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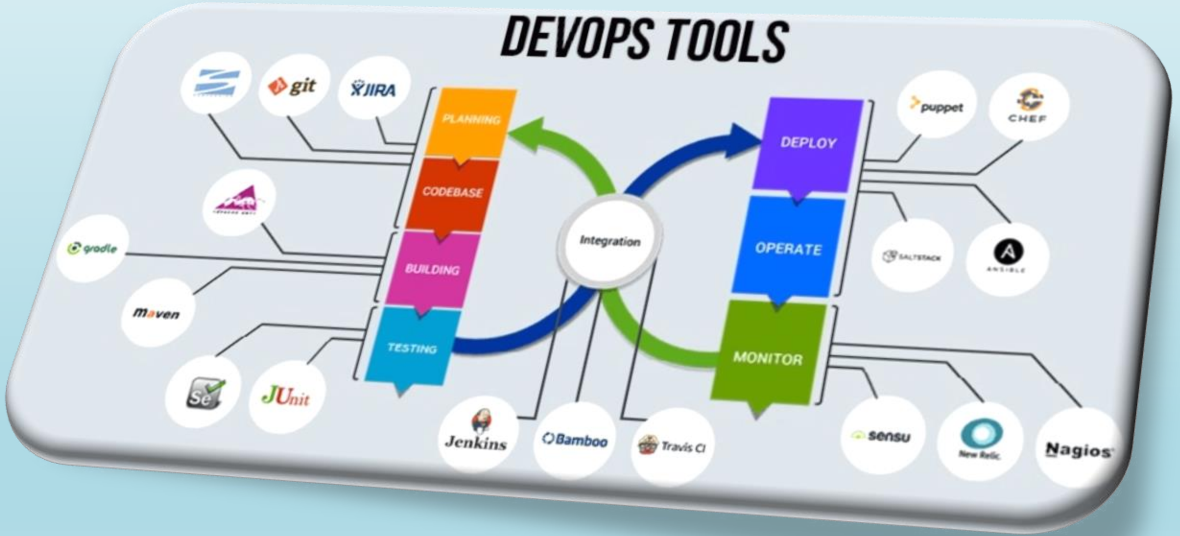
Continuous Testing [Selenium]



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Agenda

- INTRODUCTION TO SOFTWARE TESTING
- INTRODUCTION TO SELENIUM
- WHAT IS MAVEN?
- CREATING AUTOMATED TESTS
- INTRODUCTION TO TESTNG
- INTRODUCTION TO CONTINUOUS TESTING

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Introduction to Software Testing

Introduction to Software Testing

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Software testing is defined as an activity to check whether the actual results match with the expected results and to ensure that the software system is defect free.

Types of Software Testing

Types of Software Testing

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Automated Testing	Manual Testing
Test cases are executed automatically	Tests cases are executed manually
More accurate	Less accurate
More suitable when test cases are run repeatedly	More suitable when test cases are supposed to run only once or twice
Suitable for scenarios when testing is functionality based	More suitable when testing is for user experience

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Introduction to Continuous Testing

Introduction to Continuous Testing

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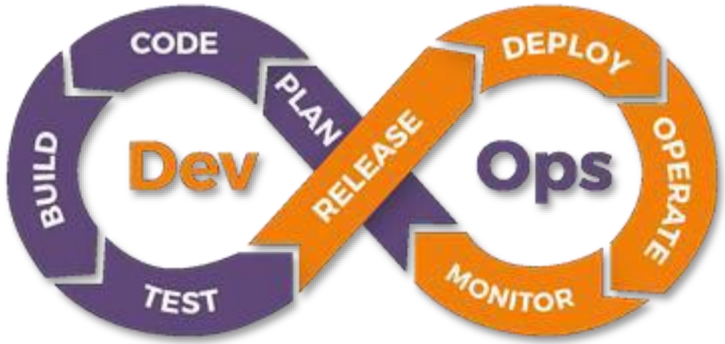
Continuous Testing is the process of executing **automated tests** as part of the software delivery pipeline in order to obtain feedback on the business risks associated with a software release candidate as rapidly as possible.



Introduction to Continuous Testing

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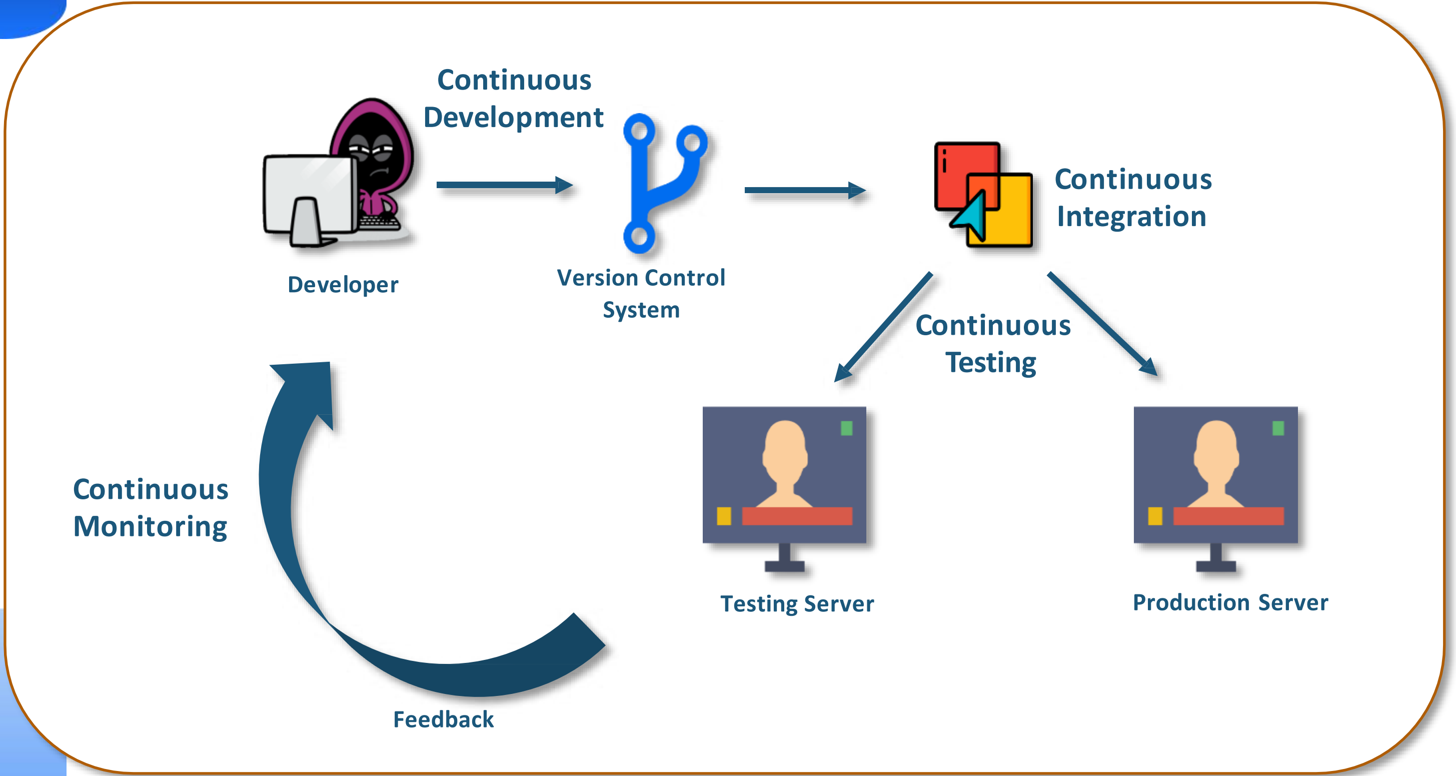

Software Delivery Pipeline

Introduction to Continuous Testing

Products are built with their respective test suites while the features are being developed.

Production Server

Testing Server

Product Features

Feature A

Test Suite

Test suite for Feature A

Introduction to Continuous Testing

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Products are built with their respective test suites while the features are being developed.

Production Server

Testing Server

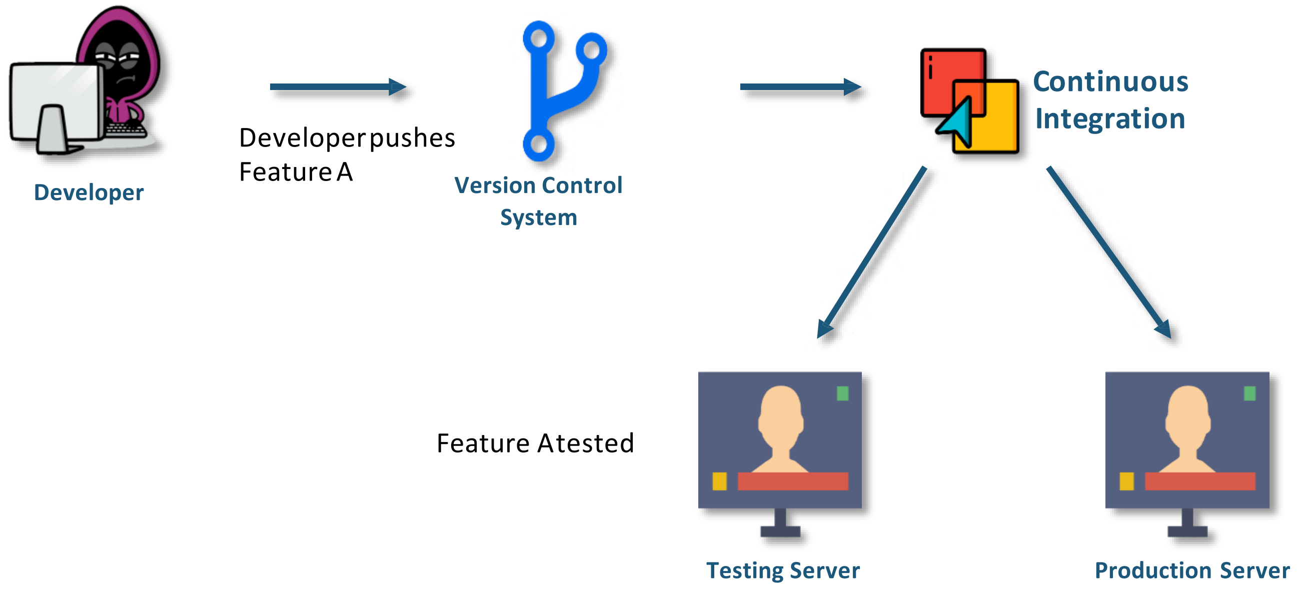
Product Features

Feature A
Feature B

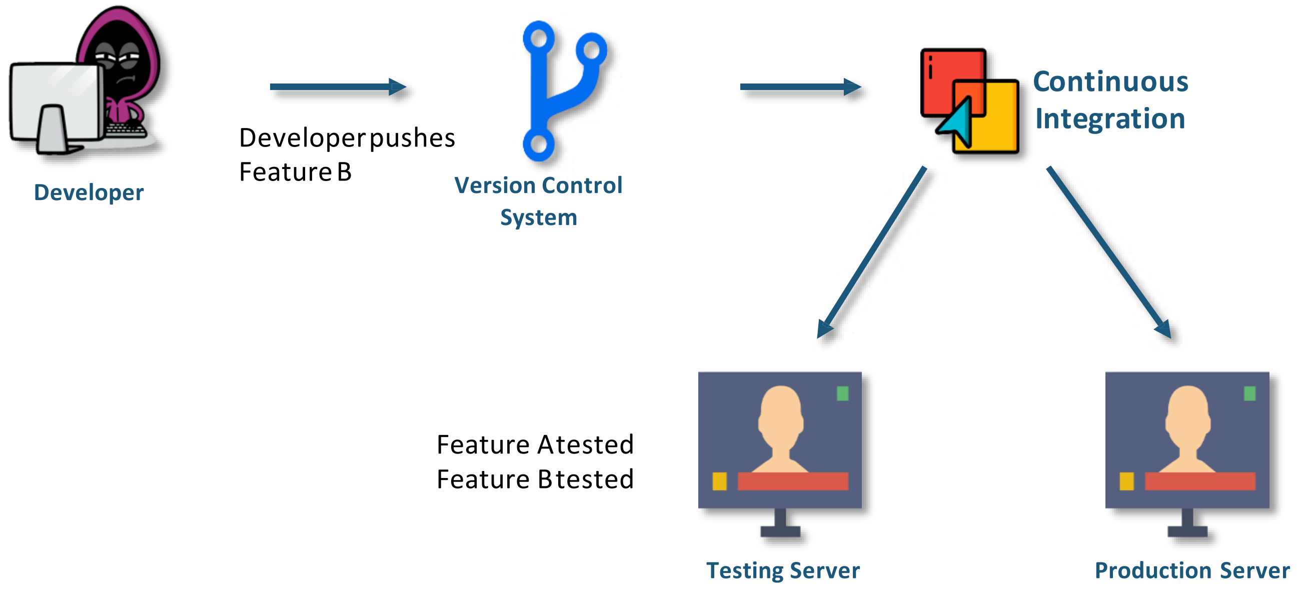
Test Suite

Test suite for Feature A
Test suite for Feature B

Introduction to Continuous Testing



Introduction to Continuous Testing



Automated Testing Tools

Types of Testing

Selenium

Appium

Cucumber

Test Studio

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Introduction to Selenium

What is Selenium?

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Selenium is a portable framework for testing web applications. Selenium provides a playback tool for authoring functional tests without the need to learn a new test scripting language.

What is Selenium?

- Selenium was first created by **Jason Huggins** in **2004**.
- He was working on a web application which had to be frequently tested.
- Since manual testing was taking a lot of time, he wrote a JavaScript program.
- This program could automatically control the browser's actions.
- He named it as ***JavaScriptTestRunner*** and donated it to the open-source community.
- It was later named as **Selenium Core**.

Components of Selenium

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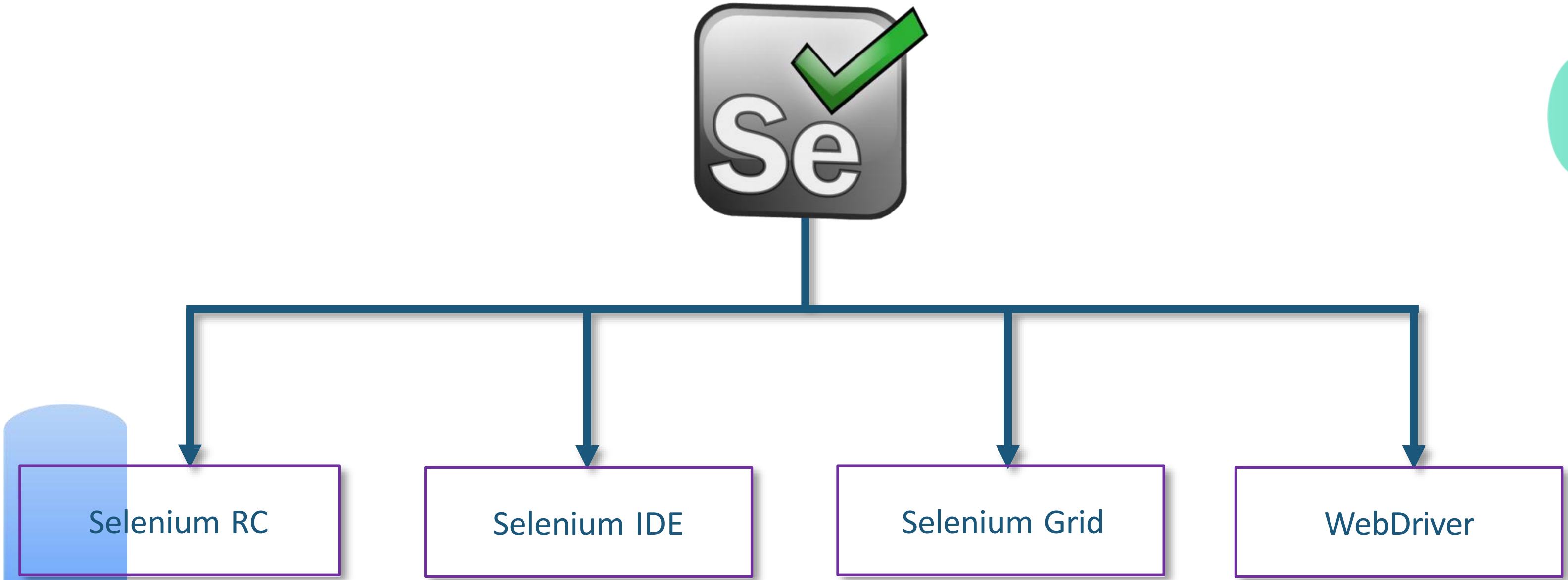
But only the Selenium Core could not suffice all the use cases of testing. Hence, a suite of Selenium components was developed for different purposes.



Components of Selenium

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Selenium RC

Selenium IDE

Selenium Grid

WebDriver

- Due to same origin policy, testers had to install Selenium Core and the web server on their local system.
- This was done to keep the domain same for the Selenium Core and the web application to be tested.
- Selenium RC(Remote Control) is a web server, which acts as an HTTP proxy.
- It tricks the OS into believing both Selenium Core and the website to be tested are on the same domain.
- This system was also known as Selenium 1.

Components of Selenium

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- Selenium RC
- **Selenium IDE**
- Selenium Grid
- WebDriver

- Selenium IDE was originally created as a Firefox extension.
- It could automate tests using the record and playback feature.
- The intention behind creating this component was to increase the speed of creating test cases in Selenium.
- It was created by Shinya Kasatani from Japan.

Components of Selenium

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- Selenium RC
- Selenium IDE
- **Selenium Grid**
- WebDriver

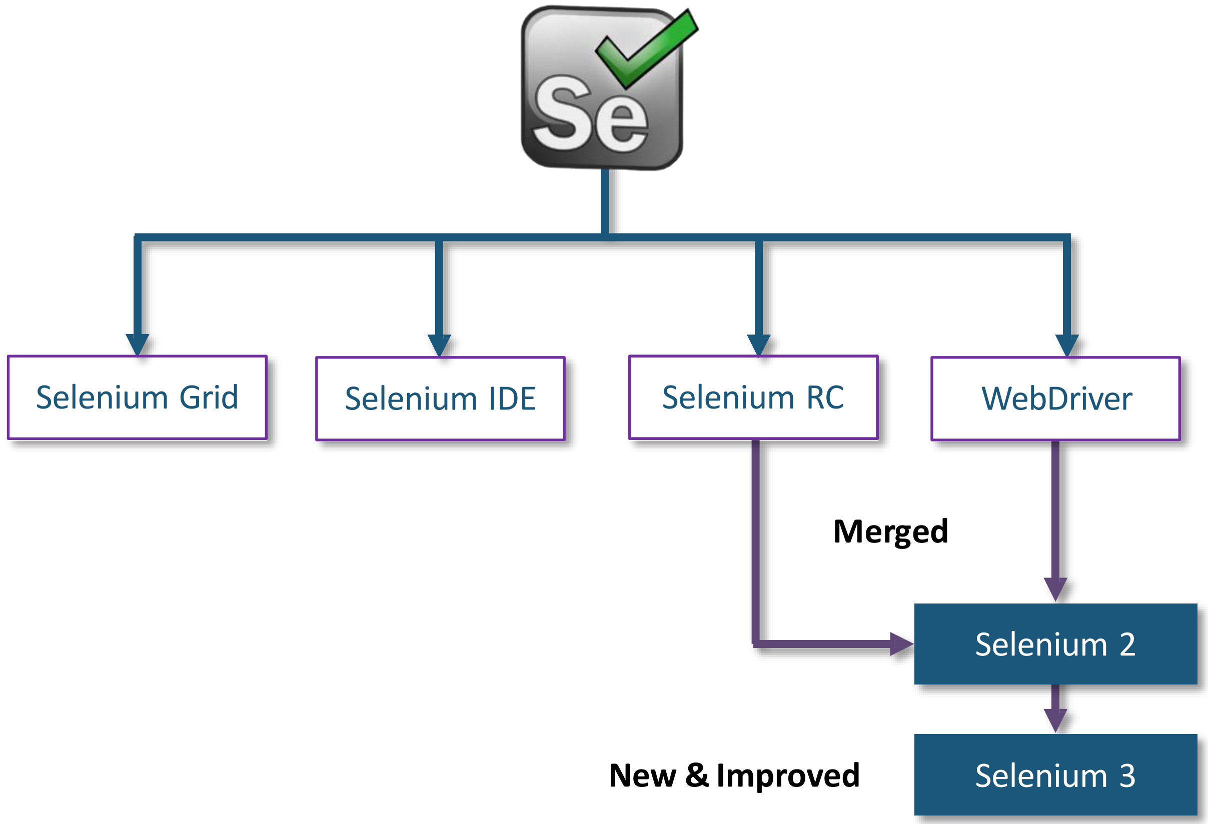
- Selenium Grid enables parallel testing of applications on multiple machines.
- It was primarily created to minimize the time taken in executing test cases.
- It can be used across multiple browsers and OS.
- It can also be used to break down a huge test suite among many computers testing the same application.

Components of Selenium

- Selenium RC
- Selenium IDE
- Selenium Grid
- **WebDriver**

- Selenium WebDriver was the first cross-platform testing framework that could control the browser from the OS level.
- It was developed in 2006, when web applications and browsers were becoming more powerful and restrictive with JavaScript programs like Selenium Core.
- It was better than Selenium IDE and RC.
- It controls the browser by directly communicating with it.

History of Selenium



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What is Maven?

What is Maven?

Maven is a build automation tool used primarily for Java projects. Maven addresses two aspects of building software: first, it describes how a software is built and, second, it describes its dependencies.

Maven™

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Why do we need Maven?

- Maven is used to download dependencies for a software program.
- Dependencies to be downloaded are included inside a POM file.
- Once the dependencies are added in the POM file, simply save the project and all the dependencies will automatically be downloaded.

Maven™

Hands-on: Setting up Selenium with Maven

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Setting up Selenium with Maven

- Install Java
- Download and Install Eclipse for Developers
- Create a Maven Project
- Acquire Maven Dependencies for Selenium

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Creating Automated Tests

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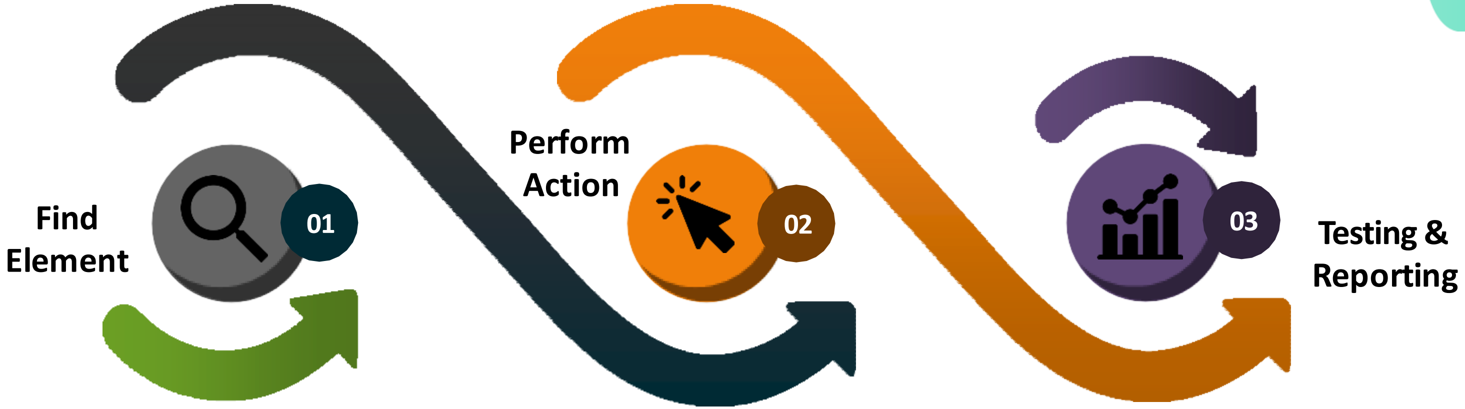
Creating Automated Tests

There are three steps to executing a web test:

- Find the element on the web browser
- Perform an action on the found element(s)
- Test and create a test report with the results



Finding Elements in Selenium

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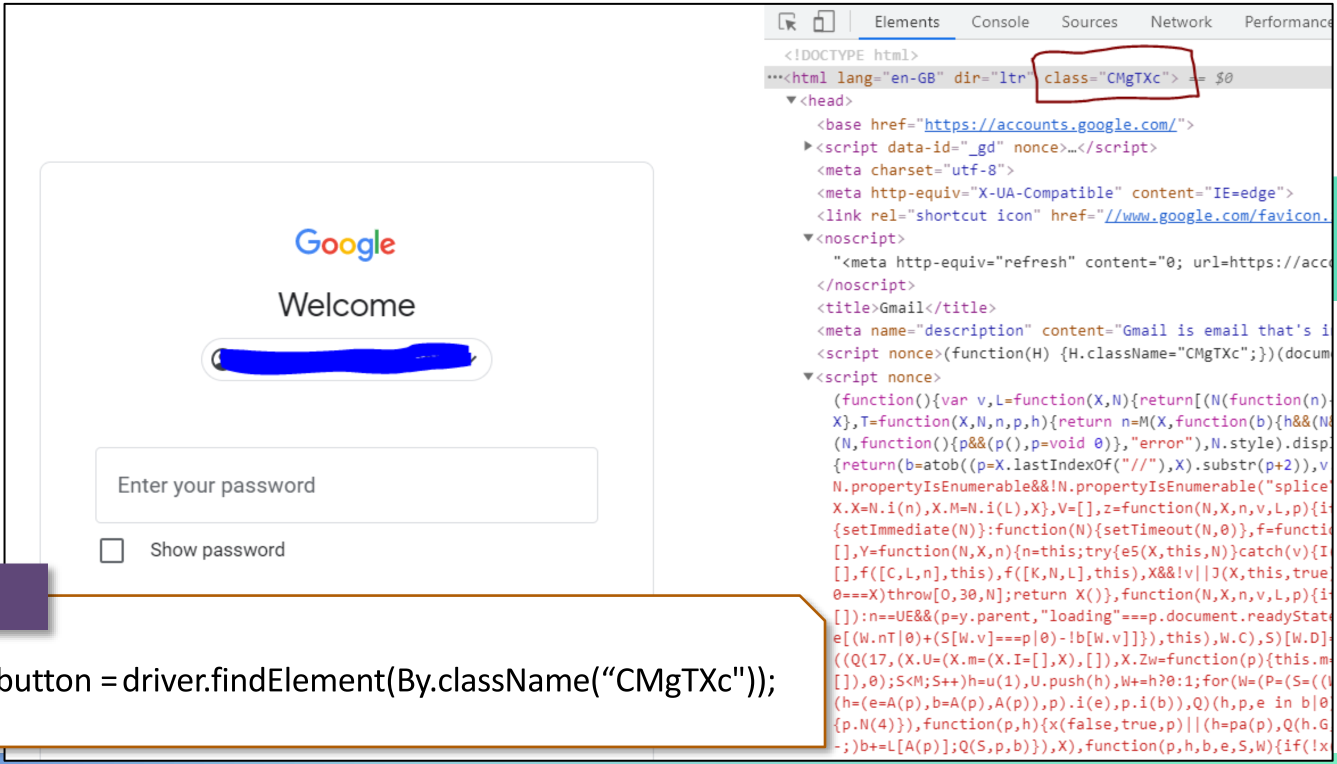
An element can be found on a web page using the followingselectors:

- ID
- Name
- Class Name
- Tag Name
- Link Text
- Partial Link Text
- XPATH



[redacted]

Enter your password

```
<!DOCTYPE html>
···<html lang="en-GB" dir="ltr" class="CMgTXc"> == $0
 ▼<head>
    <base href="https://accounts.google.com/">
  ▶<script data-id="_gd" nonce>…</script>
    <meta charset="utf-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <link rel="shortcut icon" href="//www.google.com/favicon.
  ▼<noscript>
     "<meta http-equiv="refresh" content="0; url=https://acc
    </noscript>
    <title>Gmail</title>
    <meta name="description" content="Gmail is email that's i
    <script nonce>(function(H) {H.className="CMgTXc";})(docum
  ▼<script nonce>
     (function(){var v,L=function(X,N){return[(N(function(n)
     X},T=function(X,N,n,p,h){return n=M(X,function(b){h&&(N
     (N,function(){p&&(p(),p=void 0)},"error"),N.style).disp
     {return(b=atob((p=X.lastIndexOf("//"),X).substr(p+2)),v
     N.propertyIsEnumerable&&!N.propertyIsEnumerable("splice
     X.X=N.i(n),X.M=N.i(L),X},V=[],z=function(N,X,n,v,L,p){i
     {setImmediate(N)}:function(N){setTimeout(N,0)},f=functi
     [],Y=function(N,X,n){n=this;try{e5(X,this,N)}catch(v){I
     [],f([C,L,n],this),f([K,N,L],this),X&&!v||J(X,this,true
     0===X)throw[O,30,N];return X()},function(N,X,n,v,L,p){i
     []):n==UE&&(p=y.parent,"loading"===p.document.readyStat
     e[(W.nT|0)+(S[W.v]===p|0)-!b[W.v]]}),this),W.C),S)[W.D]
     ((Q(17,(X.U=(X.m=(X.I=[],X),[]),X.Zw=function(p){this.m
     []),0);S<M;S++)h=u(1),U.push(h),W+=h?0:1;for(W=(P=(S=((
     (h=(e=A(p),b=A(p),A(p)),p).i(e),p.i(b)),Q)(h,p,e in b|0
     {p.N(4)}),function(p,h){x(false,true,p)||(h=pa(p),Q(h.G
     -;)b+=L[A(p)];Q(S,p,b)}),X),function(p,h,b,e,S,W){if(!x
```

Syntax

WebElement button = driver.findElement(By.className("CMgTXc"));

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Performing Action on Elements

The next step is taking an action. For that, one can try the following options:

- **Click()**: Used to click on the link and wait for page load to complete before proceeding to the next command
- **sendKeys()**: Used to enter values onto text boxes
- **Clear()**: Used to clear text boxes of its current value
- **Submit()**: WebDriver will automatically trigger the submit function of the form where that element belongs to

Syntax

```
WebElement button = driver.findElement(By.className(“CwaK9")).click();
```

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Testing & Reporting in Selenium Using TestNG

What is TestNG?

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TestNG is an open-source automated testing framework, where **NG** means ”**N**ext **G**eneration”. It is a testing framework inspired from JUnit and NUnit, but introducing some new functionalities makes it more powerful and easier to use.

TestNG

Features of TestNG

- TestNG annotations are easy to create test cases.
- Test cases can be grouped and prioritized more easily.
- It supports parameterization.
- It supports data-driven testing using DataProviders.
- It generates HTML reports.
- Parallel test execution is possible.
- It readily supports integration with other tools and plug-ins like Eclipse IDE, build tools Ant, Maven etc.

Hands-on:
Setting up TestNG

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Annotations in TestNG

Annotations in TestNG

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Annotations in TestNG are used to decide the flow of the program. There are a lot of annotations in TestNG, we will focus on the most used ones and following are thesame:

- **@BeforeMethod:** This will be executed before every @test annotated method.
- **@AfterMethod:** This will be executed after every @test annotated method.
- **@BeforeClass:** This will be executed before first @Test method execution. It will be executed one only time throughout the test case.
- **@AfterClass:** This will be executed after all test methods in the current class have been run
- **@BeforeTest:** This will be executed before the first @Test annotated method. It can be executed multiple times before the test case.
- **@AfterTest:** A method with this annotation will be executed when all @Test annotated methods complete the execution of those classes inside the <test> tag in the TestNG.xml file.
- **@BeforeSuite:** It will run only once, before all tests in the suite are executed.
- **@AfterSuite:** A method with this annotation will run once after the execution of all tests in the suite is complete.
- **@BeforeGroups:** This method will run before the first test run of that specific group.
- **@AfterGroups:** This method will run after all test methods of that group complete their execution.

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Hands-on: Working with Annotations in TestNG

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Headless Test in Selenium

A headless browser is a term used to define browser simulation programs that do not have a GUI. These programs execute like any other browser but do not display any UI. In headless browsers, when Selenium tests run, they execute in the background. Almost all modern browsers provide the capabilities to run them in a headless mode.

- **Useful in CI pipeline:**
  When we need to execute automated test cases remotely on a server or in any of the build and release pipelines for continuous integration servers like Jenkins, it is not always possible to install real browsers on such remote machines. We can use headless browsers to run automation tests efficiently.

- **Beneficial in web scraping:**
  When you want to write a web scraper or data extractor that needs to visit some websites and collect data, headless browsers are a perfect choice. Because we are not concerned about functionality in these cases, we visit web pages and get the data.

Headless Test in Selenium

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- **Support for multiple browser versions:**
  Sometimes, the tester would like to simulate multiple browser versions on the same machine. In that case, you would want to use a headless browser because most of them support the simulation of different versions of browsers.

- **Faster automation test execution:**
  The performance with a headless browser is better compared to real browser automation. The real browsers like Google Chrome, Firefox, and Internet Explorer take a significant amount of time to load CSS, JavaScript, Images, and open and render HTML. Headless browsers do not require all this to load and will start performing functions without waiting for a page to load completely. When we need to run the regression scripts, in headless browsers, we could save time as there are much faster and can render results quickly.

- **Multi-Tasking:**
  Headless browsers can help you, multi-task. You can use your browser or your machine to do anything else while the tests run in the background. Save hours that we otherwise spend staring at the screen.

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Hands-on: Running a Headless Test in Selenium

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Hands-on: Creating Automated Test with TestNG

Hands-on: Creating Our First Test Case

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- Open the IBM website, by visiting https://www.ibm.com
- Enter “Devops” term and click search
- On the search page, check for “DevOps – IBM Developer – IBM Developer” items in the list. If it exists, click on it
- On the course page, verify if in the page “DevOps – IBM Developer – IBM Developer” is present as the header
- In that last search result page we will check if the Item Title matches to our Desired Event Title or not, if matches display one message and display the Upcoming events for that item.

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