeline:** Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines, formerly known as workflows, or executing complex activities that do not easily fit in the standard 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.
- Multibranch Project:** Create a Multibranch CI/CD Team (or Multibranch Project) for all repositories matching some defined manner.
- Folder:** Groups a collection that shares a common name in it. Useful for putting things together. Unlike a view, which is just a filter, a folder creates a separate view, so you can have multiple things of the same name as long as they are in different folders.

3. A new empty job has been created at this point.

The screenshot shows the Jenkins job configuration page for a Maven project. The "General" tab is selected. In the "Maven Info Plugin Configuration" section, the checkbox "This project is parameterized" is checked. Other options shown include "Assign plugin name", "Assign description", "The artifact builds", "Static project", "The project is parameterized", "Hudson build", and "Execute this project". At the bottom are "Save" and "Apply" buttons.

4. Jenkins Parameterized Build in Jenkins just check the checkbox **This project is parameterized** and add the parameter by **Add Parameter** as per your project requirement.

The screenshot shows the Jenkins job configuration page for a Maven project. The "General" tab is selected. The "Maven Info Plugin Configuration" section now includes two parameters:

- Choice Parameter:** Name: Browser, Options: Firefox, Chrome, IE, Description: Select a browser for testing.
- String Parameter:** Name: URL, Default Value: https://appiumhub.com, Description: Enter application URL.

Both parameters are highlighted with red boxes. At the bottom are "Save" and "Apply" buttons.

5. If code is located on Git Under **Source Management**, select the appropriate repository for the location of project and pass the URL and credentials.



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Source Code Management

None
 CVS
 CVS Projectset
 Git

Repositories Repository URL: `git@bitbucket.localgroup/ SeleniumScript.git`

Credentials

- In the “pre-steps” build section another set of parameters can be passed to the Jenkins build. Specify the Maven targets that need to be executed in order to run test.

if your source code is located on Git the do below setting under **Build** section:

Build

Root POM: `pom.xml`

Goals and options: `test -Dsurefire.suiteXmlFiles="$TestSuite" -Dbrowser="$BROWSER" -DURL="$APP_URL"`

If you have selenium code on your local just pass the pom.xml path in **Root POM**.

Build

Root POM: `C:\Automation Testing\Scripts\WorkBench\SeleniumScript\pom.xml`

Goals and options: `test -Dsurefire.suiteXmlFiles="$TestSuite" -Dbrowser="$BROWSER" -DURL="$APP_URL"`

- Run the test in Jenkins by clicking on Building with Parameters.



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8. Run the test in Jenkins by clicking on *Build with Parameters*.

The screenshot shows the Jenkins dashboard for the 'SeleniumJenkins' project. On the left sidebar, there are several icons: Back to Dashboard, Status, Changes, Workspace, Build with Parameters (which is highlighted with a red box), Delete Maven project, Configure, Modules, Open Blue Ocean, Rename, and Test Results Analyzer. The main area is titled 'Maven project SeleniumJenkins'. It displays a workspace icon, a recent changes icon, and a 'Permalinks' section. Below these are sections for 'Build History' (with a 'trend' dropdown and a 'find' search bar) and RSS feeds. A horizontal bar at the bottom contains 'RSS for all' and 'RSS for failures'.

8. Select the browser you want to run from dropdown.

The screenshot shows the 'Build with Parameters' screen for the 'SeleniumJenkins' project. The left sidebar is identical to the previous screenshot. The main area is titled 'Maven project SeleniumJenkins'. It says 'This build requires parameters:' and lists 'BROWSER_NAME' (with a dropdown menu showing 'Chrome' selected, 'Firefox', and 'IE'), 'APP_URL' (with a text input field containing 'http://www.google.com/'), and 'TestSuite' (with a dropdown menu showing 'testng.xml' selected, 'Select a TestSuit xml'). At the bottom is a 'Build' button.

9. Select the TestSuit file.

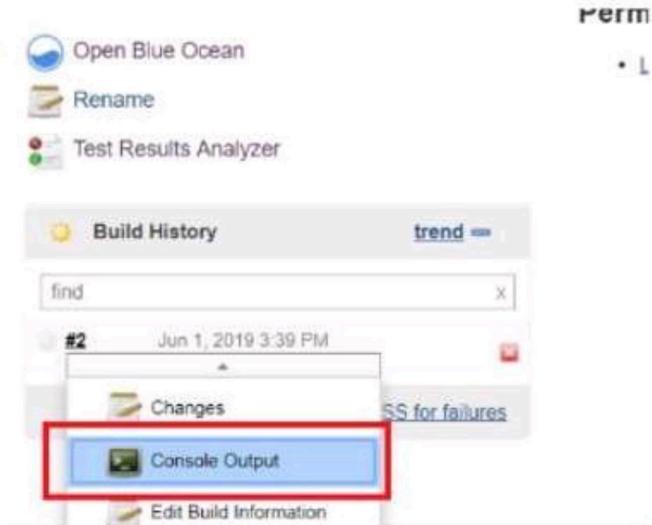
The screenshot shows the 'Build with Parameters' screen again. The 'TestSuite' dropdown menu is open, showing 'testng.xml' selected, along with other options like 'Select a TestSuit xml'. The rest of the interface is consistent with the previous screenshots.



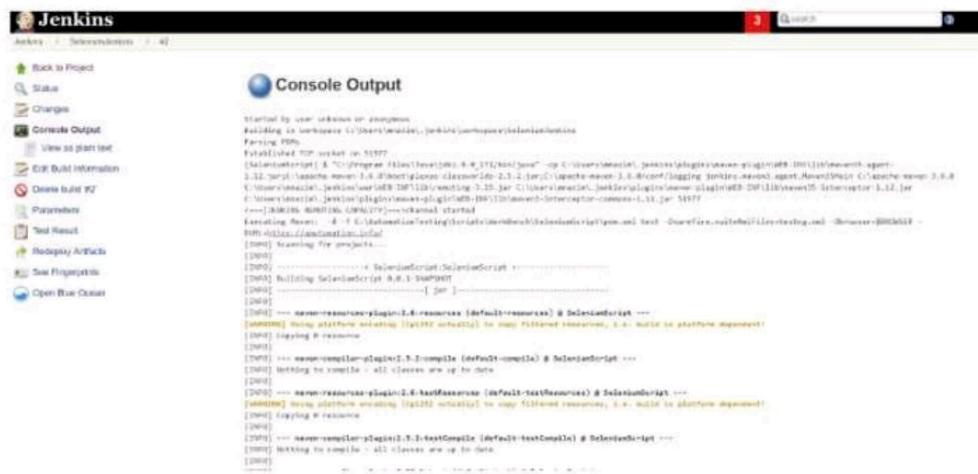
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-
10. Click the build button and go to console output .



11. See the logs from **Console Output** window.



State : Blue color of build of console output is that build is successful

12. View the html report just click on the link.



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Jenkins

Jenkins > SeleniumJenkins

- Back to Dashboard
- Status
- Changes
- Workspace
- Build with Parameters
- Delete Maven project
- Configure
- Modules
- HTML Report**
- Open Blue Ocean
- Rename
- Test Results Analyzer

Maven project SeleniumJenkins

HTML Report

Workspace

Recent Changes

Latest Test Result (no failures)

Latest Test Result (no failures)

Build History

trend =

Last build (#2) 3 min 43 sec ago

Test results

All suites: qautomation.TestScript

Suite: C:\AutomationTesting\Scripts\WorkBench\SeleniumScript\testng.xml

```
class=qautomation.TestScript
    class=qaautomation.TestScript
        class=qaautomation.TestScript
            class=qaautomation.TestScript
                class=qaautomation.TestScript
                    class=qaautomation.TestScript
                        class=qaautomation.TestScript
                            class=qaautomation.TestScript
                                class=qaautomation.TestScript
                                    class=qaautomation.TestScript
                                        class=qaautomation.TestScript
                                            class=qaautomation.TestScript
                                                class=qaautomation.TestScript
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                                                                                            class=qaautomation.TestScript
                                                                                                class=qaautomation.TestScript
                                                                                                    class=qaautomation.TestScript
                                                                                                        class=qaautomation.TestScript
................................................................
```

Tests For Suite

Groups For Suite

Times For Suite

Total running time: 10 seconds

Reporter output for Suite

Ignored methods

13. Click Test Analyzer to analyse the result.

Jenkins

Jenkins > SeleniumJenkins > Test Results Analyzer

- Back to Dashboard
- Status
- Changes
- Workspace
- Build with Parameters
- Delete Maven project

Options Download Test (CSV) Search Test/Class/Package

Chart	Package/Class/Testmethod	Passed	Transitions	2
<input checked="" type="radio"/>	qautomation	100% (100%)	0	PASSED
<input checked="" type="radio"/>	TestScript	100% (100%)	0	PASSED
<input checked="" type="radio"/>	TestApplication	100% (100%)	0	PASSED

Build details for all

Build Status

Passed: 100.0 %

Skipped: 0.0 %

Failed: 0.0 %

Build outcome: Build no: 2
• Passed: 1
• Failed: 0
• Skipped: 0

No of tests



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Conclusion:

Q1. Which browsers are supported by selenium webdriver?

Selenium WebDriver supports a wide range of browsers, making it a versatile tool for web application testing. The major browsers supported include Google Chrome, Mozilla Firefox, Internet Explorer, Safari, and Microsoft Edge. Selenium also provides support for Opera and various headless browsers like Headless Chrome and Headless Firefox, which are useful for test environments without a graphical user interface. To interact with these browsers, Selenium uses browser-specific drivers, such as ChromeDriver for Chrome, GeckoDriver for Firefox, and others. Each driver acts as a bridge between the Selenium WebDriver and the browser, enabling automation and control of browser activities within the scope of testing scenarios.

Q2. What are some features of selenium 4?

Selenium 4, the latest major release of the popular web automation framework, introduces several significant enhancements and new features. It includes an updated WebDriver interface which now fully conforms to the W3C WebDriver standard, improving compatibility and consistency across different browser drivers. Selenium 4 also introduces improved support for modern web technologies through enhanced interactions with the browser's DevTools, enabling features like network interception and more detailed emulation capabilities. The revamped Selenium Grid offers easier setup and more robust scalability for distributed testing, including better support for Docker containers. Additionally, Selenium 4 improves debugging and observability with more comprehensive logging and screenshot capabilities. The inclusion of relative locators (also known as friendly locators) allows for more intuitive element selection based on spatial relationships, enhancing the ease of test script development.