**TestNG----To Decentralize the application**

In Selenium using Java there are two Testing frameworks available,  
  
i) JUnit  
  
ii) TestNG

Java - JUnit, TestNG

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**TestNG** is a Testing Framework designed to simplify, a broad range of Testing needs from Unit Testing to System Testing.

 Initially developed for Unit Testing, now used for all kinds of Testing

TestNG maily for system testing(testing on integrated systems)

> TestNG is an open source test automation framework, where NG stands for Next Generation  
  
> TestNG inspired from JUNit but introduced some new functionality.

TestNG is more powerful than JUnit framework.

Using TestNG we can create Test cases, execute Test cases and generate reports using HTML format.

i) It generates HTML test reports  
  
ii) TestNG Annotations are easy to create Test cases.  
  
iii) Test cases can be grouped and prioritized more easily.  
  
iv) Parallel Testing is possible  
  
v) Parameterization is possible.

Execute multiple programs / classes using XML.

1)**TestNG Class**

TestNG Class is same as Java class but here noo need of main()-method

In TestNG each testcase is a method

TestNG identifies the Testcases as a method if u mention **@Test()**//Annotation before the method()

TestNG Annotations are easy to create Test Cases

*Prioritize Test Cases:*  
  
Using priority Attribute we can control the Test Execution  
Or  
Using DependsOnMethods Attribute we can control the Test Execution

2) Test cases can be grouped and **prioritized** more easily.

Using priority Attribute we can control the Test Execution

TestNG will not execute testcases in the order which v give

It executes in wt ever order it wants (DEFAULT ORDER---Alphabetical Order)

So,to get in a specified order use

**Property/Attribute---- Priority(arrays 0,1,2,3-----)**

@Test (priority = number)

**@Test(priority=0,1,2,3----)**

Create multiple Test Cases in a program / Class and Run  
  
If we use priority Attribute, then program will Run as priority (Small

Number to Big Number)

We can give any number for priority, but it will execute from Small Number to Big Number.

If u give same priority num to different testcase thn frm thm it will execute in Alphabetical Order

If u give priority to sme testcases nd one without priority thn 1st it ill execute priority once nd nxt without priority in Alphabetical Order

3)Using DependsOnMethods Attribute we can control the Test Execution

**Property/Attribute -------** dependency-----Hard **dependency**

@Test (DependsOnmethods = "BeforeMethod")

If BeforeMethod is executed successfully thn only the dependent method will execute

If BeforeMethod is Failed thn the dependent method will not execute, it will SKIP

if you want to execute the test case forcibly then use **alwaysRun** attribute.  
  
  
Scenario 1: If No functionality dependency among Test Cases in a TestNG program  - Use "priority" Attribute.  
Scenario 2: If functionality dependency among Test Cases in a TestNG program - Use "DependsOnMethods" Attribute

**alwaysRun---soft dependency**

Scenario 3: Functionality Dependency for Some Test Cases only in a TestNG program "DependsOnMethods" and "alwaysRun" Attributes.

If u mention **alwaysRun=true** thn even the method fails the dependent method will execute

@Test (dependsOnMethods = "verifygoogleTitle", alwaysRun=true)  
public void closeBrowser(){  
driver.close();

**Enable Property/Attribute**

In the real time in a program we will have many testcases nd v dnt executes all the testcases all the time so,

We can ignore the testcases--- it will not go for execution

Use enabled = false (by default it will be true so make it false)

@Test(priority=number; enabled=false)

**ASSERT//junit**

Assert.assertEquals("Google", driver.getTitle());

1

**TestNG HTML Reports/Outputs**

Generate HTML Reports.(by default it will b in html

Console Reports-PASSED, no of test run,test cases, Failed ,Skips

Detail Report(emailable\_report.html)

Summary Report (index.html))

Project-🡪refresh--🡪test\_output Folder-🡪 emailable\_report.html and index.html

Or

Project-🡪properties🡪resource🡪copy Location-🡪past in RUN-🡪 test\_output Folder-🡪 emailable\_report.html and index.html

Test execution flow

launchBrowser pre-condition for every testcase

closeBrowser post-condition for every testcase

verify pageTitle1

verify pageTitle2

class ClassName

{

WebDriver driver // declare here only

@Annotations//

Method1()//

{

launchBrowser //samecode in every method/testcase

verify pageTitle1

closeBrowser //samecode in every method

}

@Annotations//

Method2()//

{

launchBrowser //samecode in every method

verify pageTitle2

closeBrowser //samecode in every method

}

TestNGAnnotations:  
  
@Test: The annotated method is part of a Test case  
  
@BeforeMethod: The annotated method will be run before each Test method

pre-condition for every testcase in a class or program

@ BeforeMethod

Method()

{

-----

------ //these lines of code will be executed before every method/testcase start

-------}  
@AfterMethod: The annotated method will be run after each Test Method

post-condition for every testcase in a class or program

@AfterMethod

Method()

{

-----

------ //these lines of code will be executed after every method/testcase operation is done

-------}  
  
  
@BeforeClass: The annotated method will be run the first Test method in the current class is invoked.

pre-condition for all(only once it will execute) testcase in a class or program

@AfterClass: The annotated method will be run after all the Test Methods in the current class have been run.

post-condition for all(only once it will execute) testcase in a class or program

whn u have multiple testcalsses for al of thm only once wil b executed  
  
@BeforeTest: The annotated method will be run before any Test Method beloging to classes inside the tag is run  
@AfterTest: The annotated method will be run after all the Test Methods beloging to classes inside the tag.

Executing 1 TestNG class

Program🡪run as🡪TestNG Test

**XML**

**Executing multiple Programs / Classes using XML**

**https://www.mkyong.com/unittest/testng-tutorial-6-parameterized-test/**

XML for executing multiple Programs / Classes,  
  
<suite name = "Suite Name">  
<test name = "Test Name">  
<classes> // wt ever order of classes ul give here thy will execute according to that  
<class name = "package.Class1Name"/>  
<class name = "package.Class2Name"/>  
</classes>

</test>

</suite>   
--------------------------------------------------  
Navigation to create XML file in Eclipse / TestNG,  
In Eclipse IDE,  
Select Java project / package > Right Click > New > Others...  
> Enter "TestNG" > Select "TestNG Class"  
> Enter source and package names  
> Enter XML File name > Finish

Or

For existing TestNG classes

Package🡪TestNG-🡪convert to TestNG

**XML file**

Program🡪TestNG forder🡪xml.file

Executing/running

Here ul have a TestNG forder🡪TestNG Suite

Or

Xml page🡪run

**Executing multiple Programs / Classes using XML On multiple Browsers**

Parameterization--- only to capture the xml file parameter values in TestClass

<suite name = "Suite Name">  
<test name = "Test Name">

<parameter name="browser" value="Chrome"/>   
<classes> // wt ever order of classes ul give here thy will execute according to that  
<class name = "package.Class1Name"/>  
<class name = "package.Class2Name"/>  
</classes>  
</test> <!-- Test -->

<test name=" Test Name 2">

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

<classes>

<class name = "package.Class1Name"/>  
 <class name = "package.Class2Name"/>

</classes>

</test>

</suite>

We need to capture the xml parameter values in the testNG class

Thn v need to use @Parameters(“parameter name”) before the method which u want

@Parameters("browser") //parameter name should be same as xml file

public void start(String browser) // same no.of parameters u need to pass in the method but u can give different name here

{

if(browser.equals("Chrome"))

{

@Optional()//Annotation

Its should b given in the method(@Optional("VALUE"))

If u mention Optional-VALUE will b taken as default value if the @Parameter value is not given in the XML file

XML <parameter name=" " value=" "/>

Test Class @Parameters("Value")

Method(@Optional("Value") Pass same no.of Parameters-return types,values)

{

}

Inheritance(extends-keyword)

If we have same lines of code with same purpose in all of the testclasses in testsuite thn create other inheritance class with that lines nd inherit thm in other classes

And we dont include this class in XML

**Grouping Test Cases**  
  
**Test Execution Levels in Manual Testing,**  
 Smoke Testing / BVT / BAT...  
 Comprehensive Testing  
 Sanity Testing / BVT /BAT...  
 General Regression Testing Cycle1, 2, 3...  
 Final Regression Testing  
--------------------------------------  
XML File for grouping Classes,  
  
<suite name ="Suite Name">  
< test name = "Test Name">  
<groups>  
<run>  
<include name = "group name"/>

<include name = "group name"/>  
<include name = "group name"/>  
  
</run>  
  
<classes>  
<class name = "package.ClassName"/>   
<classes/>   
</groups>  
---------------------------------------------------------------  
Tags in 1st File  
  
suite,  
test,  
classes,  
class  
  
Tags in 2nd File  
  
suite,  
test,  
groups,  
run,  
include,  
classes,  
class

Here vl group different testcases of different class and execute thm al together

Same test case can b in different groups

XML

groups,  
run,  
include, //al groups  
classes,  
class // u should give only those classes of which groups(testcases) u want to run

CLASS // in @Test u should mention

@Test(priority=4,groups="Regression")

@Test(priority=0,groups="Smoke",dataProvider="getLoginData")

@Test(priority=1,groups="Smoke")

@Test(priority=2,groups="Smoke")

if thr is any common code for the classes thr also u should mention the group names

@BeforeMethod(groups={"Smoke","Regression"})

@AfterMethod(groups={"Smoke","Regression"})

**VI) Parallel Test Execution**

Parallel test execution using TestNG (using single machine/computer)  
  
1) Parallel Test Execution (Methods)

**XML File**  
  
<suite name="Suite" parallel="methods" thread-count ="3">

  <test name="Test">  
    <classes>  
      <class name="abcd.NewTest5"/>  
    </classes>  
  </test> <!-- Test -->  
</suite> <!-- Suite -->

parallel="methods" // parallelexecutes the methods in the class

thread-count ="3" //no of methods in the class

A Thread is a concurrent unit of execution.

**Class File**  
  
public class NewTest5 {  
@Test  
public void testCase1(){  
long id = Thread.currentThread().getId();  
System.out.println("Test Case 1 is Successful - Thread id is: "+ id);        
}  
@Test  
public void testCase2(){  
long id = Thread.currentThread().getId();  
System.out.println("Test Case 2 is Successful - Thread id is: "+ id);        
}  
@Test  
public void testCase3(){  
long id = Thread.currentThread().getId();  
System.out.println("Test Case 3 is Successful - Thread id is: "+ id);        
}  
}

Thread.currentThread() //inside the method

 Parallel Test Execution (Classes)  
  
**XML File**  
  
<suite name="Suite" parallel="classes" thread-count ="2"> //no of classes  
  <test name="Test">  
    <classes>  
      <class name="abcd.NewTest5"/>  
      <class name="abcd.NewTest6"/>  
      </classes>  
  </test> <!-- Test -->  
</suite> <!-- Suite -->

Parallel Test Execution// means the methods or class vl start executing at same time separately but thy ends according to thr operations

Soo to c thr sequence of ending use Thread.currentThread() //inside the method

long id = Thread.currentThread().getId();  
System.out.println("Test Case 1 is Successful - Thread id is: "+ id);

Thread Id // will give the sequence

If u execute only test class without xml(parallel) thn Thread Id will b same for al the methods

If u run with xml thn Thread Id will b different

**Parallel Test execution**  
  
  
Parallel test execution Using Selenium Grid (using multiple computers)  
----------------------------------------  
Take tests and execute using different browsers (IE, Firefox, and Chrome)  
---------------------------------------------  
Steps:  
  
Before Class - Launch Browsers (Firefox, Internet Explorer and Chrome)  
  
Execute Tests on all Browsers  
  
After Class - Close all browsers  
--------------------------------  
**Class File**--------------------------  
public class ParallelTests {  
    public WebDriver driver;  
      
    @Parameters("browser")  
    @BeforeClass  
          
    public void LunchBrowser(String browser) {  
  
    if(browser.equalsIgnoreCase("FF")) {  
    driver = new FirefoxDriver();  
    }  
  
    else if (browser.equalsIgnoreCase("IE")) {   
    System.setProperty("webdriver.ie.driver", "E:/IEDriverServer.exe");  
    driver = new InternetExplorerDriver();  
    }  
  
    else if (browser.equalsIgnoreCase("CH")) {  
    System.setProperty("webdriver.chrome.driver", "E:/chromedriver.exe");  
    driver = new ChromeDriver();  
    }   
    driver.get("http://www.google.com");   
    }  
    @Test   
    public void VerifyPageTitle() throws InterruptedException {  
    Assert.assertEquals(driver.getTitle(), "Google");  
    }   
    @AfterClass   
    public void CloseBrowsers() {  
    driver.quit();  
    }  
    }  
-------------------------------

**XML file**--------------------------  
<suite name="Suite" parallel="tests" thread-count ="3">  
  <test name="FireFoxTests">  
  <parameter name = "browser" value = "FF"/>  
     <classes>  
      <class name="seleniumTests.ParallelTests"/>  
    </classes>  
  </test>   
    
  <test name="IETests">  
  <parameter name = "browser" value = "CH"/>  
      <classes>  
      <class name="seleniumTests.ParallelTests"/>  
          </classes>  
  </test>  
    
  <test name="ChromeTests">  
  <parameter name = "browser" value = "IE"/>  
     <classes>  
     <class name="seleniumTests.ParallelTests"/>  
    </classes>  
  </test>  
</suite>

**SELENIUM GRID**

To execute the testscases parallel on different browsers of different systems

Where u write ur testcase(project) that system will b selenium Grig server/hub and ul have other client systems to execute the test cases parallel soo u need to create the nodes b/ thm

selenium Grig server/hub🡨-------------NODEs of( client systems)

server/hub and client systems should b in the same network thn only v can execute the testcases

NODE properties of a system

Operating system

Browser

**CONFIGURING SERVER nd CLIENT**

Download selenium grid s 3.4 jar file (grid nd selenium of project version should b same)

<https://github.com/SeleniumHQ/selenium/wiki/Grid2>

<http://selenium-release.storage.googleapis.com/index.html>

[selenium-server-standalone-3.4.0.jar](http://selenium-release.storage.googleapis.com/3.4/selenium-server-standalone-3.4.0.jar)

to run the jar file-----SERVER

java -jar selenium-server-standalone-<version>.jar -role hub //jar filename

java -jar selenium-server-standalone-3.4.0.jar -role hub // if u run dis in command prompt of a system that will bcm SERVER

D:

D:\> Cd Selenium\selenium grid **//LOCATION whr u STORED the FILE**

D:\Selenium\selenium grid

Selenium Grid up and running // wait upto dis

<https://github.com/SeleniumHQ/selenium/wiki/Grid2>

<http://localhost:4444/grid/console> // if u chick dis it will open the console of the GRID in browser shows the execution of clients connected to it

to run the jar file-----CLIENT //same jar file place in client also

client sysment—commandpromt

D:

D:\> Cd Selenium\selenium grid **//LOCATION whr u STORED the FILE**

D:\Selenium\selenium grid

NODE

java -jar selenium-server-standalone-<version>.jar -role node -hub <http://localhost:4444/grid/register>

java -jar selenium-server-standalone-3.4.0.jar -role node -hub http://SERVER IP ADDRESS:4444/grid/register

// SERVER IP ADDRESS--- u should give ur server ip address

// if u run dis in command prompt of a system that will bcm CLIENT NODE

Mention the node properties

java -jar selenium-server-standalone-3.4.0.jar -role node -browser browserName= ,platform= -hub http://SERVER IP ADDRESS:4444/grid/register

RUN THE TESTCASES

//ECLIPSE –programs

WebDriver driver = new RemoteWebDriver(new URL("http://localhost:4444/wd/hub"), capability);

public class BaseTest {

WebDriver driver;

@SuppressWarnings("static-access")

@BeforeMethod(groups={"Smoke","Regression"})

@Parameters("browser")

public void start(@Optional("Chrome") String browser) throws MalformedURLException

{

DesiredCapabilities obj= null;

if(browser.equals("Chrome"))

{

System.setProperty("webdriver.chrome.driver", "D:\\chromedriver\_win32\\chromedriver.exe");

obj.setBrowserName("chrome");

obj.setPlatform(Platform.WIN10);

obj.chrome();

}

else{

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

obj.setBrowserName("firefox");

obj.setPlatform(Platform.LINUX);

obj.firefox();

}

driver = new RemoteWebDriver(new URL("http://localhost:4444/wd/hub"), obj); //Opens chrome browser

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

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

driver.manage().timeouts().implicitlyWait(10, TimeUnit.SECONDS);

}

@AfterMethod(groups={"Smoke","Regression"})

public void end()

{

driver.quit();

}

TestNG

TestNG Test case

TestNG Class, TestNG Annotaions , properties/attribute

TestNG Reports/Outputs

Create Multiple Test cases

**Execute multiple programs/Classes using XML file.**

**On different Browsers**

**Parallel Test execution**

**Methods, Classe, --- same machine**

**Selenium Grid(Tests—On multiple**

**computers )**

**Grouping Test Cases**

**Data driven testing using DataProvider Annotation**

**DataDriven Testing(multiple/Dynamic Data)**

**http://www.gcreddy.com/2016/03/data-driven-testing-in-selenium.html**

@DataProvider //Annotation before method

Object[][] getLoginData() //METHOD

getLoginData() //method to get data for the file or excel file

Object[][] // 2D-array return type of the method

It is just a method to store data soo will not execute dis

V need to mention dis dataprovider nd its name in the testcase whr dis dataprovider data is used i.e

@Test(priority=0,groups="Smoke",dataProvider="getLoginData")

V need to pass the parameters in the method ( 2D-array so 2parameters )

public void verifyLogin(String username, String password) //method(parameters)

//in this data is supplied in two ways

@DataProvider

Object[][] getLoginData()

Array---rows,columns

1)---manually vl give the array data

@DataProvider

public Object[][] getLoginData()

{

Object data[][]=new Object[Rows][Columns];

data[0][0] = “ “;

data[0][1] = “ “;

data[1][0] = “ “;

data[1][1] = “ “;

data[2][0] = “ “;

data[2][1] = “ “;

return data;

}

2)----directly accessing for excel sheet(workbook,getworkbook)

Array---rows,columns

Excel---- columns,rows

@DataProvider

public Object[][] getLoginData() throws BiffException, IOException

{

Workbook wb = Workbook.getWorkbook(new File("D:\\TestData\\Testdata.xls"));

Sheet sh = wb.getSheet("valid\_user\_data");

/////Array---rows,columns

Object data[][]=new Object[sh.getRows()-1][sh.getColumns()];

for(int i=1;i<sh.getRows();i++)

{

for(int j=0;j<sh.getColumns();j++)

{ //////////// Excel---- columns,rows

data[i-1][j] = sh.getCell(j, i).getContents();//

}

}

return data;

}

@BeforeMethod(groups={"Smoke","Regression"})

@AfterMethod(groups={"Smoke","Regression"})

BUT Here only one group at a time

@BeforeGroups(groups={"Smoke"})

@AfterGroups(groups={"Smoke"})

@BeforeGroups(groups={"Regression"})

@AfterGroups(groups={"Regression"})

<suite name ="Suite Name">  
< test name = "Test Name 1">  
<groups>  
<run>  
<include name = "group name"/>

<include name = "group name"/>  
<include name = "group name"/>  
  
</run>  
  
<classes>  
<class name = "package.ClassName1"/>

<class name = "package.ClassName2"/>   
<classes/>   
</groups>  
</test>

<test name=" Test Name 2">

<classes>

<class name = "package.ClassName1"/>  
 <class name = "package.ClassName2"/>

</classes>

</test>

</suite>